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### 1AC – Plan

#### The Executive branch of the United States should acquire electricity from small modular nuclear reactors for military installations in the United States.

### 1AC – Grid Advantage

#### CONTENTION 1: GRID

**Cyber-attack is coming ---actors are probing grid weaknesses**

**Reed 12** John, Reports on the frontiers of cyber war and the latest in military technology for Killer Apps at Foreign Policy, "U.S. energy companies victims of potentially destructive cyber intrusions", 10/11, killerapps.foreignpolicy.com/posts/2012/10/11/us\_energy\_companies\_victims\_of\_potentially\_destructive\_cyber\_attacks

Foreign actors are probing the networks of key American companies in an attempt to gain control of industrial facilities and transportation systems, Defense Secretary Leon Panetta revealed tonight.¶ "We know that foreign **cyber actors are probing America's critical infrastructure networks**," said Panetta, disclosing previously classified information during a speech in New York laying out the Pentagon's role in protecting the U.S. from cyber attacks. "They are targeting the computer control systems that operate chemical, **electricity** and water plants, and those that guide transportation thorough the country."¶ He went on to say that the U.S. government knows of "specific instances where intruders have gained access" to these systems -- frequently known as Supervisory Control and Data Acquisition (or SCADA) systems -- and that "they are seeking to create advanced tools to attack these systems and cause panic, destruction and even the loss of life," according to an advance copy of his prepared remarks.¶ The secretary said that **a coordinated attack on enough critical infrastructure could be a "cyber Pearl Harbor" that would "cause physical destruction and loss of life, paralyze and shock the nation, and create a profound new sense of vulnerability.**"¶ While there have been reports of criminals using 'spear phishing' email attacks aimed at stealing information about American utilties, Panetta's remarks seemed to suggest more sophisticated, nation-state backed attempts to actually gain control of and damage power-generating equipment. ¶ Panetta's comments regarding the penetration of American utilities echo those of a private sector cyber security expert Killer Apps spoke with last week **who said that the networks of American electric companies were penetrated, perhaps in preparation for a Stuxnet-style attack**.¶ Stuxnet is the famous cyber weapon that infected Iran's uranium-enrichment centrifuges in 2009 and 2010. Stuxnet is believed to have caused some of the machines to spin erratically, thereby destroying them.¶ "**There is hard evidence** that there has been penetration of our power companies, and given Stuxnet, that is a staging step before destruction" of electricity-generating equipment, the expert told Killer Apps. Because uranium centrifuges and power turbines are both spinning machines, "**the attack is identical -- the one to take out the centrifuges and the one to take out our power systems is the same attack**."¶ "If a centrifuge running at the wrong speed can blow apart" so can a power generator, said the expert. "If you do, in fact, spin them at the wrong speeds, you can blow up any rotating device."¶ Cyber security expert Eugene Kaspersky said two weeks ago that one of his greatest fears is someone reverse-engineering a sophisticated cyber weapon like Stuxnet **-- a relatively easy task** -- and he noted that Stuxnet itself passed through power plants on its way to Iran. "Stuxnet infected thousands of computer systems all around the globe, I know there were power plants infected by Stuxnet very far away from Iran," Kaspersky said.

**Grid attacks take out C and C---causes retaliation and nuclear war**

**Tilford 12** Robert, Graduate US Army Airborne School, Ft. Benning, Georgia, “Cyber attackers could shut down the electric grid for the entire east coast” 2012, <http://www.examiner.com/article/cyber-attackers-could-easily-shut-down-the-electric-grid-for-the-entire-east-coa>

To make matters worse a cyber attack that can take out a civilian power grid, for example could also cripple the U.S. military.¶ The senator notes that is that the same power grids that supply cities and towns, stores and gas stations, cell towers and heart monitors also power “every military base in our country.”¶ “Although bases would be prepared to weather a short power outage with backup diesel generators, within hours, not days, fuel supplies would run out”, he said.¶ Which means military **command and control centers could go dark**.¶ Radar systems that detect air threats to our country **would shut Down completely**.¶ “Communication between commanders and their troops would also go silent. And many weapons systems would be left without either fuel or electric power”, said Senator Grassley.¶ “So in a few short hours or days, the mightiest military in the world would be left scrambling to maintain base functions”, he said.¶ We contacted the Pentagon and officials confirmed the threat of a cyber attack is something very real.¶ Top national security officials—including the Chairman of the Joint Chiefs, the Director of the National Security Agency, the Secretary of Defense, and the CIA Director— have said, “preventing a cyber attack and improving the nation’s electric grids is among the most urgent priorities of our country” (source: Congressional Record).¶ So how serious is the Pentagon taking all this?¶ Enough to start, or end a war over it, for sure (see video: Pentagon declares war on cyber attacks http://www.youtube.com/watch?v=\_kVQrp\_D0kY&feature=relmfu ).¶ A cyber attack today against the US could very well be seen as an “Act of War” and could be met with a “full scale” US military response.¶ That could include the use **of “nuclear weapons**”, if authorized by the President.

