# Advantage CPs – RKS Signature File – Akhil

# Notes

**CDC CP –**

This counterplan funds the Center for Disease Control and Prevention post-Trump cuts to their budget. The counterplan makes a uniqueness argument that disease infrastructure is struggling now and that funding the CDC is key to prevent a pandemic.

**Climeworks CP –**

Climeworks uses carbon capture technology and sells carbon or stores it in the ground. The counterplan funds the development of the technology which allows for increased scaling of the technology which solves for warming through carbon sequestration.

**Nanotechnology CP –**

The term “Nanotechnology” refers to a manipulation of matter on a scale smaller than 100 nanometers that was popularized by Eric Drexler. Drexler talks about the development of machines on a molecular scale. The counterplan re-allocates DOD funding towards nanotech research under NRC guidelines for regulations of development.

“Grey goo” refers to a scenario where nano-technology is self-replicating and eventually consumes the entirety of the biomass while continually building more of themselves. This theory was originally put out by Eric Drexler.

**ITER CP –**

The International Thermonuclear Experimental Reactor (ITER) is an international nuclear energy project based in France that is considered attractive because it can generate significant amounts of energy while having a minimal environmental impact. The counterplan funds the US commitment to the reactor, which the Federoff evidence says solves science diplomacy through international cooperation over the project.

**Peatlands CP –**

Peat is an accumulation of decomposed plant material in a water-saturated environment. Peatlands are ecosystems with significant amounts of peat that act as “carbon sinks”. The counterplan increases peatland restoration projects which are primarily composed of strategies such as rewetting through new water control structures.

Sphagnum Moss – this is most commonly known as “peat moss” and is the most important component in restoration. Most of the evidence indicates that in a successful restoration project, sphagnum moss would increase significantly.

**PGS CP –**

PGS stands for “Prompt Global Strike” and is a system that can deliver a precision-guided conventional weapon airstrike anywhere in the world. The counterplan resolves rapidly emerging threats and global power projection through the ability to strike anywhere in less than an hour.

## CDC CP

### 1NC – CP

#### Text: The United States Federal Government should substantially increase funding for the Center for Disease Control and Prevention

#### CDC cuts now magnify disease threats such as Zika – aff can’t solve

Freeman 6/1 (Liz, health care journalist for Naples Daily News, 6/1/17, Accessed 6/26/17, “Public Health Officials Prep for Zika as Funding Cuts Loom”, <http://www.govtech.com/em/health/Public-Health-Officials-Prep-for-Zika.html>, AD)

 (TNS) - Deep funding cuts to the Centers for Disease Control and Prevention would severely undermine response to a renewed Zika threat that’s expected as the summer mosquito season ramps up, a panel of public health officials said Wednesday. The consequences of a $1.2 billion cut, which is one-eighth of the CDC’s entire budget, would trickle down to county health departments in Florida and Texas that were hard hit by Zika last summer. The county agencies relied on federal support for laboratory testing and ground-level surveillance. President Trump’s budget proposal also includes cutting $109 million to the public health emergency preparedness program and another $40 million to the epidemiology and laboratory capacity program, according to Laura Hanen, interim executive director and chief of government affairs for the National Association of County and City Health Officials. Hanen was part of a press briefing Wednesday about the status of Zika and how Trump’s proposed cuts would come on top of one-time Zika funding last year that expires shortly. Congress allocated $1.1 billion for a Zika response in 2016. “There is no more money coming behind that unless Congress recommends a comprehensive approach,” she said. What’s really needed is a permanent public health emergency fund so there isn’t a scramble to secure money to react each time there’s a public health threat, said Dr. Paul Jarris, chief medical officer with the March of Dimes. “That is not how FEMA operates,” Jarris said, referring to the Federal Emergency Management Agency that responds to hurricanes and other natural disasters. Sen. Bill Nelson, D-Florida, on Wednesday sent a letter to Dr. Tom Price, secretary of Health and Human Services, sounding the alarm about the administration’s budget plan that includes cutting $7.2 billion from the National Institutes of Health that supports vaccine development research. In addition, Nelson’s letter referenced $35 million that would be slashed from the CDC’s center on birth defects and developmental disabilities, another $65 million in cuts for emerging infectious diseases, and $135 million would be slashed from the CDC’s public health preparedness. “Families in Florida and throughout the country deserve better,” Nelson said. “I urge you to reconsider these cuts, and I stand ready to work with you to provide the resources our country needs to respond to the Zika virus.” Planned Parenthood of Southwest and Central Florida is launching a Zika health awareness program in Collier County to reach women in underserved areas to educate them about protecting themselves against infection. The program is the result of research with Florida Gulf Coast University last year to determine how at-risk groups use information about Zika protection. The study was conducted by Dr. Charles O. Daramola, assistant professor and program director of community health at the Marieb College of Health & Human Services at FGCU. “Our job is to prevent disease, to educate the community,” Daramola said in a news release announcing the public awareness campaign that will include public service announcements and other efforts in multiple languages. There have been 5,300 cases of Zika in the U.S. mainland since the outbreak began last year with 224 cases that were locally acquired through bites from infected mosquitoes or through sexual contact, according to the National Association of County and City Health Officials. So far this year in Florida, there have been 50 travel-related cases, four locally transmitted infections and 43 pregnant women with evidence of Zika infection, according to the Florida Department of Health. About 1 in 5 people infected with Zika become symptomatic, which generally involves a low-grade fever, rash and joint pain. Pregnant women are at risk if their unborn babies are exposed to the virus, which can lead to birth defects and neurological deficits as the infants get older. Florida was hit with nearly 1,400 cases last year, mainly around Miami, through travel-based infections that began in the spring. By summer the outbreak had expanded to include locally based cases through infected mosquitoes. Public health officials in Tallahassee and Miami scrambled to respond, and Gov. Rick Scott was highly critical of the delayed federal action under the Obama administration and the potential harm to the tourism industry. The main preventive approach is continuous use of mosquito repellent, draining standing water around residences that can be a breeding ground for the Zika-carrying mosquitoes, and ongoing prenatal care for pregnant women and women of child-bearing age at risk of exposure, said Jarris, with the March of Dimes. Responding to Zika ultimately rests with county health departments and educating the public about using mosquito repellent and reaching out to women who become pregnant or are thinking of becoming pregnant, said Dr. Oscar Alleyne, senior adviser for public health programs with the National Association of County and City Health Officials. The Gulf Coast region around Texas and Southern states again face the greatest Zika threat this summer, he said.

### 2NC – CP Solves

#### More evidence – the new health care bill slashes CDC funds – exponentially magnifies the risk of diseases

Fox 3/8 (Maggie, senior health writer for NBC, 3/8/17, Accessed, 6/26/17, “GOP Health Care Bill Would Cut CDC Fund to Fight Killer Diseases”, <http://www.nbcnews.com/health/health-care/new-gop-health-care-bill-would-cut-fund-fight-killer-n730391>, AD)

Bird flu has started killing more people in China, and no one's sure why. Zika virus is set to come back with a vengeance as the weather warms up and mosquitoes get hungry. Yellow fever is spreading in Brazil, and antibiotic-resistant bacteria are evolving faster than doctors can keep up with them. And the new health care replacement bill released Monday night by Republican leaders in Congress would slash a billion-dollar prevention fund designed to help protect against those and other threats. The Prevention and Public Health Fund accounts for 12 percent of the budget for the Centers for Disease Control and Prevention. The 2010 Affordable Care Act set it up specifically to try to lower health costs by preventing diseases before they happen. The CDC uses it to help states deliver vaccines, watch for infectious diseases, keep an eye out for lead in water, promote breastfeeding in hospitals, prevent suicide and watch out for hospital-associated infections. It totals $931 million for 2017. "It really is a core activity," said Dr. Anne Schuchat, the CDC's acting director. Not only would the proposed American Health Care Act explicitly cut the fund, but President Donald Trump has said his 2018 budget would chop domestic spending and funnel more cash to the Defense Department. It worries federal, state and local health officials, who have seen their budgets steadily cut over the past 15 years. "These funds are used to prevent diseases such as hypertension, cancer and diabetes, which are drivers of the major causes of death in the United States," said Dr. Leana Wen, Baltimore's health commissioner. "They also help ensure that our nation is prepared against emerging threats such as bioterrorism and Ebola and other infectious diseases. Cutting these funds will hurt patients' health in the short term and compromise national security in the long term." “When you have a burning airplane on the runway, that's not the time to start the discussion about whether you need to buy a firetruck.” Ebola came out of the blue, causing an epidemic across West Africa in 2014 and 2015 that infected 28,000 people, killed more than 11,000 of them and frightened Americans when a patient turned up in Dallas, died and infected two of his nurses, who survived. Trump raised eyebrows among public health officials in 2014 when he used Twitter to urge measures that would not help, such as blocking the return of infected doctors and nurses. Eight Americans, including seven health care workers, came back infected with Ebola. All were treated successfully, and none infected anyone else. "The U.S. cannot allow EBOLA infected people back. People that go to far away places to help out are great-but must suffer the consequences!" he tweeted in 2014. Schuchat is sanguine about now working for Trump, and she is understanding about some of the reactions. "Ebola raised a lot of fears. It is the epitome of scary diseases. It's understandable that emotions are high," she told NBC News. She hopes she can calmly explain the issues to Congress and win the needed funding. "These emerging threats are not limited within a county, city or state," she said. Schuchat and other top U.S. health officials briefed congressional staff Tuesday on the threat of antibiotic-resistant bacteria, saying they have reached a level never seen before. "We don't have a lot of time," Schuchat said. "Resistance is a problem now, because it is a threat to modern medicine itself." Bugs are evolving into forms that cannot be treated with any drugs, and no new classes of drugs are on the horizon. The CDC, the National Institutes of Health and other government agencies had been hoping and pressing for more money to develop drugs, tests and vaccines and to look harder for where those germs might be lurking. "We really are in a different time. This is the moment for us to really invest," Schuchat said. In fact, they had been pressing for an authorized fund that would let them move quickly against new diseases, outbreaks or other threats without having to go to Congress to ask for the money. Now, instead, they are looking at cuts and a Congress controlled by the same Republican leadership that, worried about slush funds and wasteful spending, delayed funding to fight Zika for nine months. They finally cut the funding request nearly in half. It's bad timing. Just last week, the CDC raised the alert level about H7N9 avian influenza, which has killed more than 460 people in China since October. It's showing signs of mutating and is now considered the No. 1 candidate to cause a pandemic of killer influenza. "Influenza is the scariest of all bugs. These bird flu strains are beginning to change," Schuchat said. In what perhaps was a sign of the times, the briefing on the superbug threat at the Capitol attracted only a handful of staffers and no questions from legislative staff. On Wednesday, the Association of State and Territorial Health Officials, or ASTHO, will try. It's bringing state health officials to Washington to make the case not only for the prevention fund, but also for increased public health funding. They know it will be an uphill battle. "It's a tough sell," ASTHO Executive Director Michael Fraser said. "People know what it means to go to the doctor. They don't know what it means when public health agencies agencies keep you from getting bird flu or an E. coli." They'll frame their message in terms they hope will get the attention of conservatives, using the language of national defense. “Public health infrastructure doesn't have same appeal as a bridge that could be named after you.” "This is national security. Public health is protecting Americans," said Amanda Jezek of the Infectious Diseases Society of America. Fraser also hopes to tap into Trump's campaign promises about rebuilding American infrastructure. "People think about bridges and roads. ... We need similar attention to the public health infrastructure," he said. "We want to get the message out that public health is part of homeland security, part of public safety. It's not just a bunch of pamphlets and health fairs." Dr. Jay Butler, Alaska's chief medical officer and president of the ASTHO, knows this is another tough sell. "Public health infrastructure doesn't have same appeal as a bridge that could be named after you," he said. Scary tactics might help, Fraser said. "In terms of scaring the hell out of people, [we are] thinking about the spring and what we have to do around Zika, especially now that states are preparing for mosquito season," he said. "When you have a burning airplane on the runway, that's not the time to start the discussion about whether you need to buy a firetruck."

### 2NC – AT: Cuts Insignificant

#### **Budget cuts have undermined local capabilities to detect disease such as biosurveillance – funding is key**

Nuzzo 17 – Senior Associate at the Johns Hopkins Center for Health Security (Jennifer, 2/1/17, Accessed 7/17/17, “Improving Biosurveillance Systems to Enable Situational Awareness During Public Health Emergencies”, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5314963/>, AD)

State and local surveillance programs are the foundation of our national biosurveillance enterprise. The federal government's capacity to detect and maintain situational awareness during catastrophic events depends on the ability of state and local agencies (particularly health departments) to build and maintain robust and flexible biosurveillance systems. However, national biosurveillance capabilities are threatened by shortfalls in state and local financial resources. Limits in state budgets make it difficult for agencies to maintain information systems and staff solely with local resources. The Centers for Disease Control and Prevention (CDC) public health emergency preparedness cooperative agreements have been essential sources of support for state and local health departments to enable them to develop and maintain basic biosurveillance capabilities. While federal preparedness investments have been an important first step, the level of federal funding for biosurveillance appropriated to date is not commensurate with the strategic national importance of these systems. Failure to increase support for health departments will erode critical progress made to date toward ensuring that basic biosurveillance capabilities exist across the United States. Above all, the US government must ensure that there are adequate numbers of competent personnel to run biosurveillance programs, particularly at state and local health departments. Unfortunately, continued cuts in federal preparedness funding over the past 10 years have forced state and local health departments to scale back on important preparedness programs. These cuts, combined with state budget deficits and layoffs, have exacerbated existing shortages of highly skilled and competent public health personnel to build and maintain biosurveillance systems. Ensuring the functioning of critical biosurveillance programs will require sustained and committed federal support for biosurveillance programs, including adequate and flexible funding to hire and retain biosurveillance analysts.

## Climeworks CP

### 1NC – CP

#### Text: The United States Federal Government should substantially increase funding for Climeworks technology for the purpose of carbon sequestration

#### **Climeworks carbon capture solves warming through sequestration – scaling up production is key**

Peters 5/31 – environmental journalist for Fast Company (Adele , 5/31/17, Accessed 6/26/17, “This Machine Just Started Sucking CO2 Out Of The Air To Save Us From Climate Change”, <https://www.fastcompany.com/40421871/this-machine-just-started-sucking-co2-out-of-the-air-to-save-us-from-climate-change>, AD)

Climeworks carbon capture device will take the gas from the air and sell it or store it in the ground. Now we just need a few hundred thousand more–as quickly as possible. Sitting on top of a waste incineration facility near Zurich, a new carbon capture plant is now sucking CO2 out of the air to sell to its first customer. The plant, which opened on May 31, is the first commercial enterprise of its kind. By midcentury, the startup behind it–Climeworks–believes we will need hundreds of thousands more. To have a chance of keeping the global temperature from rising more than two degrees Celsius, the limit set by the Paris agreement, it’s likely that shifting to a low-carbon economy won’t be enough. “If we say that by the middle of the century we want to do 10 billion tons per year, that’s probably something where we need to start today.” [Photo: Julia Dunlop] “We really only have less than 20 years left at current emission rates to have a good chance of limiting emissions to less than 2°C,” says Chris Field, director of the Stanford Woods Institute for the Environment and coauthor of a recent paper discussing carbon removal. “So it’s a big challenge to do it simply by decreasing emissions from energy, transportation, and agriculture.” Removing carbon–whether through planting more forests or more advanced technology like direct carbon capture–will probably also be necessary to reach the goal. At the new Swiss plant, three stacked shipping containers each hold six of Climeworks’ CO2 collectors. Small fans pull air into the collectors, where a sponge-like filter soaks up carbon dioxide. It takes two or three hours to fully saturate a filter, and then the process reverses: The box closes, and the collector is heated to 212 degrees Fahrenheit, which releases the CO2 in a pure form that can be sold, made into other products, or buried underground. “It’s a big challenge to do it simply by decreasing emissions from energy, transportation, and agriculture.” [Photo: Julia Dunlop] “You can do this over and over again,” says Jan Wurzbacher, cofounder and director of Climeworks. “It’s a cyclic process. You saturate with CO2, then you regenerate, saturate, regenerate. You have multiple of these units, and not all of them go in parallel. Some are taking in CO2, some are releasing CO2. That means that overall the plant has continuous CO2 production, which is also important for the customer.” In the case of the first plant, the customer is a neighboring greenhouse, which uses the CO2 to make its tomatoes and cucumbers grow faster (plants build tissue by pulling carbon from the air, and more carbon dioxide means more growth, at least to a degree). Climeworks is also in talks with beverage companies that use CO2 in sparkling water or soda–particularly in production plants that are in remote areas, where trucking in a conventional source of CO2 would be expensive. “There, Climeworks’ plan–taking it out of the air directly on site, is very advantageous and also commercially attractive already as of today,” says Wurzbacher. “We still have to go down a couple of steps on the cost curve, but in these niche applications already today, we can offer competitive CO2.” “If a company pays us to remove 10,000 tons of CO2 from the air, we’re actually putting a plant in place that extracts these 10,000 tons of CO2.” [Photo: Julia Dunlop] In both cases, the captured CO2 would eventually be released back into the atmosphere. But the company also plans to use CO2 to make carbon-neutral products. Using renewable energy, it can split water (which is created as a by-product of its process) to create hydrogen, and then combine that with the carbon dioxide in various processes to create plastics (for example, for recycled CO2 sneakers) or fuel. Ultimately, the company wants to sell its ability to remove carbon dioxide from the atmosphere and store it underground, and it thinks that the market may be ready to pay sooner than the startup initially expected. The IPCC, the international body that issues massive, comprehensive reports on climate change, has estimated that the world will need to be removing an average of 10 gigatons of CO2–10 billion tons–a year from the atmosphere by midcentury. “If we say that by the middle of the century we want to do 10 billion tons per year, that’s probably something where we need to start today,” says Wurzbacher. “Based on our experiences now on the market, we are very confident that we will be able to develop a market in the very near future, maybe next year or in two or three years, to sell these negative emissions.” Because there isn’t yet a global price on carbon, the company imagines that the first customers might be corporations that need help reaching ambitious climate goals. After adopting more obvious solutions, like renewable energy, increased efficiency, and changes in materials or transportation, a company might turn to negative emissions to help it offset the remainder of its footprint. Wurzbacher contrasts it with other carbon trading or certificate schemes, such as paying to have trees planted somewhere. “It’s always hard to grasp what’s really happening if you do these schemes,” he says. “Unlike that, if a company pays us to remove 10,000 tons of CO2 from the air, we’re actually putting a plant in place that extracts these 10,000 tons of CO2.” Planting trees or preserving existing forests is likely to also be a critical way to absorb CO2. “The best example of carbon dioxide removal technology that we know how to do now is grow more forest and to protect the carbon content of soils,” says Field. “And those are technologies that we know how to do now that provide extensive co-benefits and are ripe for taking advantage of.” But direct air capture plants have some advantages that could make them an important part of the solution as well: The CO2 capture plant is roughly a thousand times more efficient than photosynthesis. “Air capture costs money, so anything we can do which is cheaper than air capture, we should do it, definitely.” [Photo: Julia Dunlop] “One CO2 collector has the same footprint as a tree,” says Wurzbacher. “It takes 50 tons of CO2 out of the air every year. A corresponding tree would take 50 kilograms of the air every year. It’s a factor of a thousand. So in order to achieve the same, you would need 1,000 times less area than you would require for plants growing.” The CO2 collectors can also be used in areas that wouldn’t be suitable for agriculture, helping preserve land needed for farming, and they don’t require a water source, unlike some afforestation efforts. They can also run on renewable energy. Still, to have the impact needed, the CO2 capture plants would need to be built at a massive scale. The first plant in Switzerland can capture 900 tons of carbon dioxide in a year, roughly the same amount of emissions as 200 cars. The company calculated how many shipping container-sized units would be needed to capture 1% of global emissions; the answer was 750,000. In one sense, Wurzbacher says that this is less enormous than it might seem. The same number of shipping containers pass through the Port of Shanghai every two weeks. But to capture the 10 gigatons of emissions needed, between 10 and 20 other carbon capture companies would have to have equally large operations. (As of today, a handful of others, such as Carbon Engineering and Global Thermostat, are working on similar technology.) Field, the Stanford scientist, argues that it’s important to remember that the technologies, while promising, are early-stage and unproven, and will face challenges in scaling up, especially if there isn’t a price on carbon. He also says it’s critical that people don’t get the wrong idea about the potential–the possibility of carbon capture isn’t a license to pollute more now. “We need to start scaling it today if we want to be able to put away these 10 gigatons every year by 2040 or 2050.” [Photo: Julia Dunlop] “What we should not be doing is ethically kicking the can down the road and then say, ‘Oh, we’ll probably figure out something later that we can then utilize,'” he says. “Many of the scenarios that come forward in the models that are cost effective do exactly that: They say we’ll come up with this technology, based on incomplete information it will be cheap and effective, the land will be available, and people will embrace this. That might be right. But there’s almost no evidence confirming that it’s right.” But that note of caution doesn’t mean the technology isn’t necessary. “CO2 removal is a really good idea,” he says. “And a lot of the technologies ought to be deployed today. A lot of technologies ought to be explored.” “Air capture costs money, so anything we can do which is cheaper than air capture, we should do it, definitely,” says Wurzbacher. “But we’ll need this on top of that. And we’ll not only need to develop it today, but we need to start scaling it today if we want to be able to put away these 10 gigatons every year by 2040 or 2050.” Capturing carbon, he says, is as important as the massive shift to a low-carbon economy. “It’s not either/or,” he says. “It’s both.”

