**National Speech & Debate Association**

*Policy Debate – 2014-2015 – Starter File – 1/4/15*

Resolved: The United States federal government should substantially increase its non-military exploration and/or development of the Earth’s oceans.

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# \*\*\*AUV NEGATVE – OFFCASE UPDATES\*\*\*

# 1NC – Technology Transfer DA (1/4)

**Chinese Dual-use theft in the squo has shrunk the tech gap – another wave of thefts will collapse US military lead and readiness – leads to prolif**

**IHS, 2014** [“The global implications of China’s military modernization”, Q2 – 2014, <http://www.ihs.com/tl/quarterly/features/chinas-military-modernization.aspx>, IHS Quarterly]

Proliferation and dual-use threats China’s military modernization has also generated intense concern, particularly in the United States, about the proliferation of advanced military and, significantly, dual-use technologies both to and from China. The importance of dual-use imports and the related difficulty in distinguishing between military and civilian activities in China’s state-owned enterprises was highlighted in the US Department of Defense’s 2013 Annual Report to Congress on China, which stated bluntly that: “China’s defense industry has benefited from integration with its expanding civilian economy … particularly sectors with access to foreign technology.” The report also noted that China’s opaque corporate structures, hidden asset ownership, and the connections of commercial personnel with the central government, serve to obfuscate the true nature of commercial activities in industries related to military modernization, enhancing access to militarily relevant technologies. The difficulty in controlling export of such items to China—despite the existence of export-control regimes—and the complexity of the geopolitical relations associated with these controls are highlighted by the late December 2013 resignation of Meir Shalit as the head of Israel’s Defense Export Control Agency following the accidental re-export of an Israeli-manufactured miniaturized cooling device to China. The item, which is used in electro-optic systems and in missiles, was originally part of a licensed export to a French company but had subsequently been retransferred to China. The US expressed its intense concern over the incident, fearing that the item would have been marked for transfer from China to Iran—China has a history of ballistic missile sales to Iran—to support the development of Iran’s ballistic missile program. While Israel has complied with US export-control requests since the early 2000s, the issue is becoming more delicate as Israel seeks to deepen trade relations with China, including establishing agreements to develop an alternative trade route between Israel and China that bypasses the geopolitically vulnerable Suez Canal. Israeli newspaper Haaretz reported in late December 2013 that Israeli defense and technology companies have started lobbying the prime minister’s office as well as the economic and foreign affairs ministries to increase exports of defense and dual-use items to China, including currently controlled items, in response to growing market and economic pressures affecting the Israeli defense industry. Even with export regulations in place, China has proven deft at acquiring advanced technology—including technologies undergirding US military modernization—to plug gaps, reinforce areas of relative strength, and better understand the platforms and systems that could be deployed against the PLA. Much is made of Chinese cyber and corporate espionage efforts but, during 2012 and 2013, China has complemented these efforts with a more transparent and direct approach to acquiring dual-use technologies, specifically through company acquisition. IHS tracked two completed acquisitions in 2012 and five in 2013 in which Chinese enterprises acquired US or European aerospace companies with varying degrees of exposure to defense activities, including Chongqing Helicopter’s purchase of Enstrom, a US manufacturer of commercial and military helicopters with sales to various Asian and Latin American militaries. Proliferation of dual-use and advanced military technologies to China is a risk in part because of the potentially accelerating effect such proliferation will have on China’s military modernization, but also because of concerns over the pace at which such technology will subsequently proliferate from China to key trading partners. China is not a member of critical arms and export-control regimes such as the Wassenaar Arrangement and Missile Technology Control Regime and, as a result, has a well-earned legacy as a powerful proliferator of advanced military technologies—primarily ballistic and anti-ship cruise missiles and, potentially, air defense systems—and critical dual-use items to states such as Iran, Syria, Pakistan, and even North Korea, enhancing these states’ military capability and technological base. For example, in November 2013, Pakistan launched its first two indigenous unmanned aerial vehicles—the Shahpar and Burraq. IHS described the Shahpar as “bearing more than a passing resemblance to the CASC CH-3”—China reportedly exported 20 CH-3s to Pakistan in 2010. Similarly, IHS reported in February 2014 that Pakistan was in negotiations to export the JF-17 Thunder fighter—co-developed with China—to long-time US defense partner Saudi Arabia, clearly demonstrating the cascading effects of Chinese proliferation as well as the potential knock-on export risks to Western, Russian, and emerging Asian defense industries. Such proliferation is rightly viewed as a significant risk to international security because it provides novel advanced capabilities to states that would not otherwise be able to acquire them. This is a risk that is frequently amplified because proliferation can occur in ways that actually increase the uncertainty about the capabilities specific actors possess and about their ability to use these capabilities. Such enhanced capability and uncertainty complicates the tasks of deterrence and dissuasion. US Air Force Chief of Staff General Mark Welsh summed up the risks created by Chinese proliferation in a November 2013 discussion with reporters. General Welsh noted that while the US did not expect to fight China directly, it did forecast fighting China’s modern military technologies: “It will be on the street, and we will be fighting it. Their new stuff will be better than our legacy stuff. That’s just the way it is.” China’s desire to modernize its military is a natural development for an increasingly confident and capable power seeking to enhance its security and influence in Asia and throughout the world. However, the scale and approach of modernization and nature of the capabilities being developed, combined with recent activities in the East and South China seas, have increased tensions and the risks of escalation, miscalculation, and even crisis in east Asia. While these layered and complex risks require the attention of foreign, security, and defense policymakers in affected states, China’s military modernization has already created critical issues and risks, particularly surrounding proliferation. These risks are driving uncertainty and competition related to the procurement of advanced military capabilities.

# 1NC – Technology Transfer DA (2/4)

**This process is critical to Chinese militarization**

**Lewis, 2014** [James A., Published January 30, 2014, “Factors influencing the advancement of China's military technology”, Testimony before the U.S.-China Economic and Security Review Commission, Center for Strategic and International Studies, Pg. 6-7, modified for ableist language]

Cyber espionage is best seen as the leading component of a larger economic espionage effort. Since the 1980s, technology transfer China’s decision to open its economy in the 1980s included instructions to make technology transfer to Chinese partners a part of every major business negotiation. In a discussion in June of last year in Beijing, a US official said that espionage for national security purposes was a legitimate activity for great powers like the U.S. and china, but that economic espionage was not, and should stop. A PLA officer responded that for China, economic growth and building China’s technological base were national security issues, and therefore justified. Other Asian countries have used similar policies to build industrial capacities, but they usually brought their policies into line with global IP protection norms within two or three decades. China shows no signs of doing this. China does not seem to be making this transition, for reasons of both domestic politics and international strategy. Technology transfer to China that expanded China’s productive capabilities would be in the West’s interest if China protected intellectual property protections and if important segment of China’s decision making elite, including in particular the PLA, were not so antagonistic. Espionage reinforces and accelerates the improvement of China’s manufacturing capabilities. But even without espionage, China would develop advanced manufacturing capabilities. Espionage may even [stunt] ~~retard~~ the development of indigenous capabilities to a degree, by discouraging IP creation. If China had not illicitly acquired technology, its national income would have probably recovered as quickly in the Post-Mao recovery, but it would not have made the strides towards technological parity with the west its leaders wanted for reasons of prestige and defense. The effect of illicit acquisitions has been to accelerate technological improvement and increase China’s international competitiveness. The argument that the U.S. engages in similar activities in the 19th century is simply a distortion of history. For defense industries, the combination of sustained investment and foreign technology inputs has significantly improved China’s arms production capabilities, moving it from building museum pieces to modern weaponry that in some categories is as good or almost as good as western arms. The sanctions on arms exports imposed after the Tiananmen massacre pose less of an obstacle to China’s defense industrial improvements very year. China continues to object to them and would be willing to buy Europeans weapons ((opening up the possibility of reverse engineering. European manufacturers know that China has become one of the largest arms importers in the world. But the most important reason that Tiananmen sanctions have less effect is that they do not stop the sale of advanced commercial technologies than can contribute to military production. Many countries have tried to build advanced arms and failed. It is not an easy task. But if a country is willing to spend billions of dollars for decades and is ruthless in acquiring technology, it can succeed. Of all the developing countries, China is the only one to show signs of succeeding. This is perhaps a legacy of the Party’s Leninist inheritance and the priority Lenin gave to defense production. But we need to recognize that as China’s economy modernizes, so will its defense industrial capabilities, with or without foreign assistance or Chinese espionage. China will not change its behavior until there are threats and penalties. Congress can create these. There are few rewards left to give, perhaps the only one is formal recognition of market economy status, which should not be granted until there has been significant progress in reducing economic espionage. Congressional action to compensate for China’s growing defense production capabilities could occur in four areas. • Congress could look for ways to make the U.S. a more business friendly environment. rationalizing the tax code, controlling non-discretionary spending, and streamlining regulatory burdens. • Congress could create incentives and penalties to encourage American companies to increase their network defenses. DOD has begun to do this using its contracting authorities. • Congress could provide sustained funding for the hard sciences, and for science and engineering education at the undergraduate and graduate level. It sometimes appears that Americans have forgotten the central role defense R&D played in American economic growth from 1950 to 1990. • Congress and the Administration need to take steps to reduce economic espionage. The argument that the Snowden leaks create parity between the US and China is ridiculous, like saying that U.S. spying on political and military targets in China justifies the PLA pillaging our industries. China will use Snowden leaks for political advantage, but since they already assumed we were spying on them the leaks had little effect on their actual policies or negotiating positions. The best strategy would be multilateral, with many countries giving Beijing the same message: this not responsible state behavior. U.S. policy is to encourage competition in global markets, and China as an economic competitor is a welcome addition to the global economy. Where our policies erred was in assuming that China would follow international practice in trade and that it would become a partner rather than a potential military opponent. Chinese leaders are ambivalent about their relation with the U.S. If we just had to deal with Chinese industry and economic policy-makers, the only real issue would be winning greater compliance with WTO commitments and ensuring fair conditions for competition, but they are not the drivers of Chinese policy and the PLA remains insular and deeply hostile. China can be independent, rich and powerful without being antagonistic, but this would require significant change in the Party’s thinking about international affairs. A renewed U.S. partnership with China remains possible, but will require energetic and assertive diplomacy. Yuan Shikia, the Qing General who overthrew the last Chinese emperor in 1912, said that the way to restore China’s prestige and power was to build “a wealthy nation and a strong army.” China’s current leaders could easily agree with this statement. China has been able to close the technology gap much more rapidly than expected. China is better able to make use of the technology it acquires licitly or illicitly. China’s own R&D capacity is improving as a result of sustained investment. Cyber espionage against technology and commercial targets continues unabated. And in the long term, China’s commercial growth will continue to drive improvement in manufacturing capabilities that will improve the defense industrial base.

# 1NC – Technology Transfer DA (3/4)

**This leads to US-Sino war --- makes escalation likely and more destructive**

**Johnson 2014** (Keith, Published May 16 2014 “Lord of the Sea”, <http://www.foreignpolicy.com/articles/2014/05/16/lord_of_the_sea>, Foreign Policy)

Chinese leaders increasingly speak of "territorial integrity" when talking about the South China Sea, which they pretty much claim in its entirety with the "nine-dashed-line," a vague map that seems to label most of that sea as Chinese territory. For years, Chinese scholars have pushed the notion of "blue territory," or offshore islets and surrounding waters that should be as much a physical part of China as what's behind the Great Wall. On Thursday, China's top general said as much at the Pentagon.¶ "I want to underscore, finally, that for the territory, which has passed down by our ancestors into the hands of our generation, we cannot afford to lose an inch," Gen. Fang Fenghui said of the disputes in the South China and East China seas. His U.S. counterpart, Gen. Martin Dempsey, the chairman of the Joint Chiefs of Staff, said the U.S. move to the Pacific is designed to protect freedom of navigation and trade.¶ Beijing's interest in trying to turn its near seas into Chinese territory is, at root, all about security. For centuries, leaders in Beijing worried mostly about securing their flanks on land from barbarians, Mongols, and the like. No real threat came from the sea until the British and other Europeans suddenly showed up in gunboats in the mid-1840s and opened a century of humiliation by seizing Chinese territory, grabbing trading privileges, and eventually carving up the ancient empire.¶ As Peter Dutton, the director of the China Maritime Studies Institute at the U.S. Naval War College, told Congress earlier this year, China is now seeking to secure its seaward flank by grabbing an offshore belt of territory. That explains, in large part, the aggressive moves to place oil rigs in Vietnamese waters, build military installations on islands off the Philippines, and establish air defense zones over islands run by Japan.¶ "The Chinese have long felt vulnerable from the sea, and their current maritime strategy seeks to reduce that vulnerability by extending a ring of maritime control around China's periphery," Dutton testified.¶ Chinese foreign ministry officials and scholars have since the beginning defended the placement of the oil rig on the grounds that it is close to an island that they say is an integral part of China, though Vietnam claims the islands, too. Similar arguments prevail in Beijing over the legality of building airstrips next to the Philippines or aggressively patrolling the Senkaku islands that are in dispute with Japan. Official Chinese media now uses the phrase "territorial integrity" to describe China's efforts to exert control over things that aren't really territory and which aren't, technically speaking, an integral part of China.¶ And that explains the mounting unease in Washington, which for decades has sent warships into waters claimed by friends and foes alike to assert the international right to freedom of navigation, which is the linchpin of America's ability to be a global superpower.¶ "What the Chinese are doing here is effectively going after a core, stated, U.S. national interest," said Gabriel Collins, a security analyst and an expert on Chinese maritime issues.

# 1NC – Technology Transfer DA (4/4)

**Extinction**

**Strait Times 2k** (Ching, Senior Writer at the Strait Times, “No one gains in a war over Taiwan,” June 25th, Lexis

THE high-intensity scenario postulates a cross-strait war escalating into a full-scale war between the US and China. If Washington were to conclude that splitting China would better serve its national interests, then a full-scale war becomes unavoidable. Conflict on such a scale would embroil other countries far and near and -horror of horrors -raise the possibility of a nuclear war. Beijing has already told the US and Japan privately that it considers any country providing bases and logistics support to any US forces attacking China as belligerent parties open to its retaliation. In the region, this means South Korea, Japan, the Philippines and, to a lesser extent, Singapore. . If China were to retaliate, east Asia will be set on fire. And the conflagration may not end there as opportunistic powers elsewhere may try to overturn the existing world order. With the US distracted, Russia may seek to redefine Europe's political landscape. The balance of power in the Middle East may be similarly upset by the likes of Iraq. In south Asia, hostilities between India and Pakistan, each armed with its own nuclear arsenal, could enter a new and dangerous phase Will a full-scale Sino-US war lead to a nuclear war? According to General Matthew Ridgeway, commander of the US Eighth Army which fought against the Chinese in the Korean War, the US had at the time thought of using nuclear weapons against China to save the US from military defeat. In his book The Korean War, a personal account of the military and political aspects of the conflict and its implications on future US foreign policy, Gen Ridgeway said that US was confronted with two choices in Korea -truce or a broadened war, which could have led to the use of nuclear weapons. If the US had to resort to nuclear weaponry to defeat China long before the latter acquired a similar capability, there is little hope of winning a war against China, 50 years later, short of using nuclear weapons. The US estimates that China possesses about 20 nuclear warheads that can destroy major American cities. Beijing also seems prepared to go for the nuclear option. A Chinese military officer disclosed recently that Beijing was considering a review of its "non first use" principle regarding nuclear weapons. Major-General Pan Zhangqiang, president of the military-funded Institute for Strategic Studies, told a gathering at the Woodrow Wilson International Centre for Scholars in Washington that although the government still abided by that principle, there were strong pressures from the military to drop it. He said military leaders considered the use of nuclear weapons mandatory if the country risked dismemberment as a result of foreign intervention. Gen Ridgeway said that should that come to pass, we would see the destruction of civilization.

# 2NC – AT: No Escalation

**China war causes great power nuclear war**

**White, 12** — professor of strategic studies at ANU and a visiting fellow at the Lowy Institute (Hugh, “The China Choice: A Bold Vision for U.S.-China Relations”, 8/17/12, http://thediplomat.com/2012/08/17/the-china-choice-a-bold-vision-for-u-s-china-relations/, Deech)

Even if China may not become strong enough to dominate Asia itself, it is already strong enough to prevent the U.S. maintaining primacy. If America tries to perpetuate the status quo, there is a very real risk of an escalating contest which neither side could win, and which could very easily flare into a major, and perhaps catastrophic, war. The main reason for America to seek an accommodation with China is to reduce the risk of such a catastrophe. Many people will disagree. Some of them think that the relationship with China is working fine, and that accommodation – or further accommodation – is unnecessary. They think that Washington is committed to a good relationship with Beijing, and that China will be satisfied with the kind of relationship America is offering now. I think this is too optimistic. The relationship today can manage day-to-day stresses, but is not robust enough to withstand real problems. Some people cite the Chen case earlier this year as proof that the relationship is strong, but the fact that such a minor issue can cause such anxieties about the future of the world’s most important bilateral relationship surely points the other way. The U.S.-China relationship is probably going to have to face much greater stresses in future, and it is not at all clear that it is strong enough to withstand them. Furthermore, the relationship seems to be getting weaker rather than stronger over time, so the risk of a rupture grows. The present fabric of the relationship is weak and getting weaker because China’s and America’s ambitions in Asia over coming decades are inherently incompatible. It is important to my argument to explain why this should be so. Those who think that America is already accommodating China have perhaps not really registered what is at stake here. For the past 40 years the Asian strategic order, and the U.S.-China relationship, have been based on a conception of American leadership which places all other countries in Asia in a clearly subordinate position. American policy today precludes any substantial change in this status quo over the coming decades. This was made clear by Barack Obama in his speech in Canberra in November of last year. American optimism about the future of the relationship therefore depends on the hope that China will find this acceptable. It is often said that America’s policy towards China today is not containment. But Washington clearly does resist any substantial expansion of China’s influence at the expense of U.S. primacy. So if it’s not containment, that can only be because China is not seeking such an expansion. That seems to be wishful thinking. China accepted American primacy when America was many times richer and stronger than China. Now that the balance of relative power has changed, China’s ambitions have expanded. It would be very surprising if they hadn’t. Moreover those ambitions go very deep, fuelled by nationalism. There is no reason to assume that China is not just as committed to changing the status quo to increase its influence as America is to preserving the status quo to maintain its influence. So there is no reason to assume that China will just back down, and more than America will. This means that, unless America is willing to withdraw from Asia, it does face a choice between accommodating China or competing with it. Some people – like Professor Aaron Friedberg of Princeton – see the probability of rivalry but argue against seeking an accommodation with China because they think the costs of accommodation would be higher than those of rivalry. This may turn out to be true, because it partly depends on how much we would have to concede to China to reach an accommodation. But those who argue that we should not even seek an accommodation must assume that the costs of any possible deal with Beijing would outweigh the costs of rivalry. That view seems to me to imply a very serious underestimation of the kind of rivalry we might be talking about and where it might lead. As a rival, China is already the most formidable country America has every faced, because it is economically stronger relative to America than any country has been in over a century. **A war with China would be hard to contain, and could swiftly become bigger than anything** since the Second World War, dwarfing Vietnam and Korea. **There would be a real chance of escalation to nuclear exchanges** from which U.S. cities might not be spared. **These risks must weigh very seriously in any policy debate**. It is hard to argue that they do not justify at least exploring the possibility of accommodation with China.

# 2NC – Uniqueness/Link Wall

**AUVs are targeted for trade theft – status quo classification of tech as commercial or dual use technology increases the risk of theft – that turns their REMS advantage**

**Orozco, Professor of Legal Studies, 2013**

[David, Professor of Legal Studies, The College of Business, Florida State University, Summer 2013, “AMENDING THE ECONOMIC ESPIONAGE ACT TO REQUIRE THE DISCLOSURE OF NATIONAL SECURITY-RELATED TECHNOLOGY THEFTS”, Catholic University Law Review, 62 Cath. U.L. Rev. 877, LexisNexis]

3. Private Protection of Trade Secrets In addition to the common law and state and federal statutory regimes designed to deter and rectify trade secret theft, owners of sensitive information often use private legal and non-legal mechanisms to preemptively secure information. For example, companies often employ non-disclosure agreements, confidentiality agreements, and covenants-not-to-compete to add layers of protection to their confidential data. n78 Additionally, companies may use property systems such as patents or copyrights, in conjunction with trade secrets, to increase information security. n79 Finally, companies may use non-legal mechanisms used to protect trade secrets, such as well-designed human resource and compliance systems, n80 protected networks, and encryption devices. n81 B. National Security Implications According to ONCIX, trade secret theft by foreign agents has clear and significant implications for national competitiveness because many of the country's most profitable and rapidly-growing industries are targeted for trade secret theft. n82 For example, ONCIX states that clean technologies--energy -generating technologies that reduce carbon dioxide emissions--are highly valued targets for acquisition. n83 Clean technologies have been linked to long -term energy security, n84 and investments in these technologies have grown quickly as a result. n85 Similarly, pharmaceuticals, nanotechnology, and agricultural technologies--all of which are industries characterized by high [\*891] research and development costs--are also targeted frequently for theft. n86 Loss of trade secrets in these quickly-evolving areas of business has a direct impact on national competitiveness. As one government enforcement official explained, "[w]e've already lost our manufacturing base. . . . Now we're losing our R. & D. base. If we lose that, what do we fall back on?" n87 Trade secrets also significantly affect national security if they relate to classified information or information pertaining to military technologies. ONCIX stated that the "illicit transfer of technology with military applications to a hostile state [or organization] could endanger the lives of US and allied military personnel." n88 Some military technologies are especially susceptible to trade secret theft;for example, according to ONCIX and the DOD, Autonomous Underwater Vehicles (AUVs) are routinely targeted for theft. n89 Many technologies related to national security are categorized as dual-use technologies, or technologies that can be used for both military and non -military purposes. n90 Consequently, many dual-use technologies are regulated under export control laws rather than trade secret laws. For example, the Export Administration Act of 1979 authorizes the President to control U.S. exports for the purpose of national security. n91 The Department of Commerce's Bureau of Industry Security (BIS) is responsible for administering and enforcing the Export Administration Act. n92 [\*892] The Department of Commerce defines an export as "any item that is sent from the United States to a foreign destination." n93 Under the Department's regulations, the method of exportation is immaterial; the item may be classified as an export if it is sent via regular mail, hand carry, facsimile, the Internet, by telephone, or delivered in person. n94 Because trade secret theft is increasingly committed by foreign actors targeting a broad array of technologies that are regulated by export controls, many thefts have, as a practical matter, the same effect as the unauthorized exportation of goods. n95 The BIS has the authority to regulate military technologies, dual-use technologies, and even some purely commercial technologies with export controls. n96 Regulated technologies are categorized with an Export Control Classification Number (ECCN), which identifies items based on the nature of the product. n97 ECCNs allow exporters to determine the "reasons for control," which transactions require an export license (based on the country of destination), and which license exceptions, if any, apply. n98

# 2NC – Link Wall (Civilian Tech)

**Dual-use technologies are subject to espionage**

**Cooper, 2009** - Popular Mechanics contributing editor (Simon, “How China Steals U.S. Military Secrets,” 7/10/2009, <http://www.popularmechanics.com/technology/military/news/3319656> )

More typical cases are even harder to detect. ASTI agents often navigate the murky area of dual-use technologies, where pressure sensors could be used either for bombs or for washing machines, where computer chips with missile applications might actually be destined for in-car navigation systems. Furthermore, thousands of items prohibited for export can be bought over the Internet, shipped to a U.S. address, then simply mailed to China in a padded envelope. Such materials supply the building blocks needed for complex armaments. In other cases, technology is smuggled out to an approved country using fake end-user certificates. For instance, Kwonhwan Park shipped his Black Hawk engines to Malaysia before sending them on to China. And, advanced technology such as the F-16 fighter has been sold to countries from Bahrain to Venezuela where controls may be less stringent than in the United States. The situation outrages U.S. Rep. Frank Wolf (R-Va.), who successfully fought recent plans by the State Department to use Chinese-built computers for classified material. He says too little attention is paid to China's "aggressive spying program against the U.S." The legal deterrents to espionage are weak, says Wolf, who chairs a subcommittee overseeing security and technology. "In the Cold War people went to jail for a long time" for spying, he says, but today's "negligible penalties" are more appropriate to low-level embezzlement than military spying. Park was unusual in receiving a 32-month prison term and a deportation order; in contrast, Ting-Ih Hsu and Hai Lin Nee were each sentenced to three years of probation. Meanwhile, says the IASC's Richard Fisher, a "battle is being waged. The Chinese have established a vast collection system that by the end of the decade will have helped them to become a global military power." While concern grows among policy-makers and wonks, Mangione and his team still labor in the shadows of the worldwide arms bazaar. They hope to prevent the day when U.S. troops could find themselves staring down the barrel of a high-tech weapon marked "Made in America."

**Dual-use technology do not need export approval from the government – only defense trade laws solve**

**Export.gov, 2012** (“Defense and Dual Use Controls,” 10/5/2012, <http://www.export.gov/exportbasics/eg_main_018781.asp> )

Defense Trade: Export Controls and Licenses

Generally, any person or company who intends to export a defense article must obtain the approval of DDTC prior to the export. In the case of defense export transactions (defense articles such as munitions), any person or company who intends to export such an article must first obtain approval from the U.S. Department of State Directorate of Defense Trade Controls (DDTC) prior to the export. The DDTC, under the Arms Export Control Act (AECA) and the International Traffic in Arms Regulations (ITAR), is charged with controlling the export and temporary import of defense articles and defense services covered by the United States Munitions List (USML). It has among its primary missions (a) taking final action on license applications for defense trade exports and (b) handling matters related to defense trade compliance, enforcement, and reporting. The appropriate license form must be submitted to the DDTC for the purpose of seeking approval. In most cases, in order for a license to be considered, you first must be registered with the DDTC. Section 655 Annual Military Assistance Reports are provided to Congress and show for a fiscal year the aggregate dollar value and quantity of defense articles and defense services authorized as direct commercial sales to each foreign country. Note that these reports do not cover defense articles and services that are provided via the Foreign Military Sales (FMS) program. Dual Use Export Controls Dual use licenses are required in certain situations involving national security, foreign policy, short-supply, nuclear non-proliferation, missile technology, chemical and biological weapons, regional stability, crime control, or terrorist concerns. Most export transactions do not require specific approval from the U.S. Government. Licensing is required for "dual use" exports (commercial items which could have military applications). Before shipping your product, make sure you understand the concept of dual use and the basic export control regulations.

# 2NC – Turns Economy/Competitiveness

**Tech theft results kills tech gap, and hurts economic competitiveness and credibility**

**Orozco, Professor of Legal Studies, 2013**

[David, Professor of Legal Studies, The College of Business, Florida State University, Summer 2013, “AMENDING THE ECONOMIC ESPIONAGE ACT TO REQUIRE THE DISCLOSURE OF NATIONAL SECURITY-RELATED TECHNOLOGY THEFTS”, Catholic University Law Review, 62 Cath. U.L. Rev. 877, LexisNexis]

II. THE CHALLENGES OF ENFORCING TRADE SECRET MISAPPROPRIATION LAWS A. Under-Enforcement Trade secrets can be difficult to manage and protect. First, the protection of trade secrets hinges on fiduciary relationships, which trigger mutual and corresponding duties. n99 Unlike patents, trademarks, designs, and copyrights, the safeguarding of trade secrets largely depends on individuals' ability to uphold the legal duties that arise from fiduciary relationships. n100 [\*893] Trade secrets, like other intangible assets, are non-excludable; n101 absent vigorous monitoring and expensive judicial enforcement, trade secrets are freely accessible. n102 To successfully plead trade secret misappropriation, the plaintiff must overcome a defense of independent derivation, under which the defendant claims that he discovered the trade secret through reverse engineering, or through other permissible means. n103 The burden is also on the plaintiff to prove that he expended reasonable efforts to preserve secrecy. n104 This standard can be challenging to satisfy in cases in which the plaintiff [\*894] created the protected information with the help of third parties, especially if the value of the information has appreciated over time. n105 Similarly, significant hurdles impede the enforcement of criminal trade secret laws. Indeed, many believe that the DOJ imposes substantial prerequisites for enforcement under the EEA. n106 According to some accounts, U.S. attorneys' offices have imposed a six- or seven-figure loss requirement as a precondition for prosecution. n107 The DOJ is also hesitant to criminally prosecute cases unless a civil remedy is unavailable. n108 Additionally, there are several other factors that discourage parties from pursuing an EEA claim, such as the higher burden of proof necessary to criminally convict under the EEA, the possibility of a lengthy grand jury investigation, the federal government's exclusive management of important litigation issues, the forfeiture of the attorney-client privilege and work-product immunity afforded by civil trials, and the lack of monetary damages. n109 These restrictions may prevent firms from reporting trade secret theft, compounding the public safety concerns surrounding the theft of information affecting national security. Despite the difficulty in addressing trade secret theft, civil litigation of domestic trade theft is on the rise, demonstrating the importance of trade secret information. n110 However, this increase reflects only domestic civil suits, not claims brought under the EEA. n111 Indeed, although ONCIX reports that trade [\*895] secret theft by foreign actors is growing at a considerable pace, n112 this type of trade secret theft is rarely prosecuted. n113 The restrictions imposed by the DOJ and the EEA itself likely discourage injured parties from reporting violations and from using the statute as an enforcement mechanism. The failure to report trade secret theft and to enforce trade secret laws, in turn, motivates trade secret thieves to continue engaging in this profitable activity. n114 B. Market Failures Given their status as valuable property rights, the marketplace should, in theory, provide adequate incentives to safeguard and enforce trade secrets. Evidence indicates that, although prosecution of domestic trade secret thefts has increased, cases involving foreign actors remain unenforced. n115 This disparity, according to a market efficiency theory, is caused by (1) cross-border enforcement costs; (2) negative reputational impact; and (3) inadequate information technology (IT) and compliance capabilities. 1. Cross-Border Enforcement Costs Pursuing civil remedies in foreign trade secret theft cases under the EEA is often prohibitively expensive. First, the complexities that arise during the discovery process can significantly raise litigation costs. n116 To further complicate matters, each country has its own trade secret law and hiring local counsel with adequate knowledge of a foreign jurisdiction's legal system and [\*896] paying for translation services can raise costs substantially. n117 Similarly, attempting to gather evidence abroad can pose unique challenges that require patience, creativity, and significant resources. n118 Because it is so difficult to litigate, foreign trade secret theft is best reserved for federal authorities to address under the appropriate criminal statutes and with the aid of government intelligence information and enforcement mechanisms. The U.S. government is especially interested in discovering the sources of the theft of sensitive information because of the national security concerns. n119 The U.S. government, unlike private companies, has the intelligence capabilities needed to uncover the sources of this theft. n120 Private companies, on the other hand, are either unable to trace the party's identity or unwilling to do so. n121 It is also increasingly difficult for private companies to distinguish between cyber crime, trade secret theft, and the collection of economic or technological information by foreign intelligence services. n122 2. Reputational Costs When a company discovers that a trade secret has been stolen, more often than not the company will choose not to seek legal remedy. According to ONCIX, a company may keep a security breach private because it could "tarnish a company's reputation and endanger its relationships with its investors, bankers, suppliers, customers and other stakeholders." n123 An empirical study using an event study methodology confirmed that the value of a publicly traded company can decrease by millions of dollars when the company announces that it has decided to work with federal officials to prosecute a case under the EEA. n124 Many companies, absent regulations requiring affirmative disclosure, elect to remain silent and allow the theft to go unpunished. n125 Moreover, the unavailability of civil damages under the EEA [\*897] to offset these reputational costs provides little incentive for private companies to report theft. n126 3. Inadequate IT and Compliance Capabilities Some business managers view investment in IT programs as an unnecessary cost. n127 Indeed, companies may reach a level of sophistication at which investment in IT safeguards has a negative impact on the company's ability to compete with market prices. n128 However, IT capabilities have a demonstrably positive effect on business strategy and have a significant impact on a company's bottom line. n129 The perception of investment in IT as a cost driver may, therefore, lead to suboptimal investments in IT capabilities meant to safeguard a company's most valuable technologies and knowledge-based assets. n130 Accordingly, it is crucial for businesses to integrate IT security programs into their top leadership team, as well as into legal and compliance departments. n131 Multifunctional coordination of IT resources is important for security because it can contribute to successful legal outcomes in the event of a breach, n132 as well as to help companies proactively keep track of information moving within and in and out of the organization. n133 To compound the problem, companies increasingly rely on a "high velocity" and contingent workforce, which may facilitate the movement of sensitive information. n134 The highly mobile state of information in modern business justifies investment [\*898] in state-of-the-art IT security programs and the addition of IT representatives to various levels and departments within an organization.