### 2NC – CP Solves

#### **Carbon Capture is key to hold global temperatures below 2 degrees – Climeworks tech is key**

Nguyen 5/1 - political advisor for Vice News (Tien, 5/1/17, Accessed 6/26/17, “Going Negative”, <https://news.vice.com/story/this-factory-will-suck-carbon-out-of-the-air-and-feed-it-to-plants>, AD)

But climate scientists say so-called negative-emissions technologies — which remove pollutants from air — will be crucial to meet the goal of the Paris Agreement, the landmark 2015 deal co-signed by 196 nations, to hold the increase in global temperature to no more than 2 degrees Celsius. “Climeworks is the first to scale up to substantive level,” said Julio Friedmann, a former principal deputy assistant for fossil energy for the U.S. Department of Energy and senior adviser at the Lawrence Livermore National Lab. “There’s almost no way to hit those targets without using negative emissions, and in some cases, quite soon.” The plant is projected to capture 900 metric tons of the greenhouse gas, or about the emissions from 200 cars a year. It traps ambient carbon dioxide with absorbent filters inside the plant’s air collector. To release the carbon dioxide, the filters are heated to 212 °F with waste heat from a neighboring partner waste incinerator plant owned by the company Kezo. The freed carbon dioxide is then pumped over to the greenhouse operated by Gebrüder Meier to “enhance the growth of vegetables and lettuce by up to 20 percent,” according to a press release. One study estimates that to avoid the two-degree global temperature rise by century’s end, negative emission technologies must scale up to capturing 5 billion tons of CO2 annually by 2050. That’s approximately twice the amount absorbed by all the planet’s oceans. And it’s a hefty ask for these fledgling technologies. “If we want to do this by midcentury, we need to not only start developing these technologies but implementing and scaling up these technologies. That’s what we see as our main role,” said Jan Wurzbacher, who co-founded Climeworks in 2009 with Christoph Gebald at the University ETH Zurich. Wurzbacher and Gebald developed their process in collaboration with the Swiss Federal Laboratories for Materials Science and Technology; the startup has received more than $7 million in venture capital funding from Venture Kick, Gebert Ruf Stiftung, de Vigier Stiftung and ClimateKIC, private investors, and also grants from the Swiss government for various projects, including their new plant. The company has an ambitious goal of capturing 1 percent of the global emissions of CO2 by 2025. That would require 750,000 of their modular plants in operation, Wurzbacher said. To get there, they need to cut costs by a quarter to a third and land a lot more customers, he said. The plant cost somewhere in the single-digit millions to build, according to a communications representative, who declined to give an exact number. Climeworks says it’s selling the captured CO2 to the greenhouse around market price, which won’t cover the price of the plant because it includes research and development costs. The company estimates its next plant will cost about $2 million.

### 2NC – AT: Water Shortages DA

#### New CCS tech, water requirements, and integration system avoids water issue

**Global CCS Institute ‘15** – Established in 2009 for the purpose of researching CCS (Accessed 7/23/17, “How does carbon capture affect water consumption?”, <https://www.globalccsinstitute.com/insights/authors/guidomagneschi/2015/01/02/how-does-carbon-capture-affect-water-consumption>, AD)

The benefits of an optimized integration A study presented at the GHGT-12 conference showed that the integration of a new 250 MWe demonstration carbon capture unit of the Rotterdam Opslag en Afvang Demonstratieproject (ROAD) with a recently-built 1 070 MWe coal-fired unit could reduce freshwater withdrawal and usage through waste heat integration. The addition of the ROAD carbon capture demo plant will increase the cooling water usage at the power plant. However, the impact can be decreased by integrating waste heat streams. Estimates indicate that cooling water usage would increase by 6% in absolute terms, or 12% more water consumption per MWh of power production. Extrapolation of the result for a full scale plant with similar characteristics and integration philosophy would result in a 25% absolute increase or 63% more water consumption per MWh of power production. In addition, water can be recovered in the flue gas cooler of the capture system and reused as make-up water in the power plant after proper treatment. For example, it could be used in the wet sulphur scrubbing system. Results extrapolated for a full scale plant indicate that supplemental freshwater use can be reduced by 94%, nearly eliminating the need for increased freshwater supply. The ROAD study will be presented in more detail by Andy Read, the project director, in an upcoming webinar of the Global CCS institute on the 15th of January 2015. Follow this link to register. Conclusions Additional water requirements introduced by CO2 capture processes can be of concern in areas where water is scarce. The studies available in the literature provide quantification of these requirements, indicating that they are significant. Alternative solutions exist to overcome the problem, like using less water-intensive capture technologies or optimizing the integration with the capture plant. The literature values, however, should not be used as universal indicators. The actual increase in water consumption must be estimated on a case by case basis, carefully accounting for the capture technology (type and size), the cooling systems adopted and the level of integration. A comprehensive assessment for each individual case must be carried out that considers all the available technologies for CO2 capture, including oxy-combustion technology, in order to compare their performance in terms of water requirements.

#### No risk of water wars – countries never follow through – empirics

Walsh 13 – a senior writer for TIME magazine, covering energy and the environment, citing Wendy Barnaby who is editor of People & Science, the magazine published by the British Science Association (Brian, 12/10/13, Accessed 7/20/17, “New Mideast Pipeline Deal Shows Why Water Doesn’t Start Wars”, <http://science.time.com/2013/12/10/new-mideast-pipeline-deal-shows-why-water-doesnt-start-wars>, AD)

On Dec. 9, Israel, Jordan and the Palestinian Authority signed a major deal that calls for the construction of a large desalination plant in Jordan that would take billions of gallons of water from the Dead Sea and convert it to clean drinking water—water that would be shared by Jordan and Israel. The leftover brine water would be pumped via a new, 100-mile pipeline and discharged back into the Dead Sea, the massive lake that has water 10 times as salty as that found in the oceans. The deal also calls for Israel to increase the amount of water it sells to the parched Palestinian Authority by as much as 30 million cu. meters. Silvan Shalom, the Israeli water and energy minister, called the agreement “of the highest diplomatic, economic, environmental and strategic importance.” My colleague Karl Vick in Jerusalem has more on the deal, which environmentalists have a number of qualms about. The Dead Sea has been shrinking for years, with the lake’s surface area declining by 20% over the past two decades as water from the River Jordan, which feeds into the Dead Sea, has been appropriated for farming and domestic use in Israel, Syria and Jordan. The deal itself looks to be much smaller than a mega-project that has been on the drawing board for almost 20 years. But even if the Dead Sea deal is less than historic, it’s still a deal, hammered out by entities that usually have a hard time even speaking to each other. And it’s a reminder that contrary to the much-repeated phrase that “the next world war will be fought over water,” similar deals tend to be the rule with international disputes over water, not the exception. Far from being a source of violent conflict—like religion or oil—water is something that even bitter rivals can usually sit down and discuss, however reluctantly. I don’t blame you if you don’t believe me. The idea that water is a limited resource that will inevitably be the source of conflict in arid regions of the world is considered a given in many security, foreign policy and environmental circles. Just see this piece, or this one, or that one. Or this piece, or this one, or that one. (And those are just from 2013.) Water wars were even the subject of the 2008 James Bond film Quantum of Solace—the one with the eco-villain named Greene who was going to corner the Bolivian market on water, which I have to say, is pretty dull compared to irradiating the gold in Fort Knox (Goldfinger) or flooding all of Silicon Valley (A View to a Kill). Even Mark Twain, referring to disputes between Western U.S. states over the Colorado River, memorably said that “whiskey is for drinking. Water is for fightin’ over.” But when it comes to actual armed conflict—as opposed to wars of words—I’m sorry to say that Mr. Twain has it wrong. That’s what science journalist Helen Barnaby discovered when she began work a number of years ago on a proposed book about water wars. In the course of her research, Barnaby discovered that there hasn’t been an actual war between two nations over water for about 4,500 years, back when Lagash and Umma, two Mesopotamian city-states located in what is now southern Iraq, took up arms over boundary canals. Sandra Postel and Aaron Wolf found that between the years of 805 and 1984, countries signed more than 3,600 water-related treaties. Their analysis of 1,831 international water-related treaties over the second half of the 20th century found that two-thirds of the encounters were of a cooperative nature. India and Pakistan have abided by the World Bank-arbitrated Indus Waters Treaty since 1960, and none of the three wars the bitter rivals have fought were caused by water disputes. Even as Palestinians and Israelis kill each other, water professionals on both sides interact through the Joint Water Committee, established by the Oslo-II Accords in 1995. As Barnaby put it herself in a Nature essay in 2009: Countries do not go to war over water, they solve their water shortages through trade and international agreements. Cooperation, in fact, is the dominant response to shared water resources. Drawing on research from Tony Allan at the School of Oriental and African Studies in London and the late Gideon Fishelson from Tel Aviv University, Barnaby notes that much of the water we consume is actually “embedded” in the goods we consume, like fruits and vegetables. (This is also known as “virtual water.”) While temperate countries like the U.S. can produce more than enough water to meet their population’s needs—about 1 cu. meter per year for drinking, 100 cu. meters for washing and cleaning, and 1,000 cu. meters a year to grow food—arid countries like Israel have long since outgrown their water supplies, as Barnaby writes: Ten million people now live between the Jordan River and the Mediterranean Sea. If they were to be self-sufficient in food, they would need ten billion cu. meters of water per year. As it is, they have only about one-third of that: enough to grow 15-20% of their food. They import the rest in the form of food. More virtual water flows into the Middle East each year in the form of imported grain that flows down the Nile to farmers in Egypt. Nations cooperate on water, through trade and treaties, because they have no other choice. And that’s a good thing, because it means that water is one area where even fractious countries are forced by their own needs to negotiate with each other. They may threaten war over water, but they almost never resort to it.

## ITER CP

### 1NC – CP

#### Text: The United States Federal Government should fully fund its commitment to the International Thermonuclear Experimental Reactor

#### Funding ITER revitalizes science diplomacy and incentivizes international cooperation

Federoff 8 – molecular biologist and professor of biology at Penn State (Nina, 4/2/8, Accessed 7/20/17, “Making Science Diplomacy More Effective”, <https://2001-2009.state.gov/g/stas/2008/105286.htm>, AD)

Finally, some types of science – particularly those that address the grand challenges in science and technology – are inherently international in scope and collaborative by necessity. The ITER Project, an international fusion research and development collaboration, is a product of the thaw in superpower relations between Soviet President Mikhail Gorbachev and U.S. President Ronald Reagan. This reactor will harness the power of nuclear fusion as a possible new and viable energy source by bringing a star to earth. ITER serves as a symbol of international scientific cooperation among key scientific leaders in the developed and developing world – Japan, Korea, China, E.U., India, Russia, and United States – representing 70% of the world’s current population. The recent elimination of funding for FY08 U.S. contributions to the ITER project comes at an inopportune time as the Agreement on the Establishment of the ITER International Fusion Energy Organization for the Joint Implementation of the ITER Project had entered into force only on October 2007. The elimination of the promised U.S. contribution drew our allies to question our commitment and credibility in international cooperative ventures. More problematically, it jeopardizes a platform for reaffirming U.S. relations with key states. It should be noted that even at the height of the cold war, the United States used science diplomacy as a means to maintain communications and avoid misunderstanding between the world’s two nuclear powers – the Soviet Union and the United States. In a complex multi-polar world, relations are more challenging, the threats perhaps greater, and the need for engagement more paramount.

### 1NC – Solves Energy

#### **Sustained international cooperation over the ITER is key to meet global energy demands – current projects fail**

Dixit 15 – Public Information Specialist at the IAEA Office of Public Information and Communication (Aabha, 9/15/15, Accessed 7/21/17, “The Energy of the Future: The Status of Nuclear Fusion Research and the Role of the IAEA”, <https://www.iaea.org/newscenter/news/the-energy-of-the-future-the-status-of-nuclear-fusion-research-and-the-role-of-the-iaea>, AD)

Scientists are becoming increasingly excited about the prospects that within the foreseeable future a reactor can replicate the sun’s energy source on Earth through scientific and technological innovation of a scale previously unimagined. During the annual IAEA General Conference, a side event on nuclear fusion technology was held to discuss latest advances in research and development in fusion technology. “The world is getting warmer with emissions getting from bad to worse, it is hopeful that alternative sources of energy such as fusion technology can provide electricity worldwide by the middle of this century,” said Steve Cowley, Director of the Culham Centre for Fusion Energy in the United Kingdom, in his introductory remarks. He also highlighted the pioneering work of the IAEA in promoting international collaboration in this field since 1958 and without this support, the development of fusion technology would be further behind. “We now need to urgently ramp up the work going on at the International Thermonuclear Experimental Reactor (ITER) and to push the experiment forward to meet the growing energy demands.” Discussions provided insights into the status of fusion research presently and possibilities for its upscaling to commercial energy production. Global collaboration was the best way forward to close the technological and scientific gaps to realize the dream of a functioning fusion power plant within the foreseeable future, panelists agreed. “It is too expensive and technologically challenging to attempt charting a lonely research path,” Richard Kamendje, a fusion physicist at the IAEA, told the audience. “Therefore the role played by the IAEA in fostering international collaboration and facilitating the exchange of scientific and technical information in the fusion field is key for its success.” The challenge to create a source of energy similar to that of the sun itself in a reactor is yet to be conquered. With dedicated research and unprecedented international collaboration, scientists believe that there is light at the end of the tunnel to re-create this energy in a reactor that can deliver energy to the electricity grid. This innovative experiment is to be carried out at a global nuclear fusion experiment facility presently under construction. Known as ITER and located in Cadarache, in the south of France; it is an international project with seven members: China, India, Japan, South Korea, the European Union, the Russian Federation and the United States. “There are so many international partners who are working on the components and manufacturing areas of the ITER project,” said Cowley. “Though we may compete in the advances made at the national level in fusion science and technology, we gain from the constructive outcomes. The competition to find the solutions to a problem benefits the goals of ITER. Fusion prototype reactors are being built at the national level, but what is also motivating scientists like us, is the global eagerness to see an end result that is positive for humanity.” The ITER experiment boldly represents the magic of international collaboration for the peaceful uses of the atom. ITER, should the experiment succeed, would show the path to building a power plant that uses controlled nuclear fusion, as a potentially inexhaustible energy source. More significantly, it will demonstrate how the greatest of challenges in modern science and technology can be successfully overcome through international cooperation. Giving an overview of the current status of the project and the challenges, David Campbell, Director of the Science and Operations Department at ITER pointed out that this project is the largest international scientific collaboration on earth to create sustainable energy. “From the delivery of large plant components for the experimental reactor to building additional support structures, are among some of the challenges we are facing. Without international collaboration and support, this project would just not be possible.” Proponents of fusion technology are also aiming for commercial utilization, and this on-going experiment needs to speed up, move ahead as rapidly as possible to make ITER operational at the earliest, he reiterated. The theory is relatively straight forward. The nuclear fusion reactor should achieve self-sustaining fusion reactions and produce in excess of several hundreds of MW of fusion power. But turning science to practical application is complex and challenging. While the ITER facility will test key technologies necessary for a fusion reactor, many countries are independently initiating new research and development activities leading to a demonstration of fusion energy’s readiness for commercialization (DEMO). But it would all come together, in the spirit of international collaboration under a world “DEMO Programme.” The IAEA organizes a series of DEMO programme workshops to facilitate and strengthen international cooperation to define and coordinate DEMO programme activities. Scientists and policy makers are convinced that we are on the edge of an ‘Age of Fusion’ and the ITER facility and demonstration plants would establish the technology to significantly meet, in the not too distant future, humanity’s energy needs through a virtually inexhaustible, safe, environmentally-friendly and universally-available resource. The IAEA has been in the forefront of nuclear fusion research efforts since the 1950s. The IAEA has focused its efforts on facilitating the coordination of international fusion undertakings and enhancing the interaction among developing Member States with leading fusion initiatives. The Agency can rightfully claim its share of credit in supporting the pioneering ways to make fusion energy a reality for meeting the global energy demand.

### 2NC – Politics NB

#### CP has unanimous support

Press Action ’12 (3/12/12, Accessed 7/23/17,“US Nuclear Industry Operates as if Fukushima Never Happened”, <http://www.pressaction.com/news/weblog/full_article/nuclearsubsidies03122012/>, AD)

Both Democrats and Republicans have had a long love affair with commercial nuclear power, and the relationship is showing no signs of losing steam. Since the 1950s, **members of both parties have enthusiastically lavished electric utility companies with expensive gifts, ranging from subsidies to protection from liability** for disasters to loan guarantees, all underwritten by U.S. taxpayers. The political calculus is simple: nuclear power enjoys unanimous support in Washington. Try to name one member of the U.S. Senate or House of Representatives who favors shutting down the nation’s 104 commercial nuclear reactors. Federal agencies, from the Atomic Energy Commission to the Department of Energy to the Nuclear Regulatory, have worked diligently through the years to promote nuclear power. At the state level, support for nuclear power also is extremely strong, although there are some politicians—albeit a tiny number—who have publicly called for the closure of certain nuclear plants. On the one-year anniversary **of** the start of the nuclear disaster at the Fukushima Dai-ichi nuclear power plant in Japan, one would assume a voice in official **Washington** would have emerged calling for an end to the nation’s experiment with nuclear power. In Germany, government officials made the decision to phase out nuclear power by 2022 in response to Fukushima. There’s no such sentiment among the ruling elite in the United States. Locating a member of Congress opposed to the continued operation of nuclear power plants is as hard as finding a lawmaker who favors breaking ties with Israe**l** over its mistreatment of Palestinians for the last 60 years. In fact, it’s more than hard, it’s impossible. It’s very rare to find an issue where there is a noteworthy difference between Democrats and Republicans. When there are differences, they tend to be subtle, although party officials and the corporate media will attempt to sensationalize a slight difference to create an impression that the U.S. political system permits honest and real debate.