# 2NC – US-China Relations Impact (1/2)

**Tech theft collapses US-Sino Relations – they’re on the brink now**

**Beattie, 14** (Victor, Published May 21, 2014, “Up to Chinese How Cyber Espionage Charges Impact Relations”, <http://www.voanews.com/content/us-up-to-chinese-how-cyber-espionage-charges-impact-relations-/1919109.html>)

WASHINGTON — It is up to China to determine how charges of cyber espionage aimed at five Chinese military personnel brought by the United States will affect bilateral relations, a U.S. Defense spokesman said on Tuesday. U.S. Defense spokesman Rear Adm. John Kirby said at a Pentagon news briefing Tuesday the United States has regular discussions with China at all levels of government about cyber spying, an issue he said Defense Secretary Chuck Hagel brought up during his April visit. Kirby said the degree the latest indictments affect that relationship is a decision the Chinese have to make. "We still desire, from a military perspective, to further grow the military-to-military relationship and to find ways to have a more productive conversation about these very tough issues, and cyber is one of them," Kirby said. "They’ve announced they’ve pulled out of the Cyber Working Group. That’s regrettable. It’s a decision they made. It wasn’t a decision they had to make. "This is a tough issue we don’t always agree on, but it’s one that we’ve got to keep the dialogue and conversations open on, and the secretary still firmly believes in doing that," he said. Kirby said the United States has no desire to militarize cyberspace. He said with countries like China, who are active in cyber, Washington wants to have as open and as transparent a conversation about it as possible. Economic espionage charges The U.S. on Monday announced it had charged five Chinese military officers with conducting economic espionage against American companies. The Justice Department accused a unit of China's People's Liberation Army of hacking into the computers of U.S. companies working in nuclear technology, solar power and the steel industry. Beijing has denounced the criminal allegations, the first ever leveled by the United States against a foreign power for cyber crimes targeting American businesses. China's Defense Ministry accused the United States of having "ulterior motives" and accused Washington of "hypocrisy and double standards." Wednesday, the state-run Global Times said the allegations come from a country “that spies both at home and abroad.” It added that the U.S. “has been taking bold steps in cyber espionage” and referred to former National Security Agency contractor Edward Snowden, who publicized classified documents that revealed global U.S. surveillance programs. Snowden has been charged with espionage and lives in Russia. The Global Times said those documents show “the U.S. hacked into China’s backbone networks, universities, government departments and other organs.” It applauded the suspension of the China/U.S. Cyber Working Group and called for further action. U.S. State Department spokeswoman Jen Psaki, speaking with reporters Tuesday, expressed hope that the next Strategic and Economic Dialogue (SE&D) between the two countries in Beijing in July will go on as planned. "We’re hopeful that we can maintain a dialogue with China about cyber security and a range of other issues," Psaki said. When questioned about how cooperative China may be regarding cyber issues, Psaki said, "We believe there are a range of issues we work closely together on. We’ve seen the concerns they’ve expressed. We believe we have a relationship on a range of economic and strategic security issues, and we’re looking forward to the S&ED." Hackers used email attachments The Associated Press reported the hacking techniques allegedly used against American companies were not complicated. The hackers tricked employees to open email attachments or click on website links. Cedric Leighton, a former U.S. Air Force intelligence office and currently a cyber-security consultant, said the American public, as well as government and private sector employees, are still ill-prepared to guard against such hacking techniques. Leighton said there is a larger problem these types of emails cause, other than getting people to "click on an email link or do something they shouldn't be doing." "The real problem ... it is also an increasingly common way in which cyber adversaries can gain intelligence on a [computer] network, can use it for a platform for other types of cyber-attacks and, quite frankly, it is a platform they use to steal tons of intellectual property, and it’s a global problem that is crying out for a global response at this point," he said. Leighton said U.S. companies doing business in China face the possibility of economic retaliation, such as reverse engineering some of their products, making it difficult for them to maintain market share in China. Reuters News Agency reported firms such as IBM Corp. and Cisco Systems have already seen sales drop as China turns more to internal suppliers. Leighton, however, said China’s charge of U.S. hypocrisy is ineffective given that U.S. government entities are barred by law from engaging in commercial espionage. He said that distinction does not exist in China.

# 2NC – US-China Relations Impact (2/3)

**China relations solve every impact**

**Cohen, 9** (William S. Cohen is chairman and CEO of The Cohen Group, a strategic business consulting firm based in Washington, D.C. Secretary Cohen served as U.S. secretary of defense, Maurice R. Greenberg is chairman and CEO of C.V. Starr & Co., Inc. Mr. Greenberg retired four years ago as chairman and CEO of American International Group (AIG) after more than 40 years of leadership, creating the largest insurance company in history, “Smart Power in U.S.-China Relations,” pg online @ http://csis.org/files/media/csis/pubs/090309\_mcgiffert\_uschinasmartpower\_web.pdf)

The evolution of Sino-U.S. relations over the next months, years, and decades has the potential to have a greater impact on global security and prosperity than any other bilateral or multilateral arrangement. In this sense, many analysts consider the US.-China diplomatic relationship to be the most influential in the world. Without question, strong and stable U.S. alliances provide the foundation for the protection and promotion of U.S. and global interests. Yet within that broad framework, the trajectory of U.S.-China relations will determine the success, or failure, of efforts to address the toughest global challenges: global financial stability, energy security and climate change, nonproliferation, and terrorism, among other pressing issues. Shepherding that trajectory in the most constructive direction possible must therefore be a priority for Washington and Beijing. Virtually **no major** global **challenge can be met without U.S.-China cooperation**. The uncertainty of that future trajectory and the "strategic mistrust" between leaders in Washington and Beijing necessarily concerns many experts and policymakers in both countries. Although some U.S. analysts see China as a strategic competitor—deliberately vying with the United States for energy resources, military superiority, and international political influence alike— analysis by the Center for Strategic and International Studies (CSIS) has generally found that China uses its soft power to pursue its own, largely economic, international agenda primarily to achieve its domestic objectives of economic growth and social stability.1 Although Beijing certainly has an eye on Washington, not all of its actions are undertaken as a counterpoint to the United States. In addition, CSIS research suggests that growing Chinese soft power in developing countries may have influenced recent U.S. decisions to engage more actively and reinvest in soft-power tools that have atrophied during the past decade. To the extent that there exists a competition between the United States and China, therefore, it may be mobilizing both countries to strengthen their ability to solve global problems. To be sure, U.S. and Chinese policy decisions toward the respective other power will be determined in large part by the choices that leaders make about their own nations interests at home and overseas, which in turn are shaped by their respective domestic contexts. Both parties must recognize—and accept—that the other will pursue a foreign policy approach that is in its own national interest. Yet, in a globalized world, challenges are increasingly transnational, and so too must be their solutions. As demonstrated by the rapid spread of SARS from China in 2003, pandemic flu can be spread rapidly through air and via international travel. Dust particulates from Asia settle in Lake Tahoe. An **economic downturn in one country** can and **does trigger a**n economic **slowdown in another**. These challenges can no longer be addressed by either containment or isolation. What constitutes the national interest today necessarily encompasses a broader and more complex set of considerations than it did in the past As a general principle, the United States seeks to promote its national interest while it simultaneously pursues what the CSIS Commission on Smart Power called in its November 2007 report the "global good."3 This approach is not always practical or achievable, of course. But neither is it pure benevolence. Instead, a strategic pursuit of the global good accrues concrete benefits for the United States (and others) in the form of building confidence, legitimacy, and political influence in key countries and regions around the world in ways that enable the United States to better confront global and transnational challenges. In short, the global good comprises those things that all people and governments want but have traditionally not been able to attain in the absence of U.S. leadership. Despite historical, cultural, and political differences between the United States and China, Beijing's newfound ability, owing to its recent economic successes, to contribute to the global good is a matter for common ground between the two countries. Today there is increasing recognition that no major global challenge can be addressed effectively, much less resolved, without the active engagement of—and cooperation between—the United States and China. The United States and China—the worlds first- and third-largest economies—are inextricably linked, a fact made ever more evident in the midst of the current global financial crisis. Weak demand in both the United States and China, previously the twin engines of global growth, has contributed to the global economic downturn and threatens to ignite simmering trade tensions between the two countries. Nowhere is the interconnectedness of the United States and China more clear than in international finance. China has $2 trillion worth of largely U.S. dollar-denominated foreign exchange reserves and is the world's largest holder—by far—of U.S. government debt. Former treasury secretary Henry M. Paulson and others have suggested that the structural imbalances created by this dynamic fueled the current economic crisis. Yet. China will almost certainly be called on to purchase the lion's share of new U.S. debt instruments issued in connection with the U.S. stimulus and recovery package. Secretary of State Hillary Rodham Clinton's February 23.2009, reassurance to Beijing that U.S. markets remain safe and her call for continued Chinese investment in the U.S. bond market as a means to help both countries, and the world, emerge from global recession underscored the shared interest—and central role—that both countries have in turning around the global economy quickly. Although China's considerable holdings of U.S. debt have been seen as a troubling problem, they are now being perceived as a necessary part of a global solution. Similarly, as the world’s two largest emitters of greenhouse gases, China and the United States share not only the collateral damage of energy-inefficient economic growth, b­­ut a primary responsibility to shape any ultimate global solutions to climate change. To date, cooperation has been elusive, owing as much to Washington's reluctance as to Beijing's intransigence. Painting China as the environmental bogeyman as an excuse for foot-dragging in policymaking is no longer an option; for its part, China, as the world's top polluter, must cease playing the developing-economy card. Yet energy security and climate change remain an area of genuine opportunity for joint achievement. Indeed, U.S.-China cooperation in this field is a sine qua non of any response to the energy and climate challenges. The sheer size of the Chinese economy means that collaboration with the United States could set the de facto global standards for etficiency and emissions in key economic sectors such as industry and transportation. Climate change also provides an area for cooperation in previously uncharted policy waters, as in emerging Arctic navigational and energy exploration opportunities. Washington and Beijing also share a deep and urgent interest in international peace and stability. The resumption of U.S.-China military contacts is a positive development. As two nuclear powers with worldwide economic and strategic interests, both countries want to minimize instability and enhance maritime security, as seen by parallel antipiracy missions in the waters otT Somalia. Joint efforts in support of United Nations peacekeeping, nonproliferation, and counterterrorism offer critical areas for bilateral and multilateral cooperation. Certainly, regional and

# 2NC – US-China Relations Impact (3/3)

**<<<continued --- no text deleted>>>**

global security institutions such as the Six-Party Talks concerning North Korea or the UN Security Council require the active engagement of both Washington and Beijing. Even more broadly, crisis management in geographic regions of mutual strategic interest like the Korean peninsula, Iran, or Burma require much more Sino-U.S. communication if the two countries are to avoid miscalculation and maximize opportunities to minimize human sutfering. Increasing the number of mid-level military-to-military exchanges would help in this regard. The United States and China could do more to cooperate on law enforcement to combat drug trafficking and organized crime in Western China. Afghanistan is competing with Burma as the main provider of narcotics to China; Washington could use its influence with the International Security Assistance Force in Kabul to develop a joint antinarcotics program. This could potentially build networks and joint capabilities that might be useful for U.S.-China cooperation on the issue of Pakistan. In addition, Washington should also encourage NATO-China cooperation along the Afghan border. Collaborating under the auspices of the Shanghai Cooperation Organization (SCO) might provide an additional framework for Beijing and Washington to address Central Asian security issues in a cooperative manner. 1he SCO, which includes Pakistan as an observer and will convene a multinational conference on Afghanistan in March 2009, has long made curbing narcoterrorism in Afghanistan a priority. In addition, the VS. Drug Enforcement Agency and the Chinese Anti-Narcotics Bureau should expand cooperation on interdiction and prosecution of heroin and meth traffickers. To be sure, there are a number of areas of serious divergence between Washington and Beijing. This should surprise no one. The United States has disagreements with even its allies. Two large powers with vastly dilferent histories, cultures, and political systems are bound to have challenges. History has shown, however, that the most effective way of addressing issues is for the U.S. and Chinese governments to engage in quiet diplomacy rather than public recrimination. In the U.S.-China context, there is often little to be gained—and much to be lost in terms of trust and respect—by a polarizing debate. Any differences, moreover, must not necessarily impede Sino-U.S. cooperation when both sides share strong mutual interests. I;. Scott Fitzgerald wrote that "the test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function."3 Effective policy toward China by the United States, and vice versa, will require this kind of dual-minded intelligence. Moreover, working together on areas of mutual and global interest will help promote strategic trust between China and the United States, facilitating possible cooperation in other areas. Even limited cooperation on specific areas will help construct additional mechanisms for bilateral communication on issues of irreconcilable disagreement. In fact, many of the toughest challenges in U.S.-China relations in recent years have been the result of unforeseen events, such as the accidental bombing of the Chinese embassy in Belgrade in May 1999 and the EP-3 reconnaissance plane collision in April 2001. Building trust and finding workable solutions to tough problems is the premise behind the Obama administrations foreign policy of smart power, as articulated by Secretary of State Clinton. Smart power is based on, as Secretary Clinton outlined in her confirmation hearing, the fundamental belief that 'We must use... the full range of tools at our disposal—diplomatic, economic, military, political and cultural—picking the right tool, or combination of tools, for each situation."' As the CS1S Commission on Smart Power noted in November 2007, "Smart Power is neither hard nor soft—it is the skillful combination of bothIt is an approach that underscores the necessity of a strong military, but also invests heavily in alliances, partnerships and institutions at all levels... .°5 As such, smart power necessarily mandates a major investment in a U.S.-China partnership on key issues. 'The concept enjoys broad support among the Chinese and American people and, by promoting the global good, it reaps concrete results around the world. There should be no expectation that Washington and Beijing will or should agree on all, or even most, questions. But the American and Chinese people should expect their leaders to come together on those vital issues that require their cooperation. **U.S.-China partnership, though not inevitable, is indispensable**.

# 1NC – Coast Guard CP

**Text: The United States Coast Guard should \_\_\_\_\_insert plan text\_\_\_\_\_\_**

**Solves the case and is competitive --- US Coast Guard, part of the US military, can solve**

**Tripp ‘6 – U.S. Coast Guard Research and Development Center** (Scot, “Autonomous Underwater Vehicles (AUV)s: A Look at the Coast Guard Needs to Close Performance Gaps and Enhance Current Mission Performance”, US Coast Guard, http://www.dtic.mil/dtic/tr/fulltext/u2/a450814.pdf)

The Coast Guard has declared its¶ intentions to exploit emerging¶ technologies as it moves toward its vision¶ of the Coast Guard in the year 2020—¶ Coast Guard 2020. Attaining this vision¶ requires appropriate integration of¶ technology as part of the solution to close¶ gaps in mission performance. For this to¶ happen, the Coast Guard must make¶ concerted and deliberate efforts to exploit¶ technology, moving effectively from¶ ideation through development,¶ acquisition, implementation, and lifecycle¶ support. The role of the Research¶ and Development (R&D) Center in¶ exploiting technology is to anticipate¶ future needs, create ideas, and insert new¶ technologies. As a platform for various¶ sensors, the Autonomous Underwater¶ Vehicle (AUV) is one such technology¶ with the potential to close the gaps in¶ Coast Guard performance as well as¶ enhance current mission capabilities. This¶ paper addresses Coast Guard’s AUV¶ needs for specific mission areas.¶ The variety and unique nature of Coast¶ Guard missions add a high degree of¶ complexity to technological solutions. In¶ a world where high complexity often¶ equals high cost, development does not¶ always follow a path that resolves the¶ issues encountered by the Coast Guard.¶ By working to articulate its needs now,¶ the Coast Guard hopes to influence AUV¶ development in such a way that off-the2¶ shelf items eventually can meet its¶ operational needs. Several areas show¶ that AUV developments are already¶ taking this path. AUV complexity can be¶ addressed through the ever-reducing costs¶ of computing ability, modularization,¶ sensor packaging, communication¶ networking, and miniaturization.

# 2NC – Military Solvency – REM Adv

**When coupled with military technology, AUVs are capable of finding REMs**

**Bashir 12 (Faculty of Physical Sciences and Engineering, University of Southampton**

M.B., “A Concept for Seabed Rare Earth Mining in the Eastern South Pacific”, University of Southampton, https://www.southampton.ac.uk/assets/imported/transforms/peripheral-block/UsefulDownloads\_Download/7C8750BCBBB64FBAAF2A13C4B8A7D1FD/LRET%20Collegium%202012%20Volume%201.pdf)

3.4.2 Seabed investigation –– geophysical methods¶ A number of geophysical methods for the detection of REEs may be employed in the CPTbased¶ method being considered. Those considered here are:¶ 􀁸 X-ray fluorescence spectroscopy (XRF); and,¶ 􀁸 Laser-induced breakdown spectroscopy (LIBS).¶ XRF may be performed in-situ or in a laboratory; while accurate quantitative analysis must¶ still take place in a laboratory, many examples now exist of field applications of XRF. XRF¶ measures X-rays emitted by relaxation of electrons from an outer to an inner orbital to take¶ the place of an inner electron displaced by initial X-ray excitation. The frequency of an¶ 2􀈱http://www.geomarine.co.uk/􀈱¶ 35¶ emitted X-ray identifies the element from which it came, while the intensity may be used to¶ determine the concentration (Stallard et al, 1995).¶ Examples of XRF field applications include cone penetrometer deployment for heavy metal¶ detection (Elam et al, 2000), deployment using a small AUV for study of heavy metals in¶ marine sediments at the seabed in shallow water (Breen et al, 2011) and use of handheld¶ XRF units in quantifying the REE concentration in cores taken from the Nechalacho¶ Deposit in Canada by Avalon Rare Metals (Bakker et al 2011). In this latter application it¶ should be noted that the Ce concentration was used to estimate the concentration of the¶ LREE and Y to estimate the concentration of the HREE, a similar calibration exercise¶ would likely be useful in any subsea deployment.

# 2NC – Military Solvency – Fisheries Adv

**Current Coast Guard practices don’t solve**

**Tripp ‘6 – U.S. Coast Guard Research and Development Center (**Scot, “Autonomous Underwater Vehicles (AUV)s: A Look at the Coast Guard Needs to Close Performance Gaps and Enhance Current Mission Performance”, US Coast Guard, http://www.dtic.mil/dtic/tr/fulltext/u2/a450814.pdf)

Fisheries Management¶ The Coast Guard is tasked with the¶ guardianship of the offshore Living¶ Marine Resources (LMRs). These are¶ ocean areas where commercial fishing is¶ restricted or banned. Cutters are sent to¶ 4¶ patrol these areas, typically for 2-week¶ periods, to ensure that there is no illegal¶ activity. Methods of enforcement involve¶ activities such as multiple boardings with¶ inspections, covertly blending in with a¶ fishing fleet at night, high-altitude aerial¶ reconnaissance, and long-rang radar¶ detection. Typical cutters patrolling the¶ restricted or closed fishing areas are big¶ and white. While the cutter is on-site, the¶ fishermen will fish just on the outskirts of¶ the restricted areas staying in legal¶ territorial seas.¶ Offshore Living Marine Resource¶ The effectiveness of Coast Guard¶ enforcement efforts on this mission is¶ only guaranteed while there is an on-site¶ presence. The Coast Guard’s ability to¶ maintain this presence is minimal.¶ Restricted/closed areas are often¶ hundreds of square miles. The Coast¶ Guard’s ability to traverse, conduct¶ surveillance, and intercept illegal fishing¶ vessels in these areas is limited because¶ of too few assets, people, or equipment.¶ The result is a methodology that cannot¶ meet the mission goal, which is to protect¶ these areas against depletion of fish¶ stocks.

# 2NC – Military Solvency – Environment/Drilling Adv

**The Coast Guard best at with AUVs to improve drilling- solves their environment advantage better**

**Gingras 13 (**Paul Gingras, “Oil Spill Experts Test Technology”, The St. Ignace News, http://www.stignacenews.com/news/2013-02-28/Front\_Page/Oil\_Spill\_Experts\_Test\_Technology.html)

The U.S. Coast Guard sought ice and northern weather to augment military readiness for potential oil spills in challenging conditions last week, and they got what they needed at the Straits of Mackinac. In the midst of a blizzard, a coalition of oil recovery interests, including the Coast Guard, the Environmental Protection Agency, and private providers of high-tech oil recovery equipment, loaded ice-capable tugboats Nickelena and Erika Kobasic and Coast Guard Cutter Hollyhock Tuesday morning, February 19, and proceeded to test equipment and procedures throughout the week.¶ As ice-capable tugboat Erika Kobasic is loaded with equipment, drill responders prepare for a major undertaking to test military readiness for oil spills in northern waters. ¶ As ice-capable tugboat Erika Kobasic is loaded with equipment, drill responders prepare for a major undertaking to test military readiness for oil spills in northern waters.¶ In a changing world where higher global temperatures and demand for natural resources point to more maritime traffic in the north, oil drilling in Alaska, and plans to increase oil flow beneath the Straits, the Coast Guard sought new ways to handle oil spills in Great Lakes and Arctic ice.¶ As organizers hoped, agencies identified performance gaps in new equipment, tested procedures, and created a forum for collaboration among businesses and government agencies that could be invaluable in the event of a spill, said Scott Binko, response advisor with the Coast Guard’s 9th District, who obtained a grant through the Great Lakes Restoration Initiative to help fund the USCG Research and Development Center effort at the Straits.¶ Post-doctoral scholar Peter Kimball of Woods Hole Oceanographic Institution poses next to the Autonomous Underwater Vehicle (AUV) tested at an oil recovery drill at St. Ignace Tuesday, February 19. A simple navigation system allows the vehicle to find its own way underwater. Armed with sensors, it can help reveal ice thicknesses invisible to satellites. The AUV had problems at the Straits, warranting further study by the Coast Guard, which seeks to make it more robust. Ultimately, it &ldquo;is a cool example of using robots to safely extend what humans can do,&rdquo; Mr. Kimball said. ¶ Post-doctoral scholar Peter Kimball of Woods Hole Oceanographic Institution poses next to the Autonomous Underwater Vehicle (AUV) tested at an oil recovery drill at St. Ignace Tuesday, February 19. A simple navigation system allows the vehicle to find its own way underwater. Armed with sensors, it can help reveal ice thicknesses invisible to satellites. The AUV had problems at the Straits, warranting further study by the Coast Guard, which seeks to make it more robust. Ultimately, it “is a cool example of using robots to safely extend what humans can do,” Mr. Kimball said.¶ As new technology was tested on the water, crews from the Coast Guard, the National Oceanic and Atmospheric Administration (NOAA), the other agencies coordinated efforts at the Incident Command Post set up at Little Bear East Conference Center in St. Ignace.¶ Developing an effective Command Post was a significant part of this year’s drill, Mr. Binko said.¶ “In doing this, we gained knowledge as on-scene coordinators,” he explained. “It gets better every year. Better turnout. More equipment. It’s exciting to us.”¶ Many drill participants have environmental protection experience and know pollution response techniques, Mr. Binko told The St. Ignace News. Oil cleanup is about efficiency, he added. As the Coast Guard practices with known equipment and tests new gear, responders get better.¶ One of the best aspects of Oil-in- Ice drills at the Straits is the opportunity to make mistakes, in a non-emergency situation, participants said.¶ “It’s about lessons learned,” said Lieutenant Commander Jay Lomnicky, scientific support coordinator for the Emergency Response Division of NOAA. He is responsible for the Great Lakes and western rivers.¶ Now in the third year of Oil-in-Ice drills, responders are effectively building on information gathered at every attempt, Mr. Binko said. In this case, the Straits offered one day of “horrible” on-water weather and one he called “perfect.”¶ Highlights included lowering a 300-feet-long fire boom from the Nickelena and dragging it through the water to collect ice and oil surrogate. The boom, an enormous, tubelike, floating length of material, is formed into a horseshoe shape and dragged to collect surface oil. In place of petroleum, crews used highly visible and environmentally safe oranges and peat moss at the Straits.¶ It’s a tricky process, Mr. Binko explained. Responders travel at one knot or less to avoid losing the ice and oil collected, but the test was successful. Part of the challenge was to avoid overstretching or breaking the boom. This year, a combination of ice that formed on the boom, and ice chunks 18 inches thick, damaged the fire boom. Responders also learned the boom cannot pass over surface ice, said Coast Guard Liaison Steven Keck and Mike Crickard, logistics management specialist with the Coast Guard’s National Strike Force Coordination Center.¶ Owing to the high expense of fire booms used at real spills, the Coast Guard used a training version at the Straits. Fire booms deployed at oil spills are high-tech devices equipped with casing that burns away along with the oil they collect, if it is burned on site. “In-situ burning,” or burning in place, is a method employed to remove oil from water surfaces quickly before it reaches an ice floe or shoreline.¶ “The bottom line is that conditions [at the Straits] are harsh,” which helps responders determine how to make the boom more robust, Mr. Keck said.¶ To ensure maximum effectiveness of the boom, the Coast Guard deployed an aerostat aircraft to spot oil flow from the air. Equipped with sensors to provide visual and infrared information, the aerostat amounts to a helium-filled balloon attached to a large, metal barge.¶ “The aerostat is a huge asset,” but using it in storm conditions was “tricky,” Mr. Keck said.¶ Wednesday’s strong downdrafts forced the Coast Guard to limit the balloon’s height and move the point at which it was attached to the platform.¶ The goal of such a system is to provide aerial coverage, possibly uninterrupted, for days at a time. In this case the infrared can help detect oil, which gives off a different heat signature than the water around it, he added.

# 2NC – Military Solvency – Security Adv

**Law enforcement can be solely resolved with AUVs**

**Tripp ‘6 – U.S. Coast Guard Research and Development Center (**Scot, “Autonomous Underwater Vehicles (AUV)s: A Look at the Coast Guard Needs to Close Performance Gaps and Enhance Current Mission Performance”, US Coast Guard, http://www.dtic.mil/dtic/tr/fulltext/u2/a450814.pdf)

The law enforcement mission involves¶ detection, identification, tracking and¶ interdiction of suspect vessels. The Coast¶ Guard could use a force multiplier in¶ detecting and tracking, especially in large¶ areas of operation. In many instances,¶ Coast Guard assets could be better¶ deployed because of the kind of¶ intelligence offered by the AUV. In this¶ mission area, the AUVs offer covert¶ reconnaissance with the option of¶ mobility. Similar to the fisheries¶ management mission, once the AUV¶ detects a target of interest, the AUV then¶ reports the contact to an interested party,¶ which is sufficient capability for the¶ AUV on some law enforcement¶ operations with the Coast Guard sending¶ a manned asset to conduct the actual¶ intervention. The savings occur when¶ manned assets are only deployed when¶ there is a need. Therefore, the purpose of¶ the AUV would be to increase the ratio of¶ patrol time to successful interdictions.¶ Patrolling an area without intelligence on¶ suspect activity and looking for a specific¶ target of interest are less than optimal.¶ Patrolling an area of known trafficking¶ yields some positive results. Going to an¶ area of an identified target of interest¶ likely yields better results. At the very¶ least, using the AUV to extend the sensor¶ range of the patrol boat could increase the¶ number of interdictions.¶ With GO FAST targets, it is unlikely that¶ the Coast Guard would use an AUV to¶ identify and track the target since it¶ typically runs at speeds in excess of 30¶ knots. However, it would be useful to¶ deploy an AUV system that could¶ identify the location and course of a GO¶ FAST so that it can be intercepted. A¶ system of multiple AUVs deployed¶ across a large area illustrates the picket¶ fence concept. Many factors, such as¶ sensor range and communications set-up,¶ determine the spacing and number of¶ 9¶ AUVs. A buoy system could be used for¶ the picket fence concept, but AUVs offer¶ the advantage of mobility. With mobility,¶ the AUV system could be put on a patrol¶ pattern so that one sensor now covers¶ twice the area in half the time. If the¶ AUV system has positioning, targeting,¶ Tracking and Reporting on GO FAST Activity¶ Unlike the buoy system, the entire AUV¶ system can be moved easily to a new area¶ of operation. The AUVs could be sent a¶ message to move to another area or¶ simply be recalled for pick-up and¶ transfer. Even if the AUV system is¶ utilizing a base station for recharging, it¶ is conceivable that the base station could¶ be designed to move to a new location¶ using its own AUVs.¶ The detection of the GO FAST would not¶ be as difficult as the identification of a¶ specific fishing vessel. With the fishing¶ vessel the AUV gathers prosecutable¶ evidence. With GO FAST, the Coast¶ Guard only needs to know that there is a¶ high-speed vessel transiting a certain¶ location in a specific direction, as the¶ interception would be by a more¶ traditional asset. Similar to the fisheries¶ management mission, AUV potential¶ increases with on-station time. To go to¶ an area of interest and maintain watch for¶ months are highly desirable capabilities.¶ These capabilities combined with a¶ and communications, then the GO FAST¶ would be reported by location and¶ direction. With the proper spacing of your¶ AUV fences, the area of re-acquisition¶ decreases substantially, allowing for far¶ more productive patrol time for Coast¶ Guard assets.¶ networked multiple-vehicle system give¶ the Coast Guard a covert, movable, picket¶ fence that detects and reports on activity¶ of interest.¶ While GO FAST interception requires¶ AUVs to be detectors and trackers, there¶ are law enforcement applications that¶ require both tracking and trailing¶ capabilities. In the Pacific area of operations,¶ a suspect vessel may be found only to be¶ lost while an asset returns for refueling.¶ This is not atypical where the areas being¶ patrolled exceed thousands of square¶ miles. Here an air-dropped AUV could be¶ Air-Deployed Tracking AUV¶ deployed if it had the endurance and¶ speed to maintain contact with the¶ suspect vessel. Reporting back position¶ data in the process of tracking allows for¶ better allocation of existing resource¶ time. With an adequate mission time¶ capability, the AUV would be the only¶ asset needed.

# 2NC – AT: Perm Do Both

**Links to the net benefit --- includes civilian action rather than purely military action which triggers the link to our disads**

**China will steal dual-use and civilian technology under normal export laws – only classifying it as exclusively military solves**

**Roper, 2013** - TUC National Organiser and is responsible for leading the TUC's work on organising and recruitment (Carl, *Trade Secret Theft, Industrial Espionage, and the China Threat*, page 54, Google Books)

The acquisition of advanced dual-use technology represents just one of many other methods by which the PRC will attempt to gain advanced technologies for its military modernization from American companies. China's continued military modernization drive includes a well-crafted policy for acquir- ing dual-use technologies. It seeks civil technology in part in the hopes of being able to adapt the technology to military applications. This has been referred to by some analysts as "spinning on." There is a strategy that was developed in 1995 that called for the acquisition of dual-use tech- nologies with civil and military applications and then the transfer of R&D achievements in civil technology to the research and production of weapons. The PRC has collected military-related science and technology information from openly avail- able US and Western sources and military researchers over many years. This collection effort was designed to accelerate the PLA's military technology development by permitting it to follow proven development options already undertaken. PRC procurement agents would approach US firms to gain an understanding of the uses of avail- able technology and subtly determine if it has dual-use capabilities. At the same time, they wanted to evaluate the possibility for China to purchase the dual-use technology under the guise of civil programs while maintaining its sale within the constraints of US export controls. The PRC has also attempted to acquire information from the United States and other countries about the design and manufacturing of military helicopters. The PRC could also use this approach to acquire chemical and biological weapons technology.

# 2NC – AT: Perm Do CP

**Perm is severance and negates the resolution --- Coast Guard is part of the military whereas the resolution mandates that the affirmative defends non-military exploration or development**

**US Coast Guard ’14 (U.S. Dept. of Homeland Security,** “About Us: Overview of the United States Coast Guard”, http://www.uscg.mil/top/about/)

The U.S. Coast Guard is one of the five armed forces of the United States and the only military organization within the Department of Homeland Security. Since 1790 the Coast Guard has safeguarded our Nation's maritime interests and environment around the world. The Coast Guard is an adaptable, responsive military force of maritime professionals whose broad legal authorities, capable assets, geographic diversity and expansive partnerships provide a persistent presence along our rivers, in the ports, littoral regions and on the high seas. Coast Guard presence and impact is local, regional, national and international. These attributes make the Coast Guard a unique instrument of maritime safety, security and environmental stewardship.

**Severance is a voting issue for fairness and ground – makes the aff a moving target and destroys clash**

# 1NC – China REM DA (1/3)

**China controls the market now because of a lack of US competition**

**Nicoletopoulos 11 -** consultant with Natural Resources GP Consulting Services(Vasili, “Rare earths: supply, demand, and politics”, Industrial Minerals, http://search.proquest.com.proxy.lib.umich.edu/docview/880985489?pq-origsite=summon)

REE are not rare at all, but are difficult to exploit owing to geographical and mineralogical distribution, often remote locations, specialised technology required in processing, and, increasingly, environmental concerns. China's share of world reserves is probably lower than 40%, with large unexploited deposits found in the USA, Australia, Russia and other CIS countries. Reserve estimates for proven industrial REE oxide (REO) vary widely. For China, they range from 27m. to 52m. tonnes. Estimates for Russia also differ, from "28m. tonnes ahead of China" to "about 19m. tonnes including CIS countries". REE mines in China have an abundance of heavier REE, while many of the projects elsewhere are overweight in light REE. Over 50% of the reserves in Bayan Obo, Baotou, in Inner Mongolia, China comprise cerium, while the majority in Mountain Pass, California consist of lanthanum and yttrium. In 2009, production of REO comprised: China 120,000 tonnes, India 2,700 tonnes, Brazil 700 tonnes, and Malaysia 400 tonnes. Thus, China produces more than 95% of the world total. Baotou itself reports production of 55,000 tpa of processed REE, about 44% of global production. The USA and Europe have no REE production but operate processing facilities.

**AUVs in the US explicitly destroy the Chinese industry**

**Green,** Senior Editor-in-Chief at Robotics Business Review, **14** (Tom, 5-12-14, Robotics Business Review, “Deep Sea Dive for Rare Earth Elements”, http://www.roboticsbusinessreview.com/article/deep\_sea\_dive\_for\_rare\_earth\_elements)

After a year of falling prices and depleting customer inventories, buyers of Rare Earth Elements (REEs) are coming back into this $10B market, but now supplies are getting scarce and prices are beginning to soar. With populations consuming metals and minerals on the rise, especially new middle-class consumers in China and India, demand is set to skyrocket. Future supply chains and national economies will witness major disruptions, according to a PricewaterhouseCoopers (PwC) study: Minerals and metals scarcity in manufacturing: The ticking time bomb. Three deep-ocean mining companies, Nautilus Minerals; UK Seabed Resources (the British division of Lockheed Martin); and DeepGreen Resources, plan to mine the sea floor under the Pacific Ocean (most notably in the Bismarck Sea off Papua New Guinea) using a combination of remotely operated or autonomous underwater vehicles, pumps, suction and riser pipes to extract the minerals. These REEs, with odd monikers like lanthanum, cerium, praseodymium, promethium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium, are not household names, but what they do makes every household—and the people in those households—live better lives. For example, most of our fancy electronic gadgets—like our Smartphones and laptops—depend on REEs to operate. Better yet for this Pacific sea hunt, the REEs aren’t alone on the sea floor: “staggering” levels of magnesium, gold, silver, cobalt, nickel and copper are there for the taking as well; much of which are easy pickings as mineral-rich nodules scattered over the sea bottom. Frontrunner: Nautilus Minerals Of the three contenders, the Canadian company, Nautilus Minerals (TSX:NUS), is the more ready to mine. “Nautilus plans to deploy three machines, operated by remote control. Operators sitting on a ship stationed above the deposit will control mine-bots on the seafloor: an initial cutter for clearance; a bulk cutter to do most of the work; and a machine to collect and transport the material to a pumping station. slurry ship “The material will then be pumped up in slurry form to the ship, where it will be de-watered and set to shore for processing. For nodules, robots will roam the seabed.” Critical to high-tech everything REEs are metals with unique physical, chemical and light-emitting properties vital to hybrid vehicles, rechargeable batteries, wind turbines (renewable energy) mobile (cell) phones, compact fluorescent light bulbs, laptop computers, disk drives, catalytic converters, and LED, Plasma, and LCD display panels. Neodymium, for example, is responsible for ensuring that the likes of Smartphones, hard drives, earphones, even MRI scanners, do the job they are designed to do. Far from abundant on land With over 30 percent of the world’s known REE deposits and by far the cheapest extraction process, China supplies 95 percent of the world’s REEs. However, China, with a rising middle class and booming domestic market, is steadily reducing export quotas. The Word Trade Organization (WTO), of which China is a

# 1NC – China REM DA (2/3)

**<<<CONTINUED --- NO TEXT DELETED>>>**

member, ruled in March of 2014 that China was hoarding and taking unfair advantage of the market. That decision was two years in coming, and now China will appeal the current WTO judgment, which might take another two years. Byron Capital analyst, John Hykawy said “I’ve heard from so many critical materials buyers at large corporations that they want security of supply. And security of supply to them means avoiding Chinese supply at all costs because they got fooled once. They don’t want to get fooled again.” 2- to 3-miles down: REEs not alone on the seabed In the meantime, REEs are again getting to be in short supply, and with demand forecast to progressively increase, the world drastically needs new suppliers of REEs. The London Metal Exchange lists neodymium at $800 Kg; terbium metal at 1,900 Kg; and scandium metal 15,500.00 per Kg. Relatively inexpensive is lanthanum at $13 Kg. However, the battery in a Toyota Prius hybrid requires more than 10kg of lanthanum. Now multiply $130 times millions of Toyota’s and the need for lots of lanthanum comes into focus. Stephen Ball, chief executive officer of Lockheed Martin UK, owner of UK Seabed Resources, told the BBC “It’s another source of minerals – there’s a shortage and there’s difficulty getting access, so there’s strategic value for the UK government in getting an opportunity to get these minerals.” UK Seabed Resources says surveys have revealed huge numbers of nodules – small lumps of rock rich in valuable metals – lying on the ocean floor south of Hawaii and west of Mexico. The exact value of these resources is impossible to calculate reliably, but a leading UN official described the scale of mineral deposits in the world’s oceans as “staggering” with “several hundred years’ worth of cobalt and nickel.” “These tennis-ball sized nodules, found approximately four kilometers (2.5 miles) beneath the ocean’s surface, can provide millions of tons of copper, nickel, cobalt and manganese, as well as rare earth minerals, that are used in the construction, aerospace, alternative energy, and communications industries, among others,” reports Lockheed Martin. The Japan Agency for Marine-Earth Science and Technology and the University of Tokyo confirmed the discovery of a “huge new deposit” on the Pacific seabed, claiming the “deposit can be mined at very low cost and will be able to produce materials that are 20 to 30 times more concentrated than those currently being mined in China.” Robot submersibles hold the key Located approximately 5,700 meters or 3.5 miles down, the Japanese scientists “claim the deposits to be approximately 6.8 million metric tons of rare earths, equivalent to 230 years of local demand.” Although subsea mining at depths of 500 feet or less has been carried out for some time, deep sea projects have had to await technology, which is now coming on line, funded by companies like Nautilus Minerals, with subsea robot mining tools built by technology partners like Soil Machine Dynamics.