## Nanotechnology CP

### 1NC – CP

#### Text: The Department of Defense should allocate DOD funding towards nanotechnology and follow National Research Council infrastructure and regulations guidelines

#### Research gaps and funding uncertainties prevent commercial nanotech – increased federal research is key

NRC 12 – National Research Council (1/25/12, Accessed 7/23/17, “Health and Environmental Effects of Nanomaterials Remain Uncertain; Cohesive Research Plan Needed to Help Avoid Potential Risks From Rapidly Evolving Technology”, <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=13347>, AD)

WASHINGTON — Despite extensive investment in nanotechnology and increasing commercialization over the last decade, insufficient understanding remains about the environmental, health, and safety aspects of nanomaterials. Without a coordinated research plan to help guide efforts to manage and avoid potential risks, the future of safe and sustainable nanotechnology is uncertain, says a new report from the National Research Council. The report presents a strategic approach for developing research and a scientific infrastructure needed to address potential health and environmental risks of nanomaterials. Its effective implementation would require sufficient management and budgetary authority to direct research across federal agencies. Nanoscale engineering manipulates materials at the molecular level to create structures with unique and useful properties -- materials that are both very strong and very light, for example. Many of the products containing nanomaterials on the market now are for skin care and cosmetics, but nanomaterials are also increasingly being used in products ranging from medical therapies to food additives to electronics. In 2009, developers generated $1 billion from the sale of nanomaterials, and the market for products that rely on these materials is expected to grow to $3 trillion by 2015. The committee that wrote the report found that over the last seven years there has been considerable effort internationally to identify research needs for the development and safe use of nanotechnology, including those of the National Nanotechnology Initiative (NNI), which coordinates U.S. federal investments in nanoscale research and development. However, there has not been sufficient linkage between research and research findings and the creation of strategies to prevent and manage any risks. For instance, little progress has been made on the effects of ingested nanomaterials on human health and other potential health and environmental effects of complex nanomaterials that are expected to enter the market over the next decade. Therefore, there is the need for a research strategy that is independent of any one stakeholder group, has human and environmental health as its primary focus, builds on past efforts, and is flexible in anticipating and adjusting to emerging challenges, the committee said. Because the number of products containing nanoscale materials is expected to explode, and future exposure scenarios may not resemble those of today, selecting target materials to study on the basis of existing market size -- as is the practice now -- is problematic. To help guide research, the committee noted the following four research categories, which should be addressed within five years: · identify and quantify the nanomaterials being released and the populations and environments being exposed; · understand processes that affect both potential hazards and exposure; · examine nanomaterial interactions in complex systems ranging from subcellular to ecosystems; and · support an adaptive research and knowledge infrastructure for accelerating progress and providing rapid feedback to advance research. While surveying the existing resources for research, the committee acknowledged a gap between funding and the level of activity required to support the committee's strategy. The committee concluded that any reduction in the current funding level of approximately $120 million per year over the next five years for health and environmental risk research by federal agencies would be a setback to nanomaterials risk research. Moreover, additional modest resources from public, private, and international initiatives are needed in critical areas -- informatics, nanomaterial characterization, benchmarking nanomaterials, characterization of sources, and development of networks for supporting collaborative research -- to derive maximum strategic value from the research investments. Implementation of the strategy should also include the integration of domestic and international participants involved in nanotechnology-related research, including the NNI, federal agencies, the private sector, non-governmental organizations, and the academic community. The committee said that the current structure of the NNI -- which has only coordinating functions across federal agencies and no top-down budgetary or management authority to direct nanotechnology-related environmental, health, and safety research -- hinders its accountability for effective implementation. In addition, there is concern that dual and potentially conflicting roles of the NNI, such as developing and promoting nanotechnology while identifying and mitigating risks that arise from its use, impede application and evaluation of health and environmental risk research. To carry out the research strategy effectively, a clear separation of management and budgetary authority and accountability between promoting nanotechnology and assessing potential environmental and safety risks is essential.

### 1NC – Solves Agriculture

#### **Nanotech is key to agricultural innovation**

Parisi et al 15 – research fellow at the Joint Research Centre (JRC) of the European Commission (Claudia, April 2015, Accessed 7/23/17, “Agricultural Nanotechnologies: What are the current possibilities?”, <http://www.sciencedirect.com/science/article/pii/S1748013214001340>, AD)

Nanotechnology is recognised by the European Commission as one of its six “Key Enabling Technologies” that contribute to sustainable competitiveness and growth in several fields of industrial application [1]. The new chemical and/or physical properties of nano-scale particles provide useful functions [2] that are being rapidly exploited in medicine, biotechnology, electronics, material science and energy sectors, among others. These promising developments also concern the agricultural sector, in which continuous innovation is strongly needed because of increasing global food security and climate change challenges. In the past, agriculture benefited from many different technological innovations, including hybrid varieties, synthetic chemicals and biotechnology, and researchers are now seeking in nanotechnology a new source of agricultural improvements. However, while the food industry can be seen to be clearly benefiting from nanotechnology (in particular for food processing, distribution, packaging and functional food), its real contribution to the agricultural sector is still uncertain. According to leading R&D analyses,1 research on agricultural nanotechnology applications has been ongoing for largely a decade by now, searching for solutions to several agricultural and environmental challenges, such as sustainability, improved varieties and increased productivity. Several authors have shown the growing trend of both scientific publications and patents in agricultural nanotechnology, especially for disease management and crop protection [3–5]. Nanomaterials in agriculture aims in particular to reduce the amount of sprayed chemical products by smart delivery of active ingredients, minimise nutrient losses in fertilisation [4] and increase yields through optimised water and nutrient management. Nanotechnology derived devices are also being explored in the field of plant breeding and genetic transformation [6]. Additionally, agriculture could be a source of bio-nanocomposites with enhanced physical–mechanical properties based on traditionally harvested materials, like wheat straw and soy hulls, for bio-industrial purposes [7]. Table 1 provides an overview of the most relevant agricultural nanotechnology applications. Despite these potential advantages, nanotechnology applications in the agricultural sector are still comparably marginal and have not yet made it to the market to any large extent in comparison with other industrial sectors. The wave of research discoveries seems to be mainly claimed by the academic sector or small enterprises, while big industries reveal a large patent ownership. The trends of patent applications (mainly from agro-chemical companies) are continuously growing, but no new nano-based products for the agricultural sector have reached the market. This suggests that applicants are actively patenting and keeping broad patent claims in order to assure future freedom to operate and to guarantee future exploitation in case of promising commercial developments.

### 1NC – Solves Econ/Competitiveness

#### CP promotes advanced manufactured – solves competitiveness

UNESCO 16 – United Nations Educational, Scientific, and Cultural Organization (12/7/16, Accessed 7/23/17, “Nanotechnology is a growing research priority”, <http://www.unesco.org/new/en/natural-sciences/science-technology/single-view-sc-policy/news/nanotechnology_is_a_growing_research_priority/>, AD)

Nanoscience and nanotechnology are a priority field for today’s innovation leaders. Switzerland, for instance, topped both the EU’s Innovation Scoreboard and the Global Innovation Index in 2014 and is one of the top three countries for innovation among members of the Organisation for Economic Co-operation and Development (OECD). It also has some of the highest output in nanotechnology: 198 scientific articles per million population in 2013. Switzerland leads other strong players in this field, including the Republic of Korea (150), Germany (93), France (79), the USA (69) and Japan (56), according to Thomson Reuters’ data cited by the UNESCO Science Report and analysed by Statnano. However, when it comes to the number of patents per 100 articles on nanotechnology, the order of these countries is reshuffled. The USA now takes the lead, with 44, followed by Japan (30), the Republic of Korea (27), Germany (22), Switzerland (17) and France (15). The European Union (EU) is encouraging its members to embrace smart specialization in their national strategies. To help narrow the research gap with its newest members, the EU launched the Teaming Action in 2013 within Horizon 2020, its biggest research programme ever. One of the first team projects to be approved for funding is developing the Wroclaw Centre of Excellence in new materials, nanophotonics, additive laser-based technologies and new management organization systems, with competitive funding from the Research Executive Agency. This project involves collaboration between the German Fraunhofer Institute for Material and Beam Technology and the University of Würzburg, on the one hand, and Wroclaw University of Technology and the Polish National Centre for Research and Development, on the other. Nanotechnology is a key element of advanced manufacturing, which is being pursued by a widening circle of industrial countries that include Australia, Canada, China, France, Germany, Japan, the Republic of Korea and USA. Advanced manufacturing is the focus of one of China’s 16 mega-engineering programmes to 2020, by which time the country plans to be ‘innovation-driven’. In 2014, advanced manufacturing was incorporated in Canada’s revised research strategy, Seizing Canada’s Moment: Moving Forward in Science, Technology and Innovation, with a focus on automation, including robotics, lightweight materials and technologies, additive manufacturing, quantum materials and nanotechnology. Through advanced manufacturing, governments hope to enhance national competitiveness and create jobs. The Advanced Manufacturing Partnership launched by the US president in 2013 is no exception. Steered by a committee drawn from the industrial, labour and academic sectors, this partnership benefits from an investment of US$ 2.9 billion under the Revitalize American Manufacturing Act (2014). These funds, which are to be matched by private and non-federal partners, are being used to create an initial network of up to 15 institutes, including several with a focus on additive manufacturing, such as three-dimensional (3D) printing, digital manufacturing and design, lightweight manufacturing, wide band semiconductors, flexible hybrid electronics, integrated photonics, clean energy and revolutionary fibres and textiles. Japan ranks sixth worldwide for the sheer volume of articles on nanotechnology, behind China, the USA, India, the Republic of Korea and Germany. However, industrial investment in nanotechnology dropped from ¥ 155 billion to ¥ 111 billion between 2008 and 2013 as private enterprises cut back on research spending in reaction to the global financial and economic crisis. Many firms moved their R&D and manufacturing centres abroad, in reaction to an overappreciated yen and a shrinking Japanese market. Although university funding for nanotechnology has risen to ¥ 55 billion since 2008, it remains well below industrial levels. Moreover, Japan is one of the rare cases where the volume of scientific articles has declined over the past decade. Consequently, Japan’s world share of articles has also shrunk, including in chemistry.

### 1NC – Solves Heg

#### New tech makes nanotech key to solve hegemony – the aff can’t solve

Wang 13 – member of the Center for Responsible Nanotechnology (CRN) Task Force (Brian, 8/19/13, Accessed 7/23/17, “Considering Military and Ethical Implications of Nanofactory Level Nanotechnology”, <https://lifeboat.com/ex/military.and.ethical.implications.of.nanofactory.level.nanotechnology>, AD)

The powerful technologies that are being developed could rapidly shift military balances of power. Nations cannot assume that their existing weapons inventory provides assured security. A lead in current technology, even current nanotechnologies, does not guarantee a lead with molecular manufacturing. The future balance of power will be determined by a nation’s level of development with advanced nanotechnology, as well as space capabilities and other new technologies that will be augmented by nanofactory technology. Nations without a molecular manufacturing capability will be at the mercy of opponents with the technology. Nanotechnology can shift the motivations and rational calculation for war. For example, if nanotechnology makes a nation’s economy grow at 24% per year, then in three years that nation will have twice as much stuff; they would have less incentive to attack an equal size opponent and try to take their stuff. Attacking an opponent brings in elements of risk and costs. With such large gains in the near future, rational groups should not want or need to engage in violent conflict for economic gain. Other differences between groups that lead to conflict need to be addressed to prevent violent conflict. Genocide and super-oppression become technically easier with nanotechnology. Therefore, it is more important than ever for all people to work together toward peaceful resolution of differences and to keep those who would try to initiate atrocities in check. The economic bounty and other benefits [6] that nanotechnology could provide should be used by farsighted nations to reduce the motivations for conflict.

### 1NC – Solves Warming

#### Nanotech solves warming through cooling panels – allows heat to escape the atmosphere

Batacan 13 – news director for GMA news (Victoria, 4/1/13, Accessed 7/23/17, “Fighting global warming with nanotechnology “, <http://www.gmanetwork.com/news/scitech/technology/301887/fighting-global-warming-with-nanotechnology/story/>, AD)

Can you imagine homes and buildings remaining cool with air conditioning, or cars that don’t heat up like ovens in open parking lots? Stanford scholars have just come up with a new form of cooling panel that reflects sunlight back into space, thus keeping man-made structures cool even in the daytime. The device, described in a paper published March 5 in Nano Letters, works two ways. As a broadband mirror, it reflects as much sunlight hitting a surface as possible. As a thermal emitter, it radiates the heat within a crucial wavelength range so that it escapes the Earth’s atmosphere and goes back into space rather than getting trapped as greenhouse gases that aggravate global climate change. Nanotechnology-enabled cooling Prior to the experiment, engineers had been stymied by the challenge of daytime radiative cooling. The Stanford team surmounted the challenge by utilizing nanostructured photonic materials —artificial electromagnetic media with unusual and useful functionalities resulting from structuring on a sub-wavelength scale— which can be engineered to either suppress or enhance light reflection. The materials are composed of a combination of weak light-absorbing quartz and silicon carbide. Practical applications of nanotech The standard 10%-efficient solar panels currently used on rooftops to feed electricity to airconditioning systems could soon be replaced by these new cooling panels, which generate over 100 watts per square meter. Put differently, a one-family house with 10% of roof covered by the new devices could shave 35% off its total airconditioning demand during the hottest summers. Moreover, radiative cooling is a passive technology, needing no energy to drive moving parts, so the device can be installed and used immediately. Implications for the world’s populations Shanhui Fan, Stanford professor of electrical engineering and senior author of the paper, is more excited by the social than the potential commercial impact of the device. Large numbers of the human population live in sun-scorched regions of the Earth where energy demand to fuel airconditioning presents economic and environmental challenges. Most of these people are poor, while the energy to drive cooling is usually sourced from fossil fuels, the burning of which compounds the greenhouse gas problem. Radiative cooling can take the searing heat of the sun, and send it back into the chilly vacuum of space.

### 1NC – Solves STEM

#### Federal science funding attracts STEM students to the US

Sargent 8 – specialist in Science and Technology Policy Resources, Science, and Industry Division (John, 5/15/8, Accessed 7/23/17, “Nanotechnology and U.S. Competitiveness:¶ Issues and Options”, <https://fas.org/sgp/crs/misc/RL34493.pdf>, AD)

U.S.-educated foreign students may return home to conduct research and create new businesses. In the era following World War II, many of the most gifted and talented students from around the world were attracted to the science and engineering programs of U.S. colleges and universities. For many years, many of those who graduated from these programs decided to stay in the United States and contributed to U.S. global scientific, engineering, and economic leadership. Today, many foreign students educated in the United States have economic opportunities in their home countries that did not exist for previous generations. Some nations are making strong appeals and offering significant incentives for their students to return home to conduct research and create enterprises. Thus, federal support for universities, in general, and scientific and engineering research activities, in particular, may contribute to the development of leading scientists and engineers who might return to their home countries to exploit the knowledge, capabilities, and networks developed in the United States.

### 2NC – AT: Grey Goo

#### No risk of grey goo

Science Daily citing Drexler 4 (Eric, creator of nanotechnology, 6/9/4, Accessed 7/23/17, “Nanotechnology Pioneer Slays 'Grey Goo' Myths”, <https://www.sciencedaily.com/releases/2004/06/040609072100.htm>, AD)

June 9, 2004 -- Eric Drexler, known as the father of nanotechnology, today publishes a paper that admits that self-replicating machines are not vital for large-scale molecular manufacture, and that nanotechnology-based fabrication can be thoroughly non-biological and inherently safe. Talk of runaway self-replicating machines, or "grey goo", which he first cautioned against in his book Engines of Creation in 1986, has spurred fears that have long hampered rational public debate about nanotechnology. Writing in the Institute of Physics journal Nanotechnology, Drexler slays the myth that molecular manufacture must use dangerous self-replicating machines. "Runaway replicators, while theoretically possible according to the laws of physics, cannot be built with today's nanotechnology toolset," says Dr. Drexler, founder of the Foresight Institute, in California, and Senior Research Fellow of the Molecular Engineering Research Institute (MERI). He continued: "Self-replicating machines aren't necessary for molecular nanotechnology, and aren't part of current development plans." The paper, Safe Exponential Manufacturing by Chris Phoenix, Director of Research of the Center for Responsible Nanotechnology, (CRN) and Dr. K. Eric Drexler, also warns that scaremongering over remote scenarios such as "grey goo" is taking attention away from serious safety concerns, such as a deliberate abuse of the technology. Phoenix said: "Runaway replication would only be the product of a deliberate and difficult engineering process, not an accident. Far more serious, however, is the possibility that a large-scale and convenient manufacturing capacity could be used to make powerful non-replicating weapons in unprecedented quantity, leading to an arms race or war. Policy investigation into the effects of molecular nanotechnology should consider deliberate abuse as a primary concern, and runaway replication as a more distant issue." In 1986, Drexler described a powerful manufacturing system. This "assembler" would use robots the size of bacteria to join individual molecules into products. Assemblers would be highly productive, because small things can move quickly. The products would be precise and strong because molecules are small and uniform, and form strong bonds. For all these reasons, this idea was attractive. However, Drexler also described a danger scenario. A robotic molecular manufacturing system could be directed to build a copy of itself. If someone built a tiny, self-contained manufacturing system that had all the directions for building a copy of itself, and had all the equipment needed to use biomass as raw materials, and could move around, then the system could self-replicate and spread. If it had no built-in limits, then this complex system could, in theory, lead to a worst-case scenario of runaway replicators, popularly called grey goo.' Science fiction writers focused on this idea, and 'grey goo' became closely associated with nanotechnology, spreading a serious misconception about molecular manufacturing systems and diverting attention from more pressing concerns. This new paper shows why that focus is wrong. The authors explain why self-replication, contrary to previous understanding, is unnecessary for building an efficient and effective molecular manufacturing system. Instead of building lots of tiny, complex, free-floating robots to manufacture products, it will be more practical to use simple robot-arms in larger factories, like today's assembly lines. A robot-arm pulled from a factory would be as inert as a light bulb pulled from its socket. And the factory as a whole would be no more mobile than a desktop printer, besides requiring a supply of purified raw materials to build anything. Even the process of developing the factories would not make anything remotely like a runaway replicator - the early machines would be tools, unable to operate by themselves.

## Peatlands CP

### 1NC – CP

#### Text: The United States Federal Government should substantially increase peatland restoration and growth projects for the purpose of carbon sequestration

#### Restoration is viable now and solves warming through sequestration – spills over globally

Ward and Settelmeyer 14 – ecological director at US FWS; director of TerraCarbon (Sara and Scott, Accessed 7/7/17, “Carbon Sequestration Benefits of Peatland Restoration: Attracting New Partners to Restore National Wildlife Refuge Habitats”, <http://terracarbon.webfactional.com/publications/Ward_Settelmyer_NWN_JanFeb_2014.pdf>, AD)

The U.S. Fish and Wildlife Service (FWS) is interested in attracting new partners in the delivery of quality biological carbon sequestration projects that produce real and measureable carbon dioxide (CO2 ) reductions, while at the same time advancing our wildlife conservation mission. To date, FWS has collaborated with conservation organizations and other private entities on projects that have restored over 80,000 acres of bottomland hardwood forests and will sequester over 33 million tons of carbon. We are expanding our focus to include priority ecosystems beyond bottomland hardwoods, where the restoration need and carbon sequestration capacity is great. Peatlands, like those at the Pocosin Lakes National Wildlife Refuge (NWR), are one ecosystem where FWS is collaborating with an array of stakeholders to increase resiliency to climate change through restoring the hydrology of these carbon-rich wetlands. Rewetting drained peatlands is a quantifiable approach to sequestering greenhouse gas (GHG) pollutants. Under normal saturated hydrologic conditions, decomposition in organic soils is minimized, allowing for accumulation of organic carbon (approximately 40% C content) in peatlands worldwide (Dolman & Buol 1967; Thompson et al. 2003). Peatland forests are gaining global recognition for their tremendous carbon sequestration potential (e.g., they cover only 3% of the world’s land area, but contain the equivalent of twice the carbon stock of all forest biomass worldwide (Parish et al. 2008)). Reintroduction of wetland hydrology in peatlands stops the loss of carbon via peat oxidation while allowing carbon sequestration via soil accretion and biomass to resume. Peatland rewetting is achieved by installing water control structures to raise the water table, to encourage the more natural sheet flow (rather than channelized flow from the artificial ditches), and to attenuate runoff. Millions of hectares of former peatlands in the United States have been drained and converted to agriculture and forestry. North Carolina’s Albemarle-Pamlico Peninsula is the site of the greatest pocosin, or southeastern shrub peat bog, acreage in the United States (Richardson et al. 1981); however, 70% of pocosin habitat in North Carolina has been lost since the 1960s, and there is a significant restoration potential. For example, site-specific rewetting benefits at the Pocosin Lakes NWR are estimated at 1,080 metric tons of CO2 equivalents (t CO2 -e) per acre over 100 years that will ultimately sequester over 21 million t CO2 -e for the roughly 20,000 acres of restoration collaboratively completed to date. A study to verify the carbon benefits is underway via a partnership with the Duke University Wetlands Center and The Nature Conservancy. With nearly one-half million acres of restorable peatlands in the Albemarle Sound region of North Carolina and Virginia (and 100,000 on FWS lands alone), refuges can substantially contribute to international targets for carbon sequestration through rewetting efforts while also providing important proof-of-concept examples for private landowners to follow. In addition to the carbon benefits realized through peatland restoration, restoring hydrology conditions provides other important benefits to terrestrial and aquatic ecosystems, and human communities. Extensive drainage networks at the refuges, resulting from a land use legacy of agriculture and forestry, allow runoff to reach the Albemarle and Pamlico Sounds. The drainage canals that were historically constructed to artificially lower the water table enhance the off-site transport of soils and their constituents (Daniel 1980; 1981), remobilizing mercury (Lodenius et al. 1987) and nutrients (Brinson 1991). Extensive drainage also leaves FWS and surrounding private lands vulnerable to catastrophic fires and enhanced stormwater delivery during significant storms. Healthy pocosins require periodic fire, but lowered water tables render peatlands vulnerable to more frequent and severe fires. During such fires, losses of up to five feet of peat deposits have occurred, releasing approximately 20 million tons of carbon during four separate fires in 2008 and 2011 on North Carolina and Virginia NWRs (Mickler & Welch 2011; Mickler 2012). These fires result in abrupt habitat changes, massive carbon releases to the atmosphere, significant impacts to air quality and public health, vulnerability to sea-level rise, and massive financial costs for suppression. In low-elevation peatlands, the extensive network of ditches also allow the wind-tide-driven systems to jet brackish water much further into the interior resulting in accelerated shoreline erosion and peat decay. Restoring the hydrology is a fundamental climate change adaptation strategy as it allows the soil to reaccumulate by preventing incremental (via oxidation) and catastrophic (via burning) soil loss, limits saltwater intrusion, maintains necessary soil moisture and promotes carbon sequestration benefits, and helps mitigate impacts of flooding and storm events. Given the scale of peatland rewetting need, the magnitude of the estimated carbon sequestration benefits, and significant ecosystem co-benefits (FWS 2010), there is an opportunity to expand this type of restoration to other peatlands throughout the United States and globally. Project development is presently limited by the lack of approved methodologies for quantifying the GHG benefits of peatland restoration (CAR 2013), and maybe more importantly, by the relatively limited demand in the voluntary carbon market. To date, there are two peatland rewetting methodologies that have been developed in the voluntary carbon market under the Verified Carbon Standard and that are currently in the process of independent validation (Winrock Int’l 2011; Silvestrum 2011). One of these methodologies is globally applicable and can be applied using local or regionally appropriate research data on GHG emission relationships with proxy variables such as water levels or vegetation (Silvestrum 2011). While this methodology lays out a practical and robust approach to measuring GHG emissions, there is limited experience with applying it to proof-of-concept projects (e.g., no projects have been advanced in the United States to date). These projects are critical to demonstrating the technical feasibility of peatland rewetting methodologies to regulatory agencies such as the California Air Resources Board (CARB), who could in turn approve peatland carbon offsets for use in California’s GHG cap-and-trade program and create a more robust compliance market demand to support investment in peatland rewetting efforts

### **2NC – CP Solves Warming**

#### **Peatland restoration is key to prevent accelerating climate change**

Chandler 6/12 – institute writer at MIT (David, 6/12/17, Accessed 7/7/17, “Peatlands, already dwindling, could face further losses”, <http://news.mit.edu/2017/peatlands-already-dwindling-could-face-further-losses-0612>, AD)

Tropical peat swamp forests, which once occupied large swaths of Southeast Asia and other areas, provided a significant “sink” that helped remove carbon dioxide from the atmosphere. But such forests have been disappearing fast due to clear-cutting and drainage projects making way for plantations. Now, research shows peatlands face another threat, as climate change alters rainfall patterns, potentially destroying even forested peatlands that remain undrained. The net result is that these former carbon sinks, which have taken greenhouse gases out of the atmosphere, are now net carbon sources, instead accelerating the planet’s warming. The findings are described this week in the journal Proceedings of the National Academy of Sciences, in a paper by MIT Professor Charles Harvey, research scientist Alexander Cobb, and seven others at MIT and other institutions. “There is a tremendous amount of peatland in Southeast Asia, but almost all of it has been deforested,” says Harvey, who is a professor of civil and environmental engineering and has been doing research on that region for several years. Once deforested and drained, the peatland dries out, and the organic (carbon-containing) soil oxidizes and returns to the atmosphere. Sometimes the exposed peat can actually catch fire and burn for extended periods, causing massive clouds of air pollution. Tropical peatlands may contain as much carbon as the amount consumed in nearly a decade of global fossil fuel use, and raging peat fires in Indonesia alone have been estimated in some years to contribute 10 to 40 percent as much greenhouse gas to the atmosphere as all the world’s fossil fuel burning. Tropical peatlands, unlike those in temperate zones that are dominated by sphagnum moss, are forested with trees that can tower to 150 feet, and peat fires can sometimes ignite forest fires that consume these as well. (Peat that gets buried and compressed underground is the material that ultimately turns to coal). A team of researchers from MIT, Singapore, and Brunei has located what might be the last undisturbed peat swamp forest in Southeast Asia, on the island of Borneo. Colin Harvey Harvey and his team have found one of the last undisturbed tropical peat forests, in the nation of Brunei on the island of Borneo. “We found this site that still has peat growing,” he says, partly because that petroleum-rich nation has been able to resist the economic draw of the palm-oil market. “It is remarkable how much the peat forests are just gone everywhere else.” By studying this undisturbed tract, he says, the researchers were able to see how peatlands function under normal conditions, to provide a baseline for better understanding as the lands change. “The long-term motivator for this work,” he says, is that “if we could understand how these peat forests actually accumulate peat, maybe we could preserve some of them or regenerate peat forest on damaged land.” In order to get accurate ongoing measurements of conditions in the peatland, from the water table on up to the forest canopy, the team built an observation tower by taking sections of old, kilometer-long oil pipeline and pounding them vertically deep into the soft ground. Getting into the site from the coast to collect data and maintain the facility required a long boat trip along a crocodile-inhabited river followed by an hours-long trek through the forest. When peatland forests are cut down and drained, the water table in the area drops. But most of these peatlands, Harvey says, “are pretty close to sea level. By midcentury, that land may be lost” due to sea-level rise. Encroachment of saltwater into peatland that had formerly been saturated with freshwater could kill off trees and other vegetation. In addition, changes in rainfall patterns that may occur as a result of climate change — with rainfall more concentrated in rainy and dry seasons rather than evenly distributed — could kill off many of the trees that dominate these lands. The study revealed significant aspects of the way peatlands form and grow that could be important for evaluating future effects of climate change or land-use changes. For example, they found that the peat forms domes whose growth is greatest at the center and tapers off toward the edges. That means that if measurements of peat accumulation were taken near the center and used to extrapolate an overall accumulation rate, that could result in a severe overestimate of that area’s ability to sequester greenhouse gases. The team obtained these results by constructing a quantitative model for the balance of carbon uptake (due to photosynthesis) and carbon loss (due to microbial respiration of the peat soil). When these fluxes are balanced, the peatland is at equilibrium, neither growing nor subsiding. Photosynthetic productivity of peat swamp forests is relatively constant, but the net loss of carbon from the underlying peat depends strongly on the depth of the water table, which rises and falls with rainfall and discharge from the peatland into rivers. The new study describes how peatlands evolve toward a specific dome-shaped topography that sheds water to rivers at a rate such that the carbon loss matches the carbon uptake, and the peatland reaches a stable shape. This particular peat forest, Harvey says, has an upper canopy made up almost entirely of one species of 150-foot trees, known as Shorea albida, with other species about half that height making up a second, lower canopy. Those trees bore seeds two years ago, he says, but nobody knows how often they do so, and some species can go multiple decades between seed-producing years, so there’s no way to know how long it may take for these peatlands to expand or regenerate. “This is a very important paper,” says Nigel Roulet, a professor of biogeoscience and chair of the Department of Geography at McGill University in Montreal, who was not involved in this work. “It’s a paper that will help with the development of management strategies for one of the last great carbon deposits in the world that we want to keep out of the atmosphere.” Roulet points out that “one-third of all the carbon that has gone into the atmosphere since the 1700s is from land-use change,” at locations including these tropical peat lands, which contain “so much carbon that it’s globally significant.” Figuring out how to restore such tropical peatlands, which requires understanding how they form and grow, is key to trying to reverse some of these changes, he says. The research team included graduate student Alison Hoyt at MIT, Laure Gandois at the University of Toulouse, Jangarun Erl of the Forestry Department in Brunei, Rene Dommain of the Smithsonian Institution in Washington, Kamariah Abu Salim of the University of Brunei Darussalam, Fuu Ming Kai of the Center for Environmental Sensing and Modeling of the Singapore-MIT Alliance for Research and Technology (where lead-author Cobb is now based), and Hur Sallah Haji Su’ut of the Brunei Darussalam Heart of Borneo Center. The work was supported the National Research Foundation Singapore through the Singapore-MIT Alliance for Research and Technology, the Environmental Solutions Initiative at MIT, and the National Science Foundation.

#### **Peatlands solve warming through natural carbon capture and storage – counterplan is key to effective restoration**

RSPB 11 – Royal Society for the Protection of Birds (June 2011, Accessed 7/7/17, “Realising the Benefits of Peatlands; Overcoming policy barriers to peatland restoration”, <https://www.rspb.org.uk/Images/Microsoft%20Word%20-%20Realising%20the%20benefits%20of%20peatlands_tcm9-282611.pdf>, AD)

Peatlands have the potential to be a natural solution to reducing greenhouse gas emissions. They hold a vast stock of carbon in their soils and can add more by sequestering carbon from the atmosphere. But this natural carbon capture and storage ability can only happen if peatland habitats are healthy and functioning. To get to that state many areas of degraded and damaged peatland, which are currently losing carbon, need to be restored. RSPB Scotland has called for peatland restoration1 for many years, recognising them as a fantastic habitat for some of our rarest wildlife. More recently, the value of peatlands as a store and sink for carbon has been acknowledged. It is widely accepted that peatlands are a huge store of carbon. This store needs to be protected to help limit climate change and thus benefit people in Scotland and the world. Research into the carbon benefits of restoration techniques is no longer in its infancy and the consensus is that restoration is beneficial for the climate. RSPB Scotland and others have been seeking political and financial commitment to turn this knowledge into action. In addition to knowledge, money and political commitment the right policies need to be in place to make restoration happen. There is no single policy in existence which can make restoration happen at the scale needed. Achieving the restoration goal will require existing land use and other policies to work together for the common good. In 2010, the Scottish Government clearly identified policies which support peatland restoration in its Carbon-Rich Soils discussion paper2 . But as the Royal Society of Edinburgh’s report ‘Facing up to Climate Change’3 highlighted, there are barriers in policy which hinder the progress toward coherent approaches to reduce GHG emissions. The Land Use Sector is no exception to this lack of joined up policy to support sustainable land use outcomes. This report reviews the policies and land use practices which influence peatland use and management, and which promote peatland restoration. It identifies where the barriers to restoration are and how these can be overcome to realise their natural carbon capture and storage potential.

### 2NC – AT: Fine Now

#### Excessive land use is destroying peatlands now

RSPB 11 – Royal Society for the Protection of Birds (June 2011, Accessed 7/7/17, “Realising the Benefits of Peatlands; Overcoming policy barriers to peatland restoration”, <https://www.rspb.org.uk/Images/Microsoft%20Word%20-%20Realising%20the%20benefits%20of%20peatlands_tcm9-282611.pdf>, AD)

Peatlands are only able to provide the valuable services which are of importance to human well-being where the habitat is in a functioning and healthy state. However, the use of peatlands by land owners and land managers, for a variety of purposes, has led to damage to the fragile habitat and soil. When peat becomes open, dried and exposed, the vegetation changes and the carbon in the soil oxidises and is lost to the atmosphere – adding to climate change. It also becomes more susceptible to erosion by water and wind. The scale of damage varies, from bare peat soils and deeply eroded gulleys, to heather and cotton grass dominated vegetation, and determines the ease and speed of restoration. Peatland restoration involves creating the right conditions for sphagnum moss to recolonise and thus secure the integrity of the carbon in the soil. Most crucial is rewetting the soil by manipulating the water table. Other activities depend upon the nature of the damage, for example, removing grazing animals or non-natural vegetation, such as trees. On large areas of bare peat the greatest need may be to stabilise and re-vegetate the soil.

### 2NC – AT: Droughts

#### **Restoration minimizes the risk of droughts**

Freeman et al 12 – professor of Wetland Sciences at the University of Wales (Christopher, 8/6/12, Accessed 7/10/17, “Peatland geoengineering: an alternative approach to terrestrial carbon sequestration”, <http://rsta.royalsocietypublishing.org/content/370/1974/4404>, AD)

In recent times, we have become extremely effective at developing approaches to destroy peatland ecosystems (through drainage and fire), so re-releasing their sequestered carbon [21]. There is also a threat to the stability of geoengineered peatlands in the form of droughts [24]. The IPCC Fourth Assessment Report states that ‘it is very likely that areas affected by droughts and warm spells will increase’ [1]. While this must raise some concern about the fate of carbon sequestered in peatlands, there is evidence that phenolics can remain active inhibitors even under aerobic conditions [34]. Thus, provided that phenolic supplements are applied in excess, carbon loss during the more aerobic conditions associated with droughts should be minimized.

### 2NC – AT: Alters Ecosystems

#### It’s net better for wildlife and biodiversity

Keane 3/15 – environmental correspondent for BBC (Kevin, 3/15/17, Accessed 7/7/17, “Peatland restoration plan to cut climate change gas emission”, <http://www.bbc.com/news/uk-scotland-39276964>, AD)

Landowner Emma Paterson said: "One did think, well, that sounds very odd because back in the 70s my mother got grants to do a lot of draining and this seemed to be going completely the opposite way. "Thinking on it, it's going to benefit wildlife and make the habitat better with better grazing for animals." The work on the Auchlyne and Suie estate is costing £49,000 and was organised by the Loch Lomond and the Trossachs National Park. The park's land manager, Harriet Donald, said: "You've got a lot of vegetation on the top (of healthy peatland) so basically at the moment you're losing any species, invertebrates, bird species that use that vegetation. "So once that comes back in, you're creating an active, healthy peatland which will benefit all manner of biodiversity." Environment Secretary Roseanna Cunningham said: "Restoring our peatlands and taking advantage of their value as a natural resource is crucial if we are to continue to build on our world leading low carbon ambitions, and reduce emissions by 66% by 2032. "By increasing our investment more communities will be able to transform and use peatlands as an open space, regenerating it as a habitat for wildlife and reducing greenhouse gas emissions."

#### **Natural phenolic compounds prevent ecosystem alterations**

Freeman et al 12 – professor of Wetland Sciences at the University of Wales (Christopher, 8/6/12, Accessed 7/10/17, “Peatland geoengineering: an alternative approach to terrestrial carbon sequestration”, <http://rsta.royalsocietypublishing.org/content/370/1974/4404>, AD)

Peatland geoengineering may be highly controversial in pristine ecosystems because, for example, it may alter natural pH gradients and a large part of peatland biodiversity is dependent on pH gradients. However, the addition of natural phenolic compounds or edaphic manipulation to acidify the system by natural mechanisms could preserve pH gradients and therefore biodiversity, while further slowing decay. Moreover, this could be highly valuable in protecting ‘pristine’ peatlands from haemorrhaging carbon during and after severe drought [84]. Furthermore, one could argue that pristine systems do not exist any more, given that (i) all are now bathed in high CO2 [85] and (ii) many are either enriched with nutrients or recovering from SO4 deposition

### 2NC – AT: Methane Emissions

#### **The enzymic latch ensures constrained methane emissions**

Freeman et al 12 – professor of Wetland Sciences at the University of Wales (Christopher, 8/6/12, Accessed 7/10/17, “Peatland geoengineering: an alternative approach to terrestrial carbon sequestration”, <http://rsta.royalsocietypublishing.org/content/370/1974/4404>, AD)

A further source of potential risk lies in the fact that, by expanding peatland abundance, we are encouraging an ecosystem that contributes 20 per cent to total annual emissions of methane, the largest natural source of a greenhouse gas with 25 times greater warming potential than CO2 [1]. We acknowledge that it will be essential to ensure that any applied enzymic-latch-mediated enhancement of carbon sequestration does not add to the atmospheric burden of methane. Fortunately, by suppressing enzymic generation of labile low-molecular-weight substrates, the enzymic latch has the potential to constrain methane emissions in the same way that it suppresses CO2 emissions.

## PGS CP

### **1NC – CP V.1.**

#### **Text: The Department of Defense should**

#### Produce an unclassified policy statement on the specific missions for which PGS weapons might be acquired

#### Conduct classified studies into the implications of adversary countermeasures

#### Conduct a comprehensive examination of gaps in enabling capabilities and develop plans to fill those gaps

#### Produce an unclassified report on the escalation risks of PGS weapons and possible ways of mitigating them

#### **Solves prompt global strike capabilities**

Acton 15 - co-director of the Nuclear Policy Program and a senior fellow at the Carnegie Endowment for International Peace (James M., 12/08/15, Accessed 6/1/17, “Prompt Global Strike: American and Foreign Developments”, <http://carnegieendowment.org/2015/12/08/prompt-global-strike-american-and-foreign-developments-pub-62212>, AD)

I will not even try to offer any definitive conclusion about whether the United States ought to acquire CPGS weapons; as I said at the start of my testimony, I am genuinely undecided. However, I do believe that a course correction is required if the program is to live up to its full potential and, perhaps even more importantly, if Congress is to be able to assess the scale of that potential. To date, the CPGS program has focused too narrowly on technology development; there has been an apparent failure to give proper attention to the role of CPGS weapons—and potential alternatives—in national strategy. To this end, I would like to conclude by offering some suggestions for how the Department of Defense might improve its process for developing CPGS weapons. The Department of Defense could produce an unclassified policy statement on the specific missions for which CPGS weapons might be acquired. The Department of Defense could conduct classified studies into the implications of possible adversary countermeasures over the next two or three decades for CPGS weapons, including a comparison of the effect of such countermeasures on non-prompt alternatives. The Department of Defense could conduct a comparative study of CPGS weapons and non-prompt alternatives in terms of their ability to hold mobile targets, and hard and deeply buried targets at risk; their relative unit cost; and their capability to successfully prosecute each of the missions for which the Department is considering acquiring CPGS weapons. The Department of Defense could conduct a comprehensive and dedicated examination of gaps in enabling capabilities; and develop plans, with cost estimates, to fill these gaps. The Department of Defense could produce an unclassified report on (i) the escalation risks of CPGS weapons, including but not limited to warhead ambiguity; and (ii) possible ways of mitigating them, including cooperative approaches.

### **1NC – CP V.2.**

#### Text: The United States Federal Government should permit the Department of Defense to develop and deploy Prompt Global Strike systems and provide necessary funding

#### **PGS is key to deter any adversary – Congress also supports it**

Woolf 16 (Amy, policy specialist in nuclear weapon policy, 2/24/16, Accessed 7/1/17, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues”, <https://fas.org/sgp/crs/nuke/R41464.pdf>, AD)

Conventional prompt global strike (CPGS) weapons would allow the United States to strike targets anywhere on Earth in as little as an hour. This capability may bolster U.S. efforts to deter and defeat adversaries by allowing the United States to attack high-value targets or “fleeting targets” at the start of or during a conflict. Congress has generally supported the PGS mission, but it has restricted funding and suggested some changes in funding for specific programs.