# 1NC – China REM DA (3/3)

**China’s stranglehold on REMs key to Chinese growth**

**Blakely 12 –** Professor of Public Policy at UMich(Christopher, “Rare Earth Metals & China”, Gerald R. Ford School of Public Policy , http://sites.fordschool.umich.edu/china-policy/files/2012/09/Rare-Earth-Metals-China.pdf)

Export quotas will decrease the supply of rare earths in the world markets. It is expected that the supply shortage will raise intensively among rare earths in 2014, especially the supply of neodymium, europium, terbium, dysprosium and yttrium will be affected.32 This will cause world prices of metals to rise in the short term and become more volatile with respect to China’s alternating export policy in the long term. In contrast to the global market, the export restrictions will promote Chinese producers to use rare earths in order to increase domestic supply in the manufacturing industries. Thereby, this policy would contribute more to the growth of the Chinese economy by accelerating the value-added production in the domestic economy instead of exporting these metals to the world. Apart from this, as rare earths are finite and China technically holds only a share of rare earths globally, the Chinese government might want to use these resources only for developing its domestic manufacturing industries to gain more competitiveness in the markets. In other words, it will want to invest in its future in lieu of present circumstances. The government is also working to block smuggling operations, which combine the rare earth oxides with steel composites to abstain from deductions. When they arrive at the import destination they are then reverse-processed to extract the key elements. According to current data, Japan is a primary principle in this process by purchasing nearly 20% of Chinese rare earth oxides via smuggling.33 In creating and implementing this restrictive export policy with production and transport regulations, the Chinese government is pursuing plans to close small-scale companies and to promote the merging of larger producers as a general tactic to increase its control over the industry and to prevent illegal transactions.34 Regarding China's trade policy, one of the goals of the Chinese government is to draw the attention of the foreign investors from abroad. China is planning to incentivize them to move their production facilities and their technical capabilities to China if they want access to the rare earths market. Thereby, the Chinese firms could further improve their production advantages by benefiting from the high-tech knowledge and skilled human capital of foreign companies. The goal of this policy is made explicit as seen in the statement of the Vice-Chairmen of Inner Mongolia that "we are not taking the short term view of trying to prop up prices. Imposing controls and reducing exports aim to attract more factories using rare earths metals from home and abroad to Inner Mongolia."35 In this way, the Chinese government is gambling to firmly seal its influence and control on the rare earths market by internalizing the production and market for these minerals - though the real benefit of this strategy seems unclear since the export restrictions have only encouraged trading countries to begin redeveloping or building up their own mines and knowledge resources.

**Chinese Economic Decline Causes World War III**

**Plate 3 –** Professor at UCLA(Tom Plate, UCLA professor, neo-cons a bigger risk to Bush than China,” The Straights Times, p Lexis)

But imagine a China disintegrating- on its own, without neo-conservative or Central Intelligence Agency prompting, much less outright military invasion because the economy (against all predictions) suddenly collapses. That would knock Asia into chaos. A massive flood of refugees would head for Indonesia and other places with poor border controls, which don’t’ want them and cant handle them; some in Japan might lick their lips at the prospect of World War II revisited and look to annex a slice of China. That would send Singapore and Malaysia- once occupied by Japan- into nervous breakdowns. Meanwhile, India might make a grab for Tibet, and Pakistan for Kashmir**. Then you can say hello to World War III**, Asia style. That’s why wise policy encourages Chinese stability, security and economic growth – the very direction the White House now seems to prefer.

# 2NC – Uniqueness – AT: No Control Now

**China is the greatest supplier of REMs now and their monopoly is growing**

**Hongpo** **14** – Chinese Analyst of the Rare Earth Market and degree in International Economics & Trade and Political Science, 6/27 (Shen, 6-27-14, Investor Intel, “Japan and the U.S. remain China’s main rare earth importers”, <http://investorintel.com/rare-earth-intel/japan-u-s-remain-chinas-main-rare-earth-importers/#sthash.qAuD51CE.dpuf>)

Japan and the U.S. remain China’s main rare earth importers Driven by the growing demand in high tech applications and lower rare earth prices, China’s rare earth shipments have steadily grown since the start of 2014. China exported a total of 12,505 tons of rare earth ore, metals and compounds in the first five months this year, representing a 60.4% increase from the 7,796 shipped in the same period of 2013 according to statistics released on June 23th by China Customs Statistics Information Center. The data accounts for approximately 80.7% of the country’s export quotas, therefore, it is expected that the actual export volume will be within the range of the first batch of rare earth export quotas. (China’s Ministry of Commerce set its first batch of rare earth export quotas for 2014 at 15,500 tons.) China will issue a second batch of rare earth export quotas soon. The total export value of rare earth ore, metals and compounds edged up 0.4% year to year, reaching USD$177.03 million in the five-month period according to official data. Moreover, in the first five months of 2014, Jiangxi’s exports of middle and heavy rare earths dropped 35.6% or 65.7 tons comparing with the same period of last year, while it exported a total of 1,388 tons of light rare earths, representing a 72.93% increase from a year ago. China exported 2,391 of rare earth ore, metals and compounds in May 2014, up by 41.95% year to year from 1,684 tons a year ago, while the export value was at US$39.05 million or US$ 16,331 per ton. Last month, the export volume of rare earths in China was 2,980 tons, sold at an average price of USD$ 13,988.3 per ton. China’s actual volume of rare earth exports for the first five months of 2014 are shown below: From January to April, China exported 4,090.26 tons of Lanthanum oxide; 1,591.75 tons of Cerium carbonate; 527.28 tons of Cerium oxide; 41.38 tons of Praseodymium oxide; 103.73 tons of Neodymium oxide; 289.05 tons of Yttrium oxide; 1,871 kg of Dysprosium oxide; 567 kg of Europium oxide and 4,708 kg of Terbium oxide respectively. Customs data also showed that over 29 countries and regions imported rare earths from China in the first five months of this year and Japan’s imports of rare earths from China surged 99.22% year over year to 4,664 tons, including 441.9 tons of Lanthanum oxide and 1064.6 tons of Cerium carbonate (in the first four months of this year) The U.S., meanwhile, imported 4,568 tons of rare earths from China, which represents a 57.22% increase compared with the same period in 2013. Of these 2,373.9 tons were Lanthanum oxide and 268.1 tons were Cerium carbonate (in the first four months of this year). Italy imported 691 tons of rare earths, down 5.76% year on year while Germany’s rare earth imports from China rose 757.46% to reach 586 tons over the same period in 2013. Vietnam also imports rare earths from China and its total increased 72.82% year to year, amounting to some 519 tons. The Netherlands imported 442 tons of rare earths from China, representing a 53.68% year to year increase. The six countries and regions cited above, therefore, purchased a total of 11,470 tons of rare earths from China within the January to May period, clearly showing that demand for rare earths has risen sharply. Meanwhile, Japan and the U.S. remain China’s two main rare earths importers, accounting for approximately 73.8% of the country’s total export volume in the first five months of 2014. China, meanwhile, remains the largest producer and consumer of rare earths, accounting for an estimated 83% of global supply and 70% of global demand in 2014, according to the latest report from Roskill Information Services. Currently, the Chinese government is improving the country’s rare earth recycling projects, which will be included into a scheduled management plan, according to China’s Ministry of Industry and Information Technology. In order to protect the environment and resources, China is preparing to adopt a series of new measures to regulate the rare earths industry in the second half of 2014.

# 2NC – Link Wall

**Autonomous underwater vehicles key to inexpensive detection of mineral deposits AND new technology means surveys can be done quickly and accurately**

**Wiltshire 10** – Specialist at Ocean and Resources Engineering [J. C., "MINERAL EXTRACTION, AUTHIGENIC MINERALS." Marine Policy & Economics: A Derivative of the Encyclopedia of Ocean Sciences(2010): 274., Google Books, <http://books.google.com/books?hl=en&lr=&id=dqzXwFsOFMcC&oi=fnd&pg=PA274&dq=(%22Rare+Earth+Elements%22+OR+%22rare+earth+minerals%22)+AND+(%22autonomous+underwater+vehicles%22+OR+%22Autonomous+Benthic+Explorer%22)&ots=PIzchVTPjs&sig=C1I_dhR2fdZIW6VUSsl3m8t-n44#v=onepage&q&f=false>, pg 276]

The first step in minerals development is to find an economic mine site. This is found by surveying and mineral sampling. A great deal of mineral sampling has already been done over the last 40 years throughout the world’s ocean. These data are available for initial planning purposes. Following a detailed literature review the prospective ocean miner would send out a research vessel to sample extensively in the areas under consideration. New acoustical techniques can be calibrated to show certain kinds of bottom cover, including the density of manganese nodule cover. This is one way to rapidly survey the bottom to highlight the areas with potentially economic accumulation of authigenic minerals. Significant advances in marine electronics, navigation, and autonomous underwater vehicles (AUVs) are being brought together. New “chirp” sonars which transmit a long pulse of sound in which the frequency of the transmitted pulse changes linearly with time give high resolution and long-range seafloor and sub-bottom imagery. Navigation based on the satellite global positioning system (GPS) can now give accurate underwater positions (≤1m) when linked to an acoustic relay. This level of survey equipment is now available on underwater autonomous vehicles, meaning that the cost of a ship is not necessarily an impediment. Sampling for metal concentrations follows the initial surveys. Sampling may be from a ship, a remotely operated vehicle (ROV), or a submersible. Sampling is likely to begin with dredges, progress to some kind of coring, and finish with carefully oriented drilled samples giving a three-dimensional picture of the ore distribution. These data, after chemical analysis of the contained metals, will give grade and tonnage information. The grade and tonnage estimates of the deposit will be entered into a financial model to determine whether it is economically profitable to mine a given deposit.

# 2NC – XT: China Econ Impact – REMs Key

**Reverse causal – drop in prices kills the Chinese economy**

**Nicoletopoulos 11 -** consultant with Natural Resources GP Consulting Services(Vasili, “Rare earths: supply, demand, and politics”, Industrial Minerals, http://search.proquest.com.proxy.lib.umich.edu/docview/880985489?pq-origsite=summon)

On the positive side for ROW, if illegal mining and smuggling in China are taken into account, Chinese production and exports are considerably higher than officially reported. Also, the US Pentagon is distancing itself from the "strategic danger" rhetoric. Non-Chinese companies for some time have been able to secure REE by operating in China, to benefit from cheaper REE prices in the country, eg. French REE processor Rhodia (recently acquired by Solvay SA) runs a processing plant near Baotou. Furthermore, German wind turbine producers say they are not using magnets containing neodymium in their turbines, and that only 5% of wind turbines in Germany consume REE. Any new REE projects which might come on stream internationally might cause overcapacity, especially if/when they coincide with an abrupt deceleration of the Chinese economy, and a negative effect on world commodity demand and prices. Another potential threat is if China were to turn around and bring prices back down. Nevertheless, many countries have been officially opposing the 2010-2011 Chinese REE policies. They have been pressuring the Chinese to relax their export restrictions, and stimulating supply outside China by supporting the discovery and development of REE domestically or through international cooperation agreements. The USA, aiming at energy independence, considers crucial the promotion of alternative sources of power generation. The government estimates that many REE applications are highly specific, and substitutes are either inferior or unavailable. In early October 2010, the US House of Representatives passed the REE and Critical Materials Revitalisation Act "to reestablish the US as a leading producer of REE, to make it self-sufficientE. and to never be dependent on China for crucial components for national security".

**“Heart of the Chinese economy” dependent on low REM prices**

**Rowlatt 14 –** Reporter for the BBC(Justin, “Rare earths: Neither rare, nor earths”, BBC world service, http://www.bbc.com/news/magazine-26687605)

The problem is getting hold of the rare earths that make this possible. More than 85% of the world's supply of rare-earth metals comes from China. And practically 100% of the "heavy" rare earths - at the farther end of the periodic table - come from China, including Stiesdal's dysprosium. China has some very rich deposits of rare earths in Inner Mongolia. And, until recently, China has not been very squeamish about the consequences of rare-earth extraction. It is a very dirty business. Rare earths are often found with radioactive elements like thorium and uranium, and separating them out requires a lot of toxic chemicals. Jack Lifton, founder of Technology Metals Research and an expert on rare earths, describes how, in China, the process of extraction involves leaching out the elements. They flood the high ground with chemicals, he says, and then precipitate out the metals, leaving behind a lake of carcinogenic waste fluids. In recent years China has been trying to clean the industry up. But it can't actually stop production, because many of the hi-tech industries at the heart of the Chinese economy rely on rare-earth supplies. Just how dependent the entire world is on Chinese rare earths became very clear at the end of 2010 when China threatened to restrict supplies. The spike in rare-earth prices was very dramatic - up to 3,000% for some of them.

# 2NC – XT: China Econ Impact – AT: No Escalation

**China economic contraction causes global depression, Taiwanese invasion, and backsliding into authoritarianism.**

**Lewis 7 –** Director of the Economic Research Council[Dan, “The Nightmare of a Chinese Economic Collapse,” World Finance, 4-19-07, http://www.worldfinance.com/news/137/ARTICLE/1144/2007-04-19.html]

According to Professor David B. Smith, one of the City’s most accurate and respected economists in recent years, potentially far more serious though is the impact that Chinese monetary policy could have on many Western nations such as the UK. Quite simply, China’s undervalued currency has enabled Western governments to maintain artificially strong currencies, reduce inflation and keep interest rates lower than they might otherwise be. We should therefore be very worried about how vulnerable Western economic growth is to an upward revaluation of the Chinese yen. Should that revaluation happen to appease China’s rural poor, at a stroke, the dollar, sterling and the euro would quickly depreciate, rates in those currencies would have to rise substantially and the yield on government bonds would follow suit. This would add greatly to the debt servicing cost of budget deficits in the USA, the UK and much of Euro land. A reduction in demand for imported Chinese goods would quickly entail a decline in China’s economic growth rate. That is alarming. It has been calculated that to keep China’s society stable – ie to manage the transition from a rural to an urban society without devastating unemployment - the minimum growth rate is 7.2 percent. Anything less than that and unemployment will rise and the massive shift in population from the country to the cities becomes unsustainable. This is when real discontent with communist party rule becomes vocal and hard to ignore. It doesn’t end there. That will at best bring a global recession. The crucial point is that communist authoritarian states have at least had some success in keeping a lid on ethnic tensions – so far. But when multi-ethnic communist countries fall apart from economic stress and the implosion of central power, history suggests that they don’t become successful democracies overnight. Far from it. There’s a very real chance that China might go the way of Yugoloslavia or the Soviet Union – chaos, civil unrest and internecine war. In the very worst case scenario, a Chinese government might seek to maintain national cohesion by going to war with Taiwan – whom America is pledged to defend. Today, people are looking at Chang’s book again. Contrary to popular belief, foreign investment has actually deferred political reform in the world’s oldest nation. China today is now far further from democracy than at any time since the Tianneman Square massacres in 1989. Chang’s pessimistic forecast for China was probably wrong. But my fear is there is at least a chance he was just early.

**Alternative to Chinese growth’s internal war**

**Kane and Serewicz ‘1**

**[Thomas. Security Studies from Hull. And Lawrence – Foreign Policy Analyst “China's Hunger: The Consequences of a Rising Demand for Food and Energy” Parameters, Fall 2001 Ebsco]**

Despite China's problems with its food supply, the Chinese do not appear to be in danger of widespread starvation. Nevertheless, one cannot rule out the prospect entirely, especially if the earth's climate actually is getting warmer. The consequences of general famine in a country with over a billion people clearly would be catastrophic. The effects of oil shortages and industrial stagnation would be less lurid, but economic collapse would endanger China's political stability whether that collapse came with a bang or a whimper. PRC society has become dangerously fractured. As the coastal cities grow richer and more cosmopolitan while the rural inland provinces grow poorer, the political interests of the two regions become ever less compatible. Increasing the prospects for division yet further, Deng Xiaoping's administrative reforms have strengthened regional potentates at the expense of central authority. As Kent Calder observes, In part, this change [erosion of power at the center] is a conscious devolution, initiated by Deng Xiaoping in 1991 to outflank conservative opponents of economic reforms in Beijing nomenclature. But devolution has fed on itself, spurred by the natural desire of local authorities in the affluent and increasingly powerful coastal provinces to appropriate more and more of the fruits of growth to themselves alone.[ 49] Other social and economic developments deepen the rifts in Chinese society. The one-child policy, for instance, is disrupting traditional family life, with unknowable consequences for Chinese mores and social cohesion.[ 50] As families resort to abortion or infanticide to ensure that their one child is a son, the population may come to include an unprecedented preponderance of young, single men. If common gender prejudices have any basis in fact, these males are unlikely to be a source of social stability. Under these circumstances, China is vulnerable to unrest of many kinds. Unemployment or severe hardship, not to mention actual starvation, could easily trigger popular uprisings. Provincial leaders might be tempted to secede, perhaps openly or perhaps by quietly ceasing to obey Beijing's directives. China's leaders, in turn, might adopt drastic measures to forestall such developments. If faced with internal strife, supporters of China's existing regime may return to a more overt form of communist dictatorship. The PRC has, after all, oscillated between experimentation and orthodoxy continually throughout its existence. Spectacular examples include Mao's Hundred Flowers campaign and the return to conventional Marxism-Leninism after the leftist experiments of the Cultural Revolution, but the process continued throughout the 1980s, when the Chinese referred to it as the "fang-shou cycle." (Fang means to loosen one's grip; shou means to tighten it.)[ 51] If order broke down, the Chinese would not be the only people to suffer. Civil unrest in the PRC would disrupt trade relationships, send refugees flowing across borders, and force outside powers to consider intervention. If different countries chose to intervene on different sides, China's struggle could lead to major war. In a less apocalyptic but still grim scenario, China's government might try to ward off its demise by attacking adjacent countries.

# 2NC – XT: China Econ Impact – CCP Collapse Impact (1/4)

**Economic contractions de-stabilize the CCP – growth is key to their legitimacy**

**Abebe et al ‘10** [Dan – Prof Law @ U of C Law. “International Agreements, Internal Heterogeneity, and Climate Change: The “Two Chinas” Problem” The Virginia Journal of Intl Law, Vol 50. Winter 2010 ln]

First, since the collapse of the Marxist-Leninist ideology that served as the basis for the party's authority, the CCP has adopted economic growth as the central justification for its one-party rule. The CCP has pegged its political future to a type of "performance legitimacy" n12 - it governs because it can provide faster growth and higher standards of living than any alternative form of central authority. In Eastern China, the CCP's approach has been a nearly unqualified success. Special coastal economic zones, favorable banking policies, and massive decentralization of government have combined to spur blistering economic growth. Western China, however, has been left starkly behind: per capita gross domestic product (GDP) in Western China is less than half of what it is in Eastern China. The result has been rising income inequality, social instability, and dramatic divisions between East and West, rural and city, and peasants and urban residents, along with the creation of a roaming underclass of Western Chinese seeking work in the coastal cities. n13 Worse still, these social schisms coincide with ethnic and religious fault lines: Western China is home to many ethnic minority groups that harbor substantial animosity toward CCP rule. Poorer conditions in the West have created the political environment for the emergence of separatist movements. Brisk economic growth in Western China has thus become a political imperative for the CCP, and the CCP has [\*330] prioritized it accordingly. China is likely to balk at any international agreement that might imperil this growth. Second, as a result of its growth-driven delegation of power, the CCP suffers from a surprising (for such a centralized government) erosion of state capacity: the provinces often ignore the central government's directives, frequently without meaningful consequences. n14 The political structure of the CCP and the institutional structure of China's government are sometimes overlapping or redundant and, in many places, lack effective vertical or horizontal accountability. The environmental regulatory agencies are often subordinate to the very agencies they are intended to regulate. Province-level CCP officials are often evaluated (both locally and in Beijing) by their ability to produce high levels of economic growth, not their commitment to environmental protection. Although the CCP has recently tried to recentralize power and rationalize the governance structure, n15 the center's capacity to enforce environmental regulations on the provinces is much weaker than in a typical industrialized state. The existing structural relationship between the provinces and Beijing often results in a chronic inability on the part of the CCP to provide public goods like environmental protection, an inability it will not be able to reverse without incurring substantial costs. Finally, there is reason to believe that the vast majority of economic and scientific projections have substantially underestimated China's future carbon emissions by failing to account for heterogeneity among provinces. Eastern China is already highly industrialized and reasonably wealthy; there is every reason to expect that it will begin to move towards cleaner technologies and shift economic production away from industry and towards services (which are generally less energy and carbon-intensive). n16 Western China, by contrast, is poorer and more agrarian, and the typical development pattern for such an area involves a shift towards greater industrialization and higher per capita energy consumption (and carbon production). Indeed, this is precisely the direction in which Western China is moving. n17 Every quantitative forecast of Chinese emissions - save for two important exceptions - uses only national-level data, a methodological weakness that can wash out distinctions between East and West. Of the [\*331] two studies that employ sub-national data, one projects higher emissions than any of the national-level studies; the other projects much higher emissions than any other study. n18 We read this as suggesting that Chinese carbon emissions over the forthcoming several decades may be significantly greater than the standard models have anticipated, with correspondingly higher costs to China from any agreement to curb carbon emissions. In light of the importance of economic growth to the CCP, the internal structure of Chinese governance, and the need to develop Western China, the prospects for China choosing to join such an agreement in the immediate future seem slim. This Article proceeds in four parts. Part I focuses on the general importance of economic growth to the CCP, the distribution of growth within China, and the social and economic difficulties generated by the CCP's hyper-growth policies. Part II analyzes the CCP's internal environmental enforcement capacity and argues that China would encounter substantial domestic challenges in implementing a climate accord, even if it chooses to sign one. Part III critiques the assumptions underlying quantitative forecasts of Chinese carbon emissions and suggests that future emissions may exceed conventional projections by substantial margins. Part IV canvasses extant potential frameworks for an international climate change agreement and argues that they are likely to be unsuitable to one or more of the relevant parties. Our conclusion is a pessimistic one: it will be difficult to convince China to join a meaningful international climate agreement in the near future under the best of circumstances. The Two Chinas, coupled with China's internal political dynamics, present circumstances that are hardly ideal. I. The Chinese Growth Imperative Modern China has reinvented itself on a foundation of kudzu-like economic growth. Where Marxism once served as the unifying national ideology, the CCP has substituted wealth generation and prosperity as the touchstones of the regime and suggested that the Chinese people judge the legitimacy of CCP rule by the increases in their own standards

# 2NC – XT: China Econ Impact – CCP Collapse Impact (2/4)

**<<<CONTINUED --- NO TEXT DELETED>>>**

of living. Economic growth in China has been spectacular, but it has also been highly uneven. Eastern, coastal provinces have become wealthy, while central and western provinces have lagged far behind. In effect, there is no longer simply "China." There is now Eastern China, which is urban, industrialized, and relatively prosperous, and Western China, [\*332] which is rural, agrarian, and relatively poor. This divergence in economic outcomes - a divergence that in places coincides with pre-existing ethnic and religious fault lines - poses a serious threat to social stability within China. n19 In response, the CCP has begun an aptly named "Western Development Program" in an attempt to prioritize economic growth, encourage national integration, and curb nationalist unrest in Western provinces. Accordingly, the governing regime will be reluctant to join a climate agreement that might contribute to greater instability by stunting crucial economic development in Western China. A. Foundations of CCP Rule: Economic Growth Since 1949, China has been governed by the autocratic CCP, dominated by Chairman Mao's conception of Marxism and designed to bring "socialist glory" to China while preserving party rule. After the Cultural Revolution and Mao's death in 1976, however, the CCP, led by Deng Xiaoping, began to move away from the Marxist ideological foundation that served as the legitimating discursive force for CCP authority. n20 Concerned with increasing levels of apathy toward communism and questions about its efficacy as the governing regime, n21 the CCP turned to two new sources of authority and legitimacy to galvanize support among the populace and strengthen its hold on power. The first of these was a new Chinese nationalism. The second was an emphasis on continued economic growth - a type of "performance legitimacy" n22 - as a benchmark and measure of the regime's success. From the late 1970s until the suppression of student-led democratic protests in Tiananmen Square in 1989, Deng and the CCP moved slowly toward a reform of China's centralized economic policies and internal governance structure. Deng and some of the reformers began to argue that the Chinese people wanted a higher standard of living, technological dynamism, and economic efficiency, not more ideology and excessive bureaucracy. To be economically successful, they argued, China needed the CCP's one-party rule to ensure stability and regain international prestige. In the words of one scholar, "in the most fundamental sense ... China's economic reform strategy has been guided by a strategic [\*333] vision at the top of the political system. This vision links China's security, global influence, and domestic stability to the state of its economy." n23 Sustained economic growth is paramount for the continuation of the CCP, the maintenance of China's territorial integrity, and the pursuit of China's national interests in international politics. n24 The CCP's reform strategy has been marked by incremental opening of the domestic economy, beginning with agriculture in the late 1970s and continuing through China's accession to the World Trade Organization (WTO) in 2001. n25 During the 1980s, the CCP delegated a significant amount of authority from the central government to the provinces and cities, freeing local actors - province and city-level officials - to develop policies that encouraged economic growth independent of the center. n26 After a temporary delay in reforms after Tiananmen Square, the 1990s saw the CCP commit to the creation of a market system, the privatization of some state-owned enterprises, and the development of the private sector. At the turn of the century, the CCP began to embrace private entrepreneurs and "retreat from economic administration to economic regulation as the core economic function of government." n27 From a national perspective, the CCP's economic reforms are an unqualified success. Fueled by these reforms, the Chinese economy has produced tremendous economic growth and a rapidly improving standard of living for many of China's citizens (in addition to severe consequences for the environment). Between 1978 and 2000, "overall per capita gross domestic product (GDP) in constant yuan roughly quadrupled." n28 Today, China has the world's second largest economy by purchasing power parity, surpassing Japan, India, and Germany. n29 It has the world's largest foreign capital reserves. n30 It enjoys a trade surplus of [\*334] $ 163.3 billion with the United States. n31 It is a leading destination for foreign direct investment, n32 and has become more integrated into the world economy through its membership in the WTO. By almost every economic measure, the CCP's economic policies and drive for modernization have produced tremendous aggregate gains for China and its citizens. The CCP's policies have also created a consumer society in the formerly Marxist China. From telephones to televisions, newspapers to the internet, and automobiles to overseas travel, the CCP has brought to the Chinese people access to information, goods, and technology that were unimaginable during the Maoist era. n33 The CCP's economic policies have reduced the role of the state in the affairs of daily life, leaving ordinary citizens more free to engage in social and economic activities. In so doing, the CCP has reinforced the norm that prioritizing hyper-growth polices and ensuring economic development are the party's overriding responsibilities. China is hardly unique in favoring continued economic growth; there are few nations on earth that are not attempting to grow their economies and produce wealth for their citizens. In China, however, economic growth is not merely a matter of policy. Growth, particularly in certain geographic regions, is viewed by the CCP as a political imperative, integral to the regime's survival. As subsequent discussion will demonstrate, this focus on economic growth significantly impacts the CCP's incentives to curb environmental degradation and reduce greenhouse gas emissions.

# 2NC – XT: China Econ Impact – CCP Collapse Impact (3/4)

**CCP Collapse causes nuclear and biological warfare**

**Renxing 5** (San, Epic Times Staff Member, The CCP’s Last-ditch Gamble: Biological and Nuclear War, 8/5/5, The Epoch Times,<http://english.epochtimes.com/news/5-8-5/30975.html>)

As *The Epoch Times*’ *Nine Commentaries on the Communist Party* spreads ever wider in China, the truth it speaks is awakening Chinese people to the true nature of the Chinese Communist Party (CCP) and inspiring them to cancel their Party memberships. With the number of people quitting the Party growing rapidly by the day, the Communist Party sees that the end is near. In a show of strength to save itself from demise, the CCP has brought out a sinister plan that it has been preparing for years, a last-ditch gamble to extend its life. This plan is laid out in two speeches written by Chi Haotian, Minster of Defense and vice-chairman of China’s Central Military Commission, and posted on the Internet. The background surrounding the speeches is still shrouded in mystery. The titles of the two speeches are “[War Is Approaching Us](http://english.epochtimes.com/news/5-8-4/30974.html)” [[1]](http://english.epochtimes.com/news/5-8-5/30975.html#1) and “[War Is Not Far from Us and Is the Midwife of the Chinese Century](http://english.epochtimes.com/news/5-8-4/30974.html).” The two, judging from their similar contexts and consistent theme, are indeed sister articles. These speeches describe in a comprehensive, systematic, and detailed way the CCP’s nearly 20 years of fear and helplessness over its doomed fate, and its desperate fight to extend its life. In particular, the speeches lay uncharacteristically bare what is really on the CCP’s mind and hide nothing from the public—a rare confession from the CCP that can help people understand its evil nature. If one truly understands what is said in this confession, one will immediately catch on to the CCP’s way of thinking. In short, the speeches are worth reading, and I would like to comment on them. I. A Gangster Gambles with the World as His Stake, and the Lives of People in this Global Village Become Worthless What, then, is the gist of this wild, last-ditch gamble? To put it in a few words: A cornered beast is fighting desperately to survive in a battle with humanity. If you don’t believe me, read some passages directly from the speeches. 1) “We must prepare ourselves for two scenarios. If our biological weapons succeed in the surprise attack [on the US], the Chinese people will be able to keep their losses at a minimum in the fight against the U.S. If, however, the attack fails and triggers a nuclear retaliation from the U.S., China would perhaps suffer a catastrophe in which more than half of its population would perish. That is why we need to be ready with air defense systems for our big and medium-sized cities. Whatever the case may be, we can only move forward fearlessly for the sake of our Party and state and our nation’s future, regardless of the hardships we have to face and the sacrifices we have to make. The population, even if more than half dies, can be reproduced. But if the Party falls, everything is gone, and forever gone!” 2) “In any event, we, the CCP, will never step down from the stage of history! We’d rather have the whole world, or even the entire globe, share life and death with us than step down from the stage of history!!! Isn’t there a ‘nuclear bondage’ theory? It means that since the nuclear weapons have bound the security of the entire world, all will die together if death is inevitable. In my view, there is another kind of bondage, and that is, the fate our Party is tied up with that of the whole world. If we, the CCP, are finished, China will be finished, and the world will be finished.” 3) “It is indeed brutal to kill one or two hundred million Americans. But that is the only path that will secure a Chinese century, a century in which the CCP leads the world. We, as revolutionary humanitarians, do not want deaths. But if history confronts us with a choice between deaths of Chinese and those of Americans, we’d have to pick the latter, as, for us, it is more important to safeguard the lives of the Chinese people and the life of our Party. That is because, after all, we are Chinese and members of the CCP. Since the day we joined the CCP, the Party’s life has always been above all else!” Since the Party’s life is “above all else,” it would not be surprising if the CCP resorts to the use of biological, chemical, and nuclear weapons in its attempt to extend its life. The CCP, which disregards human life, would not hesitate to kill two hundred million Americans, along with seven or eight hundred million Chinese, to achieve its ends. These speeches let the public see the CCP for what it really is. With evil filling its every cell the CCP intends to wage a war against humankind in its desperate attempt to cling to life. *That* is the main theme of the speeches. This theme is murderous and utterly evil. In China we have seen beggars who coerced people to give them money by threatening to stab themselves with knives or pierce their throats with long nails. But we have never, until now, seen such a gangster who would use biological, chemical, and nuclear weapons to threaten the world, that they will die together with him. This bloody confession has confirmed the CCP’s nature: That of a monstrous murderer who has killed 80 million Chinese people and who now plans to hold one billion people hostage and gamble with their lives.

# 2NC – XT: China Econ Impact – CCP Collapse Impact (4/4)

**Collapse of the Chinese government causes border conflict with Russia**

**Lo and Rothman 6** [Bobo Lo and Andy Rothman, May 2006, Asian Geopolitics, special report http://findarticles.com/p/articles/mi\_7057/is\_2\_9/ai\_n28498825/pg\_17/]

The second scenario for strategic conflict is predicated on a general collapse of law and order in China. With no effective central authority to contain the anarchy, millions of Chinese could cross the border into the Russian Far East. This would lead to tensions and clashes, at first sporadic and random, but subsequently escalating into interstate conflict.