### **1NC – Solves Heg/Military Readiness**

#### **PGS capabilities are key to military responses and global power projection**

Woolf 2/3 - policy specialist in nuclear weapon policy (Amy, 2/3/17, Accessed 6/27/17, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues”, <https://fas.org/sgp/crs/nuke/R41464.pdf>, p. 2-4, AD)

Throughout the Cold War, the United States maintained military bases overseas so that it could position its troops to deter, and if necessary, respond promptly to an attack from the Soviet Union or its allies. These forward bases were located, for the most part, in Europe and Asia—regions where conflict seemed most likely to occur. These overseas bases and forces were believed not only to increase preparedness, but also to deter conflict by their very presence in unstable regions. However, with the demise of the Soviet Union and the end of the Cold War, analysts argued that the United States must be prepared to fight in unexpected areas against a wide range of potential adversaries who may possess a great variety of military capabilities. Although the United States continues to deploy its military forces at bases around the world, it has begun to restructure, and, in many cases, reduce, its forces based overseas. It has also sought to improve its ability to move military forces into a region quickly when and if a conflict occurs. Moreover, as some observers have noted, the United States can no longer be certain that these bases are located close to the most likely areas of conflict. As a result, many analysts and military officials have argued that the United States must maintain and enhance its long-range strike capability so that it can strike anywhere in the world with forces that are based in or near the United States,3 or with forces that have the range to reach targets across the globe from wherever they are deployed. This would not only allow the United States to pursue an adversary without relying on forward bases, it would also allow the United States to reach targets deep inside an enemy’s territory if that area were out of the range of U.S. forces deployed at bases or on naval forces in the region. Moreover, if an adversary developed air defenses or other capabilities that could deny U.S. aircraft access to critical targets, a long-range strike capability based on ballistic missile technologies could prove valuable if launched early, as a “leading-edge” capability that degraded an opponent’s defenses. Analysts argue that these types of systems would be far less sensitive to an adversary’s anti-access and area denial (A2AD) efforts. Further, some analysts argue that the United States must be able to attack targets across the globe in a matter of hours or less, either at the start of a conflict or during ongoing operations. This is because U.S. adversaries might adapt to the U.S. precision-strike capability by denying targeting information with concealment techniques or mobility, leaving the United States with little time to attack after it identified relevant targets. Moreover, many have noted that adversaries could seek to protect their assets by deploying them in buried or hardened facilities, leading to a requirement for improvements in the U.S. ability to defeat hardened and deeply buried targets promptly, before the adversary employed the hidden capabilities. The need for prompt long-range, or global, strike capabilities has been addressed in general defense policy studies, such as the 2001, 2006, and 2010 Quadrennial Defense Review (QDR) Reports. The 2001 QDR noted that the U.S. defense strategy “rests on the assumption that U.S. forces have the ability to project power worldwide.”4 The 2006 QDR expanded on the need for prompt global strike capabilities, noting that they would provide the United States with the ability “to attack fixed, hard and deeply buried, mobile and re-locatable targets with improved accuracy anywhere in the world promptly upon the President’s order.” This QDR went on to call for the deployment of a prompt global strike capability, using Trident submarine-based ballistic missiles armed with conventional warheads, within two to four years.5 The 2010 QDR also noted that “enhanced long-range strike capabilities are one means of countering growing threats to forward deployed forces and bases and ensuring U.S. power projection capabilities.” It noted that DOD is pursuing a number of programs to meet this need, and, as a part of this effort, “plans to experiment with conventional prompt global strike prototypes.”6 DOD has also addressed the prompt global strike mission in specific reports on Air Force doctrine, which have noted that “rapid power projection based in the continental United States has become the predominant military strategy.” In May 2003, the Air Force issued a formal Mission Need Statement for the Prompt Global Strike (PGS) Mission. This statement indicated that the United States should be able to strike globally and rapidly with joint conventional forces against high-payoff targets, that the United States should be able to plan and execute these attacks in a matter of minutes or hours—as opposed to the days or weeks needed for planning and execution with existing forces—and that it should be able to execute these attacks even when it had no permanent military presence in the region where the conflict would occur.7 Officials in the Bush Administration viewed the prompt global strike mission as a means to extend the U.S. capability to address global contingencies that could threaten U.S. security and U.S. interests. For example, Admiral James O. Ellis, the commander of U.S. Strategic Command (STRATCOM) from 2002 to 2004, explained that PGS would “provide a wider range of options to the President in responding to time-critical global challenges.”8 General James Cartwright, who served as commander of STRATCOM between 2004 and 2007, defined the global strike mission by stating that “it provides to the nation the ability to rapidly plan and rapidly deliver effect any place on the globe.” The capability would not necessarily be nuclear, and a regional combatant commander could “tailor it for his target and deliver it very quickly, with very short time lines on the planning and delivery, any place on the face of the Earth.” General Cartwright also emphasized that the global strike capability involved much more than just the delivery of a weapon to a target, stating that “it encompasses both the ability to plan rapidly, to apply the precision to the intelligence and gather that intelligence in a very rapid manner, and then to apply that intelligence to the target and understand the effect we want to create.”9 The intelligence requirements for the PGS mission could, however, prove quite demanding. General Michael Hayden, then the CIA director, noted in mid-2007 that the PGS mission will require “very convincing intelligence” before any attacks occur.10 He stated “If you are going to strike suddenly ... it has to be based on very powerful, very convincing intelligence.” In addition, the intelligence may need to be released to the public, to demonstrate both the military need and time restraints that made the attack necessary. Moreover, most analysts agree that the United States does not yet have the capability to meet the intelligence demands of the PGS mission. The Obama Administration’s description of the prompt global strike mission focuses more on regional than global challenges. As was noted above, the 2010 QDR described the PGS mission as one possible means to address “growing threats to forward-deployed forces and bases and ensuring U.S. power projection capabilities.” The 2010 Nuclear Posture Review similarly viewed PGS as an important component of U.S. regional deterrence capabilities when it noted that “these capabilities may be particularly valuable for the defeat of time-urgent regional threats.

### 1NC – Solves Terrorism

#### **Developing strong PGS is key to deter the threat of terrorism**

Acton 13 - co-director of the Nuclear Policy Program and a senior fellow at the Carnegie Endowment for International Peace (James M., Accessed 7/3/17, “Silver Bullet? Asking the Right Questions about Conventional Global Strike”, <http://carnegieendowment.org/files/cpgs.pdf>, AD)

During the Cold War and the 1990s, conventional ballistic missiles were not considered for use against nonstate actors. The terrorist attacks of September 11, 2001, however, influenced U.S. defense thinking in many areas, including about potential roles for long-range conventional strike weapons. For example, the 2008 report on CPGS by the National Research Council (NRC) of the U.S. National Academies and Defense Science Board studies in 2004 and 2009, along with other notable reports on strategic strike, have connected counterterrorism missions with hypersonic long-range conventional capabilities.The archetypal scenario invoked for the use of CPGS weapons against nonstate actors is a meeting of terrorist leaders. The NRC advances two reasons why long-range hypersonic weapons might be needed in this scenario.47 First, it argues that, since the exact time and place of the meeting may not be known until the last minute, the United States might have very little time to plan and execute an attack, placing a premium on weapon speed. Second, it argues that if the United States conducts the attack with non-prompt weapons, such as cruise missiles, the target could be forewarned in the time taken for the weapon to arrive. To illustrate this point, it gives the example of a failed 1998 cruise missile attack against Osama bin Laden in Afghanistan. The National Research Council cites a source that argues that the Pakistani Navy may have detected the missiles in flight, resulting in a warning that reached the intended target beforehand.48 Other analyses have disputed this version of events, arguing that bin Laden probably decided to skip the meeting days beforehand after an associate of his was arrested.49 This particular attack aside, the general difficulty of killing bin Laden in the late 1990s seems to have influenced thinking within the Bush administration about the potential value of CPGS more broadly. In 2006, for instance, in justifying the need for CPGS at a hearing of the Senate Armed Services Committee, Flory pointed to “the difficulty that President Clinton and his people had dealing with the Osama bin Laden threat,” and the way that their efforts were beset by “concerns about boots on the ground, concerns about basing access, concerns about overflight, concerns about timing.”50 He argued that the Conventional Trident Modification could help fill the “gap” where “traditional options for one reason or the other do not work or do not give [the president] a risk benefit calculation that is acceptable.”51 SILVER BULLET? | ACTON 17 Other counterterrorism scenarios have been advanced as well. The Defense Science Board has considered the possibility of a terrorist group acquiring a “weapon of mass destruction” that is being carried in “a large backpack,” which the United States “has no more than 24–48 hours to attack or capture . . . before it is moved and perhaps lost.”52 And some have argued that CPGS weapons could be useful for interdicting the transport of nuclear material by a terrorist group or the “transfer of WMD from rogue state to terrorists.”53 There is a perception among some legislators and analysts that counterterrorism is the primary purpose of CPGS.54 That perception is almost certainly incorrect. While U.S. officials, particularly during the Bush administration but also during the Obama administration, have certainly mentioned counterterrorism applications of CPGS on multiple occasions, these references have not been as common as mentions of other uses, especially the counternuclear mission. Given that the kind of counterterrorism strikes for which CPGS might be acquired are relatively uncontroversial, at least compared to other potential applications, there is good reason to suppose that the relative scarcity of official public mentions reflects private thinking within the U.S. government.

### 2NC – CP Solves

#### **The counterplan is key to effective implementation of PGS**

Manzo 8 (Vince, CDI Research Assistant, Accessed 7/1/17, “An Examination of the Pentagon’s Prompt Global Strike Program: Rationale, Implementation, and Risks”, <http://www.infodefensa.com/wp-content/uploads/PGSfactsheet%5B1%5D.pdf>, AD)

DOD has identified 1) intelligence collection and dissemination 2) surveillance and reconnaissance 3) command, control, and communications (C3) and 4) battlefield assessment as the enabling capabilities that are necessary to effectively employ a PGS weapons system in support of theater and strategic objectives.17 A 2004 Defense Science Board (DSB) Report on Future Strategic Strike Forces concluded that current “enabling capabilities are not sufficient to fully support the requirements of global strike operations.”18 Given that DOD itself has identified the importance of enabling capabilities for PGS, it is quite disconcerting that four years later the GAO report concluded that: “DOD studies to identify potential offensive strike systems…do not collectively provide a complete assessment of enabling capabilities needed to support global strike operations.”19 This conclusion applies to separate studies being carried out by STRATCOM, the Air Force, Air Force Space Command, the Joint Staff and the Navy, indicating that inadequate focus on enabling capabilities is a systemic problem. To be fair, GAO noted that several of the studies examine enabling capabilities, but on too limited of a scale. For example, GAO also noted the two teams conducting the Air Force PGS Analysis of Alternatives have thus far simply assumed that “certain needed improvements in enabling capabilities…would be available when any future system is fielded.”20 The failure to include comprehensive assessments of enabling capabilities in PGS weapons development studies is problematic for two reasons. First, DOD may spend billions of dollars on PGS only to have it rendered impotent because STRATCOM lacks the intelligence and C3 capabilities to utilize its main advantages: target-impact speed and global reach. Secondly, if DOD incorporates a functional PGS weapon system into joint doctrine but neglects to develop the commensurate enabling capabilities, U.S. authorities may believe that they have a capability that does not actually exist. Such a situation would leave the United States more vulnerable in certain situations. For example, in the event of an imminent attack against the United States, senior decisionmakers may adopt a response that hinges on a PGS that is unlikely to achieve its desired effect. Additionally, executing a PGS without sufficient intelligence or C3 capabilities will increase the probability of an errant strike, similar to the inadvertent NATO bombing of the Chinese Embassy in Yugoslavia in 1999, which could carry serious political consequences. DOD’s systemic neglect of intelligence-gathering capabilities is perhaps the most troubling finding in the GAO report. Effective and reliable intelligence is a critical component of a PGS capability. As GAO explained, intelligence operations will serve four key functions in a PGS: monitor and integrate intelligence to analyze adversary intentions, locate and identify the target, track the target until desired effect is achieved, and assess the battlefield post-strike.21 Cartwright has listed rapid intelligence collection, integration and analysis as a distinguishing feature of the PGS concept: “[I]t encompasses both the ability to plan rapidly, to apply the precision to the intelligence and gather intelligence in a very rapid manner, and then to apply that intelligence to the target and understand the effect we want to create.”22 As GAO and Cartwright both made clear, a PGS weapons system is only one half of the equation; the corresponding intelligence capability must also exist in order to create an effective PGS capability.

### 2NC – AT: Escalates

#### **Conventional PGS weapons are comparatively better for deterrence**

Sugden 9 – defense analyst based in Washington, D.C. (Bruce M., Accessed 7/8/17, “Analyzing the Deployment of Conventional Ballistic Missiles”, <https://muse.jhu.edu/article/269966#back>, AD)

The second rationale for CBMs in an expanded mission is that a wider array of conventional strike options will allow the United States to avoid crossing the nuclear threshold; they will provide usable tools for escalation that are proportionate to the threat that needs to be deterred or defeated. In contrast, the use of nuclear weapons against most anticipated non-WMD threats is deemed disproportionate. Using nuclear weapons, even against WMD targets, will engender a host of undesired political consequences.21 Therefore, the threat to launch a conventional strike would be more credible, which is conducive to managing the escalation of the use of force below the nuclear threshold and to ensuring the success of deterrence. This line of thinking echoes the Cold War doctrine of flexible response, wherein the United States and its allies were prepared to fight at all levels of war to deter the Soviet Union from all forms of military aggression.22 A U.S. Department of Defense official, for example, declared in a 2002 briefing on the Nuclear Posture Review that “the non-nuclear strike forces, we believe, have the potential, if fully exploited, fully developed, to reduce our dependency on nuclear forces for the offensive-strike leg.”23

#### No risk of miscalc – CBMs and weapon rapidness deter conflict

Azarjew 14 – research intern for the Project on Nuclear Issues (Daria, 1/17/14, Accessed 7/7/17, “Blurred Lines: The Threat of Conventional Prompt Global Strike to Strategic Stability”, <http://poniforum.csis.org/blog/blurred-lines-the-threat-of-conventional-prompt-global-strike-to->, AD)

Advocates of Conventional Prompt Global Strike underline the opportunity to enhance deterrence with such capabilities. Certainly, such a weapon’s rapidness and ability to hold at risk fleeting targets may threaten an adversary sufficiently enough to deter actions that infringe upon U.S. interests. The 2008 National Research Council Report on CPGS argued that “there would be important political and strategic advantages to the United States being able to strike high-value targets having time-sensitive urgency that could not be effectively engaged by currently available conventional strike systems.” The NRC acknowledged the risk of ambiguity but concluded that these risks “would be manageable” and should not impede further development of the capability. The NRC’s report views other nations as “unlikely to misinterpret” a CPGS launch as a nuclear attack, and argues that confidence building measures could reduce the tension with Russia and China. Indeed, some aspects of Prompt Global Strike would provide the United States with the vital ability to deal with critical asymmetric threats related to terrorism and WMD proliferation. Other aspects of the capability, such as its promptness, would also work towards strengthening U.S. deterrence.

### 2NC – AT: Squo Solves

#### PGS capabilities are falling short of the current security environment – the counterplan is key

Sugden 9 – defense analyst based in Washington, D.C. (Bruce M., Accessed 7/8/17, “Analyzing the Deployment of Conventional Ballistic Missiles”, <https://muse.jhu.edu/article/269966#back>, AD)

The near-term PGS mission is intended to defeat emerging, time-sensitive, soft targets, such as exposed WMD launchers, terrorist leaders, and sites of state transfers of WMD to terrorists or other states within roughly one hour of a decision to attack.13 These targets may appear during any period in peacetime [End Page 117] and wartime when U.S. forces are unavailable in the vicinity or are otherwise committed. Both the 1998 cruise missile strikes against al-Qaida’s Tarnak Farm and other camps in eastern Afghanistan, which failed to kill al-Qaida’s leadership, and the opening F-117 air attack in Operation Iraqi Freedom on March 19, 2003,14 which destroyed a bunker where Iraqi President Saddam Hussein was thought to be located, underscore the importance of coupling prompt weapons delivery vehicles to accurate, actionable intelligence to hold time-sensitive targets at risk.15 The National Research Council conducted a study on the mission requirements for using CTM and alternative systems as PGS weapons systems. Its final report stated that there is a PGS capability gap, wherein U.S. nonnuclear strike capabilities fall short of those required for the current and projected security environments. The gap is illustrated by credible scenarios where two independent conditions for employing CBMs might exist: U.S. manned or unmanned aircraft are not deployed close enough to the targets to enable prompt attack; or enemy air defenses are strong enough to jeopardize the success of a mission carried out by aircraft.16 Even if U.S. long-range bombers were deployed to Guam or Diego Garcia, for example, it could take up to ten to twenty hours of flight time to reach distant targets.17 Because CBMs could hit distant targets from bases in the continental United States within a one-hour time period, proponents argue they are the ideal PGS weapons system.

#### **CP key to overcome tech barriers and lack of investment**

Brustlein 15 – head of security studies at the French institute of International Relations (Corentin, January 2015, “Conventionalizing Deterrence? U.S. Prompt Strike Programs and Their Limits”, https://www.academia.edu/10199060/Conventionalizing\_Deterrence\_U.S.\_Prompt\_Strike\_Programs\_and\_Their\_Limits, AD)

Development of CPGS capabilities has run into a series of budgetary, political and technological barriers which have mutually reinforced each other. Taken together, they help understand why progress has until now been extremely limited. These factors combined have pushed back the perspective of deploying an operational capability to the end of the decade at least 40 . In the first place, most U.S. projects suffer from their reliance on technologies that are not yet mature, particularly when relying on HGVs (scramjet propulsion is another example). The requirements laid down by the Pentagon for the planned systems – strike any target on the earth with metric precision in less than one hour – are extremely ambitious. Because Congress had ruled out the only option based on relatively proven technologies (CTM program), any CPGS system development first required key advances in mastering hypersonic flight. In theory, only a hypersonic glide vehicle could combine global range, short flight time and sufficient precision, while reducing the nuclear ambiguity problem thanks to its maneuverability during the intermediate phase of flight. However, in concrete terms, achieving a mature design for a HGV with global range poses numerous difficulties, either revealed during HTV-2 testing or anticipated in the longer term: the conditions for stable gliding flight at hypersonic speeds are still poorly understood; test costs are prohibitive, and reproducing hypersonic flight conditions in an experimental environment is both difficult and expensive; shielding the payload from the extreme heat generated by high-speed endoatmospheric flight constitutes a tremendous challenge;  current precision guidance systems seem inadequate for use with a HGV: the GPS signal could be disrupted by the plasma generated by atmospheric heating, while inertial measurement units would lack precision considering the extreme speed of both the vehicle and payload To know whether these obstacles could be overcome and explore the different potential technical options, large R&D investments sustained in the long term would be needed . However, this kind of investments has not taken place. The first phase of significant investments was planned in 2007 and was to fund the CTM program on which the administration had pinned its hopes. After Congress abruptly blocked credits due to the payload ambiguity problem, investment slightly increased in the following year, but remained at a limited level since then. As of today, the conventional prompt strike budget has never reached 200 million dollars – which, though non-negligible, is still extremely modest in comparison with the U.S. R&D budget (see Figure 1.)

### 2NC – AT: Prolif

#### **Developing domestic conventional strike capabilities spills over to global disarmament**

Futter and Zala 13 – professor of International Politics at the University of Leicester; research fellow in the department of International Relations at ANU (Andrew and Benjamin, 2/26/13, Accessed 7/16/17, “ADVANCED US CONVENTIONAL WEAPONS AND NUCLEAR DISARMAMENT”, <http://www.tandfonline.com/doi/abs/10.1080/10736700.2012.761790>, AD)

Since taking office, President Barack Obama has appeared determined to reduce the salience and centrality of nuclear weapons in US defense posture, at least in part to help facilitate the achievement of a nuclear weapon-free world. A fundamental, but often overlooked, component of this plan (in relation to the US defense posture) is the gradual attempt to place a far greater reliance upon advanced conventional weaponry in US national security thinking as well as practice, specifically through a larger role for ballistic missile defenses, advanced conventional strike programs, and sophisticated command, control, and monitoring capabilities.1 By doing this, the administration hopes to foster the domestic conditions favorable for further US nuclear reductions\*thereby reigniting the push towards nuclear abolition internationally\*while at the same time placating domestic global zero skeptics worried about a weakening of US security and the US global role. For the Obama administration, an increased role for advanced conventional weapons will allow for further US nuclear reductions, signaling to other nuclear powers an intent to eventually disarm. In this regard, the shift toward a greater role for advanced conventional weaponry may seem logical, both to increase the possibility of further nuclear reductions, and as a prudent response to the fluid requirements of US security.