**Nuclear winter**

**Sharavin 01** [Alexander, What the Papers Say, 10-3-01, The Third Threat]

Russia may face the “wonderful” prospect of combating the Chinese army, which, if full mobilization is called, is comparable in size with Russia’s entire population, which also has nuclear weapons (even tactical weapons become less strategic if states have common borders) and would be absolutely insensitive to losses (even a loss of a few million of the servicemen would be acceptable for China). Such a war would be more horrible than the World War II. It would require from our state maximal tension, universal mobilization and complete accumulation of the army military hardware, up to the last tank or a plane, in a single direction (we would have to forget such “trifles” like Talebs and Basaev, but this does not guarantee success either). Massive nuclear strikes on basic military forces and cities of China would finally be the only way out, what would exhaust Russia’s armament completely. We have not got another set of intercontinental ballistic missiles and submarine-based missiles, whereas the general forces would be extremely exhausted in the border combats. In the long run, even if the aggression would be stopped after the majority of the Chinese are killed, our country would be absolutely unprotected against the “Chechen” and the “Balkan” variants both, and even against the first frost of a possible nuclear winter.

# 2NC – XT: China Econ Impact – Turns Global Economy

**China key to the global economy**

**Hoge 4** – Editor of Foreign Affairs Magazine (James Hoge, Editor of Foreign Affairs. Foreign Affairs, July-August , 2004, p. 48)

Nevertheless, China's own extraordinary economic rise is likely to continue for several decades -- if, that is, it can manage the tremendous disruptions caused by rapid growth, such as internal migration from rural to urban areas, high levels of unemployment, massive bank debt, and pervasive corruption. At the moment, China is facing a crucial test in its transition to a market economy. It is experiencing increased inflation, real-estate bubbles, and growing shortages of key resources such as oil, water, electricity, and steel. Beijing is tightening the money supply and big-bank lending, while continuing efforts to clean up the fragile banking sector. It is also considering raising the value of its dollar-pegged currency, to lower the cost of imports. If such attempts to cool China's economy -- which is much larger and more decentralized than it was ten years ago, when it last overheated -- do not work, it could crash. Even if temporary, such a massive bust would have dire consequences. China is now such a large player in the global economy that its health is inextricably linked to that of the system at large. China has become the engine driving the recovery of other Asian economies from the setbacks of the 1990s. Japan, for example, has become the largest beneficiary of China's economic growth, and its leading economic indicators, including consumer spending, have improved as a result. The latest official figures indicate that Japan's real GDP rose at the annual rate of 6.4 percent in the last quarter of 2003, the highest growth of any quarter since 1990. Thanks to China, Japan may finally be emerging from a decade of economic malaise. But that trend might not continue if China crashes.

# 2NC – China Influence Impact (1/4)

**Rare earths key to Chinese regional strategy – they will fight for control over the market**

**Marketos 12** - writer-analyst specialising in Eurasia geopolitics. He works for the Hellenic Ministry of Foreign Affairs and is a lecturer in the Athens, Greece

(Thrassy, “CHINESE STRATEGY TOWARD CENTRAL AND SOUTH ASIA: ENERGY INTERESTS AND ENERGY SECURITY”, East View Information Services, http://dlib.eastview.com.proxy.lib.umich.edu/browse/doc/28307747)

Concerns about supply stability, cost, and resource distribution have led to a greater emphasis on resource diplomacy. Due to the interconnectedness of these issues, there has been a rise in their implementation as instruments of foreign policy. Also, as a result of the projected future rise in the global demand for energy resources, supply might become constrained. A meaningful example can be borrowed from China's strategic use of its rare earth elements (REEs). At the moment, China provides 97% of the world's rare earth elements. This creates the use of REEs as a diplomatic bargaining tool, much like Russia has used oil and gas supplies to pressure European countries. China has indicated it will not use REEs in such a manner, yet in 2011 it suspended exports to Japan after a territorial row regarding claims to the Senkaku Islands and accompanying exclusive economic zone (EEZ) in the East China Sea, which reached a climax in 2010 after a fishing boat collision. China might not have control over the sea lanes that provide its oil, gas, and resource supplies, but it can use its REEs as means of political leverage while it retains a monopoly over the market. REEs such as lanthanum and cerium are vital for the petroleum refining industry and are used as fluid catalytic cracking units. If REE export quotas are reduced, this will impact on the price of gasoline production. Paradoxically, REEs are a fundamental component for many green technologies needed to break out of oil-cycle fuel dependence.3 It remains extremely unlikely that China will go to war over resource issues alone as hostilities would be a severe obstacle to the prosperity of the codependent economies of China, the U.S., and other countries across the region and the world. China further needs sustained economic growth to fuel its military buildup. A major threat for the Chinese Communist Party is the fear that regional and global powers may work to boycott or blunt China's economic success. Prosperity has somewhat elevated domestic unrest, making continued growth a necessity.4 Chinese academic Gong Jianhua said in 2011 that China's "territorial sovereignty, strategic resources, and trade routes comprise its core interests, and like any other country China will never compromise them." According to Chinese analysts, lack of resources and lack of trust can lead to future wars. Of these two causes, the access and control of resources will be the most fundamental. Yet in the case of energy security in the South China Sea (SCS), both trust and resource-access appear equally important. Trust is decidedly lacking in all the parties concerned. China will not rely on the U.S. Navy to patrol and police the high seas and mediate rivalries with other powers. It will therefore increasingly try to protect and assume control over its SLOC.5 On the other hand, Central Asia and Afghanistan-areas that are the predominant focus of interest of Beijing's inland energy security pattern (as will be explicitly referred to below)-are areas that could either function as a tool in a containment strategy by the West or Russia or as a window to Europe, Iran, and the coastal regions in the South. There is a real fear of containment among the Chinese elite, even if it is not necessarily seen as a likely outcome. This is not to say that China views Greater Central Asia (GCA) as its Lebensraum, but more importantly as a strategic region for trade and security in the long term.6 This has, however, resulted in China trying to create an irrevocable presence in the region, both through bilateral relations and through multilateral institutions and its strategy of multilateral diplomacy. China has been relatively successful in expanding its operations space within GCA, despite some noticeable drawbacks.

# 2NC – China Influence Impact (2/4)

**China influence is good- solves international agreements, conflict resolution, globalization**

**Iqbal 14** (Khalid, retired Air Commodore and former assistant chief of air staff of the Pakistan Air Force, a member of the visiting faculty at the PAF Air War College, Naval War College and Quaid-i-Azam University, “Challenges to China’s peaceful rise”, The Nation, [http://www.nation.com.pk/columns/05-May-2014/challenges-to-china-s-peaceful-rise //](http://www.nation.com.pk/columns/05-May-2014/challenges-to-china-s-peaceful-rise%20//) nz)

China’s rapid development has attracted worldwide attention during recent years. In pursuing the goal of rising in peace, the Chinese leadership has strived for improving relations with all the nations of the world. It adheres to a strict policy of strategic self-restraint. While continuing to signal its territorial and economic claims in the East and South China Seas, Beijing has concluded agreements with 12 neighbouring countries over the demarcation of its disputed land border. Chinese government has reiterated time and again that joint development of abundant offshore resources could help overcome disputes. Within the G-20, China plays a pivotal role in shaping the new global order. To become a mainstream player of international economy, it has also joined the World Trade Organization. According to China’s strategic plans, it will take until 2050, before it can be called a modernized, medium-level developed country. China’s rise can be seen as a typical political process. Success of economic development always has attendant political and security implications. China’s stunning economic growth has convinced the West that it is just a matter of time until China becomes a world superpower. There are competing narratives and counter narratives to portray the “China threat” thesis: first, the ideological and cultural factors; Samuel Huntington had added a cultural factor to the rise of China. In his book “The Cash of Civilizations”, he mischievously constructed an “unholy alliance between Islamic and Confucian civilizations”. Secondly, the geopolitical and geo economic perspective has it that even if China sheds off its ideological straitjacket, nationalism may still drive China into a course of clash with the United States; especially if the US refuses to accommodate or share the leadership with China as a rising power. It is not easy for the United States to reconcile with the reality of passing over the mantle of super power, without fighting it out militarily. Due to these considerations, the United States’ China policy often oscillates from demonization to romanticization of China, and from containment to engagement. Strategic response from the US is hazy. In the short run, it is executing a containment policy; and is also bracing up for confrontation, if needed, in the long run. In good sprite, China played down the significance of ties between Tokyo and Washington. A commentary carried by the official Xinhua news agency described Obama’s visit “a carefully calculated scheme to cage the rapidly developing Asian giant”, adding that “the pomp and circumstance Obama receives … cannot conceal the fact that Tokyo has become a growing liability to Washington’s pursuit of long-term interests”. The state-run “Global Times” said in an editorial that the US had “basically recognised a stronger China”, adding that while Washington “explicitly shows favour for Tokyo and Manila” in territorial disputes it had also sought to avoid irritating China due to its economic importance. Obama has come under pressure to demonstrate that the US is serious about its promised strategic “pivot” towards the Asia-Pacific. But he has to tread a fine line between reassuring allies while avoiding harming US ties with China, the world’s second-biggest economy with a growing military presence in the region.“We have strong relations with China, a critical country not just to the region but to the world,” Obama said. “We want to encourage the continued peaceful rise of China, and work together on trade and climate change”, he added. “But what we have also emphasised is that all of us have responsibility to maintain the rule of law – large and small countries have to abide by what is considered just and fair and resolve disputes in a peaceful fashion,” he added, in an apparent reference to China’s dispute with the Philippines over islands in the South China Sea. China has persistently played a positive role during numerous international conflicts and crises, and has earned good repute amongst peace loving nations. China is the pioneer of a new style of constructive diplomacy at the UN, resulting in slashing down of frequency of veto usage by the P-5. China’s role has been quite positive during ongoing conflicts and crises like: Arab spring; Syrian crisis; Crimean conflict; Iranian nuclear deal; post 2014 settlement of Afghanistan etc.Over decades,China’s leadershiphas made its case for peaceful rise by highlighting that China’s development creates great opportunities and that globalization spreads them to all corners of the world. Pakistan wishes china well in its peaceful rise with a word of caution: such efforts may not stay entirely peaceful as economic development and national security are always intricately linked; there is considerable overlapping in these domains, and these generally move in tandem. Economic development needs a secure environment, and a secure environment needs robust economic growth— akin to the chicken and egg analogy.

# 2NC – China Influence Impact (3/4)

**Chinese influence is key to Asian stability**

**Keating 14** (Paul, Prime Minister of Australia 1991-1996, “US and China Must Share Power and China Must Make Japan Feel Safe”, NPQ, <http://www.digitalnpq.org/archive/2014_spring/09_keating.html>)

As power shifts between states, their relationships change, and when power shifts between great powers that changes the whole international order. Today in Asia we are living through and trying to manage the biggest shift in the distribution of wealth and power in a century—maybe the biggest in history. Everything we as leaders and governments work for—peace, stability, prosperity and even, in a nuclear armed world, the avoidance of disaster—depends on the great powers working together effectively to create a new Asian order that reflects and accommodates the new distribution of power, and at the same time preserves the essential features which have underwritten stability in Asia in recent decades. This is going to make big demands on everyone. Middle and smaller powers have their roles to play in supporting, encouraging and warning the big players, but the biggest responsibilities fall on the great powers themselves. In Asia today that means, above all, America and China. A lot of attention has been given to America’s responsibility to respond to China’s rise in a way that genuinely serves the wider interests of regional stability and contributes constructively to building a new order in Asia. That means being willing to accept that it can no longer exercise primacy in Asia as it has for so long. It must be willing to really share leadership with China. But China too has equal responsibility for creating a new, stable and sustainable order in Asia. As it steps up to a larger leadership role it will at the same time need to be willing to accept and respect restraints on the way it uses its immense strength, because the acceptance of such restraints by great powers is the key to any successful and durable international order. There is much evidence that China’s leaders understand all this very clearly. They have for a long time emphasized China’s desire to live in peace with its Asian neighbors: the phrases “peaceful rise,” “harmonious world” and most recently “new mode of great power relations” are well known to us all. But actions speak louder than words, and China’s neighbors are naturally looking to see how China actually uses its power.

# 2NC – China Influence Impact (4/4)

**Asian instability causes extinction—outweighs other scenarios**

**Mead 10** (Mead, senior fellow @ the Council on Foreign Relations, 2010 Walter, American Interest, “Obama in Asia”, http://blogs.the-american-interest.com/wrm/2010/11/09/obama-in-asia/)

The decision to go to Asia is one that all thinking Americans can and should support regardless of either party or ideological affiliation.  East and South Asia are the places where the 21st century, for better or for worse, will most likely be shaped; economic growth, environmental progress, the destiny of democracy and success against terror are all at stake here.  American objectives in this region are clear.  While convincing China that its best interests are not served by a rash, Kaiser Wilhelm-like dash for supremacy in the region, the US does not want either to isolate or contain China.  We want a strong, rich, open and free China in an Asia that is also strong, rich, open and free.  Our destiny is inextricably linked with Asia’s; Asian success will make America stronger, richer and more secure.  Asia’s failures will reverberate over here, threatening our prosperity, our security and perhaps even our survival. The world’s two most mutually hostile nuclear states, India and Pakistan, are in Asia.  The two states most likely to threaten others with nukes, North Korea and aspiring rogue nuclear power Iran, are there.  The two superpowers with a billion plus people are in Asia as well.  This is where the world’s fastest growing economies are.  It is where the worst environmental problems exist.  It is the home of the world’s largest democracy, the world’s most populous Islamic country (Indonesia — which is also among the most democratic and pluralistic of Islamic countries), and the world’s most rapidly rising non-democratic power as well.  Asia holds more oil resources than any other continent; the world’s most important and most threatened trade routes lie off its shores.  East Asia, South Asia, Central Asia (where American and NATO forces are fighting the Taliban) and West Asia (home among others to Saudi Arabia, Israel, Turkey and Iraq) are the theaters in the world today that most directly engage America’s vital interests and where our armed forces are most directly involved.  The world’s most explosive territorial disputes are in Asia as well, with islands (and the surrounding mineral and fishery resources) bitterly disputed between countries like Russia, the two Koreas, Japan, China (both from Beijing and Taipei), and Vietnam.  From the streets of Jerusalem to the beaches of Taiwan the world’s most intractable political problems are found on the Asian landmass and its surrounding seas. Whether you view the world in terms of geopolitical security, environmental sustainability, economic growth or the march of democracy, Asia is at the center of your concerns.  That is the overwhelming reality of world politics today, and that reality is what President Obama’s trip is intended to address.

# 2NC – China Influence Impact – AT: Chinese Influence Bad

**Alternative to robust Chinese influence is internal conflict --- internal link turns relations and US influence**

**Mead 09** [Walter Russell Mead, Henry A. Kissinger Senior Fellow in U.S. Foreign Policy at the Council on Foreign Relations, “Only Makes You Stronger,” The New Republic, 2/4/9, http://www.tnr.com/story\_print.html?id=571cbbb9-2887-4d81-8542-92e83915f5f8]

The greatest danger both to U.S.-China relations and to American power itself is probably not that China will rise too far, too fast; it is that the current crisis might end China's growth miracle. In the worst-case scenario, the turmoil in the international economy will plunge China into a major economic downturn. The Chinese financial system will implode as loans to both state and private enterprises go bad. Millions or even tens of millions of Chinese will be unemployed in a country without an effective social safety net. The collapse of asset bubbles in the stock and property markets will wipe out the savings of a generation of the Chinese middle class. The political consequences could include dangerous unrest--and a bitter climate of anti-foreign feeling that blames others for China's woes. (Think of Weimar Germany, when both Nazi and communist politicians blamed the West for Germany's economic travails.) Worse, instability could lead to a vicious cycle, as nervous investors moved their money out of the country, further slowing growth and, in turn, fomenting ever-greater bitterness. Thanks to a generation of rapid economic growth, China has so far been able to manage the stresses and conflicts of modernization and change; nobody knows what will happen if the growth stops.

**That goes nuclear**

**Yee & Storey ‘2** [Herbert Yee, Professor of Politics and International Relations at the Hong Kong Baptist University and Ian Storey, Lecturer in Defence Studies at Deakin University, The China Threat: Perceptions, Myths and Reality. 2002, Pg 5]

The fourth factor contributing to the perception of a China threat is the fear of political and economic collapse in the PRC, resulting in territorial fragmentation, civil war and waves of refugees pouring into neighbouring countries. Naturally, any or all of these scenarios would have a profoundly negative impact on regional stability. Today the Chinese leadership faces a raft of internal problems, including the increasing political demands of its citizens, a growing population, a shortage of natural resources and a deterioration in the natural environment caused by rapid industrialisation and pollution. These problems are putting a strain on the central government's ability to govern effectively. Political disintegration or a Chinese civil war might result in millions of Chinese refugees seeking asylum in neighbouring countries. Such an unprecedented exodus of refugees from a collapsed PRC would no doubt put a severe strain on the limited resources of China's neighbours. A fragmented China could also result in another nightmare scenario - nuclear weapons falling into the hands of irresponsible local provincial leaders or warlords.2 From this perspective, a disintegrating China would also pose a threat to its neighbours and the world.

# \*\*\*AUV NEGATIVE – CASE UPDATES\*\*\*

# 1NC – REM Environment Turns (1/2)

**REM mining causes environmental destruction – empirics prove**

**Huang et al 10** (Xiang Huang a,b,, Mika Sillanpää a,c, Egil T. Gjessing d, Sirpa Peräniemi e, Rolf D. Vogt d Quals: a Laboratory of Applied Environmental Chemistry, University of Eastern Finland, Patteristonkatu 1, FIN-50100 Mikkeli, Finland b Department of Chemistry and Environmental Sciences, Tibet University, No. 36 Jiangsu Lu, Lhasa, T.A.R. 850000, PR China c Faculty of Technology, Lappeenranta University of Technology, Patteristonkatu 1, FI-50100 Mikkeli, Finland d Department of Chemistry, University of Oslo, P.O. Box 1033, Oslo 0315, Norway e Department “Environmental impact of mining activities on the surface water quality in Tibet: Gyama valley” Elsevier Science Direct [http://www.sciencedirect.com.proxy.lib.umich.edu/science/article/pii/S0048969710004882#](http://www.sciencedirect.com.proxy.lib.umich.edu/science/article/pii/S0048969710004882)) LK

The Chinese state's long-standing strategies to open Tibet's vast reserves of copper (Cu), iron (Fe), lead (Pb), zinc (Zn), and other minerals (e.g. Cr, Mn and B, etc.) is now accelerating with the established central China–Tibet railroad. With this increased exploration, the control and management of an even more vital resource—the Tibetan Plateau's vast supply of freshwater—are pertinent emerging issues. The Tibetan Plateau within Tibet Autonomous Region (T.A.R.) covers an area of 1.22 million km2 .Within this region, large deposits of various sorts of mineral resources have been discovered since the early 1950s. The Plateau is furthermore believed to have great potential for future discoveries of large mineral deposits since the Plateau's geology is favorable for rare earth mineral deposits (Zhong, 2002; Zheng et al., 2007). The tremendous value and importance of these mineral resources have rallied increased attention from the authorities and commenced comprehensive geology mapping and mineralogy studies on the Plateau. Encouraged by the convenience of the newly operated railway, in addition to accelerating economic growth in Tibet and the general supply shortage in the whole of China, the mining operation of nonferrous metal (e.g. Cu, Cr, Pb, Zn and Au) in the region has received high priority and, hence, started playing signiﬁcant role in the local industrial development. Mining activities started in the early 1990s and by the end of 2007 there were already 66 domestic mining operations registered in the region (DLR, 2008). These mining activities have led to the severe degradation of the fragile local environment on the Plateau due to the lack of adequate management and planning, as well as poor operating experience and waste management (Lin et al., 2007). These detrimental effects stand in stark conﬂict to that the mining activities become a principal contributor to local economic growth. Among the known mineral deposit in central Tibet, the Gandise porphyry copper belt is believed to be one of the three largest porphyry belts in the world (Zheng et al., 2007). Within the belt, lies the Tibetan “Three Rivers” area, i.e. Yarlung Tsangpo, Lhasa River and Nyangchu basins in the centre of Tibet, comprising an area of 6.65×104 km2 . This region is defined as one of the ten most concentrated mineral resource areas in western China (Zhong, 2002), rich in nonferrous- and precious metals. Within this “Three River” area, Gyama copper-polymetallic deposit is the most intensively exploited area in Tibet due to its convenient location enabling easy transportation. Drinking water (Gyamaxung-chu) contamination causing deaths of livestock and illness to the local population, conflicts between mining operators and local farmers and nomads have therefore become a major concern at the region. The Tibetan Plateau is called the “Water Tower of Asia” and more than one third of the world population lives in the downstream watersheds of the rivers flowing from the Plateau. Nevertheless, environmental regulations are poorly implemented by local authorities as well as by the mining operators. There is a clear lack of sound quality assessments and therefore adequate knowledge on the apparent and potential impacts of the present mining practices on the downstream water bodies (Zhe, 2006; Lin et al., 2007). In this study we present data from chemical characterization of Gyama stream water, as well as tailings and stream sediments from the Gyama copper-polymetallic plants within the Gyama valley. The aim of this study was to describe the chemical properties of the surface water and to assess the potential environmental consequence of the present mining practices in this valley, and try to fill the apparent knowledge gap of the detrimental effects caused by the rapidly increased mining explorations on the abundant fresh water resources on the Plateau.

# 1NC – REM Environment Turns (2/2)

**It specifically turns their internal link—it devastates marine biodiversity**

**MIT no date** (MIT- The Future of Strateigc Natural Resources “Deep Sea Mining” <http://web.mit.edu/12.000/www/m2016/finalwebsite/solutions/oceans.html>) LK

Deep Sea mining, like asteroid mining, is a relatively unconventional method of extracting Rare Earth elements (REEs). Unlike asteroid mining, however, deep sea mining has already been undertaken through projects such as deep sea diamond mining. Actual mining for REEs has not been attempted because of environmental issues and cost. These issues are much more complicated and not as easily fixed as other concerns. Deep Sea mining would be an effective way to obtain a large amount of rare earths; in one specific section of the ocean floor, "...one square kilometer could meet a fifth of the world's annual consumption of rare metals and yttrium..." (Phys.org, 2011). However, the economic viability of deep sea mining is still questionable. If the environmental and financial factors were cleared, then deep sea mining would definitely be a feasible option for the long term. Implementation Details In order for deep sea mining to be implemented, suitable sites must be found. Deep sea remotely operated vehicles (ROVs) are able to obtain samples using drills and other cutting tools in order to analyze them for rare earth minerals. With the location of a suitable mining site, the ocean floor is ready to be harvested. Two technologies being considered for commercial mining of the ocean floor are continuous line bucket system (CLB) and hydraulic suction systems. CLB is the preferred method and transfers the mud up to the ship in a conveyor belt type system. Hydraulic suction has a pipe running the mud up from the ocean floor and another pipe that transfers the tailings back to the ocean floor (Economist 2006). Hydrothermal vents are the primary source for deep sea mines. These magma below these vents heats the surrounding seawater, which causes metals within the sediment to leach into the water. The subsequent shock of the cold water causes the metals to precipitate and form as solids in the sediment surrounding the vents. Because of these high concentrations, most deep sea mining would occur in the chimneys above the vents. Vents themselves would be preserved undamaged, but the chimneys would be destroyed. These chimneys, however, can be built back over time, and is the equivalent of "cutting grass" on the ocean floor (Begley, 2010). Cost Environmental cost is currently the biggest issue with deep sea mining. There are numerous controversies about whether or not testing deep sea mining is worth the damage it could cause to biodiversity in the ocean. The first step towards making deep sea mining into a feasible option would be to ensure the protection of "sensitive ecosystems and minimize the potential environmental impact of this industry" (Terradaily). These environmental costs come primarily from the intrusive nature of mining. Deposits are located near deep sea thermal vents, which sustain very unique ecosystems. There are thousands of previously undiscovered species first seen around these vents, and many more presumably to be discovered. Many are filter feeders, and many fear that the sediment stirred up by mining activities may not allow them to obtain enough nutrients.

# 1NC – REM Adv Frontline Updates (1/2)

**REMs supply alone insufficient - No US manufacturing capability**

**Fladager,** B.A. in Journalism from CSU and Journalist for the Casper Journal, **13** (Greg, 9-7-13, Casper Journal, “Rare Earth minerals critical”, http://www.casperjournal.com/news/article\_ebdb10e4-0624-508a-a556-724b40e439fc.html)

Designated ‘critical’ Byer explained the U.S. government is concerned about the nation’s vulnerability to losing its rare earths supply, enough so that the Departments of Defense and Energy have designated rare earths as “critical” to national security. “In the past few years we’ve had 23 different federal studies about rare earths, critical minerals. They’ve all concluded we have a crisis and that we have an emergency … we’ve got a problem in the whole rare earths supply chain,” Byers said. “That supply chain is not just in the mining piece, but it goes all the way through manufacturing … We can’t manufacture magnets, high strength magnets, we can’t manufacture phosphors and we can’t do the catalysts … catalysts used in the chemical industry. This is why this is so important.”

**Plan can’t solve—AUV’s can’t do the mining and pick-up themselves**

**Wiltshire 10,** Specialist at Ocean and Resources Engineering[J. C., "MINERAL EXTRACTION, AUTHIGENIC MINERALS." Marine Policy & Economics: A Derivative of the Encyclopedia of Ocean Sciences(2010): 274., Google Books, <http://books.google.com/books?hl=en&lr=&id=dqzXwFsOFMcC&oi=fnd&pg=PA274&dq=(%22Rare+Earth+Elements%22+OR+%22rare+earth+minerals%22)+AND+(%22autonomous+underwater+vehicles%22+OR+%22Autonomous+Benthic+Explorer%22)&ots=PIzchVTPjs&sig=C1I_dhR2fdZIW6VUSsl3m8t-n44#v=onepage&q&f=false>, pg 276]

Once a deposit has been characterized and leased, a mining plan is drawn up. This plan will depend on the mineral to be mined. In general, several steps must be taken to mine. The first is separating the mineral from the bottom. In the case of polymetallic sulfide, manganese crust or underlying phosphorite, a cutting operation is involved. In the case of phosphorite nodules, manganese nodules, or sulfide muds there is solely a pick-up operation. Cutting requires specialized cutting heads, often these are simply rotating drums with teeth (Figures 3-5). Such cutters have been developed for the dredging industry as well as the underground coal industry on land. The size, angle, and spacing of the teeth on a cutter are dependent on the rate of cutting desired and the size to which particles are to be broken. The overall mineral pickup rate is determined by the necessary rate of throughput at the mineral processing plant. This can be worked back to pick-up rate on the bottom. Engineering judgment then dictates whether this is best achieved with larger numbers of smaller cutters or a lower number of larger cutters. This may translate into multiple machines operating on the bottom and feeding one lift system.

When the mineral is broken into sufficiently small pieces, these must then be collected for lifting. This is usually a scooping or vacuuming operation. Scooping is accomplished by blades of various shapes. Vacuuming is usually the result of a powerful airlift or pump farther up the line. One system tested by the Ocean Minerals Co. for picking up manganese nodules involved an Archimedes screw-driven robotic miner, which had two pontoons. A flange in screw-shaped spiral was welded onto each pontoon. The screws both served to drive the vehicle forward as well as pick up the nodules which were sitting in the mud it passed over. There may be a sieving or grinding step between mineral pick-up and lift. This serves two functions; the sieving gets rid of unwanted bottom sediment that may have become entrained in the ore; the grinding ensures that the particle size range going up the lift pip is in the correct range to get optimum lift without clogging the pipe.

# 1NC – REM Adv Frontline Updates (2/2)

**AUVs are unsuited for finding REMs without a CPT rig.**

**Bashir 12** (Bashir, M. B., et al., Faculty of Physical Sciences and Engineering University of Southampton Southampton, United Kingdom, "A concept for seabed rare earth mining in the eastern South Pacific." (2012).)

AUVs are common in subsea oceanographic investigations and may be deployed with a variety of sensors to gather data about properties of sea water and the seabed and underlying material (e.g. Griffiths and McPhail). However, deploying a CPT from an AUV poses some problems, as most AUVs are designed to be neutrally buoyant. This has three consequences that make the AUV unsuited for this task: Being neutrally buoyant the AUV cannot exert a significant downwards force on the CPT without anchoring itself to the seabed or losing its neutral buoyancy; The AUV will have a limited power supply, as batteries are heavy; and The AUV will have limited capacity to carry samples. Against this, if an AUV CPT rig could be designed to overcome these challenges it could cover large areas more quickly than the other technologies

# 1NC – Solvency Turns (1/4)

**Even if AUV data collection is feasible – overall costs reduces length and range of missions**

**Rodriguez,** M.A. in Engineering, **et al 12** (Dylan, Matthew Franklin and Christopher Byrne specializes in mechanical engineering at the Worchester Polytechnic Institute, 12-12-12, Worchester Polytechnic Institute, “A Study of the Feasibility of Autonomous Surface Vehicles”, <https://www.wpi.edu/Pubs/E-project/Available/E-project-121212-135500/unrestricted/ASV_IQP.pdf> )

Our findings were further confirmed after communicating with a number of different Woods Hole Oceanographic Institute researchers in the Applied Ocean Physics and Engineering department. They reported similar weaknesses in their data collection methods, some of which included endurance and cost. WHOI studies many different aspects of the ocean and uses a wide variety of technology to complete their objectives. While buoys, manned craft and satellites are used for research, a significant amount of WHOI’s data collection comes from the use of various autonomous underwater vehicles. Some of their deep-sea AUVs include Sentry, SeaBED, and Slocum Glider. As we have seen with other organizations, long-term continuous data collection is very valuable. The WHOI researchers raised the concern that these AUVs need to be deployed and often accompanied by a manned research vessel. These vessels are used for deployment, refueling, re-missioning, tracking, and receiving the collected data but can cost $20,000 to $50,000 per day. The expense of these vessels reduces the feasible length of many AUV missions

**Even if AUVs work they’re impossible to coordinate effectively**

**Sujit 13** Department of Electrical and Computer Engineering, University of Porto,( 1/4/13, “An Empirical Evaluation of Co-ordination Strategies for an AUV and UAV,” Journal of Intelligent & Robotic Systems, 70.1, Springer, http://link.springer.com.proxy.lib.umich.edu/article/10.1007%2Fs10846-012-9728-z)

Unmanned Aerial Vehicles (UAVs) and Au- tonomous Underwater Vehicles (AUVs) are cur- rently being used for various military, commercial and scientific missions. These include surveillance, reconnaissance, search and rescue, mapping and oceanographic data collection. Although numer- ous advances have been achieved in autonomy for UAVs and AUVs, there has been little re- search in developing co-operative algorithms for co-ordination among UAVs and AUVs. UAVs can cover significant range of areas over a short period of time, while AUVs are typically deployed for long periods of time to gather data. UAVs pro- vide global coverage while AUVs provide local coverage. The spatial coverage ability of the UAV combined with the AUVs capability to measure various environmental parameters with high ac- curacy can be used for various real-time tracking applications in the ocean such as tracking an oil spill, measuring temperature gradients, harmful algal blooms, etc. A highly capable AUV having autonomy and a combination of various sensors such as conductivity, depth, temperature, vision and hydrophones can be used to track these phe- nomenon, but the AUV can only provide a local view of the complete phenomenon. Such local gradient tracking is certainly useful but it doesn’t give an overall picture of the phenomenon. Al- ternatively, one can deploy buoys to collect data. This requires deployment of multiple buoys and the deployment cost of such an infrastructure is high and not practical for fully autonomous deployments. Most AUV missions follow a set pattern: way- points are uploaded to the AUV, the AUVs fol- low the waypoints, collect data and return to their predetermined locations. The operator downloads the data, carries out an assessment of the data and generates a new mission. During the process of data collection, if the accuracy of the data needs to be improved then the mission has to be redone. Since, the missions are carried out for several hours, the operator has access to data after a long period. Any kind of inaccuracy in the data will affect the mission duration and increase the cost of the mission significantly. A UAV is an ideal vehicle to have in such a scenario since it can quickly and effectively provide a global coverage of the area and furthermore it can be used to task the AUV. This team of heterogeneous un- manned vehicles, often with different capabilities can provide coverage and accurate data of the phenomenon. To maximize the complementary capabilities of different vehicles, we need to ex- plore various cooperative strategies. In this paper, we develop various cooperative strategies for an exploration mission using a UAV–AUV team.

# 1NC – Solvency Turns (2/4)

**Difficulty with communication make AUV results inaccurate which takes out solvency**

**Coleman 06,** Univ. of Idaho( “Identifying Error in AUV Communication,” OCEANS 2006 - Asia Pacific, IEEEXplore, http://ieeexplore.ieee.org.proxy.lib.umich.edu/xpl/articleDetails.jsp?tp=&arnumber=4393891&queryText%3DAUV+failures+-analysis)

Communication is an essential component of cooperation among AUVs. For AUVs to coordinate their actions, they must share information and make requests. When AUVs are on the surface, they can use RF (radio frequency), but they are otherwise limited to acoustic communication. The underwater chaimel is notoriously bad for communication, with propagation effects such as ray bending and multipath adversely affecting communication. Data rates are also restricted because acoustic energy is absorbed by water as the frequency increases [if The current method of dealing with error in underwater communication is to build redundancy into the code and large amounts of error correction processing into the receiving end. An alternative approach has been to borrow from natural language semantics and pragmatics in designing flexible AUV languages that reduce reliance on processing resources, thereby minimizing error rates. It is clear, however, that communication error is a major thorn in the side of cooperating AUVs. Cooperation among AUVs is needed to accomplish increasingly difficult tasks. AUVs have contributed to the US Navy’s underwater Mine Countermeasures (MCM) by finding, classifying, and neutralizing underwater mines; they have, however, been limited to single vehicles acting independently. The US Navy is moving towards large area MCM with complete coverage requirements of 30 km by 30 km in a week. Given the current AUV coverage rate, deployment of multiple vehicle formations will be required. Since the ocean is a dynamic, unpredictable environment where all relevant events cannot be anticipated, AUVs in the formation will need to handle problems cooperatively during the mission; otherwise, time will be wasted in covering missed areas. Replacing a lost vehicle [2j, dealing with lost communication [3j, and acquiring mine location targets [4j are aspects of cooperative behavior we have investigated. As collaborative behavior has grown more sophisticated, the potential sources of error have also grown. Since we are dealing with autonomous agents, the errors go beyond simply corruption of the signals transmitted from one vehicle to another. They can involve, for instance, the theory of agency we introduce into our system—if an AUV’s beliefs about the environment or the other vehicles are incorrect, it may transmit an incorrect message or falsely interpret an incoming message. These errors can exert their influence at any time during the run, producing different effects depending on various aspects of context, including what has happened during that run. Given the complexity of the AUV communication system, we should approach error classification systematically so that we can better control its identification and our response. This approach should encompass the whole communication system, from the sender’s initial message plaiming through transmission of the signals to the receiver’s interpretation. At present, we know of no such approach in the literature. Our approach requires thinking of system error as a type of system failure—error is induced into the system when an element of the system fails to do its part, implying that system error and system failure are closely correlated notions. We exploit this correlation for the purpose of structuring error identification and response. To this end, we introduce Design Failure Mode and Effects Analysis (DFMEA), which is an existing approach to modeling system failure. DFMEA divides the system into functional modes and isolates specific forms of failure in terms of a cause/effect pairs associated with each mode. We have modified the DFMEA for a communication system involving autonomous agents, where the same error can propagate into many different effects.

# 1NC – Solvency Turns (3/4)

**AUVs detection fails—several reasons**

**Bovio 06** (Edoardo, “Autonomous Underwater Vehicles for Port Protection”. NATO Undersea Research Centre, July 2006)

However the difficulty in finding and classifying targets in presence of burial and the limited classification efficiency achieved in highly cluttered areas suggest that the problem of protecting our ports is not completely solved. The most significant problem demonstrated by the experimental work is the inability of high frequency side scan sonar to counter targets buried in the sea floor. The detection and classification of targets is based on the analysis of the acoustic shadow cast by the object. As the high frequency sound does not penetrate the sediment, an object completely buried in the bottom is not detected. Sometimes a feature visible on the sonar image (e.g. scour pit, trench, etc) can indicate the presence of a buried object. An object partially buried in the mud is detected but its shadow may be highly distorted and classification could be difficult. See for example the different images of a cylinder shown in Figure 4. When the target is proud on a flat sea floor (left), it casts a shadow typical of a cylindrical object and can be classified based on physical dimensions (length, width, height) that can be easily measured from the image. However when the target is partially buried the shadow is not representative of a cylindrical object. In the middle image it is possible to measure only its length and the distance between the lifting eyebolts. In the right image only the two eyebolts are visible and the distorted shadow does not convey any information. The bottom of ports and harbours can be littered with all kind of man made objects and the clutter density is orders of magnitude higher than normally encountered in traditional MCM operations. In highly cluttered areas like the one shown in Figure 5, even easy target (bottom left) could be easily undetected or wrongly classified by operators. Even more difficult would be the case of other targets shown on the bottom with increasing order of complexity. Improvised Explosive Devices (IED) are particularly difficult to detect because their shape cannot be easily associated with that of known mines. The necessity to have a quick reaction in cases of crisis and the difficult (i.e. highly cluttered) environment where operations will have to be performed, requires that surveys of our ports be carried regularly with the highest possible positioning accuracy (less than 5m error) in order to have accurately geo-referenced data bases. Efficient algorithms for change detection will ensure a rapid assessment that a new object is present.

**AUVs ineffective – lack of knowledge of the environment and environmental factors inhibit effectiveness**

**Volosov et al 7** – Prof of Computer Science, Electrical & Electronic Engineering at UC Davis

(Victor, “PROBLEMS OF CREATING INTELLIGENT AUTONOMOUS ROBOTIC UNDERWATER VEHICLES AND THEIR APPLICATION”, Cybernetics and Systems Analysis, http://65.54.113.26/Author/42970062)

Solving synthesis problems for ARUV control systems (synthesis of navigation algorithms and control algorithms for its spatial and angular movement) is complicated with the following factors: — ARUVs operate in insufficiently studied aquatic environments with unpredictable variability and inhomogeneous properties (temperature, saltiness, layers of sound velocity jumps, sound-scattering layers, refraction, reverberation, currents, etc.), which considerably hampers measurement, control, and communication; — autonomy of an ARUV generates many problems associated with failures of measurement, control, and communication equipment and with the uncertainty of the properties of the ARUV itself and of the environment. Uncertainty is a constant attribute of the entire process of ARUV operation; — because of specific features of water, transducers used in an ARUV have lower accuracy, speed, and resolution than those used in land moving objects or aviation and space-rocket objects.

# 1NC – Solvency Turns (4/4)

**Errors in AUV manufacturing and design make the system too expensive and slow**

**Stevenson 9 –** chief mechanical engineer for the Underwater Systems Laboratory at the National Oceanography Centre (Peter, “AUV Design: Shape, Drag and Practical Issues”, University of Southampton Press, http://auvac.com/uploads/publication\_pdf/AUV%20Design-%20Shape,%20Drag%20and%20Practical%20Issues.pdf)

The accumulation of test data and practice helps asses the practicalities of new designs, and the tabulated summary gives an indication of how the actual Cd values compare with values taken in good faith at the design stage. The ancillary systems added to the outside of an AUV and imperfections in manufacturing contribute significantly to the drag, although proportionately less to a torpedo form than to a laminar flow body. Items such as global positioning system aerials are now smaller than those produced 10 years ago, and fairing them into a slender mast has become easier. The degradation due to panel mismatch is difficult to quantify but is significant, and the quality of fit is closely related to the price paid for tooling and quality of manufacturing. Short hull designs have only modest increases in Cd and may prove to be more practical, easing problems of internal packaging, transport, launch and recovery and deck space requirements.

# 2NC – Solvency – XT: Cost Overruns

**The tag and track method is ineffective for marine life – context of AUVs**

**Thys 04 –** PhD in MarineBiology (Tierney, “Marine Animals: the Next Generation of Autonomous Underwater Vehicle?”, Sea Studios Foundation, http://oceansunfish.org/350\_Thys.pdf)

The limitation of this technique is that due to the relatively high expense of vessel time and the labor-intensive nature of tracking, tracks tend to be on the order of days instead of months or years. Hence this technique is not cost-effective for examining large-scale patterns. Also, it is only possible to actively follow one individual at a time, a drawback that limits the potential sample size. For listening stations, the rates and types of data that can be obtained are currently limited.

# 2NC – Solvency – XT: Coordination Failure

**Problems with AUV synchronization deck solvency**

**Hegrenaes** **10** – Navigation system doctorate and robotics technologist with solid background in control theory, systems engineering, engineering management, and R&D. Recipient of thesis award and scholarship, and author of multiple international publications. (9/10, “Horizontal Mapping Accuracy in Hydrographic AUV Surveys,” Autonomous Underwater Vehicles (AUV), 2010 IEEE/OES, IEEEXplorer, http://ieeexplore.ieee.org.proxy.lib.umich.edu/xpls/icp.jsp?arnumber=5779662)

While the list of error sources discussed above is fairly extensive, it is by no means complete. The need for accurate timing has not been discussed, but it is clearly a prerequisite - both for synchronization of payload and AUV navigation data, but also for synchronization of the AUV against the topside clock connected to the USBL positioning. In the HUGIN AUVs the payload sensors and the navigation system are synchronized against the same 1 PPS in-situ and will consequently not drift relative to each other. Before launch the AUV is also synchronized to GPS, and consequently also the HiPAP system. Several types of crystal oscillators may be used but most are 1 ppm or better. For a mission lasting for 24 h this corresponds to 86.4 ms. For an AUV traveling at 2 rn/s forward speed this induces a 17 cm positioning error along-track. Oscillators with as low as 0.02 ppm drift are however available [18], making the problem negligible. As for additional errors sources related to the sounding equipment one could mention contribution from 2pi wrapping and multipath. A further discussion is beyond the scope of this paper. The reader is referred to [35] for a further discussion.

# 2NC – Solvency – XT: Detection Failure

**Geolocation data and open communication of data must be improved before AUVs can be effective**

**Thys 4 –** PhD in Marine Biology(Tierney, “Marine Animals: the Next Generation of Autonomous Underwater Vehicle?”, Sea Studios Foundation, http://oceansunfish.org/350\_Thys.pdf)

For MOOS data to become truly integrated into the oceanographic data stream, two factors must be considered: firstly, present geolocation estimates must be improved. Resolution of all gathered data must continue to improve in order to comply with the quality standards needed for such organizations as GOOS (Global Ocean Observing System), CLIVAR (Climate Variability and Predictability) and OBIS (Ocean Biogeographic Information System). Other data gathering organizations include GCOS, GLOBEC, JGOFS, NOPP and GODAE.\* Secondly, open highways of \* All acronyms are defined in the Appendix. 6 communication between biologists, oceanographers and engineers are critical to impart essential biological specifics, like natural history and capture logistics, of proposed MOOS to ensure successful operations.

# \*\*\*ECONOMIC UPDATES\*\*\*

# 1NC – US Econ High (1/2)

**US growth is strong – oil prices**

**Rugaber 1-3**-2015 (Christopher S. Rugaber, Associated Press, “Why the US will power the world economy in 2015” <http://www.lansingstatejournal.com/story/money/economy/2015/01/03/us-will-power-world-economy/21246283/>)

WASHINGTON – The United States is back, and ready to drive global growth in 2015. After long struggling to claw its way out of the Great Recession, the world's biggest economy is on an extended win streak that is edging it closer to full health. But the new year doesn't look quite so bright in other major countries. China is slowing as it transitions from investment to consumption. Japan has slid into a recession. Russia appears headed for one. Europe is barely growing. And the U.S.? Six years after its financial system nearly sank and nearly that long since the recession ended, the United States is expected to grow in 2015 at its fastest pace in a decade. Its expansion from July through September — a 5 percent annual rate — was the swiftest for any quarter since 2003. That pace will likely ease a bit. Still, the economy is expected to expand 3.1 percent next year, according to a survey by the National Association for Business Economics. It would be the first year of 3 percent growth since 2005. The acceleration of U.S. growth is a key reason the global economy is also expected to grow faster, at about 3 percent, up from 2.5 percent in 2014, according to economists at JPMorgan Chase and IHS Global Insight. Cheering cheaper oil Plunging oil prices are a big reason for the optimism. Prices have been cut roughly in half since summer. In some areas of the country, gasoline prices have slipped below $2 a gallon. The drop, along with more fuel-efficient cars, will save the average U.S. household $550 on gas next year, according to the U.S. Energy Information Administration. That means consumers have more to spend on items like cars, furniture and appliances. What's more, Americans' finances are in firmer shape. Job growth is accelerating. Businesses are investing in buildings and software, and home building is expected to pick up. Lower oil prices will also help Europe and Japan, and the global economy should expand faster than it did this year, economists say. But the divergence between the United States and most of the rest of the world is striking and carries some risks. Big exporters, from China to Germany to Japan, will depend heavily on a recovering U.S. to boost their economies. A pickup in global growth "is highly dependent on the assumption that the U.S. economy continues to improve," said Douglas Porter, chief economist at BMO Capital Markets. "If that doesn't play out, there's not much left for the global economy to fall back on.

# 1NC – US Econ High (2/2)

**US is growing, especially in comparison to the BRICs**

**Rugaber 1-3**-2015 (Christopher S. Rugaber, Associated Press, “Why the US will power the world economy in 2015” <http://www.lansingstatejournal.com/story/money/economy/2015/01/03/us-will-power-world-economy/21246283/>)

Swirling global headwinds Even if the U.S. economy does strengthen further, the rest of the world could struggle. For one thing, faster growth will likely lead the Federal Reserve to raise interest rates in 2015, which could draw more investment from overseas. The inflow of capital would raise the dollar's value and potentially cause destabilizing drops in other currencies. Governments and businesses overseas that borrowed in dollars would find it harder to repay those debts. The hot economies of the last decade — the emerging markets of Brazil, Russia, India and China collectively known as the "BRICs" — will likely grow in 2015 at their slowest pace in six years, according to Oxford Economics, a forecasting firm. Falling oil and commodity prices have smacked Brazil and Russia particularly hard. China may expand 6.5 percent or more. Yet that's a far cry from the nearly double-digit growth it enjoyed for decades. Europe and Japan will be lucky to expand even 1 percent. The gap between the U.S. and the rest of the world reflects a fundamental trait of the U.S. economy: It's more insulated from the rest of the world's ups and downs than other major economies are. Exports account for just 14 percent of U.S. output, the smallest share among the 34 mostly rich members of the Organization for Economic Cooperation and Development. One U.S. company largely protected from overseas trends is Globe Specialty Metals, a Miami-based producer of silicon metals that draws 90 percent of its revenue from North America. Its silicon is added to aluminum and rubber parts used in cars, and robust auto sales have boosted the company's revenue. CEO Jeff Bradley says he's optimistic about 2015. As gas prices have sunk, Americans have been buying more SUVs and pickups, which use more aluminum. Demand for solar power panels is also lifting sales. "Things are lining up for next year to be one of the best years in the history of our company," Bradley said. Powering U.S. consumers In the United States, consumers are the main drivers of growth. And fortunes are looking up for more households. Employers are on track to add the most jobs in 15 years in 2014. As a percentage of income, Americans' debt has dropped to 2002 levels. In some ways, the U.S. economy actually benefits from slower growth abroad. Investors in search of safety have plowed money into Treasurys, thereby helping hold down inflation and U.S loan rates, including for mortgages. Lower rates, in turn, could fuel more home sales and construction next year. Stan Humphries, chief economist at Zillow, thinks Americans ages 25 to 34, stung by higher rents, will buy homes in greater numbers by the end of 2015. Mortgage giants Freddie Mac and Fannie Mae have relaxed their down payment requirements, which were a strain for younger would-be buyers. Humphries also thinks developers will build more lower-priced homes that millennials can afford. Some signs of hope overseas have emerged. Falling oil prices should benefit people in Europe, Japan and China, all of which import oil. And analysts expect the European Central Bank to ramp up its stimulus efforts, possibly by buying government bonds. That step would inject more cash into the economy to boost lending and keep rates low.

# 2NC – US Econ High Exts. (1/4)

**US econ shows robust growth figures**

**Starkman 1-2**-2015 (Dean, “Overseas problems won't derail growing U.S. economy, analysts say” <http://www.latimes.com/business/la-fi-global-economy-outlook-20150103-story.html>)

Call it the Great Divide: The new year figures to be one of robust economic growth in the U.S., with slowdowns, stagnation and setbacks everywhere else in the world. The list of global problems is indeed long and worrisome. Europe and Japan teeter on the edge of recession. Russia careens toward a full-blown economic crisis. China's once-torrid growth is slowing faster than previously forecast. And many emerging economies are getting slammed by plunging oil prices. All the overseas problems put together, though, are not enough to derail a strong U.S. economy, Wall Street analysts say. The Commerce Department stunned markets Dec. 23 by reporting that the nation's total economic output grew at an annual pace of 5% in the third quarter. The result blew past an already strong estimate of 3.9%. "Spirits unleashed," was how Mark Zandi of research firm Moody's Analytics Inc. described the U.S. economy even before the final estimate for the third quarter came in. The good U.S. economic news, forecasters said, will translate into solid but not spectacular returns in the stock market, which has been on a long bull run. The Standard & Poor's 500 index was up about 11.4% for 2014, its third straight year of gains since the Great Recession. Most forecasts call for returns to be about half that in 2015 and beyond. Forecasts can always be wrong, of course, but the new year begins with a set of unusually well-defined themes that, unless something dramatic happens, figure to play an important role in shaping the year's global economic picture. Here are a few of them: A strengthening U.S. economy Although the third-quarter Commerce Department report was a pleasant surprise, most forecasts call for gross domestic product — the value of all goods and services produced in the country — to be lower but still healthy near or above 3%. That's a rate not achieved for a full year since the Great Recession. The economy remains a long way from full employment, Zandi said, but job growth now averaging around 225,000 a month should be enough for the next 18 months to absorb the number of under-employed and unemployed, which together account for about 1.25% of the labor market. Even before mid-2016, wage growth, long a missing ingredient from the U.S. recovery, should take hold and reach 3.5% before inflation over the next two years, around 2% after inflation. Improved moods among consumers could mean more purchases of cars and other big-ticket items that already are back to pre-recession levels. GM Arlington, Texas, plant still running hard GM workers along the production line at the General Motors Assembly Plant in Arlington, Texas. (Louis DeLuca / Dallas Morning News) Morgan Stanley expects the still-struggling housing sector to bounce back with 10.2% growth in residential investment. The 1.8% growth for the just-completed year was hampered by a difficult winter, an uptick in mortgage rates and tight lending standards that only now are starting to ease. Moody's also noted that nearly 3 million millennials — those 18 to 34 years old — moved in with their parents since the start of the recession seven years ago, and they represent pent-up demand for housing. Analysts expect that only the energy sector, hurt by a plunge in oil prices, will lag behind.

# 2NC – US Econ High Exts. (2/4)

**US econ improving – oil**

**Starkman 1-2**-2015 (Dean, “Overseas problems won't derail growing U.S. economy, analysts say” <http://www.latimes.com/business/la-fi-global-economy-outlook-20150103-story.html>)

Cheap oil A stronger U.S. recovery already was on track when oil prices began their more than 40% drop six months ago to levels not seen since the Great Recession. Prices started to stabilize as the holidays approached around $55 a barrel for West Texas Intermediate crude. The result will be a windfall for global consumers in oil-importing countries. Moody's Chris Lafakis estimated that every $10 decline in oil prices corresponds to about a 0.2% gain in real U.S. economic growth. If oil stays at current levels, he said, the net effect will be to channel $120 billion from the oil sector — or about 13% of corporate profits — to the rest of the U.S. economy. Oil is expected to drift higher but remain relatively cheap throughout the year, more likely in the range of $80 a barrel, according to several forecasts. Oil exporters such as Venezuela, Iran and Russia will continue to suffer, but Citigroup estimated that the total global redistribution of income from oil producers to consumers will be about $850 billion, or nearly 1.1% of global GDP. For Europe and Japan, cheap oil could provide a significant boost to their central banks' efforts to pump up growth. Analysts, in general, summed up their forecasts with a warning that even with a world-beating U.S economy, investors should enter 2015 with tempered expectations. The bull market will probably continue, said Candace Browning, Merrill Lynch's head of global research, but "the sentiment is far from euphoric."

# 2NC – US Econ High Exts. (3/4)

**All metrics point to a growing economy**

**Trading Economics 2015** (“GDP Growth” <http://www.tradingeconomics.com/united-states/gdp-growth>)

The United States economy advanced an annualized 5.0 percent in the third quarter of 2014, according to final figures from the Bureau of Economic Analysis, beating previous estimates and market expectations. It is the highest pace since the third quarter of 2003, reflecting an upturn in consumer spending and investment and a downturn in imports. Third quarter GDP growth has now been revised up by a total of 1.5 percent since the first estimate. Last month, the BEA second estimate showed the economy advanced 3.9 percent. Real personal consumption expenditures increased 3.2 percent in the third quarter, compared with an increase of 2.5 percent in the second. Durable goods increased 9.2 percent, compared with an increase of 14.1 percent. Nondurable goods increased 2.5 percent, compared with an increase of 2.2 percent. Services increased 2.5 percent, compared with an increase of 0.9 percent. Real nonresidential fixed investment increased 8.9 percent in the third quarter, compared with an increase of 9.7 percent in the second. Investment in nonresidential structures increased 4.8 percent, compared with an increase of 12.6 percent. Investment in equipment increased 11.0 percent, compared with an increase of 11.2 percent. Investment in intellectual property products increased 8.8 percent, compared with an increase of 5.5 percent. Real residential fixed investment increased 3.2 percent, compared with an increase of 8.8 percent. Real exports of goods and services increased 4.5 percent in the third quarter, compared with an increase of 11.1 percent in the second. Real imports of goods and services decreased 0.9 percent, in contrast to an increase of 11.3 percent. Real federal government consumption expenditures and gross investment increased 9.9 percent in the third quarter, in contrast to a decrease of 0.9 percent in the second. National defense increased 16.0 percent, compared with an increase of 0.9 percent. Nondefense increased 0.4 percent, in contrast to a decrease of 3.8 percent. Real state and local government consumption expenditures and gross investment increased 1.1 percent, compared with an increase of 3.4 percent. The change in real private inventories subtracted 0.03 percentage point from the third-quarter change in real GDP after adding 1.42 percentage points to the second-quarter change. Private businesses increased inventories $82.2 billion in the third quarter, following increases of $84.8 billion in the second quarter and $35.2 billion in the first.

# 2NC – US Econ High Exts. (4/4)

**More statistics prove**

**BBC 12-23-2014** (“US economy growing at quickest pace for 11 years” http://www.bbc.com/news/business-30585541)

The US economy grew at an annual rate of 5% in the third quarter, its fastest pace for 11 years, official figures suggest. The US Commerce Department said GDP rose faster than the previous estimate of 3.9% for the July-to-September period, boosted by stronger consumer and business spending. This was the fastest rate of growth since the third quarter of 2003. The strong figure builds on the second-quarter growth rate of 4.6%. Much of the third quarter growth came from consumer spending, which accounts for around two-thirds of US economic activity. Consumer spending grew at an annual pace of 3.2%, the fastest since the fourth quarter of 2013. Growth in business investment was raised to a rate of 8.9% from an earlier estimate of 7.1%. There was a stronger pace of spending than previously thought on equipment, intellectual property products and non-residential structures. After two strong quarters for the US economy, economists predict that growth will slow to an annual rate of around 2.5% in the current October-December quarter. But they predict growth of about 3% in 2015, which would be the fastest pace since 2005. Jobs and spending The US economy has struggled to regain its pre-2007 vigour following the global economic downturn, which was precipitated by the US subprime mortgage crisis. After the recession in the US ended in 2009, growth struggled to return to its previous levels. Growth has averaged about 2.2% annually, compared with 3.3% growth in 2005. However, analysts think US growth is set to accelerate as businesses become more confident about taking on employees. The US unemployment rate was 5.8% in November. With more people working, solid gains are expected in consumer spending. It is widely anticipated that the US central bank, the Federal Reserve, will begin raising interest rates in 2015.

# 2AC – World Econ Low

**The rest of the world’s economy is struggling**

**Starkman 1-2**-2015 (Dean, “Overseas problems won't derail growing U.S. economy, analysts say” <http://www.latimes.com/business/la-fi-global-economy-outlook-20150103-story.html>)

Overseas struggles U.S. economic strength is offset by weakness in Europe, where policymakers are contemplating further stimulus to ward off the risk of deflation — a debilitating condition of falling prices and wages. Morgan Stanley, Goldman Sachs Group Inc. and other banks forecast growth for the Eurozone to be less than 1%, only slightly above what Citigroup Inc. describes as the region's "shabby recovery" of a meager 0.68% on average since the financial crisis. Bank of America Corp.'s Merrill Lynch unit calls the risk of European deflation a "clear and present danger." The German economy, the region's largest, slowed to about 1.5% growth last year and Citigroup and others expected it to slow further, to about 1.1% in 2015. A relative bright spot is Spain, where fiscal stimulus, rising business confidence and an improving labor market are expected to contribute to growth of a still-modest 1.6%. Russia, the Eurozone's third-largest trading partner, is near recession as it struggles with cheap oil and international sanctions over its actions in Ukraine. Its currency fell more than 60% against the dollar last year. Japan, which tipped into recession in the third quarter, will continue to struggle with 1% growth, according to most forecasts. China, once a growth engine, now is considered a worry, as its economy slows to 7% or below amid questions about the health of its property markets and financial system. Moody's said China's growth is likely to be the slowest since 1990. Already-strong dollar hits a 9-year high Analysts consider the U.S. economy to be insulated, for now, from the world's travails mainly because exports account for only about 13% of its total economic output and foreign sales for only 10% of total sales by the 500 major companies in the S&P 500 index.

# 2AC – Japanese Econ Low

**Japanese economy is suffering**

**Rugaber 1-3**-2015 (Christopher S. Rugaber, Associated Press, “Why the US will power the world economy in 2015” <http://www.lansingstatejournal.com/story/money/economy/2015/01/03/us-will-power-world-economy/21246283/>)

Doubting Japan The global economy's biggest wild card next year might be Japan. It slid into recession last quarter after a sales tax hike hammered consumer spending. Prime Minister Shinzo Abe has delayed a second increase to 2017. Japan's central bank is buying government bonds and other financial assets in a bid to boost inflation and stimulate growth. Yet so far, wages haven't risen in line with prices, thereby threatening consumer spending. Masaaki Ogawa, a third-generation vegetable shop owner on Tokyo's downtown Sugamo shopping street, is among many who feel frustrated. "The older people have money, but they don't want to spend it," Ogawa said. "The younger people want to spend, but they don't have any money."

# \*\*\*DEEP OCEAN NEGATIVE UPDATES\*\*\*

# 1NC – Biofuels Advantage Turns (1/5)

**Algae biofuel development leads to Chinese cyberattacks to steal secrets – turns science leadership and tech development**

**Mufson 14** (Steven, “Why were this company’s computers attacked millions of times this year? Algae.”, Washington Post, 7/12/14, http://www.washingtonpost.com/business/economy/why-were-this-companys-computers-attacked-millions-of-times-this-year-algae/2014/07/10/ac4df98c-f59a-11e3-a3a5-42be35962a52\_story.html)

About 16 months ago, a Florida-based biofuel company called Algenol noticed that its Internet service was slowing down. In checking that out, Jack Voth, Algenofs information technology chief, stumbled on something odd: a telnet connection to its videoconference camera from an Internet Protocol address in China, a country where Algenol has never sought to do business. That was only the beginning. Ever since, Algenol has been on high alert for what Voth describes as “nefarious activity;” the company estimates that hackers have attempted to break into its computers 39 million times in four months this year, triple the level of a year earlier. The most serious of these were more than 63,000 attempts that came directly from China, including 6,653 attempts over 15 months from IP addresses and servers that Algenol says are the same as the Peoples’ Liberation Army addresses identified in a public report by [Mandiant](https://www.mandiant.com/), a leading computer security firm. Another Internet trail led Algenol to Aliyun Computing, the cloud computing subsidiary of Alibaba, one of the most powerful online commerce and retail giants in China. Interest in the company is running high because it is set to launch what may turn out to be the largest initial stock offering in U.S. history. Alibaba says Algenol mischaracterized ordinary Internet traffic as attacks. What makes a small company in Florida so interesting to cyberspies? Algae. It’s not usually the stuff of trade secrets, but Algenol, a company with about 125 employees, is developing technology that converts algae biomass into transportation fuels, including biodiesel and gasoline — all while consuming the greenhouse gas carbon dioxide rather than producing it. Algenofs work would interest anyone who wants to curb climate change. As the Chinese government tries to limit the hazardous pollution that has upset its citizens, it has set out to increase biofuel production tenfold. That might be enough incentive for Chinese cyberspies. “This is not at all unusual. China has made the decision to focus on alternative energy as a topic of industrial espionage,” said James Andrew Lewis, a cybersecurity expert at the Center for Strategic and International Studies. He said the Chinese government and state-owned enterprises have targeted trade secrets for soap, house paint and wooden furniture. “It doesn’t have to be about national security,” Lewis said. Algenol isn’t alone in its battle against Chinese computer attacks. In May, the Justice Department [indicted five members](http://www.washingtonpost.com/world/national-security/us-to-announce-first-criminal-charges-against-foreign-country-for-cyberspying/2014/05/19/586c9992-df45-11e3-810f-764fe508b82d_story.html) of the Chinese military on charges of hacking into computers and stealing trade secrets from leading steel, nuclear-power and solar-power firms. China denied the charges. Foreign Ministry spokesman Qin Gang said in a statement that they were “purely ungrounded and absurd,” adding that the United States had “fabricated facts” in the indictment. Algenol chief executive Paul Woods says little has changed following the indictments and expressed frustration about the rising tide of attacks. Hacking attacks come from many countries, he says, but most are efforts to steal credit-card information. Chinese hackers, by contrast, tend to target trade secrets and unique technology. “What are you going to do? Sue them in a Chinese court? You have no recourse,” said Woods, adding that the Justice Department indictments would not touch the alleged culprits or change behavior and were “a joke.” Algenol, which hasn’t built a large-scale plant, has spent hundreds of thousands of dollars on technology to protect its computers, but the volume of attacks — not only from China, but also from the United States, Germany, Russia and Taiwan — has made it impossible to track all the sources and log complaints with them.

# 1NC – Biofuels Advantage Turns (2/5)

**Algae biofuel development leads to invasive HAB species – damage human health and create marine dead zones**

**Chimera et al. 10** (Charles G Chimera, Christopher E Buddenhagen & Patti M Clifford, “Biofuels: the risks and dangers of introducing invasive species”, Biofuels 1:5, 2010, http://www.future-science.com/doi/abs/10.4155/bfs.10.47)

The R&D of microalgal-based biofuels has seen a resurgence of interest in the past few years [66,67]. Significant funding and collaborative partnerships are promoting algal-based biofuels as an important component of a sustainable energy future [68 ,691 . The potential benefits of microalgae include its high per-acre productivity, ability to thrive in a variety of water sources, non-arable land use, mitigation of GHGS, and production of biofuels and other valuable coproducts [70]. However, microalgae introduced into new environments also have the potential to become invasive species. As stated by Phalan, "the features which make them attractive biofuel crops wide environmental tolerance, rapid growth, ease of establishment, low water demand, ability to resprout when harvested are precisely those traits which predispose species to become alien invasives" [71]. l There are an estimated 1-10 million algae species on Earth, with the majority being microalgae [72]. Microalgae are photosynthetic prokaryotic and eukaryotic organisms with fast growth rates [73]. They inhabit fresh, brackish and marine waters around the world [74] and are ecologically important, accounting for 50% of CO2 fixation [75]. Microalgae that are native or introduced to an area and become invasive are often referred to as harmful algal blooms (HABs). HABs are species of phytoplankton that cause negative effects on human health (through the production of toxins), impact living marine sources (wild and cultivated fish), impact tourism and recreation of coastal waters (through "˜red tides'); and damage marine ecosystems by creating anoxic areas that kill marine life. There are approximately 80 toxic and 200 noxious microalgal species involved in HABs out of a total of 4000 described marine planktonic microalgae [76]. Research indicates that the rise in HABs shows the signs of a global epidemic of HABS. Whether this recognition is the result of an increase of scientific awareness of toxic algal species, utilization of coastal waters for aquaculture, cultural eutrophication of waters, unusual climatalogical conditions or the transport of dinoflagellates by ships ballast water or shellfish stock is unclear [77-801. The invasion patterns of microalgae are dependent on human vectors and subsequent adaptation ofthe algae to their new environment. In the North Sea ofthe Atlantic Ocean, a shift in the successional pattern of flagellate and dinoflagellate species has been attributed to human-induced climate and ocean salinity changes. HABs have increased and resulted in a proportional change in the community composition of diatoms and dinoflagellates. Continued climatic change could result in a successional change in the phytoplankton of the area [81]. Anthropogenic nutrient enrichment of coastal areas has also been linked to HAB events around the world [82]. Microalgal genera or species proposed for biofuel production that have had HAB incidents include Amphom, Mmschia, Pseudo-nitzsc/Jia and Prymnesium parvum. It has been suggested that locating algal biofuel production plants close to seawater will remove the need for fresh water resources and increase their sustainability [83]. However there is little discussion on the ecological impacts resulting from an accidental introduction of a microalgal biofuel species into the surrounding environment. Microscopic species can easily be moved from one site to another unintentionally; for example, rock snot (Didymosphenia geminata) is a one-celled diatom that can spread in a drop of water, on clothing, pets or other gear. It is an emerging global invasive species, particularly in parts ofthe USA and New Zealand [84]. In invaded habitats, D. geminata blooms can affect trophic levels in fresh water systems, impacting ecosystem structure and function [85] \_ The authors suggest that because D. geminata is microscopic, its invasion patterns may have more in common with global diseases than with higher taxonomic organism invaders. While there is a rush to develop an algal-based biofuel industry, the development of risk assessment procedures and risk mitigation measures have not kept pace. There is a lack of information on what the negative effects could be to an ecosystem by introducing a non-native, native or GM algal species. While there are numerous risk assessment procedures developed for I-IABs [86], risk assessment for I-IAB species is complicated due to algal species diversity and the degree of taxonomic expertise that is required to identify the species in question. Research efforts are needed to develop tools for taxonomic classification and the identification of population dynamics of I-IAB species to improve monitoring and risk assessment efforts, and to develop management and mitigation procedures that limit the impacts of I-IABs to the environment [76].

# 1NC – Biofuels Advantage Turns (3/5)

**Algae cultivation leads to eutrophication of water systems – kills seagrasses that are key to maintain marine life**

**NRC 12** (National Research Council, “Sustainable Development of Algal Biofuels in the United States”, Committee on the Sustainable Development of Algal Biofuels, 2012, http://www.laboratoryequipment.com/sites/laboratoryequipment.com/files/legacyimages/101412\_report.pdf)

Large-scale algae cultivation requires the provision of large quantities of nutrients, especially nitrogen and phosphorus, to ensure high yield (see section Nutrients in Chapter 4). Even where nitrogen and phosphorus are not in oversupply, the total nutrient concentrations in algal biomass will be high. Although accidental release of cultivation water into surface water and soil is unlikely, such an event could lead to eutrophication of downstream freshwater and marine ecosystems, depending on the proximity of algal ponds to surface and grormdwater sources. Eutrophication occurs when a body of water receives high concentrations of inorganic nutrients, particularly nitrogen and phosphorus, stimulating algal growth and resulting in excessive algal biomass. As the algae die off and decompose, high levels of organic matter and the decomposition processes deplete oxygen in the water and result in anoxic conditions (Smith, 2003; Breitburg et al., 2009; Rabalais et al., 2009; Smith and Schindler, 2009). In some cases, eutrophication-induced changes could be difficult or impossible to reverse if altemative stable states can occur in the affected ecosystem (Scheffer et al., 2001; Carpenter, 2005). Eutrophication effects have been well studied, and they depend on the nutrient loadings to the receiving waters and the volume and residence time of water of these systems (Smith et al., 1999; Smith, 2003). High nutrient loading could lead to anoxia in the deep cool portion of lakes or in hypoxia in the receiving water bodies. Potential biotic effects of eutrophication include changes in algal density and in the structure and biomass of the broader ecological community (Scheffer et al., 1997; Reynolds et al., 2002; Smayda and Reynolds, 2003). Fish yield is affected by phytoplanktonl biomass and by the nutrient ratios in the edibility of phytoplankton (Oglesby, 1977; Bachmann et al., 1996). Nutrient levels play a key role in determining the productivity and structure of the primary producing community in estuaries and coastal marine waters (Deegan et al., 2002; Smith, 2006) and by extension, the productivity and structure of higher trophic levels. Nutrient- enriched shallow marine systems tend to have a reduced seagrass community (Burkholder et al., 1992; Hauxwell et al., 2003) because elevated nitrogen concentrations and loadings adversely affect seagrass (Efroymson et al., 2007 and references cited therein). In high-nitrate environments, seagrasses can be shaded by epiphytic algae and macroalgae (Drake et al., 2003) or sometimes by phytoplankton blooms (Nixon et al., 2001). Seagrasses affect the entire estuarine food web because they stabilize sediments; serve as habitats and temporary nurseries for fish and shellfish; are sources of food for fish, waterfowl, benthic invertebrates, or manatees and provide refuges from predation. Eutrophication and other nutrient-related effects could be a concem for cultivation of microalgae or macroalgae in large suspended offshore enclosures (for example, Honkanen and Helminen, 2000).