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## AT: CDC

### 2AC – CDC Not Key

#### **Funding CDC won’t resolve disease crises – local administrations are essential to resolve pandemics**

Yong 16 – staff writer at the Atlantic (Ed, 12/20/16, Accessed 7/22/17, “How a Pandemic Might Play Out Under Trump”, <https://www.theatlantic.com/science/archive/2016/12/outbreaks-trump-disease-epidemic-ebola/511127/>, AD)

Should an outbreak breach America’s borders (or begin within them), the nation’s response will be determined by more than just Trump. His nominated Secretary of Health and Human Services, Tom Price, has experience in orthopedic surgery, but not infectious disease. His objections to the Affordable Care Act are well-documented, but his stance on public health is not. And other key appointees, like the directors of the CDC, NIH, and USAID, haven’t been named yet. Still, such agencies have experienced staff and institutional memories that persist beyond administrations. They can go about the business of identifying threats, tracing paths of transmission, and saving lives, without much political input. And even though federal agencies “are very important in providing centralized guidance, the real boots-on-the-ground work often happens at the level of state, county, and city health departments,” says Jill DeBoer, deputy director of the Center for Infectious Disease Research and Policy. That was certainly the case when the Ebola outbreak reached Dallas in September 2014. It wasn’t the CDC that saved the day, but a county judge, county epidemiologists, and other local health officials. To an extent, the experience that pools at the base of the medical hierarchy can compensate for any instability at the top. Even so, the early months of a new administration are uniquely vulnerable. Consider the bio-terror attacks of September 2001, when anthrax-laced letters were mailed to offices in the wake of the World Trade Center collapse. Tommy Thompson had been HHS Secretary for just eight months, and “didn’t seem to trust the career part of the government,” says Lynn Goldman, Dean of the Milken Institute School of Public Health at George Washington University. “He didn’t trust the experts in government to talk to the public.” People heard wrong or confusing pronouncements, while postal workers didn’t get guidelines on protecting themselves. “This kind of communication issue often happens during the transition,” Goldman says. She blames the frequent lags in appointing the middle-level deputies and assistant secretaries who connect newcomers at the top of the government with experienced health workers at the bottom. Expertise needs to flow quickly in an outbreak; in a transition, its channels are often dammed or diverted. Even when the system works, it does so imperfectly. “There’s been some progress in our preparedness but we’re very far from where we need to be, especially in our ability to deal with biodefense threats,” says Pardis Sabeti. She envisages a worldwide network that regularly uses genetic sequencing to test for dangerous microbes, better standards for coordinating a global response, and pipelines for quickly developing effective diagnostic tests. “We need something that moves at light speed, and we don’t have it.”

## AT: Climeworks

### 2AC – PDB

#### **Perm do both**

Lant 6/1 - adjunct professor at Arizona University and journalist for Futurism (Karla, 6/1/17, Accessed 6/29/17, “A Plant 1,000 Times More Efficient at CO2 Removal Than Photosynthesis Is Now Active”, <https://futurism.com/a-plant-1000-times-more-efficient-at-co2-removal-than-photosynthesis-is-now-active/>, AD)

Other innovative efforts to reduce global CO2 levels are already underway all over the world. Researchers at the University of California, Los Angeles (UCLA), have found a way to turn captured carbon into concrete for building, while scientists from Rice University have found that doping graphene with nitrogen allows it to convert CO2 into environmentally useful fuels. If enacted, various proposals to preserve wetlands, old growth forests, and other areas could also reduce CO2 levels. Climeworks’ plant is particularly appealing because it can be used repeatedly, produces something commercially useful, and is about 1,000 times more efficient at CO2 removal than photosynthesis. “You can do this over and over again,” Climeworks director Jan Wurzbacher told Fast Company. “It’s a cyclic process. You saturate with CO2, then you regenerate, saturate, regenerate. You have multiple of these units, and not all of them go in parallel. Some are taking in CO2, some are releasing CO2.” Even so, Field emphasizes that the possibility of carbon capture should not be seen as a license to emit more CO2. We need to combine the technology with a low-carbon economy to ensure our planet’s survival. “It’s not either/or,” according to Field. “It’s both.”

### 2AC – CCS Fails

#### **CCS fails and makes warming worse – empirics**

Greenpeace 16 – independent global environmental campaigning group (7/1/16, Accessed 7/23/17, “Carbon capture and storage a costly, risky distraction”, <http://www.greenpeace.org/international/en/campaigns/climate-change/Solutions/Reject-false-solutions/Reject-carbon-capture--storage/>, AD)

Carbon capture and storage (CCS) at a glance Instead of phasing out dirty energy,[130] the fossil fuel industry suggests burying billions of tonnes of carbon dioxide underground to keep it from warming the planet. Using carbon capture and storage (also called geosequestration or carbon sequestration) technologies, they claim to be able to capture carbon dioxide from power stations and industrial plant smokestacks, funnel it through pipelines, then store it permanently in underground rock formations and aquifers. An unproven and costly technology A major problem with the fossil fuel’s industry plan is that CCS doesn’t work. Only a handful of small-scale demonstration projects are operating. There isn’t a single commercial-scale power plant capturing and storing its emissions. The technology hasn’t advanced much since Greenpeace first assessed it back in 2008. Instead, CCS is floundering. High costs and technical issues have led to a wave of high profile project and program cancellations in recent years, more proof that this technology simply isn’t ready for prime time. Some of the more notable cancellations: Norway cancelled the Mongstad project in 2013 the US government pulled the plug (again) on its FutureGen CCS facility in 2015 major European utilities dropped out of the EU carbon capture platform in 2015 the UK government cancelled its £1 billion taxpayer-funded CCS competition in 2015 and the industry is all but dead in that country. Even projects that have managed to achieve operation, and been heralded as successful, are plagued with problems. The troubled SaskPower coal-fired Boundary Dam project in Canada is just one example. Cracks expose risks of carbon dioxide storage To actually deliver reductions, the emissions captured and injected must stay underground permanently. If leaked back into the atmosphere, they would only make climate change worse and threaten people and animals. Attempts to store carbon dioxide underground have only highlighted the risks. Some examples: In Salah, Algeria: One of the world's few-large scale CCS projects, In Salah [shut down indefinitely in 2011. The reason: injecting carbon dioxide into sandstone caused earthquakes. This cracked the denser overlaying rock (cap rock) that is meant to prevent the carbon dioxide from leaking out. Sleipner, Norwegian North Sea: When scientists studied the seafloor at one of the world's oldest injection sites for carbon dioxide, they found huge fractures in the region the gas was stored, and many potential paths for leakage. They concluded it is likely carbon dioxide would eventually leak from the reservoir where it is now stored. Mississippi, US: An oil company injecting carbon dioxide underground has experienced several well blowouts, which released large amounts of emissions back into the atmosphere. In one incident, the large amount of carbon dioxide released suffocated deer and other animals. As if this wasn't enough, fossil fuel companies are actively lobbying to shift responsibility and liability for storing and monitoring buried emissions to the public. Put simply, carbon dioxide storing is so risky that these polluting industries expect governments to step in and take responsibility for storage sites once they’ve closed. In the event of a leak, the people, not polluters would bear the consequences. CCS is a waste of money Another problem with CCS is the high cost of capturing, liquefying, transporting and burying carbon dioxide emissions. CCS costs at least 40 percent more than solar, 125 percent more than wind, and 260 percent more than geothermal energy for each kilogram of carbon dioxide emissions avoided (per unit of electricity generated). It is also costly in energy terms: carbon capture and storage can cut an existing coal plant’s power output by as much as 40 percent. CCS is such a bad deal industry doesn’t want to pay to make it work. They expect the public to foot the bill. But why should we spend public funds to prop up dirty, dying industries? We simply don't have time or money, especially when this takes investment away from clean, renewable energy and energy efficiency — the true industries of our future.

### 2AC – Water Shortages DA

#### **Expanding Carbon Capture tech doubles water consumption – causes shortages in stressed regions like India and China**

Wynn 13 – market analyst for Reuters (Gerard, 1/28/13, Accessed 7/20/17, “Carbon capture water impact is a concern”, <http://www.arabnews.com/carbon-capture-water-impact-concern>, AD)

LONDON: As well as being extremely costly proposed carbon capture technology could more than double water consumption by conventional coal-fired power plants, adding to reasons for an urgent demonstration program. Carbon capture and storage (CCS) technology is central to cutting carbon emissions from fossil fuel power plants as the only known way to slash these from gas and coal combustion. But no commercial-scale demonstration plant exists in the power generation sector, and just one is under construction at Boundary Dam Power Station in Saskatchewan, Canada. A major problem is the extra capital cost of trapping greenhouse gas emissions, normally vented into the atmosphere, and piping it underground, estimated at about $ 1.5 billion for a medium-sized coal power plant. There are also public acceptance concerns regarding the possibility that the stored CO2 may leak and suffocate people above ground, a risk often discounted by experts. Another potential deal-breaker, and far less discussed, is a so-called water penalty, which is particularly relevant in water-stressed India and China where most new coal plants will be built in the coming decades. Concerns about water availability are growing worldwide in response to rising populations, more frequent heatwaves and ground-water depletion. Ways to mitigate the problem include a parallel support for wind and solar power, which have negligible water consumption. In thermal power generation, a fuel source such as gas, coal or a nuclear reactor is used to boil steam and drive a turbine-generator. Typically, steam exhaust from the turbine is condensed and recycled back to the boiler, repeating the process. That condensation requires significant cooling water, given that more efficient power generation depends on a cooler condensate. A 500 megawatt coal-fired power plant uses more than 12 million gallons of water per hour, according to U.S. Department of Energy data. There is an important distinction between water withdrawal and consumption: withdrawal refers to how much water is diverted for example from a river or the sea, while consumption refers to whether that is then made permanently unavailable for example through evaporation, or else returned to its original source. The two main types of cooling systems are once-through and recirculating. Once-through cooling pulls in water, to cool the steam exhaust, and then returns it to the river or sea. Instead of releasing the water back into the environment, wet recirculating systems pump it to a cooling tower or pond where some evaporates and the rest is condensed and recycled. They have higher consumption and lower withdrawal because of this evaporation and recycling. At present US power generation is split equally between the two but recirculating systems will increasingly dominate because of the 1972 Clean Water Act, with the aim of protecting aquatic creatures sucked into power plants during water withdrawal, a process which does them no good at all. CCS adds to water consumption from coal combustion, according to the technology of the original power plant. In the case of conventional pulverized coal power plants, the CCS process (called post-combustion) uses solvents to absorb the CO2 from the power plant exhaust gases and significantly raises water consumption in two ways. First, the process requires additional water to cool the power plant exhaust gases to below 40 degrees Celsius, as well as to cool the solvent, and then the concentrated CO2 prior to compression and dehydration. "The CDR (carbon dioxide recovery) facility requires a significant amount of cooling water for flue gas cooling, water wash cooling, absorber intercooling, reflux condenser duty, reclaimer cooling, the lean solvent cooler, and CO2 compression interstage cooling," reported a US National Energy Technology Laboratory (NETL) study, published in 2010, "Cost and Performance Baseline for Fossil Energy Plants." Second, the CCS process itself is energy hungry, sapping around a quarter of the power plant output, called "parasitic load" because it cuts net electricity available to the grid. That raises water consumption per unit of exported power.

#### **Shortages go nuclear**

NPR 10 – NPR citing Steven Solomon, author of Water: The Epic Struggle for Wealth, Power, and Civilization that has written for The New York Times, BusinessWeek, The Economist, Forbes, and Esquire (1/3/10, Accessed 7/20/17, “Will The Next War Be Fought Over Water?”, <http://www.npr.org/templates/story/story.php?storyId=122195532>, AD)

Just as wars over oil played a major role in 20th-century history, a new book makes a convincing case that many 21st century conflicts will be fought over water. In Water: The Epic Struggle for Wealth, Power and Civilization, journalist Steven Solomon argues that water is surpassing oil as the world's scarcest critical resource. Only 2.5 percent of the planet's water supply is fresh, Solomon writes, much of which is locked away in glaciers. World water use in the past century grew twice as fast as world population. "We've now reached the limit where that trajectory can no longer continue," Solomon tells NPR's Mary Louise Kelly. "Suddenly we're going to have to find a way to use the existing water resources in a far, far more productive manner than we ever did before, because there's simply not enough." One issue, Solomon says, is that water's cost doesn't reflect its true economic value. While a society's transition from oil may be painful, water is irreplaceable. Yet water costs far less per gallon — and even less than that for some. "In some cases, where there are large political subsidies, largely in agriculture, it does not [cost very much]," Solomon says. "In many cases, irrigated agriculture is getting its water for free. And we in the cities are paying a lot, and industries are also paying an awful lot. That's unfair. It's inefficient to the allocation of water to the most productive economic ends." At the same time, Solomon says, there's an increasing feeling in the world that everyone has a basic right to a minimum 13 gallons of water a day for basic human health. He doesn't necessarily have an issue with that. "I think there's plenty of water in the world, even in the poorest and most water-famished country, for that 13 gallons to be given for free to individuals — and let them pay beyond that," he says. Solomon says the world is divided into water haves and have-nots. China, Egypt and Pakistan are just a few countries facing critical water issues in the 21st century. In his book he writes, "Consider what will happen in water-distressed, nuclear-armed, terrorist-besieged, overpopulated, heavily irrigation dependent and already politically unstable Pakistan when its single water lifeline, the Indus river, loses a third of its flow from the disappearance from its glacial water source."

## AT: ITER

### 2AC – Too Long

#### **ITER takes over a dozen years to be operational and squo solves**

Martin 5/4 – senior energy expert at MIT (Richard, 5/4/16, Accessed 7/20/17, “Why the World’s Largest Nuclear Fusion Project May Never Succeed”, <https://www.technologyreview.com/s/601388/why-the-worlds-largest-nuclear-fusion-project-may-never-succeed/>, AD)

The ITER project reached a critical phase last week, as a panel of experts convened to review the latest revised budget and time line to build the proposed fusion reactor delivered its findings. Launched in 2006, ITER has been plagued with delays and cost overruns as the challenge of bringing six countries—the United States, China, India, Japan, Russia, and South Korea—together with the European Union to build an experimental reactor has proved nearly insurmountable. The latest schedule put forth by the project’s director, French nuclear physicist Bernard Bigot, calls for the machine to be switched on by 2025 and to actually achieve fusion only in 2035—a dozen years later than originally planned. The panel found that timing plausible but said that the latest budget, which would add another €4.6 billion ($5.3 billion) in cost overruns to the project, was unlikely to become available. ITER’s troubles are striking at a time when private-sector fusion companies, such as General Fusion and Tri Alpha Energy, are attracting venture capital funding and making apparent progress in building prototypes (see “Finally, Fusion Takes Small Steps Toward Reality”). Southern California-based Tri Alpha, which has received nearly half a billion dollars in venture funding from a list of investors that includes Goldman Sachs and Vulcan, the investment fund of Microsoft cofounder Paul Allen, said in August that it had successfully confined the cloud of ionized plasma in which the fusion reactions will occur. And General Fusion, which has also received millions in private funding, last month was awarded another $12.75 million from the Canadian government. The next few months will likely determine the fate of ITER. The U.S. Department of Energy is expected this week to release a report on the future of American participation in the project (the Senate has voted more than once to end U.S. funding for ITER, but those measures have died in the House). And ITER’s own governing council will decide in June on how the ambitious but ill-starred project will move forward.

#### **CP takes too long and is net worse for science diplomacy**

Fountain 5/27 – journalist for the New York Times specializing in Climate Change (Henry, 5/27/17, Accessed 7/20/17, “A Dream of Clean Energy at a Very High Price”, <https://www.nytimes.com/2017/03/27/science/fusion-power-plant-iter-france.html>, AD)

There are major technical hurdles in a project where the manufacturing and construction are on the scale of shipbuilding but the parts need to fit with the precision of a fine watch. “It’s a challenge,” said Dr. Bigot, who devotes much of his time to issues related to integrating parts from various countries. “We need to be very sensitive about quality.” Even if the project proceeds smoothly, the goal of “first plasma,” using pure hydrogen that does not undergo fusion, would not be reached for another eight years. A so-called burning plasma, which contains a fraction of an ounce of fusible fuel in the form of two hydrogen isotopes, deuterium and tritium, and can be sustained for perhaps six or seven minutes and release large amounts of energy, would not be achieved until 2035 at the earliest. That is a half century after the subject of cooperating on a fusion project came up at a meeting in Geneva between President Ronald Reagan and the Soviet leader Mikhail S. Gorbachev. A functional commercial fusion power plant would be even further down the road. “Fusion is very hard,” said Riccardo Betti, a researcher at the University of Rochester who has followed the ITER project for years. “Plasma is not your friend. It tries to do everything it can to really displease you.” Fusion is also very expensive. ITER estimates the cost of design and construction at about 20 billion euros (currently about $22 billion). But the actual cost of components may be higher in some of the participating countries, like the United States, because of high labor costs. The eventual total United States contribution, which includes an enormous central electromagnet capable, it is said, of lifting an aircraft carrier, has been estimated at about $4 billion. Despite the recent progress there are still plenty of doubts about ITER, especially in the United States, which left the project for five years at the turn of the century and where funding through the Energy Department has long been a political football. The department confirmed its support for ITER in a report last year and Congress approved $115 million for it. It is unclear, though, how the project will fare in the Trump administration, which has proposed a cut of roughly 20 percent to the department’s Office of Science, which funds basic research including ITER. (The department also funds another long-troubled fusion project, which uses lasers, at Lawrence Livermore National Laboratory in California.) Dr. Bigot met with the new energy secretary, Rick Perry, last week in Washington, and said he found Mr. Perry “very open to listening” about ITER and its long-term goals. “But he has to make some short-term choices” with his budget, Dr. Bigot said. Energy Department press aides did not respond to requests for comment. Some in Congress, including Senator Lamar Alexander, Republican of Tennessee, while lauding Dr. Bigot’s efforts, argue that the project already consumes too much of the Energy Department’s basic research budget of about $5 billion. “I remain concerned that continuing to support the ITER project would come at the expense of other Office of Science priorities that the Department of Energy has said are more important — and that I consider more important,” Mr. Alexander said in a statement. While it is not clear what would happen to the project if the United States withdrew, Dr. Bigot argues that it is in every participating country’s interest to see it through. “You have a chance to know if fusion works or not,” he said. “If you miss this chance, maybe it will never come again.” But even scientists who support ITER are concerned about the impact it has on other research. “People around the country who work on projects that are the scientific basis for fusion are worried that they’re in a no-win situation,” said William Dorland, a physicist at the University of Maryland who is chairman of the plasma science committee of the National Academy of Sciences. “If ITER goes forward, it might eat up all the money. If it doesn’t expand and the U.S. pulls out, it may pull down a lot of good science in the downdraft.” In the ITER tokamak, deuterium and tritium nuclei will fuse to form helium, losing a small amount of mass that is converted into a huge amount of energy. Most of the energy will be carried away by neutrons, which will escape the plasma and strike the walls of the tokamak, producing heat. In a fusion power plant, that heat would be used to make steam to turn a turbine to generate electricity, much as existing power plants do using other sources of heat, like burning coal. ITER’s heat will be dissipated through cooling towers. There is no risk of a runaway reaction and meltdown as with nuclear fission and, while radioactive waste is produced, it is not nearly as long-lived as the spent fuel rods and irradiated components of a fission reactor. To fuse, atomic nuclei must move very fast — they must be extremely hot — to overcome natural repulsive forces and collide. In the sun, the extreme gravitational field does much of the work. Nuclei need to be at a temperature of about 15 million degrees Celsius. In a tokamak, without such a strong gravitational pull, the atoms need to be about 10 times hotter. So enormous amounts of energy are required to heat the plasma, using pulsating magnetic fields and other sources like microwaves. Just a few feet away, on the other hand, the windings of the superconducting electromagnets need to be cooled to a few degrees above absolute zero. Needless to say, the material and technical challenges are extreme. Although all fusion reactors to date have produced less energy than they use, physicists are expecting that ITER will benefit from its larger size, and will produce about 10 times more power than it consumes. But they will face many challenges, chief among them developing the ability to prevent instabilities in the edges of the plasma that can damage the experiment. Even in its early stages of construction, the project seems overwhelmingly complex. Embedded in the concrete surfaces are thousands of steel plates. They seem to be scattered at random throughout the structure, but actually are precisely located. ITER is being built to French nuclear plant standards, which prohibit drilling into concrete. So the plates — eventually about 80,000 of them — are where other components of the structure will be attached as construction progresses. A mistake or two now could wreak havoc a few years down the road, but Dr. Bigot said that in this and other work on ITER, the key to avoiding errors was taking time. “People consider that it’s long,” he said, referring to critics of the project timetable. “But if you want full control of quality, you need time.”