[note to self: seagrass impact card? regular ecosystems impact card?]

# 1NC – Biofuels Advantage Turns (4/5)

**Algae cultivation leads to water contamination – dangerous to human health and turns pollution**

**NRC 12** (National Research Council, “Sustainable Development of Algal Biofuels in the United States”, Committee on the Sustainable Development of Algal Biofuels, 2012, http://www.laboratoryequipment.com/sites/laboratoryequipment.com/files/legacyimages/101412\_report.pdf)

Some compounds present in algal ponds or photobioreactors could be toxic to humans or other organisms depending on exposure levels. Herbicides often are added to open systems to prevent growth of macrophytes and for selective control of algae (NALMS, 2004), but their application likely would be regulated as in the case of agriculture. If wastewater or oil well- produced water (Shpiner et al., 2009) is used as a water source for algae cultivation, heavy metals could be present. Wastewater could include industrial effluent (Chirmasamy et al., 2010) and municipal wastewater that has undergone various levels of treatment (Wang et al., 2010). The composition and amount of toxicants vary by the type of wastewater. Produced water (water contained in oil and gas reservoirs that is produced in conjunction with the fossil fuel) may contain high levels of organic compounds, oil and grease, boron, and ammonia (NH3) (Drewes et al., 2009). Many algal species including cyanobacteria, diatoms, and chlorophytes can bioconcentrate heavy metals (Watras and Bloom, 1992; Vymazal, 1995; Mathews and Fisher, 2008). Mercury could be introduced into feedstock production waters if unscrubbed flue gas from coal-fired power plants is used as a carbon dioxide (CO2) source (0'Dowd et al., 2006). Therefore, potential risks from using each type of produced water need to be identified so that adequate containment and mitigation measures can be implemented in cultivation and processing. Waterbome toxicants (toxic substances made or introduced into the environment anthropogenically, not including algal toxins) potentially pose risk to humans or other animals if exposures occur. Occupational exposures could be significant, especially during the harvesting phase. Thus, monitoring of toxic compounds in the culture media is important. Potential toxicity exposure to animals through drinking is discussed in the section on terrestrial biodiversity. The release of culture waters to natural environments could pose other risks to animal consumers. Toxic concentrations and doses for various chemicals are available in the Environmental Protection Agency (EPA) Integrated Risk Information System database for humans (EPA, 2012) in Suter and Tsao (1996) for aquatic biota, in Sample et al. (1996) for terrestrial wildlife, and in other government and independent compilations. Cultivation of algae in wastewater may require special handling and means of containment. Monitoring for the presence of toxicants or pathogens might be necessary to ensure the quality of the culture water.

1

# 1NC – Biofuels Advantage Turns (5/5)

**Algae emit CH4 and N2O – massively more potent GHGs than CO2**

**Zhu and Ketola 12** (Liandong and Tarja, “Microalgae production as a biofuel feedstock: risks and challenges”, International Journal of Sustainable Development & World Ecology 19:3, June 2012, http://www.academia.edu/3459816/Microalgae\_production\_as\_a\_biofuel\_feedstock\_risks\_and\_challenges)

Another risk is greenhouse gas releases for microalgae systems [mainly CO 2 , methane (CH 4 ) and N 2 O] and NH 3 release. At night and on cloudy / rainy days, microalgae consume oxygen in respiration, causing anaerobic zones in the culture water, leading to the emission of CH 4 and N 2 O. The emissions of N 2 O generally range between 1%and 3% of the fertiliser added (IPCC 2006), whereas for NH 3 they are 0.6–9% of the fertiliser (Erisman et al.2009). CH 4 and N 2 O, respectively, possess 21- and 310-fold the global warming potential of CO 2 (IPCC 2006),while the released ammonia can lead to toxicity (Sialveet al. 2009). Moreover, if the culture system fails, dead microalgae biomass will be broken down through the action of anaerobic microorganisms. This denitriﬁcation process will increase emissions of CO 2 ,CH 4 and especially N 2 O (Tortosa et al. 2011). All three of these gases makes igniﬁcant contributions to global warming (IPCC 2006;Liu et al. 2010)

# 2NC – Biofuels Advantage Turns – Cyber Exts.

**China will cyberattack algae development efforts – they’re desperate for new energy sources**

**Mufson 14** (Steven, “Why were this company’s computers attacked millions of times this year? Algae.”, Washington Post, 7/12/14, http://www.washingtonpost.com/business/economy/why-were-this-companys-computers-attacked-millions-of-times-this-year-algae/2014/07/10/ac4df98c-f59a-11e3-a3a5-42be35962a52\_story.html)

China has made the search for commercial biofuels a priority. “With rapid economic development, energy consumption in China has tripled in the past 20 years,” wrote a group of six Chinese biochemical engineers, four of whom work at the Institute of Process Engineering at the Chinese Academy of Sciences. “The search for new green energy as substitutes for nonrenewable energy resources has become an urgent task,” [they wrote in an overview of existing literature](http://www.sciencedirect.com/science/article/pii/S0306261910005878) in the October 2011 issue of Applied Energy, a publication of the Dutch giant Elseviers. Internet security experts say that some Chinese individuals or entities are trying to take a short cut to acquiring biofuel technology, including converting algae to fuel. In tracing the source of the attacks on Algenol, Voth has looked to [a public report](https://www.mandiant.com/blog/mandiant-exposes-apt1-chinas-cyber-espionage-units-releases-3000-indicators/) by Mandiant, a reputable Alexandria-based Internet security firm. The firm traced “advanced persistent threats” to a cyber-espionage unit of the People’s Liberation Army — the second bureau of the general staff’s third department. Voth said the IP addresses and servers he tracked were the same as the ones in the Mandiant report. Jen Weedon, manager of threat intelligence at [FireEye](http://www.fireeye.com/), which acquired Mandiant in December, said FireEye had identified 25 Chinese groups engaged in cyber-espionage. “We’ve seen six of those 25 pursue companies involved in biofuels,” she said, all of them tied to intelligence agencies, the military, other parts of the government or government contractors. “The biofuels industry fits squarely in what they call strategic emerging industries.”

# 2NC – Biofuels Advantage Turns – Invasive Species Exts. (1/3)

**Algae biofuels risk harmful toxins and upsetting fragile ecosystems**

**OSU 12** (Ohio State University, “Genetically engineered algae for biofuel pose potential risks”, Science Daily, 8/20/12, http://www.sciencedaily.com/releases/2012/08/120820121044.htm)

Algae are high on the genetic engineering agenda as a potential source for biofuel, and they should be subjected to independent studies of any environmental risks that could be linked to cultivating algae for this purpose, two prominent researchers say. Writing in the August 2012 issue of the journal BioScience, the researchers argue that ecology experts should be among scientists given independent authority and adequate funding to explore any potential unintended consequences of this technological pursuit. A critical baseline concern is whether genetically engineered algae would be able to survive in the wild, said Allison Snow, professor of evolution, ecology and organismal biology at Ohio State University and lead author of the paper. "If they're grown in big, open ponds, which is mainly what were talking about, could the newer types of microalgae get out into nature and mingle? We need to know if they can survive and whether they can hybridize or evolve to become more prolific when they get out of a controlled environment," Snow said. "If they can survive, we also need to know whether some types of genetically engineered blue-green algae, for example, could produce toxins or harmful algal blooms -- or both," Snow noted. And because algae are so small and could be dispersed by rough weather or wildlife activity, biologists worry that any transgenes they contain to enhance their growth and strength could be transferred to other species in a way that could upset a fragile ecosystem. "The applications are new and the organisms are less well-known. They range from being very tame 'lab rats' that won't survive in nature to wild organisms that can presumably cross with each other unless some measures are taken to prevent crossing. It's a very new situation," Snow said. Snow co-authored the article with aquatic ecologist Val Smith, a professor in the Department of Ecology and Evolutionary Biology at the University of Kansas. Snow has a history in this area of research. She led a study in 2002 that was the first to show that a gene artificially inserted into crop plants to fend off pests could migrate to weeds in a natural environment and make the weeds stronger. She also has served on national panels that monitor and make recommendations about the release of genetically engineered species into the environment. There are a lot of unknowns about this area of research and development in microalgae, and that's largely because algae don't have the breeding history that, say, corn and soybeans have, Snow said. In addition, few details are publicly available because much of this information remains confidential as businesses compete to be the first to commercialize their genetically altered algae.

# 2NC – Biofuels Advantage Turns – Invasive Species Exts. (2/3)

**Algae biofuel development leads to ecosystem destruction – eutrophication and kills biodiversity**

**Zhu and Ketola 12** (Liandong and Tarja, “Microalgae production as a biofuel feedstock: risks and challenges”, International Journal of Sustainable Development & World Ecology 19:3, June 2012, http://www.academia.edu/3459816/Microalgae\_production\_as\_a\_biofuel\_feedstock\_risks\_and\_challenges)

The term biodiversity is used to refer to the richness of the life forms and their associations in a biome (Suneetha2010). In a balanced system, weather, predators, diseases and availability of food sources all affect species presence and population size (Benton 2001). Water contamination and the presence of alien invasive species will threaten the development and stability of biodiversity in any system. A microalgae culture facility, whether a closed or open system, can be established in a water-rich delta, a desert or in the open sea. In an open system, the use of large quanti-ties of fertiliser for microalgae cultivation can lead to direct and indirect releases of reactive N species into the environ-ment. Moreover, in microalgae culture systems chemicals and disinfectants are widely used for pest prevention water treatment, and cleaning and disinfection of equip-ment. Moreover, during biomass harvest, ﬂocculants are also essential. As a result, the downstream discharge of residual chemical nutrients can lead to net increases in nutrient levels in the receiving water body. Although fur-ther environmental effects have not yet been fully known assessed, eutrophication resulting from nutrient imbalance in water will give rise to toxic algal blooms and ﬁsh kills in the natural environment (Glibert et al. 2005; Estradaet al. 2009).There are over 100,000 microalgal species, and only a handful have been well studied and adopted for widespread cultivation in the aquaculture and food industry. Creating pure microalgae culture is difﬁcult, and involves the limi-tation or exclusion of natural and native species. Any exotic or potentially invasive microalgae species from system wastewater that are released into the natural environment will threaten the integrity of local and regional ecosys-tems, since downstream water may contain non-harvested microalgal cells. The movement or drift of microalgae carries risks for wild species, and may result in biolog-ical invasions. Through species competition, large-scale microalgal reproduction will threaten the safety of native species, and could even cause a biological disaster – species extinction (Fritts and Rodda 1998)

# 2NC – Biofuels Advantage Turns – Invasive Species Exts. (3/3)

**Algae biofuels hurt the environment—releases more GHG emissions & threatens water resources**

**Rampton & Zabarenko, 2012** (Roberta Rampton and Deborah Zabarenko- environmental correspondents for Reuters, “Algae biofuel not sustainable now-U.S. research council”, Reuters, 10/24/2014, http://uk.reuters.com/article/2012/10/24/us-usa-biofuels-algae-idUKBRE89N1Q820121024)

It said a main reason to use alternative fuels for transportation is to cut climate-warming greenhouse gas emissions created by burning fossil fuel. But estimates of greenhouse emissions from algal biofuels cover a wide range, with some suggesting that over their life cycle, the fuels release more climate-warming gas than petroleum, it said. The product now made in small quantities by Sapphire uses algae, sunlight and carbon dioxide as feedstocks to make fuel that is not dependent on food crops or farmland. The company calls it "green crude." Tim Zenk, a Sapphire vice president, said the company has worked for five years on the sustainability issues examined in the report. "The NRC has acknowledged something that the industry has known about in its infancy and began to address immediately," he said. He said Sapphire recycles water and uses land that is not suitable for agriculture at its New Mexico site, where it hopes to make 100 barrels of algal biofuel a day by 2014. The U.S. Navy used algal biofuel along with fuel made from cooking oil waste as part of its "Green Fleet" military exercises demonstration this summer, drawing fire from Republican lawmakers for its nearly $27 per gallon cost. The council study also said it was unclear whether producing that much biofuel from algae would actually lead to reduced greenhouse gas emissions. The report shows the strategy is too risky, said Friends of the Earth, an environmental group. "Algae production poses a double-edged threat to our water resources, already strained by the drought," Michal Rosenoer, a biofuels campaigner with the group, said in a statement.

# 2NC – Biofuels Advantage Turns – Warming Exts.

**Releases more CO2 emissions than other biofuels**

**Lewis & Peterson, 2013** (Jonathan Lewis- Senior Counsel - Climate Policy & Cameron Peterson- climate policy, “THE STATUS OF ALGAL BIOFUEL DEVELOPMENT”, Clean Air Task Force, 07/15/2013, http://www.catf.us/resources/whitepapers/files/201307-CATF%20Status%20of%20Algal%20Biofuels.pdf)

Lifecycle analyses (LCAs) of the greenhouse gas (GHG) emissions emitted in the production of algal biofuels are less than encouraging as well. They tend to range significantly, depending on the study, but can be an order of magnitude greater than those from other sources. One review of twenty-four LCAs of algal biofuel produced in open raceway ponds found that the process emitted between 0.1 and 4.4 kg CO2e/kg of algae whereas the high end of emissions given for biofuels produced by corn, soybeans, and camelina was 0.4, 0.5, and 0.3 kg CO2e/kg, respectively (Handler et al., 2012, p.89). While only three of the twenty-four LCAs resulted in emissions of more than 1 kg CO2e/kg of algae, the results demonstrate the potentially negative environmental impacts due to fossil energy, freshwater, and fertilizer use in algae cultivation. For instance, the LCA study that exhibited emissions of 4.4 kg CO2e/kg of algae assumed the addition of potassium nitrate, deemed by Handler et al. (2012) as the “the worst-performing N fertilizer in all three of our chosen environmental metrics” (p. 90). This assumption, among many others, generated lifecycle emissions of more than twice those of any other study that Handler et al. analyzed.

# 1NC – Biofuels Advantage Defense (1/5)

**Can’t solve warming – oil would have to be $1000 a barrel for it to compete and requires too much algae to be viable**

**The Economist 13** (“What happened to biofuels?”, The Economist, 9/7/13, http://www.economist.com/news/technology-quarterly/21584452-energy-technology-making-large-amounts-fuel-organic-matter-has-proved-be)

Some observers doubt whether even the most sophisticated biofuels can compete with fossil fuels in the near future. Daniel Klein-Marcuschamer, a researcher at the Australian Institute for Bioengineering and Nanotechnology, conducted a comprehensive analysis of renewable aviation fuels. He concluded that producing first-generation bio-jet fuel from sugarcane would require oil prices of at least $168 a barrel to be competitive, and that some second-generation algae technologies would require crude oil to soar above $1,000 a barrel (the current price is around $110) to break even. Mr Klein-Marcuschamer has made his model open-source in an effort to help the industry find ways to make biofuels more competitive. Even if second-generation processes can be economically scaled up, however, that might in turn highlight a further problem. To make a significant dent in the 2,500m litres of conventional oil that American refineries churn through each day, biofuel factories would have to be able to get hold of a staggering quantity of feedstock. Mr Ghisolfi of Beta Renewables points out that a factory with an annual output of 140m litres needs 350,000 tonnes of biomass a year to operate. “There are only certain areas, in Brazil and some parts of the US and Asia, where you can locate this much biomass within a close radius,” says Mr Ghisolfi. “I am sceptical of scaling to ten times that size, because getting 3.5m tonnes of biomass to a single collection point is going to be a very big undertaking.” Billions of tonnes of agricultural waste are produced worldwide each year, but such material is thinly spread, making it expensive to collect and transport. Moreover, farms use such waste to condition the soil, feed animals or burn for power. Diverting existing sources of wood to make biofuels will annoy builders and paper-makers, and planting fuel crops on undeveloped land is hardly without controversy: one man’s wasteland is another’s pristine ecosystem. Dozens of environmental groups have protested against the EPA’s recent decision to permit plantations of fast-growing giant reed for biofuels, calling it a noxious and highly invasive weed. Just as the food-versus-fuel argument has proved controversial for today’s biofuels, flora-versus-fuel could be an equally tough struggle for tomorrow’s.

# 1NC – Biofuels Advantage Defense (2/5)

**Large-scale biofuels are impossible – their ev is about the science, but commercialization is impossible – no adoption**

**The Economist 13** (“What happened to biofuels?”, The Economist, 9/7/13, http://www.economist.com/news/technology-quarterly/21584452-energy-technology-making-large-amounts-fuel-organic-matter-has-proved-be)

SCIENTISTS have long known how to convert various kinds of organic material into liquid fuel. Trees, shrubs, grasses, seeds, fungi, seaweed, algae and animal fats have all been turned into biofuels to power cars, ships and even planes. As well as being available to countries without tar sands, shale fields or gushers, biofuels can help reduce greenhouse-gas emissions by providing an alternative to releasing fossil-fuel carbon into the atmosphere. Frustratingly, however, making biofuels in large quantities has always been more expensive and less convenient than simply drilling a little deeper for oil. Ethanol, for instance, is an alcoholic biofuel easily distilled from sugary or starchy plants. It has been used to power cars since Ford’s Model T and, blended into conventional petrol, constitutes about 10% of the fuel burned by America’s vehicles today. Biodiesel made from vegetable fats is similarly mixed (at a lower proportion of 5%) into conventional diesel in Europe. But these “first generation” biofuels have drawbacks. They are made from plants rich in sugar, starch or oil that might otherwise be eaten by people or livestock. Ethanol production already consumes 40% of America’s maize (corn) harvest and a single new ethanol plant in Hull is about to become Britain’s largest buyer of wheat, using 1.1m tonnes a year. Ethanol and biodiesel also have limitations as vehicle fuels, performing poorly in cold weather and capable of damaging unmodified engines. In an effort to overcome these limitations, dozens of start-up companies emerged over the past decade with the aim of developing second-generation biofuels. They hoped to avoid the “food versus fuel” debate by making fuel from biomass feedstocks with no nutritional value, such as agricultural waste or fast-growing trees and grasses grown on otherwise unproductive land. Other firms planned to make “drop in” biofuels that could replace conventional fossil fuels directly, rather than having to be blended in. Governments also jumped on the biofuels bandwagon. George Bush saw biofuels as a route to energy independence, signing into law rules that set minimum prices and required refiners and importers to sell increasing amounts of biofuel each year. By 2013, America was supposed to be burning nearly 3,800m litres a year of “cellulosic” biofuels made from woody plants. Toil and trouble But instead of roaring into life, the biofuels industry stalled. Start-ups went bust, surviving companies scaled back their plans and, as prices of first-generation biofuels rose, consumer interest waned. The spread of fracking, meanwhile, unlocked new oil and gas reserves and provided an alternative path to energy independence. By 2012 America’s Environmental Protection Agency (EPA) had slashed the 2013 target for cellulosic biofuels to just 53m litres. What went wrong? Making a second-generation biofuel means overcoming three challenges. The first is to break down woody cellulose and lignin polymers into simple plant sugars. The second is to convert those sugars into drop-in fuels to suit existing vehicles, via a thermochemical process (using catalysts, extreme temperatures and high pressures) or a biochemical process (using enzymes, natural or synthetic bacteria, or algae). The third and largest challenge is to find ways to do all this cheaply and on a large scale. In 2008 Shell, an energy giant, was working on ten advanced biofuels projects. It has now shut most of them down, and none of those that remain is ready for commercialisation. “All the technologies we looked at worked,” says Matthew Tipper, Shell’s vice-president for alternative energy. “We could get each to produce fuels at a lab scale and a demonstration scale.” But bringing biofuels to market proved to be slower and more costly than expected.

# 1NC – Biofuels Advantage Defense (3/5)

**No algae adoption absent large-scale policy changes – no incentive to switch**

**Howell 09** (Katie, “Is Algae the Biofuel of the Future?”, Scientific American, 4/28/09, http://www.scientificamerican.com/article/algae-biofuel-of-future/)

Raytheon Co. and other companies are also looking into the reuse of CO2 emissions for algae production. Frank Prautzsch, director of Raytheon's Rapid Initiatives Group, the company's renewable-energy enterprise arm, said his team is running carbon capture and recycling R&D and pilot programs at [coal-fired power plants](http://www.scientificamerican.com/blog/60-second-science/post.cfm?id=epa-ruling-halts-all-new-coal-fired-2008-11-14) in Colorado and Arizona. "The fuel basis of algae is very important," Prautzsch said. "The reason we focus on algae is because of its oil yield and its ability to not be addressable inside our food crop." Power plants could capture CO2 and use it to produce algae directly at the plant, "if they have the real estate for an algae farm," Prautzsch said. Algae can grow in almost any climate and with minimal water, so long as there is sunlight. If conditions are not ideal for algae development, the plant could pipe its CO2 emissions away to someplace like Sapphire's 3,000-acre Integrated Algal Biorefinery in southern New Mexico. Push for policy changes But Zenk does not think that is going to happen until Congress enacts some policy changes. It would be wise, he said, to include a provision in any climate change legislation to give carbon emitters a credit for beneficial reuse of the greenhouse gas. "It's both the cost-of-carbon issue but also creating a policy framework that allows these emitters to [get credit for beneficial reuse of their carbon](http://www.scientificamerican.com/article.cfm?id=cap-and-trade-obama-budget)," he said. Zenk is urging lawmakers to include incentives for power plants to do more than[capture and sequester](http://www.scientificamerican.com/report.cfm?id=carbon-capture-storage-ccs) their CO2 emissions. "We think a better policy is to find a way to use waste, which is CO2, and recycle it and beneficially reuse it and turn it into something that is important for our economy," he said.

# 1NC – Biofuels Advantage Defense (4/5)

**Ocean science research is happening now and is sufficient**

**Gewin, 2013** (Virginia Gewin, a science journalist covering environmental issues — from food security to acidifying oceans, “Los Angeles unveils plans for ocean-research centre”, Nature News, 06/21/2013, http://www.nature.com/news/los-angeles-unveils-plans-for-ocean-research-centre-1.13250)

California has no shortage of high-profile marine research institutes — from the Scripps Institution of Oceanography in La Jolla in the south, to the Monterey Bay Aquarium Research Institute farther north, in Moss Landing. But backers of a plan to convert a 100-year-old dock in the Port of Los Angeles into a US$500-million research centre and business park called AltaSea say that there is still an untapped niche in ocean science — a facility focused on making Los Angeles and other coastal cities sustainable by helping them to adapt to climate change, to become more energy efficient and to reduce marine pollution. The 11-hectare facility will be developed by a public–private collaboration of the Port of Los Angeles, a family foundation and several California universities. The centre will house labs with circulating seawater, offices, lecture halls, classrooms and a visitor centre, according to construction plans unveiled on 17 June by port officials. The collaboration also hopes to build the world's largest seawater wave tank to study wave damage to coastal infrastructure. "The idea is to create a hybrid institute around the fundamental challenges inherent to coastal cities," says Anthony Michaels, chief scientist at Pegasus Capital Advisors, an investment firm in El Segundo, California, who championed the AltaSea proposal during his tenure as director of the Wrigley Institute for Environmental Studies at the University of Southern California in Los Angeles. AltaSea's first tenant will be the Southern California Marine Institute (SCMI), a research alliance of 11 major universities in the region — including eight California State University campuses, the University of Southern California and Occidental College, both in Los Angeles, and the University of California, Los Angeles. "This will be a green, world-class research centre in an area where we are seeing the greatest urban-ocean problems, from runoff to climate change," says biologist Daniel Pondella, the SCMI's director and a professor at Occidental College. AltaSea's location on an industrial urban waterfront will help the 19-year-old alliance to continue its work on harmful algal blooms, the restoration of near-shore reefs damaged by nutrient runoff, and other signs of human impact on the world's oceans. Finding funds Geraldine Knatz, the Port of Los Angeles's executive director — and a former marine scientist — calls the project “a game changer” that could help revitalize the San Pedro neighborhood that AltaSea will call home. Fifty years ago, more than 100,000 people streamed to the port each day; today, that figure has shrunk to just 16,000. But first, AltaSea's backers will have to continue trawling for cash. They have raised just $57 million of the estimated $155 million that they will need to pay for the project's first phase, which they hope to complete in 2018. The Port of Los Angeles is contributing $32 million to upgrade the dock and the Annenberg Foundation in Los Angeles has donated $25 million to kick-start construction. A second phase of development, including construction of the wave tank, would bring the project's total cost to an estimated $500 million over 20 years. Michaels says that he isn't worried about raising the extra money. He envisions AltaSea as a hotbed of research for companies working on aquaculture, algal biofuels, marine sensors and urban agriculture, and not just as a home for academic scientists. "We're taking a gamble on the real faith that a facility this unique will create genuine value by bringing everyone together," he says. Despite tight federal and state research funding, even would-be competitors — such as the Center for Oceans and Human Health at the Scripps Institution of Oceanography — view AltaSea as a welcome addition. "Studying the interactions between the ocean and human health is an emerging area of science," says Bradley Moore, director of the Scripps centre, which was established last year with a $6-million joint grant from the US National Science Foundation in Arlington, Virginia, and the National Institutes of Health in Bethesda, Maryland. "If AltaSea can put more resources towards helping find solutions, that's great."

# 1NC – Biofuels Advantage Defense (5/5)

**US natural gas boom crowds out algal biofuels**

**SIO, 04/08/2014** (Scripps Institution of Oceanography, “Scripps, UCSD algae biofuel programs rated top in US by DOE”, Biodiesel Magazine, 04/08/2014, http://www.biodieselmagazine.com/articles/46097/scripps-ucsd-algae-biofuel-programs-rated-top-in-us-by-doe)

The algae biofuel industry has grown significantly since CAB-Comm was founded in 2008 (it was then called the San Diego Center for Algae Biotechnology, SD-CAB), expanding from scientific to commercial interests. Its development is spurred in part by a desire to wean American dependence on foreign oil, but another motivation to develop algae biofuel is that it has the potential to cut carbon dioxide emissions in half, because the algae sequester carbon as they grow and partially offset the carbon released when the biofuel is burned. Cost is the main factor holding algae biofuel back, as it’s currently two to three times more expensive than fossil fuels, even when produced by the largest and most efficient operations. There are some indications that algae biofuel will be cost-competitive with fossil fuels within five years, but investment in large-scale production isn’t likely to happen until then. The recent boom in America’s natural gas production enabled by fracking could further dampen investor interest and slow the development of algae biofuels.

# 2NC – Biofuels Advantage Defense – Solvency Exts. (1/3)

**Biofuels can’t solve – energy demand too high**

**De Decker 08** (Kris, “Leave the algae alone”, Low-Tech Magazine, 4/4/08, http://www.lowtechmagazine.com/2008/04/algae-fuel-biof.html)

While the first generation of biofuels is wreaking havoc on the environment and the food markets, the second generation is getting ready to make things only worse. Behind the scenes, scientists are already working on the third generation, whatever that may be. In five or ten years time, when it becomes clear that algal fuel is devouring our water and energy resources and cellulosic ethanol is mining our agricultural soils, we will be promised that the third generation will again solve all the problems of the previous generation. It might be a better solution to bury the whole idea of biofuels right here and now and focus on [real](http://www.lowtechmagazine.com/2009/07/trolleytrucks-trolleybuses-cargotrams.html) [solutions](http://www.lowtechmagazine.com/2008/09/speed-energy.html). The trouble with biofuels is not the technology, but our unrealistic expectations. Producing fuels out of food crops could be a useful and sustainable solution if our energy consumption would not be so ridiculously high. All our habits, machines and toys are built upon an extremely concentrated form of energy, fossil oil, and trying to replace that fuel with a much less concentrated form is simply impossible. In 2003, Jeffrey Dukes [calculated](http://globalecology.stanford.edu/DGE/Dukes/Dukes_ClimChange1.pdf) that 90 tons of prehistoric plants and algae were needed to build up one gallon of gasoline. We burn this amount of organic material to drive 25 miles to pick up some groceries. In one year, the world burns up 400 years of prehistoric plant and algae material. How can we ever expect to fulfill even a small part of our fuel needs by counting on present plant and algae material? The problem we have to fix is our [energy consumption](http://www.lowtechmagazine.com/energy_consumption/). Biofuels, from whatever generation, only distract us from what really should be done.

# 2NC – Biofuels Advantage Defense – Solvency Exts. (2/3)

**Can’t solve warming – algae is not a carbon sink and risks catastrophic NO2 and methane pollution**

**NRC 12** (National Research Council, “Sustainable Development of Algal Biofuels in the United States”, Committee on the Sustainable Development of Algal Biofuels, 2012, http://www.laboratoryequipment.com/sites/laboratoryequipment.com/files/legacyimages/101412\_report.pdf)

Primary GHG emissions from algal biofuels are expected to be connected to the use of energy in the processing chain (see section Energy in Chapter 4). The translation of energy use to GHG emissions is complicated by variability in the carbon overhead of different forms of energy, in particular electricity. The average direct GHG emissions of electricity production in the United States is 606 grams of CO2 equivalent per kilowatt hour. Depending on the mix of fossil fuels, hydropower, nuclear, wind, and other sources providing power to the grid, emissions vary by state from 13 to 1,017 grams C02 equivalent per kilowatt hour (EIA, 2002). The approach taken by many analysts is to use a national average emissions factor (Liu et al., 2011). LCA results for net GHG emissions for algae biofuel production vary from a net negative value (that is, a carbon sink) to positive values substantially higher than petroleum gasoline (Table 5-4). As with the case for energy use (see Chapter 4), drivers of variability in CO2 emissions are nutrient source, productivity and process performance, and the credit associated with coproducts. For example, Sander and Murthy (2010) asslmled that residual algae biomass substitutes for com in ethanol plants. Com is energy intensive to produce; the GHG credit from replacing com with oil-extracted algae as a feedstock for ethanol results in a negative carbon balance. For reference, the direct carbon emission of combusting gasoline is about 2.7 kg CO2 equivalent per liter of fuel (Farrell, 2006). The vast differences in results in Table 5-4, ranging from a net carbon credit to emissions far larger than those from petroleum-based diesel, present a challenge for interpretation. Liu et al. (2012) performed a meta-analysis of these studies to analyze variability in processing energy by replacing differences in data and assumptions for nutrients and coproducts with common data (Lardon et al., 2009; Clarens et al., 2010; Jorquera et al., 2010; Sander and Murthy, 2010; Stephenson et al., 2010; Campbell et al., 2011). Differences in nutrient sourcing and coproducts are treated via four scenarios: virgin versus recycled CO2 and no coproducts versus coproducts. The common coproduct system used is generation of bioelectricity from gas generated by anaerobic digestion with the electricity generated substituting for carbon emissions from the U.S. grid. Table 5-5 shows the ranges in results from the six treated studies, after normalization, for the four scenarios. These meta-analysis results suggest that the C02 source and coproducts are critical factors in the GHG balance. It is, however, premature to conclude that algae based on recycling C02 and producing biogas has net negative GHG emissions. The variability in Table 5-5 is based on differences in energy data and assumptions in the six existing studies. It is not yet clear if current LCA analyses of algae-based systems will accurately reflect the energy use of a real- world, scaled-up system. None of the studies above addresses the potential issue of indirect land-use change from biofuels. As stated earlier, it is possible that conversion of pastureland to algae cultivation facilities would necessitate conversions to pastureland elsewhere. However, uncertainties are too great to quantify this probability or to calculate net GHG emissions under these assumptions. (See section Land-Use Change in this chapter.) While many agricultural processes emit non-carbon GHGs such as nitrous oxide (N20) and methane (Weber and Matthews 2008), these emissions have not been established empirically as significant for algae cultivation. N20 could be emitted from cultivation systems, and these emissions would need to be quantified in the future for cultivation conditions that might promote N20 or methane emission. One study of a single species quantified N20 emissions from algal culture under laboratory conditions (Fagerstone et al., 2011). In this study of Nannochloropsris salma with nitrate as a nitrogen source, elevated N20 emissions were observed under a nitrogen headspace (photobioreactor simulation) during dark periods, but N20 emissions were low during light periods. In contrast, when the headspace consisted of air (open-pond simulation), N20 emissions were negligible. Denitrifying bacteria were present. Denitrification is the microbial reduction of nitrate and nitrite with generation of N20 and, ultimately, gaseous nitrogen. Anaerobic environments are required for the transformation, but high rates of denitrification occur where oxygen is available altemately, then unavailable (Kleiner, 1974). In rivers, ponds, lakes, and estuaries, the production of N20 is correlated with nitrate concentrations in the water (Stadmark and Leonardson, 2005). The denitrification rate depends on the

# 2NC – Biofuels Advantage Defense – Solvency Exts. (3/3)

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underlying soil and the liner's permeability. Whether anaerobic denitrification is the only potential pathway for N20 generation in algae cultivation systems is unclear. Weathers (1984) has shown that certain Chlorophyceae in axenic culture evolve N20 when using nitrite as a nitrogen source. Florez-Leiva et al. (2010) found that coastal open-pond systems containing Nannochloris emitted large quantities of N20 during senescence. They speculated that oxidation of ammonitml (NH4) by bacteria was the likeliest N20-generation pathway under the observed aerobic conditions. Proper management of the algae cultivation systems, which would prevent senescence of algae and maintain aerobic conditions in ponds, likely would keep N20 emissions to low levels. Methanogenesis can occur in freshwater and marine sediments, waterlogged soils, marshes, and swamps where oxygen is low. These conditions might prevail in some ponds with substantial biomass or other organic matter in the sediment. Methane is released when organic acids, alcohols, celluloses, hemicelluloses, and proteins are degraded. Methane production is related to water temperature (Stadmark and Leonardson, 2005) and is maximized at neutral pH (Alexander, 1977). Methanogenesis is suppressed by nitrogen compounds that bacteria can use as electron acceptors, including nitrate and nitrite (Bollag and Czlonkowski, 1973), but these compoimds may be reduced easily in oxygen-depleted environments. Methanogenesis and denitrification might be enhanced if the culture fails. During catastrophic failure of the culture, the dense algal cultures in algal biofuel ponds can become anaerobic and emit a variety of volatile nitrous or sulfur compounds as well as methane. However, culture failures would be expected to be short-term and rare occurrences if algal biofuel companies are to maintain a profit margin.

# 2NC – Biofuels Advantage Defense – Biofuels Fail Exts. (1/4)

**Large-scale algae fuel production impossible – to offset US oil production would require an area the size of Alabama**

**Hannon et al. 11** (Michael Hannon, Javier Gimpel, Miller Tran, Beth Rasala, and Stephen Mayfield, “Biofuels from algae: challenges and potential”, Biofuels 1:5, September 2011, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/)

Regardless of the growth strategy employed and efficiency of oil extraction, the scale of implementation that is required to replace a meaningful amount of fossil fuel is significant. In 2008, the USA alone required 19,497,950 barrels of oil per day [[32](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R32)]. For algae, or any other biofuel feedstock, to impact this number, significant acreage must be dedicated to production facilities, with estimates suggesting that 30 million acres will be required to meet US oil demand. Different models have been presented for how large-scale aquaculture can be achieved. Although both terrestrial strategies and marine strategies may be required, in this article we focus on the terrestrial aquaculture, since marine strategies are completely unknown at present and may require engineering significantly different from what is practiced today. The terrestrial models use land that is not presently used for food agriculture, and has minimal known environmental or other significant economic utility. Water use Water is potentially a major limiting factor in algal growth. Expansion of algal growth into nonarable land will require water; fortunately, many of these regions have substantial alkaline or saline water reservoirs beneath them, providing a significant source of nonpotable water that is suitable for growth of many algal species. Perhaps surprisingly, algae grown in open ponds have water requirements per unit area similar to that of cotton or wheat, but less than that of corn, to replenish the water lost in evaporation (for an overview of water requirements of terrestrial plants used in biofuel production see [[33](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R33)]). It is imperative when considering broad deployment of algae, to consider water use to avoid a future ‘water versus fuel’ debate. Although substantial alkaline reserves are available, water will remain a central issue for algae biofuels production and will need to be considered carefully as the industry expands. Nutrient challenge Algae require nutrients, light, water and a carbon source, most often CO2, for efficient growth. The major nutrients required by most algae include phosphorous, nitrogen, iron and sulfur. Often, the nutrient requirement necessary for algal growth is ignored, since algae are very efficient at sequestering these nutrients when present in their environment [[34](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R34),[35](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R35)]. Changes in nutrient load and algal growth have been studies extensively in terms of eutrophication of lakes and coastal regions, but not as heavily in terms of productivity in large-scale aquaculture [[36](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R36),[37](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R37)]. If terrestrial agriculture is a model for some of the challenges for algal aquaculture, then providing sufficient nutrients for large-scale algal growth is a significant challenge. Microand macro-nutrient supplements, or fertilizer, account for significant costs in the current terrestrial agriculture industry [[38](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R38)], and biofuels are not expected to be an exception. The use of fertilizers has been increasing globally. Unfortunately, many fertilizer components are generated from fossil fuels or mined and, as such, they are not renewable [[39](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R39)–[42](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R42)]. Algae, similar to plants, require sources of phosphorus, nitrogen and potassium, which are the major components of agricultural fertilizers, and large-scale aquaculture will impact these already limited supplies. In addition, optimal growth of many algal species requires chelated iron and sulfur. Phosphorous makes up slightly less then 1% of total algal biomass and is required at approximately 0.03–0.06% in the medium to sustain algal growth. Fertilizers in the USA used for agriculture currently contain a less than optimal concentration of phosphate owing to limited supplies. Presently, less than 40 million tons of phosphate is mined from the USA annually, and the maximum phosphate production from this mining peaked in the late 1980s. If algal biofuels are to completely replace petroleum in the USA, an additional 53 million tons of phosphate must be acquired annually. This is a significant challenge, given that the total amount of phosphate in the USA is estimated to be approximately 2.8 billion tons. This leaves few options other then efficient recycling the phosphate back into the algae ponds or significantly increasing mining output, a prospect that would seem to provide a temporary solution at best. Nitrogen, unlike phosphorous, is not limited in supply but is often a limiting macronutrient when it comes to plant and algae growth. Algae require nitrogen to be fixed into ammonia, nitrates and similar molecules, in order to be used as a nutrient source [[43](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R43)]. Some bacteria, such as rhizobia, have the ability to fix their own nitrogen and some form symbiotic relationships with terrestrial plants, providing the plants with this crucial nutrient to sustain protein and nucleic acid synthesis [[42](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R42),[44](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R44)]. Some cyanobacteria also have the ability to fix nitrogen, while almost all algal species identified to date require an exogenous source of fixed nitrogen, and most prefer ammonia, as it is less energetically demanding than nitrate or nitrite [[45](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R45)]. Providing a cheap source of fixed nitrogen will be important for algae biofuel production, and the possibility of using nitrogen-fixing cyanobacteria to supply this nitrogen may help minimize these costs [[46](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R46)]. In the open oceans, iron is a major limiting nutrient for algal growth, as demonstrated by the induction of algal blooms by the addition of exogenous iron to open oceans [[47](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R47)]. Interestingly, the addition of iron to induce an algal bloom has been considered and tested as a strategy to sequester CO2 [[47](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R47)–[49](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R49)]. Biologically, iron is required for electron transport in all known photosynthetic organisms, includingChlamydomonas reinhardtii, and is typically found in iron-sulfur clusters in a variety of photosynthetic proteins [[50](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R50)]. Iron in its oxidized form is not optimal for uptake, and most algae prefer chelated iron. Fortunately, iron can be easily acquired and is more available than many of the other required nutrients. Sulfur, in addition to its key role in the electron transport chain, is also required for protein synthesis and lipid metabolism. Sulfur deficiency has been shown to limit algal density and stunt growth [[51](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R51)]. Thus, it seems likely that sulfur will be important for optimal algal growth, and cost/benefit analysis will need to be considered to determine the optimal amount of sulfur to add to the media for the best economic return. The acquisition of the aforementioned nutrients, as well as potassium and at least nine other microand macro-nutrients, should not be overlooked when considering the implications of scaling algal biofuel production to meaningful levels [[52](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R52)]. Many of the nutrients may be supplemented by combining nutrient-rich waste water or agricultural runoff with algal growth facilities, streamlining water remediation and optimizing economic fuel production. These strategies appear to be viable at some scale; however, alternative possibilities must also be developed. Ultimately, a combination of methods may be required, and perhaps a recycling of microand macro-nutrients will have to be developed for algae-based biofuels to reach a capacity that impacts present fossil fuel use. One of the most promising techniques for recycling nutrients in algal ponds is to use anaerobic digestion [[53](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/#R53)]. This bacterial process produces methane gas, while keeping the majority of the nutrients in a bacterial slurry that can be killed and the mix used for algal fertilizer. Methane gas is not currently a high-value commodity, but can help provide energy to operate algae farms, and cheap anaerobic digestion will preclude producing some types of higher value proteins in the algae. Therefore, a balance should be reached between efficient anaerobic digestion and high-value co-products, as shown in [Figure 4](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3152439/figure/F4/).

# 2NC – Biofuels Advantage Defense – Biofuels Fail Exts. (2/4)

**Throwing money at algae biofuels fails—won’t be viable for decades**

**Russek, 2010** (Gabriela Russek, India Carbon Outlook writer, “ Algae Biofuels: Possibilities, Uncertainties”, India Carbon Outlook, 01/19/2010, http://india.carbon-outlook.com/content/algae-biofuels-exciting-possibilities-uncertain-future)

These benefits are so significant that governments, investors, and scientists still support investing in R&D, even though research thus far been fraught with disappointments. Decades of scientific study have gone into algae biofuels, including Japanese and US government projects, and privately funded research. The United States Government funded research into the fuel from 1978-1996, in the DOE Aquatic Species Project, but ended the project to focus limited budgets on bioethanol.[13] Despite over 30 years of research, there is still no commercially viable large-scale production of algae biofuel.[14] As fossil fuel prices rise, investment in the technology has been renewed. The U.S. Government is resuming funding.[15] Major investors are partnering with algae tech companies, including an investment of $600 million by Exxon Mobil into Synthetic Genomics, and a similar partnership between Bill Gates’ Cascade Investments and Sapphire Energy’s algae research.[16] The many new of enthusiastic start-up algae fuel companies (one article mentioned more than 60) are making wildly optimistic predictions about the volumes of algae biofuel that could be produced at competitive prices in the near future. However, the technology is very far from commercially viable, and several of these companies have shut down in the face of financial realities.[17] Experts are cautiously optimistic, but few are willing to predict how soon the technology could be commercially viable. They are also unsure exactly how efficient it will be in terms of land required, production costs, and carbon abatement. "(t)his research is driven by the conviction that economies of scale, improvement in yields and output are achievable,” explains Raffaello Garofalo, executive director of the European Algae Biomass Association (EABA), but adds, “"It would not be responsible to give you dates."[18] It is not a solution for the near-term future; a presenter at the Algae Biofuel summit, Bill Barclay, said the low-estimate claims of 2-4 years are unrealistic[19], and decades-long algae fuel researcher John Benemann is betting on 10-15.[20]

# 2NC – Biofuels Advantage Defense – Biofuels Fail Exts. (3/4)

**Too many obstacles that plan’s research can’t overcome**

**LTM, 2008** (Low-Tech Magazine, “Leave the algae alone”, Low-Tech Magazine, 04/08/2008, http://www.lowtechmagazine.com/2008/04/algae-fuel-biof.html)

All this sounds very good, but algae also need a few things, most notably: a lot of sunshine and massive amounts of water. To grow algae, you also need phosphorus (besides other minerals), an element that is very much needed by agriculture. Most algae are grown in brackish or salt water. That sounds as if water is no issue, since our planet has not a shortage of salt water. However, just like solar energy plants, algae plants are best located in very sunny regions, like deserts. But, in deserts, and in very sunny places in general, there is not much water to find. That’s not a problem for solar plants, because they don’t need it. But, how are you going to get seawater to your desert algae plant? Check the websites of all these companies: not a word about it. There are not that many possibilities. You can transport seawater to the desert, but that's going to cost you an awful lot of energy, probably more than what can be produced by the algae. You can also take freshwater from more nearby regions or underground aquifers and turn it into artificial seawater. But, you promised that algal fuel would not compete with food production. A third option is to put your algae plant next to the sea. Now, there are places which are both close to the sea and have lots of sun. But chances are slim that they are as cheap and abandoned like deserts are. Most likely, they are already filled up with tourists and hotels, to name one possibility. So you might be forced to look for a less sunny place close to the sea – which inevitably means that your energy efficiency is going down. Which again raises the question: will the algae deliver more fuel than is needed to make them?

**Major roadblocks halt algal biofuels**

**Buchele, 2012** (Mose Buchele, State Impact writer, “The Downside of Using Algae as a Biofuel”, State Impact, 12/17/2012, http://stateimpact.npr.org/texas/2012/12/17/the-downside-of-using-algae-as-a-biofuel/)

This year, people ranging from the President of the United States to this humble reporter, have spoken of algae’s potential in creating a carbon neutral biofuel. A recent study from the University of Texas showed how the tiny organisms could create 500 times more energy than they take to grow. And the promise of the slimy green stuff is made even more enticing by the fact that it consumes carbon dioxide, sewage, and fertilizer run-off. It could, theoretically, clean the planet even as becomes a new source of fuel. Now comes the downside. A report by the National Academies of Science has identified major road blocks to the widespread development of algal biofuel. Chief among them is water use, says Paul Zimba Director for the Center of Coastal Studies at Texas A&M Corpus Christi. Zimba took part in the study. He says “as much as 3000 liters of water” are required to produce a single liter of fuel when algae growers use open pond systems in arid environments. “There are commercial operations, open pond system operations in the southwest primarily,” Zimba told StateImpact Texas. He says there’s a general feeling that water loss from those systems is too much “to allow the development of large scale systems hundreds of acres along this line.” Water availability was just one of the challenges to widespread algae cultivation outlined in the report. Others include finding space for large growing operations, and competition for fertilizer. “There will be a competitive demand for fertilizers that could affect food production in terms of being competitive cost-wise for their fertilizer products,” he said.

# 2NC – Biofuels Advantage Defense – Biofuels Fail Exts. (4/4)

**Benefits exaggerated**

**Hall & Benemann, 2011** (Charles A. S. Hall is at the College of Environmental Science and Forestry, State University of New York, and John R. Benemann is with Benemann Associates, Walnut Creek, California, “Oil from Algae?”, BioScience, 10/11/2011, http://bioscience.oxfordjournals.org/content/61/10/741.full)

What is the reality? First, no oil or other biofuel from algal photosynthesis is currently produced in commercial quantities or even at the pilot or prepilot scales. At most, a few gallons of samples seem to have been made. (Fermentation processes, such as those of Solazyme and Martek, which convert sugars or starches to oil, are an exception, but these are in a fundamentally different category from the autotrophic processes using carbon dioxide and solar energy that are our focus here.) Second, many projections for algal oil production are exaggerated. Some even exceed thermodynamic limits, and most ignore practical realities. Even achieving 20,000 liters per ha per year of oil would require a major research and development effort, and 40,000 liters per ha per year would appear to be a likely practical long-term maximum for the United States.

# 2NC – Biofuels Advantage Defense – Costs Exts.

**Algal biofuels won’t be cost competitive—research now is failing**

**Milledge, 2010** (John J. Milledge, a Visiting Research Fellow, School of Civil Engineering and the Environment, University of Southampton, “The Challenge of Algal Fuel: Economic Processing of the Entire Algal Biomass”, Resilience, 02/09/2010, http://www.resilience.org/stories/2010-02-09/challenge-algal-fuel-economic-processing-entire-algal-biomass)

Micro-algae have considerable potential for the production biofuel and in particular biodiesel (1). At present the process of producing fuel from algae would appear to be uneconomic with over 50 algal biofuel companies and none as yet producing commercial-scale quantities at competitive prices (2) (3) It has been suggested that the cost of production needs to be reduced by up to two orders of magnitude to become economic (4). Others estimate biodiesel from algae costs at least 10 to 30 times more than making traditional biofuels (5). Algae can be grown in simple open systems or closed systems known as bioreactors (6) (7). Although, bioreactors can have benefits, their cost may prohibit their use for the production of biofuel. (8) The cost of producing dry algal biomass in a tubular bioreactor has been given as US $32.16per kg in a tubular bioreactor (9). Some estimates have indicated that closed reactor systems will only be able to compete with crude oil at US$800 per barrel (US$5 per litre) (10). Solix Biofuels has developed technologies to produce oil derived from algae, but it costs about $32.81 a gallon (over US$8 per litre) (11).

**Algae biofuels won’t be cost competitive in the near-term**

**Russek, 2010** (Gabriela Russek, India Carbon Outlook writer, “ Algae Biofuels: Possibilities, Uncertainties”, India Carbon Outlook, 01/19/2010, http://india.carbon-outlook.com/content/algae-biofuels-exciting-possibilities-uncertain-future)

COST CONCERNS At this stage, algae biofuels’ cost would have to be drastically reduced to come anywhere close to competing with current fuel options. The current cost of production for algae biodiesel is estimated at $10-100/gallon, depending on the production method. Open pools are cheaper; bioreactors are far more expensive but currently the better method[27]. By comparison, this summer the Indian government set gasoline prices at about $3.50/gallon; and $2.60 for diesel. (Gasoline and biodiesel have about the same energy per gallon[28]). It is somewhat unlikely that bioreactors could be scaled up and become cost competitive. They involve constantly pumping algae through a complex array of chambers and pipes: expensive to build, and energy-intensive to run. Instead, the challenges of open pools—invasive species, temperature variability, etc.—will need to be overcome to bring costs down.[29] It is also essential to find ways to convert the non-oil byproducts, which make up as much as 80% of the algae, into useful commodities—human or animal food, for instance—and to market them effectively.[30] There is a great deal of speculation about net carbon footprint, expected costs, and fuel production per acre, but algae biofuel technology simply is not at a where we can make accurate predictions. Unsurprisingly, ill-thought-out overestimates and dour skepticism often are filling in the gap. Anyone making the decision to invest personal or public funds in algae biofuels should be aware of the true level of uncertainty, and decide whether the potential long-run benefits are worth the short-term costs and the high risk of failure.

# 2NC – Biofuels Advantage Defense – SQ Solves

**Algal biofuel research now**

**DOE, 06/09/2014** (Department of Energy, “BETO Announces June Webinar: Algal Biofuels Consortium Releases Groundbreaking Research Results”, DOE, 06/09/2014, http://www.energy.gov/eere/bioenergy/articles/beto-announces-june-webinar-algal-biofuels-consortium-releases)

BETO will host a live webinar titled “Algal Biofuels Consortium Releases Groundbreaking Research Results” on Wednesday, June 11, 2014, from 2:00 p.m. to 3:00 p.m. Eastern Standard Time. Dr. Jose Olivares of Los Alamos National Laboratory will present the results of algal biofuels research conducted by the National Alliance for Advanced Biofuels and Bioproducts (NAABB). NAABB is the largest advanced biofuels consortium ever funded, consisting of 39 institutions from national laboratories, academia, and industry. Register for the webinar today to reserve your spot!

# 2NC – Biofuels Advantage Defense – Natural Gas Exts. (1/2)

**US natural gas crowds out biofuels**

**Silverstein, 2012** (Ken Silverstein, named one of the Top Economics Journalists by Wall Street Economists & is an award-winning journalist whose work has been published in more than 100 periodicals and has served as a source for energy stories in The New York Times, Washington Post, “Will Shale Crowd Out Coal and Green Energy?”, Energy Biz, 01/04/2012, http://www.energybiz.com/article/12/01/will-shale-crowd-out-coal-and-green-energy)

Now that France’s Total and China’s Sinopec have invested $4.5 billion in two of this country’s premier natural gas developers, common wisdom is suggesting that the fate of shale-gas here will outshine all competing energy forms. But is that logic well considered? Estimates are that at least a century’s worth of shale-gas is now recoverable from underneath America’s feet. Some are betting that such volume will drive down the cost of that fuel, making the alternatives unattractive. “With the new abundance and lower prices, lower-carbon gas seems likely to play a much larger role in the generation of electric power,” writes Daniel Yergin, in his new book “The Quest.” By comparison, nuclear would seem expensive while coal would appear to be more carbon intensive. Meantime, it creates “a more difficult competitive environment for wind projects.” Yergin, however, is admonishing policymakers not to rely exclusively on shale-gas. That’s because too many factors can disrupt markets and include everything from politics to environmental and natural disasters. Shale will not just become a U.S. phenomenon. But it will also have a great impact around the globe. Global proven reserves are estimated to be at 6,600 trillion cubic feet, according to the U.S. Energy Information Administration. China and the United States have the most supplies at 1,275 and 862 trillion cubic feet, respectively. In this country, for example, shale gas has grown 48 percent a year from 2006 to 2010. It now makes up a third of all natural gas supplies. The other countries sitting atop huge swaths of shale gas are Argentina, Mexico, South Africa and Australia. And while France has such potential, the regulatory environment there is unfriendly to developers and instead, it is choosing to maintain its reliance on nuclear power. For that reason, Total sees a future in the United States where it has invested $2.32 billion in Chesapeake Energy in Ohio’s Utica shale region. China’s Sinopec placed a similar amount in Devon Energy. “This is consistent with our strategy to develop positions in unconventional plays with large potential and, in this case, with value predominantly linked to oil price,” says Yves-Louis Darricarrere, with Total. “Total is conscious of the environmental aspects linked to developing shale acreage.” Diversifying Risks In “Quest,” Yergin points to the Japanese nuclear accident and the Arab Spring that caused oil prices to spike as two geo-political events simultaneously occurred. Both had a tremendous effect on the energy economy. But the energy analyst adds that shale-gas is most impacted by the environmental issues here. To extract the shale-gas that is embedded inside of rocks, a concoction of water, sand and chemicals is pumped a mile beneath the earth’s surface. Not only does it take a huge amount of water but the mixture that comes back to the top is filthy. Many communities have therefore expressed concern about their water quality. Another major fear is that the production process is more carbon-intensive than that of developing conventional natural gas. And that unease has been underscored by the International Energy Agency in France that cautions against unguarded heat-trapping emissions and is suggesting more investment in clean technologies. According to the BP Energy Outlook, global energy consumption will rise by 1.7 percent a year until 2030. The contribution to energy growth of renewables from solar, wind, geothermal and biofuels is predicted to increase from 5 percent in 2010 to 18 percent by 2030. At the same time, the outlook says that natural gas is projected to be the fastest growing fossil fuel while coal and oil are likely to lose market share as all fossil fuels experience reduced growth rates. Fossil fuels’ contribution to primary energy growth is projected to fall from 83 percent to 64 percent.

# 2NC – Biofuels Advantage Defense – Natural Gas Exts. (2/2)

**US surged natural gas production crowds out biofuels**

**Daly, 2013** (John Daly, CEO of U.S.-Central Asia Biofuels, “Research Unlocks Algae Biofuel Potential”, Oil Price, 11/25/2013, http://oilprice.com/Alternative-Energy/Biofuels/Research-Unlocks-Algae-Biofuel-Potential.html)

Public health concerns to date have not been compelling enough to warrant severe changes in regulatory oversight. Objective research about drinking water, earthquake, and waste water risks from the natural gas development should be a high priority. Industry should realize the importance of public confidence and lead these research efforts. Natural gas developers should adopt prudent, conservative, industry-wide practices to ensure that risks are minimal. Regulators should be diligent in encouraging independent research and speedy, responsible reactions to new knowledge including oversight and monitoring. The impact of the development of natural gas on renewables is troubling. The potential for solar, wind, biofuels, and other forms of clean, renewable energy to have a significant and positive impact on our nation is high. But it is an economic reality that these forms of energy must compete and win in the marketplace.

# 1NC – Pharmaceutical Advantage Defense (1/2)

**Health care law solves the pharmaceutical industry – increases profits by a third**

**Japsen 13** (Bruce, “Obamacare Will Bring Drug Industry $35 Billion In Profits”, Forbes, 5/25/13, http://www.forbes.com/sites/brucejapsen/2013/05/25/obamacare-will-bring-drug-industry-35-billion-in-profits/)

Despite expiring patents on blockbuster drugs and a wave of new regulation from the Affordable Care Act that will cost drug makers, the pharmaceutical industry will reap between “$10 billion and $35 billion in additional profits over the next decade,” a new analysis shows. The health law, which will bring millions of uninsured Americans health benefits beginning in January 2014, will be a critical boon to pharmaceutical industry balance sheets, increasing revenue by one-third by the end of the decade, according to a new report from research and consulting firm GlobalData of London. That means the U.S. pharmaceutical industry’s market value will mushroom by 33 percent to $476 billion in 2020 from $359 billion last year. The increase in sales and profits comes amid a wave of expiring patents on some of the industry’s most popular brand name drugs such as Lipitor from [Pfizer](http://www.forbes.com/companies/pfizer/) [PFE +0.47%](http://www.forbes.com/companies/pfizer/) (PFE), the blood thinner Plavix sold by [Bristol-Myers Squibb](http://www.forbes.com/companies/bristol-myers-squibb/) [BMY +0.29%](http://www.forbes.com/companies/bristol-myers-squibb/) (BMY), the diabetes drug Actos from Eli Lilly (LLY) and Takeda Pharmaceuticals as well as various cholesterol treatments sold by [Abbott Laboratories](http://www.forbes.com/companies/abbott-laboratories/) [ABT +1.04%](http://www.forbes.com/companies/abbott-laboratories/)(ABT) and its recently spun off proprietary business [AbbVie](http://www.forbes.com/companies/abbvie/) [ABBV -0.66%](http://www.forbes.com/companies/abbvie/) (ABBV). In large part because of competition from cheaper generic drugs, a report last year from IMS [Health](http://www.forbes.com/health/), for example, said pharmaceutical manufacturers will see “minimal growth in their branded products through 2016.” But the health law will pave the way for a major rebound in sales with an estimated $115 billion in new business over a 10-year period. Enrollment in the Medicaid health insurance program alone is expected to increase by about 19.5 million people, GlobalData said.

**Research can’t solve disease – companies lie about the science for profit**

**Goldacre 14** (Ben, “What the Tamiflu saga tells us about drug trials and big pharma”, The Guardian, 4/9/14, http://www.theguardian.com/business/2014/apr/10/tamiflu-saga-drug-trials-big-pharma)

Today we found out that Tamiflu doesn't work so well after all. Roche, the drug company behind it, withheld vital information on its clinical trials for half a decade, but the [Cochrane Collaboration](http://www.cochrane.org/), a global not-for-profit organisation of 14,000 academics, finally obtained all the information. Putting the evidence together, it has found that Tamiflu has little or no impact on complications of [flu](http://www.theguardian.com/society/flu) infection, such as pneumonia. That is a scandal because the UK government spent £0.5bn stockpiling this drug in the hope that it would help prevent serious side-effects from flu infection. But the bigger scandal is that Roche broke no law by withholding vital information on how well its drug works. In fact, the methods and results of clinical trials on the drugs we use today are still[routinely and legally being withheld](http://www.publications.parliament.uk/pa/cm201314/cmselect/cmpubacc/295/295.pdf) from doctors, researchers and patients. It is simple bad luck for Roche that Tamiflu became, arbitrarily, the poster child for the missing-data story. And it is a great poster child. [The battle over Tamiflu](http://www.bmj.com/content/339/bmj.b5164) perfectly illustrates the need for full transparency around clinical trials, the importance of access to obscure documentation, and the failure of the regulatory system. Crucially, it is also an illustration of how science, at its best, is built on transparency and openness to criticism, because the saga of the Cochrane Tamiflu review began with a simple online comment. In 2009, there was widespread concern about a new flu pandemic, and billions were being spent stockpiling Tamiflu around the world. Because of this, the UK and Australian governments specifically asked the Cochrane Collaboration to update its earlier reviews on the drug. Cochrane reviews are the gold-standard in medicine: they summarise all the data on a given treatment, and they are in a constant review cycle, because evidence changes over time as new trials are published. This should have been a pretty everyday piece of work: the previous review, in 2008, had found some evidence that Tamiflu does, indeed, reduce the rate of complications such as pneumonia. But then a Japanese paediatrician called Keiji Hayashi left a comment that would trigger a revolution in our

# 1NC – Pharmaceutical Advantage Defense (2/2)

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understanding of how evidence-based medicine should work. This wasn't in a publication, or even a letter: it was a simple online comment, posted informally underneath the Tamiflu review on the Cochrane website, almost like a blog comment. Cochrane had summarised the data from all the trials, explained Hayashi, but its positive conclusion was driven by data from just one of the papers it cited: an industry-funded summary of 10 previous trials, led by an author called Kaiser. From these 10 trials, only two had ever been published in the scientific literature. For the remaining eight, the only available information on the methods used came from the brief summary in this secondary source, created by industry. That's not reliable enough. This is science at its best. The Cochrane review is readily accessible online; it explains transparently the methods by which it looked for trials, and then analysed them, so any informed reader can pull the review apart, and understand where the conclusions came from. Cochrane provides an easy way for readers to raise criticisms. And, crucially, these criticisms did not fall on deaf ears. Dr Tom Jefferson is the head of the Cochrane respiratory group, and the lead author on the 2008 review. He realised immediately that he had made a mistake in blindly trusting the Kaiser data. He said so, without defensiveness, and then set about getting the information needed. First, the Cochrane researchers wrote to the authors of the Kaiser paper. By reply, they were told that this team no longer had the files: they should contact Roche. Here the [problems began](http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001201). Roche said it would hand over some information, but the Cochrane reviewers would need to sign a confidentiality agreement. This was tricky: Cochrane reviews are built around showing their working, but Roche's proposed contract would require them to keep the information behind their reasoning secret from readers. More than this, the contract said they were not allowed to discuss the terms of their secrecy agreement, or publicly acknowledge that it even existed. Roche was demanding a secret contract, with secret terms, requiring secrecy about the methods and results of trials, in a discussion about the safety and efficacy of a drug that has been taken by hundreds of thousands of people around the world, and on which governments had spent billions. Roche's demand, worryingly, is not unusual. At this point, many in medicine would either acquiesce, or give up. Jefferson asked Roche for clarification about why the contract was necessary. He never received a reply. Then, in October 2009, the company changed tack. It would like to hand over the data, it explained, but another academic review on Tamiflu was being conducted elsewhere. Roche had given this other group the study reports, so Cochrane couldn't have them. This was a non-sequitur: there is no reason why many groups should not all work on the same question. In fact, since replication is the cornerstone of good science, this would be actively desirable. Then, one week later, unannounced, Roche sent seven documents, each around a dozen pages long. These contained excerpts of internal company documents on each of the clinical trials in the Kaiser meta-analysis. It was a start, but nothing like the information Cochrane needed to assess the benefits, or the rate of adverse events, or fully to understand the design of the trials. At the same time, it was rapidly becoming clear that there were odd inconsistencies in the information on this drug. Crucially, different organisations around the world had drawn [vastly different conclusions](http://www.bmj.com/content/339/bmj.b5164)about its effectiveness. The US Food and Drug Administration (FDA) said it gave no benefits on complications such as pneumonia, while the US Centers for Disease Control and Prevention said it did. The Japanese regulator made no claim for complications, but the European Medicines Agency (EMA) said there was a benefit. There are only two explanations for this, and both can only be resolved by full transparency. Either these organisations saw different data, in which case we need to build a collective list, add up all the trials, and work out the effects of the drug overall. Or this is a close call, and there is reasonable disagreement on how to interpret the trials, in which case we need full access to their methods and results, for an informed public debate in the medical academic community. This is particularly important, since there can often be shortcomings in the design of a clinical trial, which mean it is no longer a fair test of which treatment is best. We now know this was the case in many of the Tamiflu trials, where, for example, participants were sometimes very unrepresentative of real-world patients. Similarly, in trials described as "double blinded" – where neither doctor nor patient should be able to tell whether they're getting a placebo or the real drug – the active and placebo pills were different colours. Even more oddly, in almost all Tamiflu trials, it seems a diagnosis of pneumonia was measured by patients' self-reporting: many researchers would have expected a clear diagnostic algorithm, perhaps a chest x-ray, at least. Since the Cochrane team were still being denied the information needed to spot these flaws, they decided to exclude all this data from their analysis, leaving the review in limbo. It was published in December 2009, with a note explaining their reasoning, and a small flurry of activity followed. Roche posted their brief excerpts online, and committed to make full study reports available. For four years, they then failed to do so. During this period, the global medical academic community began to realise that the brief, published academic papers on trials – which we have relied on for many years – can be incomplete, and even misleading. Much more detail is available in a clinical study report (CSR), the intermediate document that stands between the raw data and a journal article: the precise plan for analysing the data statistically, detailed descriptions of adverse events, and so on.