### 2AC – Other Countries AC

#### **US funding alone is insufficient**

Tomlinson 5/14 – business columnist for the Houston Chronicle (Chris, 5/14/17, Accessed 7/20/17, “Fusion fizzling for lack of funding”, <http://www.chron.com/business/columnists/tomlinson/article/Potential-of-fusion-energy-slipping-away-10998236.php>, AD)

AUSTIN - The United States is part of a multinational partnership to build a device in the south of France that could change the trajectory of mankind: the International Thermonuclear Experimental Reactor. The project will cost at least $16 billion before it just might create the Holy Grail of electricity generation: A plasma bottle that can fuse two hydrogen atoms together and produce more energy than it consumes. But the project known as ITER (pronounced EAT-er) is chewing through taxpayer money and politicians' patience now that it's a decade behind schedule. The fate of the world's most expensive science project is the subject of a new documentary film, "Let There Be Light," which premiered at the SXSW Conference and Festivals in Austin. The scientists working on the project are confident that if the sponsoring countries would only provide more funding quicker, their fusion reactor will pave the way for a limitless supply of clean, cheap energy. Holders of the public trust, meanwhile, fear that ITER will be history's most expensive white elephant. Only one thing is certain. If the U.S., Japan, Russia, China, India, South Korea and the European Union don't increase funding, this project and possibly all future fusion research will screech to a halt.

### 2AC – L/ to Politics

#### **CP links to politics – its historically divisive**

Lucibella 14 – staff science writer at the American Physical Society (Michael, September 2014, Accessed 7/20/17, “Congress Divided Over Future of U.S. ITER Contributions”, <https://www.aps.org/publications/apsnews/201409/iter.cfm>, AD)

The U.S. Congress is divided over the future of U.S. contributions to the world’s largest fusion experiment, the International Thermonuclear Experimental Reactor (ITER), located in the south of France. The Senate Appropriations subcommittee on energy and water development voted on June 17 to zero out funding for the troubled ITER project, while the House passed a version of the same bill that would increase its funding. However the president has threatened to veto the House’s bill for other reasons and the Senate has pulled its bill from consideration, leaving the future funding of the U.S. contribution to ITER uncertain. ITER is building a thirty-meter tall tokamak in Cadarache, France. The aim of the international collaboration is to achieve ignition, the point where more energy is generated by its fusion reactions than is put into running it. The project is a major stepping-stone towards generating clean fusion energy, but it’s been troubled for years by serious budget overruns and long delays. According to a recent U.S. General Accounting Office report, the project's completion date is 20 years behind schedule, and the U.S. contribution has swelled by nearly $3 billion. Senate Appropriations Committee members on both sides of the aisle have long been critical of U.S. contributions to the program. “We’ve withdrawn funding for the program,” said Sen. Lamar Alexander (R-Tenn.). “It hasn’t shown the progress it should. An audit by distinguished scientists told us that.” In addition, Sen. Dianne Feinstein (D-Calif.) has also been one of the program’s harshest critics. The Senate committee attempted to zero out funding for the program last year as well, but it was restored when the House and Senate bills were reconciled.

## AT: Nanotechnology

### 2AC – Deterrence Turn

#### Nanotech collapses deterrence and interdependence – laundry list of impacts

Treder 5 – Executive Director of the Center for Responsible Nanotechnology (Accessed 7/23/17, “War, Interdependence, and Nanotechnology”, <http://www.futurebrief.com/miketrederwar002.asp>, AD)

Liberty, security, prosperity, and world peace—from the time of the American Revolution to the present, humankind has made remarkable strides toward these ideals. Today, more people live in freedom than at any time in history. Although poverty is still a serious worldwide problem, more people are healthier and better fed than ever before. And despite regional wars and terrorist attacks (which have beset civilization for centuries), we have managed to avoid destroying ourselves with full-scale thermonuclear war. But looming just over the horizon is a grave threat. It is nanotechnology. From the dawn of the nuclear age until the present day, we have relied on two mechanisms to protect us from World War III: the doctrine of Mutually Assured Destruction (MAD), and the growing interdependence of nations. However, in the very near future we may not be able to count on these controls. The tenuous balance of MAD and the worldwide network of commercial trade are both threatened by the rise of advanced nanotechnology. Fortunately, there are things we can do now before it’s too late. We need to seek solutions that could prevent a buildup to devastating war. Let’s begin by examining the problems in greater detail. Imagine a world in which every society has the ability to achieve self-sufficiency, making use of local materials to manufacture valuable products when and where they are needed. Imagine that the United States and other leading industrial nations have ample access to clean, low-cost, sustainable energy sources and no longer rely on expensive imported oil. In such a scenario, will vanishing trade imbalances and reduced competition lead to peace and stability? In today’s world, even though each nation is politically independent, they all rely to some degree on other nations for trade or security, or both. No nation—at least no nation of even minimal significance—exists free from this interdependence. But a proposed new form of manufacturing making use of massively parallel, automated molecular machine systems (molecular manufacturing), made possible by advanced nanotechnology, has the potential to change all that. By building “from the bottom up,” with every molecule in a desired position, huge increases in material strength, durability, and flexibility can be attained. Rapid prototyping, enabled by portable manufacturing appliances that produce their own weight in high-quality output every day, will revolutionize design and unleash innovation. Better built, longer lasting, cleaner, safer, and smarter products for the home, for communications, for medicine, for transportation, and for industry—all of that is just the beginning. Add in widely available, inexpensive, renewable energy; cheap, ready access to space flight; and remarkably efficient greenhouses, which reduce our agricultural footprint to a fraction of its current size while sharply increasing output. Sounds wonderful, right? Unfortunately, it’s not that simple. Molecular manufacturing will be a general-purpose and dual-use technology. What that means is that it will not only make benign products, but can create powerful weapons as well. It promises miraculous benefits, but also dire consequences. When individual countries are able to provide their own goods and services, without the need for import or export trade, they will have less incentive to maintain good relations with others. When economic security is no longer an issue, the only remaining security concern will be military. This scenario contains all the elements for a terrible new arms race. Every country possessing unrestricted molecular manufacturing capability will have the ability to design, test, and inexpensively stockpile huge numbers of powerful weapons of any size. If nanotechnology development is allowed to proliferate, we can expect that many countries will achieve both economic independence and unprecedented military prowess. Will we then see a stable equilibrium, a tenuous balance of power similar to the Mutually Assured Destruction of the Cold War? Not likely. Nuclear weapons require massive research efforts and industrial development, which can be globally tracked with greater ease than nanotech arms programs. Molecular manufacturing will enable quicker weapons optimization due to cheap, rapid prototyping. Once a design is approved, vast numbers of powerful new weapons could be produced overnight. It will be nearly impossible to know how much war-making capacity your enemy or your neighbor might possess in the near future. Unless molecular manufacturing capability is contained, the number of nanotech-possessing nations in the world could be much higher than today’s number of nuclear nations, increasing the chance of inflaming dangerous regional conflicts that could spin out of control. Greater uncertainty of the capabilities of the adversary could foster caution—but it also could increase the temptation for preemptive strikes to prevent proliferation. Decreased response time to an attack, and better-targeted destruction of an enemy's visible resources, will make for highly unstable conditions. Worse still, this technology opens the door for the development of rival groups within countries. We might see repeated military coups, devastating civil wars, and dissolution of nations into large numbers of hostile, unpredictable, immensely powerful tribes. Another potential scenario is radical transnational groups, bound by religious, cultural, or ideological extremism, using molecular manufacturing toward terrorist ends. We also must consider the potential negative impacts of advanced nanotechnology on our current socio-economic structure. Low-cost local manufacturing and duplication of designs could lead to monetary upheaval, as major economic sectors contract or even collapse. For example, the global steel industry is worth over $700 billion. What will happen to the millions of jobs associated with that industry—and to the capital supporting it—when materials many times stronger than steel can be produced quickly and cheaply wherever (and whenever) they are needed? Productive nanosystems could make storable solar power a realistic and preferable alternative to traditional energy sources. Around the world, individual energy consumers pay over $600 billion a year for utility bills and fuel supplies. Commercial and industrial uses drive the figures higher still. When much of this spending can be permanently replaced with off-grid solar energy, many more jobs will be displaced. The worldwide semiconductor industry produces annual billings of over $150 billion. The U.S. Bureau of Labor Statistics reports that the industry employs a domestic workforce of nearly 300,000 people. Additionally, U.S. retail distribution of electronics products amounts to almost $300 billion annually. All of these areas will be impacted significantly if customized electronics products can be produced at home for about a dollar a pound, the likely cost of raw materials. If any individual can make products containing computing power a million times greater than today’s PCs, where will those jobs go? Other nations will be affected as well. For example, the Chinese government may welcome the advent of general-purpose molecular manufacturing for several reasons, including its potential to radically reduce poverty and reduce catastrophic environmental problems. But at the same time, China relies on foreign direct investment (FDI) of over $40 billion annually for much of its current economic strength. When money to purchase Chinese manufactured goods stops flowing in, economic turmoil could spark violent struggles. Overall, it’s not a pretty picture. Without wise planning, molecular manufacturing is likely to produce severe economic disruption and social disorder, as well as a perilously unstable new arms race that could lead to devastating acts of war.

### 2AC – Grey Goo

#### **CP causes gray goo – extinction**

Drexler 97 – (Eric, Accessed 7/23/17, “Unbounding the Future: the Nanotechnology Revolution”, <http://www.foresight.org/UTF/Unbound_LBW/chapt_12.html>, AD)

The previous section discussed ordinary accidents that would occur during the use of nanotechnology by generally responsible, yet fallible, human beings. Nanotechnology also raises the specter, however, of what have been termed "extraordinary accidents": accidents involving runaway self-replicating machines. One can imagine building a device about the size of a bacterium but tougher and more nearly omnivorous. Such runaways might blow like pollen and reproduce like bacteria, eating any of a wide range of organic materials: an ecological disaster of unprecedented magnitude—indeed, one that could destroy the biosphere as we know it. This may be worth worrying about, but can this happen by accident? How to Prepare a Big Mistake The so-called "Star Trek scenario" (named after an episode of Star Trek: The Next Generation that featured runaway "nanites") is perhaps the most commonly imagined problem. In this scenario, someone first invests considerable engineering effort in designing and building devices almost exactly like the one just described: bacterial-sized, omnivorous, able to survive in a wide range of natural environments, able to build copies of themselves, and made with just a few built-in safeguards—perhaps a clock that shuts them off after a time, perhaps something else. Then, accidentally, the clock fails, or one of these dangerous replicators builds a copy with a defective clock, and away we go with an unprecedented ecological disaster.

### 2AC – Warming Turn

#### **Nanotech produces black carbon – causes warming**

Hall 9 – founder of the sci. nanotech Usenet newsgroup (J. Storrs, 12/15/9, Accessed 7/23/17, “"Nanotechnology" causes global warming”, <http://foresight.org/nanotechnology-causes-global-warming/>, AD)

One of the reasons I inveigh so heavily against the use of the word “nanotechnology” to mean merely stuff that’s measured in nanometers, is that while it focuses on the size — “nano” — it tends to ignore the function — the “technology.” Nanotech to me is about high-energy-density, high-frequency, eutactic machinery. To those focused on size alone, it means … smoke. The carbon nanoparticles forming black carbon (not quite the same thing as carbon black) range from about 10 nanometers to a micron in size. If emitted into the air, they can remain airborne for quite some time. Now, yet another NASA study has appeared showing that black carbon aerosols could be responsible for as much of a warming effect as CO2. (h/t el Reg) Given that NASA GISS climatology studies are run by James Hansen, the leading CO2-is-the-culprit proponent, you can assume the new theories have been examined carefully.

## AT: Peatlands

### 2AC – Too Long

#### Development takes over a decade and CO2 can escape

Marshall 12 – environmental journalist for NewScientist (Michael, 9/27/17, Accessed 7/7/17, “Scattering moss can restore key carbon sink”, <https://www.newscientist.com/article/dn22313-scattering-moss-can-restore-key-carbon-sink/>, AD)

Freeman is trying to develop a genetically modified sphagnum that could boost the amount of carbon stored in peat. Sphagnum naturally produces phenolic compounds that slow the decomposition of the plants that make up peat. Preventing peat decomposition will help keep the carbon it holds locked away. Freeman wants to create a sphagnum that overproduces phenolics, slowing peat decomposition even further. Freeman says the genetically modified sphagnum could store enough carbon each year to offset global transportation emissions. It will take at least 10 years to develop the modified plant (Philosophical Transactions of the Royal Society A, DOI: doi.org/jd3). It’s a promising idea, not least because it also restores habitats and improves water quality, says Tim Kruger of the Oxford Geoengineering Programme at the University of Oxford. “What’s important is to understand how long the carbon is stored,” he says. If the changing climate causes the peat to decompose, the carbon dioxide will escape again.

### 2AC – Squo Solves

#### Scotland is funding restoration now

Keane 3/15 – environmental correspondent for BBC (Kevin, 3/15/17, Accessed 7/7/17, “Peatland restoration plan to cut climate change gas emission”, <http://www.bbc.com/news/uk-scotland-39276964>, AD)

The restoration work will help reduce the country's greenhouse gas emissions by locking carbon into the environment. It is estimated there are 1.7 million hectares of peatland in Scotland, much of which is eroding. The funding will double the amount already restored from almost 10,000 hectares to 20,000. A significant increase in peatland restoration forms part of Scotland's draft Climate Plan, which is currently going through parliament. It aims to increase annual targets to 20,000 hectares, with 250,000 expected to be restored by 2032. The carbon contains greenhouse gases that are released when it is exposed due to erosion of the peatlands by the elements. Erosion is caused by the peat either being washed away by rainfall or dried out by the sun. Experts flatten the peat embankments using diggers and then cover over with vegetation. Andrew McBride, a peatland specialist with Scottish Natural Heritage, told BBC Scotland: "Scotland's peatlands actually hold the equivalent of about 140 years of our emissions from Scotland - all the industry. So it's very important that we hold the actual carbon and the peat in place. The project aims to restore 20,000 hectares of peatlands in Scotland "If it goes into the atmosphere, it's actually going to exacerbate climate change and that's why we're doing this, basically to cap it and keep it in place." Work has recently begun on a 15-hectare stretch of moorland on the Auchlyne and Suie estates in Perthshire, which involves the re-profiling of 12km of peat hags. Two diggers will spend about four weeks re-sculpting the landscape 2,000ft above sea level.

### 2AC – Too Early

#### Peatland restoration isn’t ready or effective now – knowledge gaps mean that it’s too early

Chimner 16 – phD in ecology at Michigan Technological University (Rodney, Accessed 7/7/17, “An overview of peatland restoration in North America: Where are we after 25 years?”, <https://www.researchgate.net/publication/308691296_An_overview_of_peatland_restoration_in_North_America_Where_are_we_after_25_years>, AD)

Although the number and scale of peatland restoration projects has expanded in NA (e.g. González & Rochefort 2014), there are still many knowledge gaps. One obvious gap is the autecology of peatland plant species. A diverse array of peatlands is being restored, but the establishment requirements of many plant species are poorly understood. Knowledge is needed for determining the plant species that are suitable for survival in the full range of chemical and hydrological conditions found, as well as determining the best options for obtaining and propagating species. The moss layer transfer technique has focused on restoring a peat moss carpet over relatively homogenous milled peatelds to reestablish peat-accumulating functions (Rochefortet al. 2003). However, a whole array of diversity comes with pools, seepage, hummocky islands, and lagg peatland habitats(Poulin et al. 2002). Integrating these features into restoration plans would restore biodiversity not solely associated with Sphagnum carpets (e.g. Paradis et al. 2015). Because most activities in peatlands usually involve compression or removal of the peat prole, there is often a sharp eco-hydrological disconnect between (1) the residual old peat layers and the newly formed moss carpet (McCarter & Price 2015) and (2) theedge of the natural peatland and the ecotone of the restored site(Paradis & Rochefort 2016). Research is needed to improve theeco-hydrological connectivity of restored peatlands.Less is known about how to restore fens than bogs in NA. Restoration of fens is greatly challenged by poor understanding of the groundwater hydrology supporting fens. In North Carolina, mountain fens may be affected by local development activities such as landscape-hardening that reduce ground water recharge (Wilcox unpublished data). At the opposite extreme, increased groundwater discharge from a large constructed pool upslope from Cowles Bog (fen), Indiana maintains an elevated water table that allowed the invasion of cattails (Wilcox et al.1984). In both cases, fen restoration is dependent on knowledge of the groundwater-ow system (Wilcox et al. 1986).Colonization of peatlands by invasive plants requires knowl-edge of control measures for restoration to be effective. Forexample, a former peat extraction site near Sandusky, Michi-gan is now completely occupied by the invasive haplotype ofPhragmites australis (common reed). In addition to cattail, com-mon reed is also prevalent in Cowles Bog, and it is invad-ing Byron-Bergen Swamp, a fen in western New York State(Seischab 1984), along with other invasives such as Brachy-podium sylvaticum (slender falsebrome), Phalaris arundinacea(reed canarygrass), and over a dozen other species (Graham &Listowski 2016).Peat-consuming res lower the elevation of the peat surfacerelative to the surrounding unburned peat (Turetsky et al. 2011;Reddy et al. 2015) and in some cases burn to mineral soil. Theloss of elevation lowers the water table in unburned peat at burnedges and increases the depth and duration of inundation inburned areas (Watts 2013). Additionally, the post repeat sur-face has different physical characteristics and less microtopo-graphic variability than unburned peat (Benscoter et al. 2005).The impacts of peat-consuming res bear some similarities tothose caused by peat extraction. Restoration techniques devel-oped for peat-extraction sites may be applicable in severelyburned peatlands. However, more work is needed to quantify the impacts of peat res and develop strategies for restoring peat-accumulating vegetation in burned areas.A better understanding of peat formation and interactionswith long-term hydrological changes after restoration is alsorequired. Compaction and carbon loss from long-term dryingalter the hydrologic function of peat (Price et al. 2003; Kennedy& Price 2005). The success of peatland restoration may be inu-enced by the development of a sufciently thick new peat layerthat has ecohydrological and hydrophysical properties similarto natural peatlands (McCarter & Price 2015). However, thisprocess may take decades (Schimelpfenig et al. 2014; Taylor &Price 2015). More information is needed on how disturbanceand restoration alter hydrologic feedbacks that inuence successof long-term restoration (Waddington et al. 2015).Degraded peatlands are often net sources of greenhouse gases(GHGs), which is why climate change mitigation is routinelytouted as a rationale for peatland restoration (Lunt et al. 2010).However, more studies are needed, and in different peatland types, to quantify how GHG emissions and carbon sequestration responds to restoration efforts in the long term. Additional information is needed to quantify how different restoration tech-niques modify GHGs (Wilson et al. 2016). This is important forrestoration that involves rewetting because lled and blockedditches can be hotspots for methane (CH4) emissions (Wadding-ton & Day 2007; Strack & Zuback 2013), but it is unknown ifthis is a short-term pulse or a longer-term process. Rewettingcan also release N2O in former agricultural elds (Schrier-Uijlet al. 2014).The push to use peatland restoration as climate mitigationforces us to address the question: how much climate mitigationshould be designed into restoration projects? Vascular plantssuch as sedges with well-developed aerenchyma have beenfound to increase CH4emissions (Waddington & Day 2007;Mahmood & Strack 2011; Cooper et al. 2014a, 2014b), andcertain water table levels have been found to maximize car-bon storage (Tuittila et al. 2004). Should certain plant speciesor peatland types, such as sedge-dominated fens, not be restoredbecause of their greater CH4emissions? By maximizing peat-land restoration for climate mitigation benets, could otherecosystem functions and values, such as habitat and biodiversitybe reduced?There are many research gaps for understanding how peat-land restoration can inuence the GHGs that inuence climatechange; however, there are even more unknowns on how cli-mate change could alter peatlands and peatland restoration prac-tices. A challenge is quantifying how individual species willrespond to temperature changes and how species and biogeo-chemical cycling responds to temperature and hydrology. Cli-mate change is forcing scientists to rethink what it means torestore an ecosystem (Harris et al. 2006; Hobbs et al. 2009). Isthe goal to restore a peatland to some past historic conditions ofthe ecosystem development or to a new “novel” state that mayassist with enhancing ecological function and prepare the siteRestoration Ecology 7 Peatland restoration in North Americafor climate changes (Hobbs et al. 2011; Wiens & Hobbs 2015)?If we are preparing restored peatlands for a different climate, should we actively engage in assisted migration of species? Canwe use paloeecological data to understand better past species climate interactions that can help guide our decisions (Gorham& Rochefort 2003)? Peatland restoration in NA has advancedsignicantly, with many new projects and research directions inthe last few decades. However, many research gaps exist that must be addressed to enhance our ability to successfully restore peatlands in a rapidly changing world.

### 2AC – Droughts

#### **Warming causes global climate patterns that destroy peatlands**

Dunn and Freeman 11 – director at the Wolfson Carbon Capture Laboratory; Professor of Wetland Science at the [University of Wales](http://en.wikipedia.org/wiki/University_of_Wales%2C_Bangor) (Cristian and Christopher, Accessed 7/10/17, “Peatlands: our greatest source of carbon credits?”, <http://www.tandfonline.com/doi/abs/10.4155/cmt.11.23>, AD)

Many researches also warn that a warmer, drier climate as is being predicted by some climate change models for many areas of the globe (especially over parts of Western Europe and North America), could lower the water table of some peatlands creating aerobic conditions in the peat matrix. This may affect the soils biogeochemical process and lead to a rise in the rate of decomposition, increasing GHG emissions from the peatlands: switching more of them from being net-carbon sinks to carbon sources [27-37]. It is also feared chat warmer temperatures will increase peatland permafrost thaw, diminishing the tundras carbon-storage capacity [58.39].

## AT: PGS

### **2AC – PGS Escalates**

#### **Increasing US PGS capabilities risks military escalation with Russia and China**

Stevenson 16 - aerospace and defense reporter at FlightGlobal (Beth, 8/6/16, Accessed 6/27/17, “USA's hypersonic programme could rile Russia and China”, <https://www.flightglobal.com/news/articles/usas-hypersonic-programme-could-rile-russia-and-chi-429952/>, AD)

The Prompt Global Strike (PGS) programme aims to develop a hypersonic, precision-guided conventional weapon that can deploy anywhere in the world within one hour. “Initially we might think that [hypersonic] is the silver bullet,” Mark Hilborne, lecturer at the defence studies department of King’s College London, told the Royal Aeronautical Society’s air power conference. “But these weapons might undermine strategic agreements between nuclear states.” Hilborne says that both China and Russia are developing their own air-launched hypersonic weapons, but have revealed little about their programmes, in sharp contrast to the USA's transparency over its PGS effort. While the USA has stated PGS will only carry a conventional payload, Hilborne says China and Russia may distrust Washington's assurances and there is no agreement in place to prevent the two from arming their hypersonic missiles with nuclear warheads. China carried out its seventh hypersonic test in April, a similar number to that carried out by the USA, “and as far as we know they were broadly successful”, Hilborne says. He says that “nuclear weapons are at the core of the Russian perception of power”, so Moscow is more likely to incorporate a warhead of this type to gain an advantage over adversaries with stronger conventional inventories. “They are very aware of their conventional inferiority, even though they are making advancements in that area,” he says. Hypersonic technology will not only lend itself to weapons, Hilborne notes, but could also be applied to surveillance aircraft. However, this could “still have the reverse effect [of] what is intended”. In addition to the payload ambiguity, Hilborne sees a number of characteristics of the technology that could cause alarm in Beijing or Moscow. The high manoeuvrability of hypersonic weapons compared with ballistic missiles could mean that the target is able to be altered, leading to uncertainty over their intended use. The boost-glide trajectory of the PGS could also be mistaken for a space weapon, even though it only leaves the earth’s atmosphere for a small amount of time, as is also the case with ICBMs. “There seems to be a lot of strategic challenges that they entail,” Hilborne adds, noting that their development coincides with heightened tensions between the big three global powers.

#### Escalating war with Russia ensures extinction

Barrett et al 13—PhD in Engineering and Public Policy from Carnegie Mellon University; Seth Baum (Anthony, 6/24/13, Accessed 7/7/17“Analyzing and Reducing the Risks of Inadvertent Nuclear War Between the United States and Russia”, AD)

War involving significant fractions of the U.S. and Russian nuclear arsenals, which are by far the largest of any nations, could have globally catastrophic effects such as severely reducing food production for years, 1 potentially leading to collapse of modern civilization worldwide, and even the extinction of humanity. 2 Nuclear war between the United States and Russia could occur by various routes, including accidental or unauthorized launch; deliberate first attack by one nation; and inadvertent attack. In an accidental or unauthorized launch or detonation, system safeguards or procedures to maintain control over nuclear weapons fail in such a way that a nuclear weapon or missile launches or explodes without direction from leaders. In a deliberate first attack, the attacking nation decides to attack based on accurate information about the state of affairs. In an inadvertent attack, the attacking nation mistakenly concludes that it is under attack and launches nuclear weapons in what it believes is a counterattack. 3 (Brinkmanship strategies incorporate elements of all of the above, in that they involve intentional manipulation of risks from otherwise accidental or inadvertent launches. 4 ) Over the years, nuclear strategy was aimed primarily at minimizing risks of intentional attack through development of deterrence capabilities, and numerous measures also were taken to reduce probabilities of accidents, unauthorized attack, and inadvertent war. For purposes of deterrence, both U.S. and Soviet/Russian forces have maintained significant capabilities to have some forces survive a first attack by the other side and to launch a subsequent counter-attack. However, concerns about the extreme disruptions that a first attack would cause in the other side's forces and command-and-control capabilities led to both sides’ development of capabilities to detect a first attack and launch a counter-attack before suffering damage from the first attack. 5 Many people believe that with the end of the Cold War and with improved relations between the United States and Russia, the risk of East-West nuclear war was significantly reduced. 6 However, it also has been argued that inadvertent nuclear war between the United States and Russia has continued to present a substantial risk. 7 While the United States and Russia are not actively threatening each other with war, they have remained ready to launch nuclear missiles in response to indications of attack. 8 False indicators of nuclear attack could be caused in several ways. First, a wide range of events have already been mistakenly interpreted as indicators of attack, including weather phenomena, a faulty computer chip, wild animal activity, and control-room training tapes loaded at the wrong time. 9 Second, terrorist groups or other actors might cause attacks on either the United States or Russia that resemble some kind of nuclear attack by the other nation by actions such as exploding a stolen or improvised nuclear bomb, 10 especially if such an event occurs during a crisis between the United States and Russia. 11 A variety of nuclear terrorism scenarios are possible. 12 Al Qaeda has sought to obtain or construct nuclear weapons and to use them against the United States. 13 Other methods could involve attempts to circumvent nuclear weapon launch control safeguards or exploit holes in their security. 14 It has long been argued that the probability of inadvertent nuclear war is significantly higher during U.S.–Russian crisis conditions, 15 with the Cuban Missile Crisis being a prime historical example. It is possible that U.S.–Russian relations will significantly deteriorate in the future, increasing nuclear tensions. There are a variety of ways for a third party to raise tensions between the United States and Russia, making one or both nations more likely to misinterpret events as attacks. 16

### 2AC – PGS Fails

#### **PGS isn’t quick enough**

Bunn and Manzo 11 - Distinguished Research Fellow in the Center for Strategic Research; Research Analyst in CSR (M. Elaine and Vincent, February 2011, Accessed 2/7/17, “Conventional Prompt Global Strike: Strategic Asset or Unusable Liability?”, <http://www.dtic.mil/dtic/tr/fulltext/u2/a546381.pdf>, AD)

Some analysts doubt that the United States will encounter a crisis in which a CPGS strike is both necessary and feasible. They argue that collecting, analyzing, and vetting intelligence take time. The insights derived during this process often require additional information and further analysis, which usually entails redeploying intelligence assets and consulting with local authorities. By the time the United States is able to verify the location of a target, U.S. forward-deployed or foreign forces could be within striking distance. In other words, the time required to gather the information necessary to execute a CPGS strike would create alternative options for fulfilling U.S. objectives. Some targets might be so fleeting that the United States would not have time to reposition forward-deployed strike assets to hit time-sensitive targets. Critics argue that in these cases, a CPGS strike would also be infeasible. Without on-site reconnaissance assets, U.S. leaders would lack the requisite information to confirm the target’s location with sufficient precision to launch a CPGS strike and estimate collateral damage.43 Senator Jack Reed articulated this reasoning in 2006: “I presume, in terms of developing our intelligence sources, we first have suspicion, then we have information, we go out and verify it, and in that process . . . our national security officials would begin to move assets into the area which would conduct a strike with precision weapons.”44 This argument has merit because it reflects experience from routine U.S. counterterrorism operations in Iraq, Afghanistan, and Pakistan. The United States would not need CPGS weapons for most counterterrorism and counterproliferation strikes. But CPGS weapons would be for exceptional rather than routine scenarios. The operative question is whether plausible scenarios exist in which the United States could possess actionable intelligence but be unable to strike targets with other conventional strike assets. The answer is yes. The forward-deployed forces that collect and confirm intelligence about a target might be incapable of disabling or destroying it. For instance, an unmanned aircraft system might be unarmed or adversary forces might destroy it. Special Operations Forces might locate a target but lack the www.ndu.edu/inss SF No. 263 9 capability to attack it. Any number of obstacles could prevent on-site assets from successfully engaging a target. Since the scenarios under consideration involve fleeting targets, other forward-deployed forces might be unable to respond in time.45

#### **It’s also not strong enough to deter conflict**

Brustlein 15 – head of security studies at the French institute of International Relations (Corentin, January 2015, “Conventionalizing Deterrence? U.S. Prompt Strike Programs and Their Limits”, https://www.academia.edu/10199060/Conventionalizing\_Deterrence\_U.S.\_Prompt\_Strike\_Programs\_and\_Their\_Limits, AD)

Finally, strong doubts remain about the ability of a conventional warhead to destroy all types of hardened targets earmarked for CP(G)S capabilities. The problem here partly stems from the difficulty to ensure extreme terminal precision of the delivery system . Precision is all the more necessary as the weight and volume of the payload will remain limited so that it can be carried over very long distances. Even in conditions where intelligence is available and reliable, and where the required degree of precision is possible, it is not certain that a penetrator combined with a conventional explosive would succeed in generating sufficiently powerful physical effects to neutralize the hardest or most deeply buried targets . Beyond a certain depth, precision is no longer a substitute for the raw energy needed to neutralize the target. Over 40 years after the first studies presenting precision-guided conventional weapons as an alternative to tactical nuclear weapons, only the latter seem able to guarantee destruction against adversaries possessing hardened, extensive tunnel complexes hiding WMD capabilities.

### 1AR – PGS Escalates

#### **Specifically, true of Russia - PGS threatens strategic stability**

SputnikNews 16 - alternative news media brand (2/15/16, Accessed 6/29/17, “US Prompt Global Strike ‘Very Dangerous’ for Strategic Stability”, <https://sputniknews.com/military/201602151034758287-us-pgs-endangers-strategic-stability/>, AD)

WASHINGTON (Sputnik) – The United States’ efforts to deliver a precision-guided weapon anywhere in the world within an hour, Prompt Global Strike (PGS), poses a threat to the arithmetic of strategic stability, Russian NATO envoy Alexander Grushko said in an interview with US media published Sunday. "We should add issues like prompt global strike. This is very dangerous development in military terms for strategic stability," Grushko told The Wall Street Journal. Grushko said Moscow had a number of concerns with NATO, including a missile defense system planned to be deployed in Europe and the weaponization of space. Both the United States and Russia have research and development aimed at the eventual deployment of long-range boost-glide weapons and hypersonic missiles capable of reaching any target in the world in less than an hour. Russia has raised concerns

#### **The risk of miscalc is high**

Woolf 2/3 - policy specialist in nuclear weapon policy (Amy, 2/3/17, Accessed 6/27/17, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues”, <https://fas.org/sgp/crs/nuke/R41464.pdf>, p. 33-34, AD)

Some Members of Congress and many analysts outside government have focused much of their criticism of the PGS concept on the potential that other nations might detect the launch of a U.S. CPGS missile and conclude, mistakenly, that the United States had launched an attack with nuclear-armed missiles. Specifically, some have argued that, if the United States were to launch these missiles during a conflict, nations with minimal satellite capabilities and launch notification systems (such as China) or degraded launch notification systems (such as Russia) could conclude that they were under attack with nuclear missiles.96 Further, because many possible targets lie south of Russia and China, and the United States has historically planned to launch its ballistic missiles over the North Pole, a conventionally armed long-range ballistic missile might fly over these two nations to strike its targets. For many minutes during their flight patterns, these missiles might appear to be headed towards targets in these nations. The potential for misunderstanding is compounded by the short time of flight of these missiles, giving these nations little time to evaluate the event, assess the threat, and respond with their own forces. Under such circumstances, critics claim that these nations may conclude they have no other option than to respond with their own nuclear weapons.

#### **PGS ensures retaliation – assumes their defense**

Woolf 16 (Amy, policy specialist in nuclear weapon policy, 2/24/16, Accessed 7/1/17, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues”, <https://fas.org/sgp/crs/nuke/R41464.pdf>, p. 34-35, AD)

Taken together, these three types of measures might help reduce the risks of misunderstandings. But the accumulation of information during peacetime and frequent communications during crises may not be sufficient to address problems that could come up in an atmosphere of confusion and incomplete information during a conflict. Specifically, the argument in favor of using long-range ballistic missiles for the PGS mission assumes that the United States might have little warning before the start of a conflict and might need to launch its missiles promptly at that time. This scenario would allow little time for the United States to consult with, or even inform, other nations about its intentions. If other nations are caught by surprise and fear they might be under nuclear attack, they might also decide to respond promptly, before the United States had the opportunity to convince them that the missiles carried conventional warheads. 104 Report to Congress on the “Concept of Operations” for the Common Aero Vehicle, Submitted in response to Congressional Reporting Requirements, by Peter B. Teets, Under Secretary of the Air Force, February 24, 2004, p. 4. 105 Air Force Space Command, Common Aero Vehicle White Paper, p. 11. Conventional Prompt Global Strike and Long-Range Ballistic Missiles Congressional Research Service 35 Even though routine data exchanges and on-site inspections may provide confidence in the absence of nuclear warheads on the missiles on a day-to-day basis in peacetime, they cannot provide assurances that the warheads could not be changed in a relatively short period of time or that the warheads were not actually changed in the days or weeks since the last inspection. In addition, changing the basing patterns or launch patterns of missiles to draw a sharper distinction between conventional and nuclear-armed missiles assumes both that other nations can observe the differences and that they believe the different appearances indicate different warheads. Finally, these measures would do nothing to alleviate concerns among nations that did not participate in the cooperative programs. As a result, while the measures described above can reduce the possibility of misunderstandings, they probably cannot eliminate them. Moreover, they cannot address concerns, often expressed by officials in Russia and China, that the United States might use these weapons, along with other conventional strike systems and missile defenses, to acquire a the ability to attack strategic or nuclear targets in these nations without resorting to the use of U.S. nuclear weapons.

#### **Breaking the nuclear taboo makes it uniquely likely**

Long et al 10 – Assistant Professor at the School of International and Public Affairs (Austin, Spring 2010, Accessed 7/10/17, “Going Nowhere Fast Assessing Concerns about Long-Range Conventional Ballistic Missiles”, <https://muse.jhu.edu/article/377375>, AD)

Another major concern with conventionalizing long-range missiles, which has not been examined in studies of the issue, involves the problem of regional nuclear ambiguity. If the United States conventionalizes its long-range missiles, existing nuclear-armed powers would be more likely to arm their medium-range and long-range missiles with conventional warheads, raising serious concerns about crisis stability. Despite having far different nuclear capabilities and doctrines compared with those of the United States, other nuclear powers have at times closely copied its nuclear policies when it is technically feasible, and it is certainly feasible for them to conventionalize their nuclear missiles.14 In this context, the nuclear ambiguity issue in regional nuclear dyads (such as the China-India; Pakistan-India; Pakistan-Israel; and, if Iran acquires nuclear weapons, Iran-Israel dyads) would be serious. Moreover, ambiguity mitigation and transparency measures being proposed for the U.S.-Russia dyad would be harder to implement in more volatile regional situations. In a political-military crisis, a regional power could misinterpret a conventional ballistic missile fired from its regional nuclear rival as an indicator of a nuclear attack and could respond with nuclear weapons. Breaking the taboo against the use of nuclear weapons would be detrimental not only to the parties involved but also to U.S. and international security.15 [End Page 175]

#### **Perception makes it uniquely likely**

Manzo 8 (Vince, CDI Research Assistant, Accessed 7/1/17, “An Examination of the Pentagon’s Prompt Global Strike Program: Rationale, Implementation, and Risks”, <http://www.infodefensa.com/wp-content/uploads/PGSfactsheet%5B1%5D.pdf>, AD)

Given that U.S. intercontinental ballistic missiles (ICBMs) and SLBMs have previously only carried nuclear warheads, many analysts argue that other countries, such as Russia or China, might “misinterpret the launch of a conventionally-armed ballistic missile and conclude that they are under attack with nuclear weapons.”35 Although this concern has been expressed in context of both Navy and Air Force conventional missile programs, concern over the CTM program is more acute: “To outside observers, the [Trident] sub’s conventional and nuclear weapons would appear identical—the same size, the same speed, shooting from the same locations.”36 Ian Davis and Robin Dodd argue that the deployment of conventional ballistic missiles will inject an additional dose of uncertainty into any U.S. long-range missile launch. As a consequence, countries “targeted by any ICBM strike would need to treat any attack as a nuclear one if they were to avoid being open to a successful surprise US nuclear first strike.”37 In other words, the United States could potentially exploit this capability by initiating a nuclear first strike under the guise of a conventional long-range missile launch. The implication of this argument is that deploying long-range ballistic missiles with conventional warheads will further complicate any efforts to reduce the readiness level of other states’ nuclear weapons, as they will feel that their arsenals are even more vulnerable to a U.S. first strike. Whether reducing the readiness level of nuclear weapons should be on the agenda in future arms control negotiations is a separate issue, but its omission from such should be the result of a conscious policy decision, not an unintended and unexamined consequence of a new weapon deployment. A recent article in Arms Control Today quotes a Russian source echoing this very concern: “Prompt global strike is very dangerous [because] you never tell what the load [is] when a strategic missile is launched.”38 Former Russian President Vladimir Putin has expressed similar concerns: “The launch of such a missile could provoke an inappropriate response from one of the nuclear powers, could provoke a full-scale counterattack using strategic nuclear forces.”39Similarly, the congressionally-mandated NAS report affirmed that such concerns “merit serious consideration,” and also recommended “providing a modest amount of applied research (6.2) funding towards measuring the more challenging hypersonic flight technologies needed for other longer-term CPGS [conventional prompt global strike] options envisioned by the Air Force and the Army.”40