# 1NC – Pharmaceutical Advantage Defense – SQ Solves (1/6)

**Pharmaceutical industry is recovering- cost-cutting, downsizing, new products, and emerging markets- prefer predictive evidence**

**Dutt 2014** (Arpita Dutt, writer for Zacks, industry stock research engine, March 26, 2014. “Pharma and Biotech Stock Outlook – March 2014”. http://www.zacks.com/commentary/31869/pharma-biotech-stock-outlook---march-2014)

The pharmaceutical sector has been slowly but steadily recovering from the impact of the patent cliff being faced by several companies over the past few years. The worst of the patent cliff is over and the NYSE ARCA Pharmaceutical Index (^DRG) is up 21.4% over the last year. So far in 2014, the index is up 6.9%. Several companies which had been struggling to post growth in the face of genericization over the past few years are now on the recovery path. New products should start contributing significantly to results, and increased pipeline visibility and appropriate utilization of cash should increase confidence in the sector. Products that lost exclusivity recently include Eli Lilly’s ([LLY](http://www.zacks.com/stock/quote/lly)) Cymbalta and Evista.AstraZeneca’s ([AZN](http://www.zacks.com/stock/quote/azn)) Nexium could also start facing generics from May 2014 in the U.S. where sales were $2.1 billion in 2013. Collaborations, Acquisitions and Restructuring The pharma sector witnessed major merger and acquisitions (M&A) activity over the last couple of years. Going forward, we expect small bolt-on acquisitions to continue. In-licensing activities and collaborations for the development of pipeline candidates have also increased significantly. Several pharma companies are focusing on in-licensing mid-to-late stage pipeline candidates that look promising, instead of developing a product from scratch, which involves a lot of funds and time. Small biotech companies are open to in-licensing activities and collaborations. Most of these companies find it challenging to raise cash, thereby making it difficult for them to survive and continue with the development of promising pipeline candidates. Therefore, it makes sense for them to seek deals with pharma companies that are sitting on huge piles of cash. We recommend biotech stocks that have attractive pipeline candidates or technology that can be used for the development of novel therapeutics. Therapeutic areas which could see a lot of in-licensing activity include immuno-oncology, oncology, central nervous system disorders, diabetes and immunology/inflammation. The hepatitis C virus (HCV) market is also attracting a lot of attention. Some recent acquisitions/deals include Shire’s ([SHPG](http://www.zacks.com/stock/quote/shpg)) acquisition of ViroPharma,Salix’s ([SLXP](http://www.zacks.com/stock/quote/SLXP) - [Analyst Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=SLXP)) acquisition of Santarus as well as the acquisition of Optimer Pharmaceuticals and Trius Therapeutics by Cubist Pharmaceuticals([CBST](http://www.zacks.com/stock/quote/cbst)) and that of Elan by Perrigo Company ([PRGO](http://www.zacks.com/stock/quote/PRGO) - [Analyst Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=PRGO)). A major acquisition agreement was announced recently -- that of Forest Labs ([FRX](http://www.zacks.com/stock/quote/frx)) byActavis ([ACT](http://www.zacks.com/stock/quote/act)). This deal shows the intention of generic companies to establish a strong position in the branded market. Another significant deal was the one signed between Celgene ([CELG](http://www.zacks.com/stock/quote/celg)) and OncoMed Pharmaceuticals ([OMED](http://www.zacks.com/stock/quote/OMED) - [Snapshot Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=OMED)) for the joint development and commercialization of up to six anti-cancer stem cell candidates from OncoMed's biologics pipeline. Another trend that we are seeing in recent months is the divestment of non-core business segments. Pfizer ([PFE](http://www.zacks.com/stock/quote/PFE) - [Analyst Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=PFE)) sold its Capsugel unit and its Nutrition business in Aug 2011 and Nov 2012, respectively. Pfizer then spun off its animal health business into a new company, Zoetis ([ZTS](http://www.zacks.com/stock/quote/ZTS) - [Analyst Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=ZTS)). Meanwhile, GlaxoSmithKline ([GSK](http://www.zacks.com/stock/quote/gsk)) divested certain non-core brands from its Consumer Healthcare segment. In Aug 2011, AstraZeneca sold its Astra Tech business to DENTSPLY ([XRAY](http://www.zacks.com/stock/quote/XRAY) - [Analyst Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=XRAY)). The monetization of non-core assets will allow the pharma/biotech companies to focus on their areas of expertise. Abbott Labs ([ABT](http://www.zacks.com/stock/quote/abt)) split into two separate publicly traded companies; while one company deals in diversified medical products, the other, AbbVie ([ABBV](http://www.zacks.com/stock/quote/abbv)), is focusing on research-based pharmaceuticals. Johnson & Johnson ([JNJ](http://www.zacks.com/stock/quote/jnj)) is also looking to divest its ortho-clinical diagnostics business. Vertex ([VRTX](http://www.zacks.com/stock/quote/VRTX) - [Snapshot Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=VRTX)) monetized its Incivo-related royalties; the company can use the cash generated from this deal for its cystic fibrosis program. Restructuring activities are also gaining momentum as large pharma companies are looking to cut costs and streamline their operations. Most of these companies are re-evaluating their pipelines and discontinuing programs which do not have a favorable risk-benefit profile. Some of the companies that announced restructuring plans include Merck ([MRK](http://www.zacks.com/stock/quote/mrk)),Novartis ([NVS](http://www.zacks.com/stock/quote/NVS) - [Snapshot Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=NVS)), Eli Lilly, Shire and Sanofi ([SNY](http://www.zacks.com/stock/quote/SNY) - [Analyst Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=SNY)). Destination Ireland Of late, several companies have been looking towards Ireland for acquisitions. The latest company to join the Irish club is Horizon Pharma ([HZNP](http://www.zacks.com/stock/quote/hznp)) which is doing a reverse merger with Dublin-based Vidara. Tax benefits are a major attraction for such deals. Other such recent acquisitions include that of Warner Chilcott by Actavis and Elan by Perrigo. Emerging Markets and Biosimilars Another trend seen in the pharmaceutical sector is a focus on emerging markets. Companies like Mylan ([MYL](http://www.zacks.com/stock/quote/MYL) - [Analyst Report](http://www.zacks.com/registration/pfp/?ALERT=zrmodule&ADID=ZACKS_PFP_TOP_ZRMODULE&skip_rpt_name_check=skip_rpt_name_check&t=MYL)), Pfizer, Merck, Eli Lilly, Glaxo and Sanofi are all looking to expand their presence in India, China, Brazil and other emerging markets. Until recently, most of the commercialization efforts were focused on the U.S. -- the largest pharmaceutical market -- along with Europe and Japan. Emerging markets are slowly and steadily gaining more importance, and several companies are now shifting their focus to these areas. However, while higher demand for medicines, government initiatives for healthcare, new patient population and increasing use of generics should help drive demand, we point out that emerging markets are also not immune to genericization. Moreover, investigations into bribery charges in China could put a lid on near-term growth. Meanwhile, growth in Europe will continue to be pressurized by austerity and cost-containment measures. We are also seeing several companies entering into deals for the development of biosimilars, generic versions of biologics. Companies like Merck, Amgen, Biogen([BIIB](http://www.zacks.com/stock/quote/biib)) and Actavis are all targeting the highly lucrative biosimilars market. 4Q Earnings All companies falling under the Medical sector have reported fourth quarter and full year 2013 results. While earnings-beat and revenue-beat ratios (percentage of companies coming out with positive surprises) were pretty impressive, growth ratios were modest. Fourth quarter results were

# 1NC – Pharmaceutical Advantage Defense – SQ Solves (2/6)

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characterized by currency headwinds as well as the impact of generics. Fourth quarter 2013 earnings "beat ratio" was 74.0% while the revenue "beat ratio" was 76.0%. Total earnings for this sector were up 1.1%, compared to 0.2% recorded in the third quarter of 2013. Total revenues moved up 5.3% in the quarter versus 5.8% growth in the third quarter of 2013. Looking at the consensus earnings expectations for the first quarter, earnings are expected to decline 3.3%. Tough challenges for some companies, negative currency movement and a few patent expirees will affect first quarter growth. However, growth should pick up from the second quarter for which 1.6% earnings growth is expected. Overall, 2014 earnings are expected to grow 6.5%. For a detailed look at the earnings outlook for the Medical and other sectors, please check our [Zacks Earnings Trends](http://pdf.zacks.com/pdf/ZR/H4609354.PDF)report. Focus on New Products 2013 saw the FDA approving 27 novel medicines, about one-third (33%) of which were identified by the FDA as “First-in-Class,” meaning they use a new and unique mechanism of action for treating a medical condition. These include drugs like Invokana (type II diabetes), Kadcyla (HER2-positive late-stage breast cancer), Sovaldi (an interferon-free oral treatment for some patients with chronic hepatitis C) and Mekinist (metastatic melanoma). Yet another one-third of the approved drugs fall under the rare or “orphan” disease category that affects 200,000 or fewer Americans. These include Imbruvica (mantle cell lymphoma), Gazyva (chronic lymphocytic leukemia), Kynamro (homozygous familial hypercholesterolemia) and Adempas and Opsumit (both for pulmonary arterial hypertension). Three of the approved drugs – Gazyva, Imbruvica and Sovaldi – had breakthrough therapy designation. Breakthrough status, a new designation that became effective after Jul 9, 2012, is designed to cut short the development time of promising new treatments. Some important products approved in 2013 include: Drugs like Tecfidera, Sovaldi and Imbruvica represent strong commercial potential. So far in 2014, drugs that have gained approval include AstraZeneca’s Myalept (complications of leptin deficiency) and Farxiga (type II diabetes), Chelsea Therapeutics’ ([CHTP](http://www.zacks.com/stock/quote/chtp)) Northera (to treat neurogenic orthostatic hypotension),BioMarin’s ([BMRN](http://www.zacks.com/stock/quote/bmrn)) Vimizim (Morquio A syndrome) and Vanda Pharma’s Hetlioz (non-24- hour sleep-wake disorder). Upcoming events include FDA advisory panel review of the regulatory application forMannKind’s ([MNKD](http://www.zacks.com/stock/quote/mnkd)) experimental diabetes treatment, Afrezza. April should be an active month with the agency expected to deliver a response on the approvability of several experimental drugs including Afrezza, Glaxo’s Eperzan (type II diabetes) and Arzerra (CLL). Zacks Industry Rank Within the Zacks Industry classification, pharma and biotech are broadly grouped into the Medical sector (one of 16 Zacks sectors) and further sub-divided into four industries at the expanded level: large-cap pharma, med-biomed/gene, med-drugs and med-generic drugs. We rank all the 260-plus industries in the 16 Zacks sectors based on the earnings outlook and fundamental strength of the constituent companies in each industry. To learn more, visit: [About Zacks Industry Rank](http://www.zacks.com/stocks/industry-rank). As a point of reference, the outlook for industries with Zacks Industry Rank #88 and lower is ‘Positive,’ between #89 and #176 is ‘Neutral’ and #177 and higher is ‘Negative.’ The Zacks Industry Rank for large-cap pharma is #225, med-biomed/gene is #69, med-drugs is #84, while the med-generic drugs is #8. Analyzing the Zacks Industry Rank for different medical segments, it is obvious that the outlook is Positive for med-drugs, med-biomed/gene and med-generic drugs and Negative for large-cap pharma stocks. OPPORTUNITIES While several companies will continue to face challenges like EU austerity measures and genericization, the pharma industry is out of the worst of its genericization phase. Many companies which had faced generic headwinds in the last couple of years should continue to see a sustained improvement in results this year. Cost-cutting, downsizing, streamlining of the pipeline, growth in emerging markets and new product launches should support growth. Among pharma stocks, Shire, a Zacks Rank #1 (Strong Buy) stock, looks well-positioned for growth with the company expanding its product portfolio and pipeline through the acquisition of ViroPharma. Horizon Pharma, a Zacks Rank #2 (Buy) stock, also seems on the right path with the company announcing its plans to acquire Ireland-based Vidara. In the biotech space, we are positive on Biogen. Tecfidera, the company’s recently launched oral multiple sclerosis drug, is off to a strong start with the product delivering sales of $876 million (as of Dec 31, 2013) since its launch in early April 2013. While Tecfidera has gained the top spot in the oral multiple sclerosis market in the U.S., Avonex and Tysabri should continue contributing significantly to sales. Tecfidera gained EU approval recently. Biogen is also progressing with its hemophilia pipeline. We are also positive on Amgen ([AMGN](http://www.zacks.com/stock/quote/amgn)). Amgen should be able to deliver on its long-term strategy based on expansion in key markets, launch of new manufacturing technologies, and pipeline development. Enbrel should continue performing well. Amgen’s late-stage pipeline is also moving along. While Amgen is a Zacks Rank #2 stock, Biogen is a Zacks Rank #3 (Hold) stock. Gilead, a Zacks Rank #1 stock, continues to do well in the HIV segment and has a potential blockbuster in its portfolio in the form of HCV treatment, Sovaldi. Among generic companies, Actavis looks well-positioned. Actavis is slowly and steadily building its position in the branded market through acquisitions (Actavis Group, Warner Chilcott and the upcoming acquisition of Forest). With fewer major patent expiries slated to occur in the next few years, we are encouraged by Actavis’ focus on building its branded and biosimilars pipeline. The company carries a Zacks Rank #2.

# 1NC – Pharmaceutical Advantage Defense – SQ Solves (3/6)

**Recent biotech advances take out the need for the aff- diseases are being cured and medicine is being developed at an exponential rate**

**Market Watch 2013** (Market Watch, segment of the Wall Street Journal that reports on recent trend in the economy, November 7, 2013. “The global revolution in biotechnology and the impact of regenerative Medicine.” http://www.marketwatch.com/story/the-global-revolution-in-biotechnology-and-the-impact-of-regenerative-medicine-2013-11-07)

Nov 07, 2013 (ACCESSWIRE via COMTEX) -- "**This is the golden age of science**." That's what Mike Milken, chairman of the Milken Institute, told CNBC's Kelly Evans on Monday during an interview with Milken and National Institute of Health director Francis Collins at the 5th Annual Partnering for Cures convention at the Grand Hyatt in Manhattan. Francis Collins referenced healthcare as being in an evolutionary period and noted that steps need to be taken for the United States to maintain a world leadership position. "When you look at the rest of the world, they have read America's playbook and have seen how success happened and they are trying to become what we used to be," commented Collins. In our view, a cornerstone in a robust U.S. (and global) biotechnology ecosystem is regenerative medicine and many of the next generation treatments that cell-based therapeutics has to offer. **The rapidly growing field** as an adjunctive or front line treatment embodies a new wave of therapies to meet countless areas of great unmet medical need where legacy, small molecule-based drugs are showing limited impact, or facing extreme challenges. **This impact is being recognized globally** - a good example is Japan, which has embraced the potential of regenerative medicine and is actively seeking to establish itself as a global leader in the area. It has earmarked regenerative medicine specifically, announcing **$3.2 billion** in funding for programs to advance the area, using pluripotent stem cells and other approaches. In the annual "Meeting on the Mesa," a three-day convention of world leaders and investors in regenerative medicine held in La Hoya, California last month, Dr. Gil Van Bokkelen, Chief Executive Officer and Chairman of Athersys, Inc. [ATHX](http://www.marketwatch.com/investing/stock/ATHX) -2.80% touched not only on the initiatives of Japan, and global potential of the field of regenerative medicine, but also the unique potential of Athersys'MultiStem(R) technology. Interested investors can watch the entire video interview on YouTube here:<http://www.youtube.com/watch?v=LO6rd3fWgKc> Dr. Van Bokkelen noted that MultiStem is being developed as an "off the shelf" medicine, or in technical terms an "allogeneic" stem cell therapy that can be manufactured on a large scale, stored for years in frozen form, and administered without tissue matching or immune suppressive drugs. Athersys is developing the technology for several indication areas, including some that are recognized by analysts and pundits as **having breakthrough potential**. Current clinical programs include, ischemic stroke, acute myocardial infarction, preventing Graph versus Host Disease (GvHD) and treating Inflammatory Bowel Disease (IBD) in patients where other medicines have proven ineffective. This latter program is part of an ongoing international Phase II trial in partnership with Pfizer, Inc. [PFE](http://www.marketwatch.com/investing/stock/PFE) -0.12% for treatment-refractory inflammatory bowel disease, with results expected in early 2014. New treatments for a condition like IBD, focusing on patients where other therapies have proven ineffective, could validate the potential of regenerative medicines to reverse the course of an advanced disease, at a time when treatment expenses skyrocket and quality of life deteriorates dramatically. In fact, a hallmark feature of regenerative medicine is its apparent utility in addressing areas of substantial unmet medical need, where the cost burden is high. Success from ongoing or planned MultiStem trials, especially for an area like ischemic stroke, could provide a powerful catalyst for Athersys shares.Top-line results from the IBD trial are expected in the first quarter of 2014, with results from the stroke clinical trial expected several months later. As noted by Dr. Van Bokkelen's presentation, MultiStem has great potential as a novel therapeutic approach for conditions where current standards of care are essentially non-existent or ineffective. One of the reasons for this is the multimodal activity of MultiStem, which addresses key shortcomings of traditional drugs or technologies that typically focus on a single mechanism of action. He notes that cells are different because they are capable of promoting healing in several ways, such as by expressing factors that reduce inflammatory damage, protect and preserve tissue that is at risk following an injury, promote formation of new blood vessels in regions of inadequate blood supply, and by stimulating recovery in other ways. Recent deal activity also suggests growing acceptance of regenerative medicine technologies, including the Cytori Therapeutics, Inc. [CYTX](http://www.marketwatch.com/investing/stock/CYTX) -0.89% partnership to commercialize technology in Australia and Asia, and the recent Mesoblast, Inc. (asx:MSB) acquisition of the rights to the Osiris Therapeutics, Inc. [OSIR](http://www.marketwatch.com/investing/stock/OSIR) -0.57% Prochymal franchise. With new regulatory initiatives in Japan and other countries poised to speed development options for companies focused on clinical development of new medicines, it seems that regenerative medicine is now beyond its flash point. The tremendous potential is now being recognized in multiple areas around the world, including in some corners of Wall Street.

# 1NC – Pharmaceutical Advantage Defense – SQ Solves (4/6)

**Pharmaceutical industry is growing in the squo- new medicines, govt. subsidies, new R&D, and new markets**

**SelectUSA 2014** (SelectUSA, domestic based market analyst group, May 23, 2014. “The Pharmaceutical and Biotech industries in the United States.” http://selectusa.commerce.gov/industry-snapshots/pharmaceutical-and-biotech-industries-united-states)

The United States is the world’s largest market for pharmaceuticals and the world leader in biopharmaceutical research. According to the Pharmaceutical Research and Manufacturers Association (PhRMA), U.S. firms conduct the majority of the world’s research and development in pharmaceuticals and hold the intellectual property rights on most new medicines. The biopharmaceutical pipeline also **has over 5,000 new medicines** currently in development around the world with approximately 3,400 compounds currently being studied in the United States - more than in any other region around the world. More than 810,000 people work in the biopharmaceutical industry in the United States as of 2012, and the industry supports a total of nearly 3.4 million jobs across the U.S. economy, including jobs directly in biopharmaceutical companies, jobs with vendor companies in the broad biopharmaceutical supply chain, and jobs created by the economic activity of the biopharmaceutical industry workforce. The biopharmaceutical sector is one of the most research and development (R&D)-intensive in the United States, with companies investing more than 10 times the amount of R&D per employee than all manufacturing industries overall. The markets for biologics, over-the-counter (OTC) medicines, and generics show the most potential for growth and have become increasingly competitive. Biologics account for a quarter of all new drugs in clinical trials or awaiting U.S. Food and Drug Administration approval. OTC market growth will be driven by a growing aging population and consumer trend to self-medication, and the conversion of drugs from prescription to non-prescription or OTC status. The U.S. market is the world’s largest free-pricing market for pharmaceuticals and has a favorable patent and regulatory environment. Product success is largely based on competition in product quality, safety and efficacy and price. U.S. government support of biomedical research, along with its unparalleled scientific and research base and innovative biotechnology sector, make the U.S. market the preferred home for growth in the pharmaceutical industry.

# 1NC – Pharmaceutical Advantage Defense – SQ Solves (5/6)

**Pharmaceutical companies are recovering- growth rates are up and will sustain**

**Business Line 2014** (The Hindu Business Line, latest news on India and international business and finance, January 5, 2014. “Pharma cos likely to post 15% profit growth in Q3.” http://www.thehindubusinessline.com/industry-and-economy/pharma-cos-likely-to-post-15-profit-growth-in-q3/article5541288.ece

Pharmaceutical companies are expected to post core profit **growth of over 15 per cent year-on-year** for the quarter ended December 2013. “We expect core profit growth of over 15 per cent y-o-y across the pharmaceutical sector in Q3 FY14. The US launches and currency benefit will be the key growth drivers,” Kotak Institutional Equities said in its report. While the domestic growth stays subdued, the US launches remain strong, it said. It expects the US generic launches to be the key growth driver, offsetting weak growth in India. Improving US product mix and currency remain key margin drivers for Indian generics, according to the report. “The currency benefit **is likely to sustain**. In the current quarter, the Indian rupee has appreciated by 1 per cent sequentially on a quarter-end basis. Hence, we expect marginal impact due to translation impact of net balance-sheet items and MTM losses on foreign currency hedges,” said Kotak Equities research analyst Krishna Prasad. Among the leading pharma players, Sun Pharma and Dr Reddy’s will lead the sector, while Lupin US generics growth is expected to remain strong, it said, adding that Kotak expects a stable growth for Glenmark and remains conservative on recovery in Cipla and Cadila in the third quarter of 2013-14 fiscal (Q3 FY’14), the report said. “We expect core profit growth of over 15 per cent y-o-y across the sector except Cipla. Sun Pharma and Dr Reddy’s will lead the pack — with 45 per cent and 33 per cent y-o-y net profit growth, respectively. In both cases, we expect US generics to be the primary growth driver along with currency,” Prasad said. “For Lupin, we estimate 13 per cent y-o-y growth in EBITDA, while a PAT growth of 26 per cent is driven by lower tax rate. We expect strong margin expansion for Dr Reddy’s (360 bps y-o-y) driven by US launches,” the Kotak report said. A gradual recovery is expected for Cadila and Cipla, it said, adding that it does not factor in significant improvement in operational performance for the current quarter. “We estimate sharp recovery in core EBITDA margin for Ranbaxy at 9 per cent driven by lower remediation expense. We expect stable earnings performance for Glenmark with 19 per cent y-o-y growth in core net profit,” the report said. For Lupin, the strong growth in US generics is partially offset by muted performance in India/Japan leading to a marginal decline (40 bps) in EBITDA margin, Prasad said.

# 1NC – Pharmaceutical Advantage Defense – SQ Solves (6/6)

**Pharma sector growing now- exports, new products, and investor confidence**

**Kabtta 2013** (Kiran Kabtta, Market News reporter, Novermber 28, 2013. “Pharma sector: Export gains, domestic bounce-back augur well”. http://articles.economictimes.indiatimes.com/2013-11-28/news/44547025\_1\_sun-pharma-indian-companies-domestic-market)

Drug makers posted healthy results in the quarter to September due to their strong performance in the United States largely because of [rupee depreciation](http://economictimes.indiatimes.com/topic/rupee%20depreciation). High realisations from exports more than compensated for the subdued performance in the domestic market, where trade-related disruptions and price revisions after the implementation of the new [drug pricing policy](http://economictimes.indiatimes.com/topic/drug%20pricing%20policy) took their toll on the pharmaceutical companies. Most companies reported over 25% growth in their US business compared with the year-ago period. Increased sales from exclusive product launches, besides the favourable currency movement, boosted the performance of several firms. Sun Pharma, Lupin, Dr Reddy's Labs, Cadila Healthcare and Aurobindo Pharma posted gains in their US business during the three-month period. In the domestic market, however, most companies remained confined to single-digit growth. Multinational companies such as GSK Pharma, Pfizer and [Novartis](http://economictimes.indiatimes.com/topic/Novartis), which earn a dominant share of their revenues from the [Indian market](http://economictimes.indiatimes.com/topic/Indian%20market), were the biggest losers on this count while Indian companies such as Sun Pharma and Glenmark stood out as outperformers with strong double-digit growth. Companies in contract research and manufacturing services have been facing challenges, including pricing pressure, increased raw material prices and slowdown in business. Even so, Divi's Labs and [Dishman Pharma](http://economictimes.indiatimes.com/topic/Dishman%20Pharma) managed to post betterthan-expected results. **The outlook for the sector continues to be positive.** Export realisations are expected to improve as the rupee is hovering around the same level. In the domestic market, the worst seems to be over with the settlement of margin-related issues between companies and the drug distributors. Growth in the domestic market is also expected to bounce back to double-digit levels. Sun Pharma is expected to continue to be the industry outperformer, followed by companies such as Lupin and Dr Reddy's Labs. These companies have strong product pipelines and sound base business in their key markets. Despite the positive outlook, stretching stock valuations have led to correction in [stocks](http://economictimes.indiatimes.com/topic/stocks) of leading pharma companies such as Sun Pharma, Cipla and Lupin over the past month. Investors seem to be booking short-term profits in these defensive stocks even as pharma companies are expected to continue on the growth trajectory

# 2NC – Pharmaceutical Advantage Defense – Solvency Exts. (1/2)

**Can’t solve disease – patent system disincentivizes companies from most important research**

**Moreno 14** (Carlos, “How Big Pharma is slowing cancer research”, Reuters, 3/31/14, http://blogs.reuters.com/great-debate/2014/03/31/how-big-pharma-is-slowing-cancer-research/)

Even as scientists seek to [bring new cancer treatments to market](http://www.newyorker.com/online/blogs/elements/2013/07/world-war-cancer.html), however, drug patent issues are holding back some researchers. A major hurdle is in combination [drug trials](http://www.nytimes.com/2014/01/25/business/bristol-myers-squibb-reports-stronger-than-expected-results.html?action=click&module=Search&region=searchResults%230&version=&url=http%3A%2F%2Fquery.nytimes.com%2Fsearch%2Fsitesearch%2F%3Faction%3Dclick%26region%3DMasthead%26pgtype%3DHomepage%26module%3DSearchSubmit%26contentCollection%3DHomepage%26t%3Dqry445%23%2F%2522drug%2Btrial%2522%2BAND%2B%2522cancer%2522%2Fsince1851%2Fallresults%2F1%2Fallauthors%2Fnewest%2F) that test two or more therapies at once. Pharmaceutical companies often shy away from trials that have great potential, because the drugs may not generate profits if they are used together with a generic drug or a drug patented by a different company. Recently, there have been major advances in our understanding of how cancer progresses. As scientists have sequenced thousands of cancer genomes, patterns are starting to emerge. One clear insight we have gained is the likelihood that no single drug will be able to defeat cancer. The reason most cancers become drug resistant and come back is because their DNA mutates quickly. Cancer cells that are not killed by the drugs survive, continue to grow and replace the cells that have been wiped out. So how can we beat the evolution of cancer cells? Most cancer researchers believe that the way to do it is to use the same approach that holds HIV in check for AIDS patients: with combinations of drugs. These drug cocktails, if used appropriately, may someday control many cancers because the cells resistant to one drug will be sensitive to another. The great challenge is figuring out which drug combinations are likely to work the best. But when it comes time for clinical trials that are necessary to bring drug combinations to market, there are two major hurdles. The first hurdle occurs when two drugs have been patented by two different pharmaceutical companies. When this is the case, quite often neither company wants to fund the trial. This reluctance is because only 8 percent of new drugs obtain FDA approval, clinical trials can take many years to complete, and there can be legal conflicts regarding ownership and publication of results — resulting in the fear of litigation from the other company. There can also be squabbles over how to divide expenses and profits, with one or both parties looking for a bigger cut of the potential financial gains, and both putting profits before patients. The second obstacle can arise when there is no patent protection, and thus no financial incentive to test the cocktail and market it if it works. There is only a financial incentive to move forward if all patents are active and held by a single company, and with drug combinations, this is often not the case.

# 2NC – Pharmaceutical Advantage Defense – Solvency Exts. (2/2)

**Can’t solve disease – fundamental scientific barriers to wide applicability**

**NRC 02** (National Research Council, “MARINE BIOTECHNOLOGY IN THE TWENTY-FIRST CENTURY”, Committee on Marine Biotechnology: Biomedical Applications of Marine Natural Products Ocean Studies Board Board on Life Sciences Division on Earth and Life Studies National Research Council, 2002, http://worldtracker.org/media/library/Science/Biotechnology/Marine%20Biotechnology%20in%20the%2021st%20Century%20-%20Nrc.pdf)

It has been stated that the "search and discovery of exploitable biology" is undergoing a "paradigm shift" as a "consequence of the bioinformatics revolution" (Bull et al., 2000). In the context of natural product-based drug discovery bioinformatics is producing new information that affects many of the key steps in the drug discovery process. Among the most significant developments are the revelation of vast new potential resources available from uncultured microorganisms and the discovery of a plethora of new potential therapeutic targets from various whole-genome sequences. This new knowledge presents tremendous opportunities for the discovery of therapeutic agents from natural sources. There remain, however, significant obstacles impeding the realization of this potential. Unlocking the biosynthetic capabilities of the new realm of marine microbes remains a fundamental scientific challenge. These organisms not only hold the greatest promise for the discovery of new agents from the marine environment but also provide a feasible solution to the inherent problem of supply Studies of their physiology and means for their cultivation are vital. A major obstacle to the discovery of new marine natural products with promising biological activities is simply the difficulty of having them evaluated in a wide range of targeted assays. Although new therapeutic targets are being developed at an astonishing rate, ability to evaluate marine chemodiversity in these assays is severely limited. Part of the limitation owes to the scarcity of the compounds, which are often isolated in minute quantities insufficient to supply a library for repeated rounds of bioassay Lacking a renewable source or reasonable synthetic route, many of these compounds will never have more than a few targets. The traditional process of naturalproduct discovery may preclude their evaluation against the widest range of biological targets, especially in ultrahigh-throughput-screening systems. Through its component operations of Ayerst and the former Medical Research Division of American Cyanamid or Lederle Labs, V/yeth-Ayerst Research, the pharmaceutical research and development arm of American Home Products, has a rich history in the discovery and development of therapeutic agents from natural sources. At Lederle, the tetracycline family of antibiotics was the first product line derived from nature. Aureomycin (chlortetracycline) was isolated in the early 1940s from the soil organism Streptomyces aureWciens and was followed shortly thereafter by four improved versions; the final one, Minocin, was introduced in 1971 \_ Research has continued on this important class of antibiotics at V/yeth and a number of agents are advancing toward the marketplace. Two more recent microbial-derived commercial products are Rapamune (rapamycin) for use in transplantation and Mylotarg, a calicheamicin immunoconjugate targeting acute myeloid leukemia.

# 1NC – STEM Advantage Defense (1/3)

**Status quo solves science leadership – even China isn’t a credible threat – our card addresses your warrants**

**Acemoglu and Robinson 12** (Daron and James A., MIT economist and Professor of Government at Harvard respectively, “World's next technology leader will be US, not China – if America can shape up”, Christian Science Monitor, 4/19/12, http://www.csmonitor.com/Commentary/Global-Viewpoint/2012/0419/World-s-next-technology-leader-will-be-US-not-China-if-America-can-shape-up)

The odds favor the US not only because it is technologically more advanced and innovative than China at the moment, with an income per capita more than six times that of China. They do so also because innovation ultimately depends on a country’s institutions. Inclusive political institutions distribute political power equally in society and constrain how that power can be exercised. They tend to underpin inclusive economic institutions, which encourage innovation and investment and provide a level playing field so that the talents of a broad cross-section of society can be best deployed. Despite all of the challenges that they are facing, US institutions are broadly inclusive, and thus more conducive to innovation. Despite all of the resources that China is pouring into science and technology at the moment, its political institutions are extractive, and as such, unless overhauled and revolutionized soon, they will be an impediment to innovation. China may continue to grow in the near term, but this is growth under extractive institutions – mostly relying on politically connected businesses and technological transfer and catch-up. The next stage of economic growth – generating genuine innovation – will be much more difficult unless China's political institutions change to create an environment that rewards the challenging of established interests, technologies, firms, and authority. We have a historical precedent for this type of growth and how it runs out of steam: the [Soviet Union](http://www.csmonitor.com/tags/topic/U.S.S.R.). After the [Bolsheviks](http://www.csmonitor.com/tags/topic/Bolshevik+Party) took over the highly inefficient agricultural economy from the Tsarist regime and started to use the power of the state to move people and resources into industry, the Soviet Union grew at then-unparalleled rates, achieving an average annual growth rate of over 6 percent between 1928 and 1960. Though there was much enthusiasm about Soviet growth – as there is now about China’s growth machine – it couldn’t and didn’t last. By the 1970s, the Soviets had produced almost all the growth that could be derived from moving people from agriculture into industry, and despite various incentives and bonuses, and even harsh punishments for failure, they could not generate innovation. The Soviet economy stagnated and then totally collapsed. China has more potential than the Soviet Union. Its growth has not come simply by government fiat, but also because it has reformed its economic institutions, providing incentives to farmers and some firms (though having government connections still helps enormously, and challenging powerful firms can land you in jail or worse). China also had more technological catching up to do than the Soviet Union. But this potential will come to an end as well unless China radically transforms its institutions. This requires not only obvious steps such as introducing an independent judiciary, independent media, and more secure property rights for businesses, but truly inclusive political institutions. This necessitates a fundamental political opening so that political power is more equally distributed and can underpin economic institutions. This, in turn, will create a level playing field and encourage and fully reward all sorts of innovation – especially the disruptive kind.

# 1NC – STEM Advantage Defense (2/3)

**Alt cause to STEM failure – ocean enthusiasm can’t overcome Common Core failure**

**Stotsky 13** (Sandra, Professor of Education Reform in the Department of Education Reform at the University of Arkansas, “Common Core fails to prepare students for STEM”, The Denver Post, 12/17/13, http://www.denverpost.com/opinion/ci\_24743742/common-core-fails-prepare-students-stem)

When states adopted Common Core's math standards, they were told (among other things) that they would make all high school students "collegeand career-ready" and strengthen the critical pipeline for science, technology, engineering and math (STEM). However, with the exception of a few standards in trigonometry, the math standards end after Algebra II, as James Milgram, professor of mathematics emeritus at Stanford University observed in "Lowering the Bar: How Common Core Math Fails to Prepare High School Students for STEM," a report that Milgram and I co-authored for the Pioneer Institute. Who was responsible for telling the truth to the Colorado Board of Education when it adopted these standards in 2010? Who should be telling Gov. John Hickenlooper, business executives, and college presidents today that Common Core includes no standards for pre-calculus and that high school graduates taught only to Common Core's mathematics standards won't be prepared to pursue a four-year degree in STEM? Superintendents, local school committees, and most parents don't seem to know that under Common Core, their students won't be able to pursue a STEM career. In fact, they think that Common Core's math standards are rigorous. U.S. government data show that only one out of every 50 prospective STEM majors who begin their undergraduate math coursework at the pre-calculus level or lower will earn bachelor's degrees in a STEM area. Moreover, students whose last high school mathematics course was Algebra II or lower have less than a 40 percent chance of earning any kind of four-year college degree. It's not as if the lead mathematics standards writers themselves didn't tell the public how low Common Core's high school mathematics standards were. In 2010, Jason Zimba, a lead writer, said the standards are "not only not for STEM, they are also not for selective colleges." In January 2010, William McCallum, another lead mathematics standards writer, said, "The overall standards would not be too high, certainly not in comparison [to] other nations, including East Asia, where math education excels." There are other consequences to having a college readiness test in math with low expectations. The U.S. Department of Education's competitive grant program, Race to the Top, requires states to place students who have been admitted by their public colleges and universities into credit-bearing (non-remedial) mathematics (and English) courses if they have passed a Common Core-based "college readiness" test. Selective public colleges, engineering schools, and universities in every state will likely have to lower the level of their introductory math courses to avoid unacceptably high failure rates. Milgram and I were members of Common Core's Validation Committee, which was charged with reviewing each successive draft of the standards. We both refused to sign off on the academic quality of the national standards, but made public our explanation and criticism of the final version of Common Core's standards. It is still astonishing that Colorado's state board of education adopted Common Core's standards without asking the engineering, science and math faculty at its own higher education institutions (and the math teachers in our own high schools) to do an analysis of Common Core's definition of college readiness and make public their recommendations. After all, who could be better judges of what students need for a STEM major? We clearly need to revise Common Core's mathematics standards as soon as possible so that all American schools are able to offer the coursework beginning in grades 5 or 6, enabling mathematically able students to aim for a STEM major in college. Unless, of course, Colorado's towns and cities aren't interested in American-born and educated engineers, doctors or scientists.

# 1NC – STEM Advantage Defense (3/3)

**Alt cause to STEM decline – bureaucratic environment, losing students overseas**

**Kluger 13** (Jeffrey, TIME Science editor at large, “What U.S. Needs to Be the Leader in STEM Again”, TIME, 9/20/13, http://nation.time.com/2013/09/20/what-u-s-needs-to-be-the-leader-in-stem-again/)

But the U.S. is in no position to boast these days. Consider these numbers from this morning’s TIME Education Summit panel on Basic and Applied Research. Last year’s entire operating budget for the National Science Foundation was $7.4 billion—or only $400 million more than Americans spent on potato chips in the same period. Last year too, 20% of undergrads in China were studying in the STEM fields. In Europe it was 11%. In the U.S. it was 4.4%. “In 2008, I was working on a paper about a newly discovered superconducting material,” said Robert Birgeneau, chancellor emeritus and professor of physics at the University of California, Berkeley, “Wen I looked at my citations I realized that 80% of the papers I mentioned were from universities in China.” There are a lot of reasons the U.S. is falling behind in the fundamental disciplines in which it once led. Money, of course, is a big part of it. “I was the head of the National Institutes of Health in the 1990s,” said Harold Varmus, currently the director of the National [Cancer](http://topics.time.com/cancer/) Institute. “Our funding doubled from 1998 to 2003. Now we’re facing nothing but stagnation and sequestration.” Then too there’s the ferociously competitive, stultifyingly bureaucratic research culture. “We have built an unsustainable environment in which large numbers of faculty members train large numbers of students, hyper-populating their fields,” says Varmus. “I can fund perhaps 10% of the studies that apply for NCI grants.” The problem is not that too many people are studying in the STEM fields. It’s that there simply isn’t enough basic infrastructure—including money—to let them go on to do the research they are training to do. In the biomedical field, said Robert Dijkgraaf, director of the Institute for Advanced Study, the average age at which a researcher receives a first grant is 42. “It’s difficult and sometimes painful to be a member of the scientific community in the U.S.,” says Varmus. “Other countries offer a more comfortable environment.” The paradoxical result, he says, is that we do a better job of attracting students from overseas to come here and study than we do of holding onto our own students. And once undergrads from China or Europe get their still highly coveted degree from an American university, they take their newly acquired skills back home.