**Plan solves grid collapse---SMRs make bases resilient --- prevents lashout**

**Andres and Breetz 11** Richard B, Professor of National Security Strategy at the National War College and a Senior Fellow and Energy and Environmental Security and Policy Chair in the Center for Strategic Research, Institute for National Strategic Studies, at the National Defense University and Hanna L, doctoral candidate in the Department of Political Science at The Massachusetts Institute of Technology, February, "Small Nuclear Reactors for Military Installations: Capabilities, Costs, and Technological Implications", www.ndu.edu/press/lib/pdf/StrForum/SF-262.pdf

Small Reactors and Energy Security¶ The DOD interest in small reactors derives largely from problems with base and logistics vulnerability. Over the last few years, the Services have begun to reexamine virtually every aspect of how they generate and use energy with an eye toward cutting costs, decreasing carbon emissions, and reducing energy-related vulnerabilities. These actions have resulted in programs that have significantly reduced DOD energy consumption and greenhouse gas emissions at domestic bases. Despite strong efforts, however, two critical security issues have thus far **proven resistant to existing solutions**: bases’ vulnerability to civilian power outages, and the need to transport large quantities of fuel via convoys through hostile territory to forward locations. Each of these is explored below.¶ Grid Vulnerability. DOD is unable to provide its bases with electricity when the civilian electrical grid is offline for an extended period of time. **Currently, domestic military installations receive 99 percent of their electricity from the civilian power grid.** As explained in a recent study from the Defense Science Board:¶ DOD’s key problem with electricity is that critical missions, such as national strategic awareness and national command authorities, are almost entirely dependent on the national transmission grid . . . [**which] is fragile, vulnerable, near its capacity limit, and outside of DOD control**. In most cases, neither the grid nor on-base backup power provides sufficient reliability to ensure continuity of critical national priority functions and oversight of strategic missions in the face of a long term (several months) outage.7¶ The grid’s fragility was demonstrated during the 2003 Northeast blackout in which 50 million people in the United States and Canada lost power, some for up to a week, when one Ohio utility failed to properly trim trees. The blackout created cascading disruptions in sewage systems, gas station pumping, cellular communications, border check systems, and so forth, and demonstrated the interdependence of modern infrastructural systems.8¶ More recently, awareness has been growing that the grid is also vulnerable to purposive attacks. A report sponsored by the Department of Homeland Security suggests that a coordinated cyberattack on the grid could result in a third of the country losing power for a period of weeks or months.9 Cyberattacks on critical infrastructure are not well understood. It is not clear, for instance, whether existing terrorist groups might be able to develop the capability to conduct this type of attack. It is likely, however, that some nation-states either have or are working on developing the ability to take down the U.S. grid. In the event of a war with one of these states, it is possible, if not likely, that parts of the civilian grid would cease to function, taking with them military bases located in affected regions.¶ **Government and private organizations are currently working to secure the grid against attacks; however, it is not clear that they will be successful**. Most military bases currently have backup power that allows them to function for a period of hours or, at most, a few days on their own. **If power were not restored after this amount of time, the results could be disastrous**. First, military assets taken offline by the crisis would not be available to help with disaster relief. Second, during an extended blackout, **global military operations could be seriously compromised**; this disruption would be particularly serious if the blackout was induced during major combat operations. During the Cold War, this type of event was far less likely because the United States and Soviet Union shared the common understanding that blinding an opponent with **a grid blackout could escalate to nuclear war**. America’s current opponents, however, may not share this fear or be deterred by this possibility.¶ In 2008, the Defense Science Board stressed that DOD should mitigate the electrical grid’s vulnerabilities by turning military installations into “islands” of energy self-sufficiency.10 The department has made efforts to do so by promoting efficiency programs that lower power consumption on bases and by constructing renewable power generation facilities on selected bases. Unfortunately, these programs will not come close to reaching the goal of islanding the vast majority of bases. **Even with massive investment in efficiency and renewables, most bases would not be able to function for more than a few days after the civilian grid went offline**.¶ **Unlike other alternative sources of energy, small reactors have the potential to solve DOD’s vulnerability to grid outages**. Most bases have relatively light power demands when compared to civilian towns or cities. Small reactors could easily support bases’ power demands separate from the civilian grid during crises. In some cases, the reactors could be designed to produce enough power not only to supply the base, but also to provide critical services in surrounding towns during long-term outages.¶ Strategically, islanding bases with small reactors has another benefit. One of the main reasons an enemy might be willing to risk reprisals by taking down the U.S. grid during a period of military hostilities would be to affect ongoing military operations. Without the lifeline of intelligence, communication, and logistics provided by U.S. domestic bases, American military operations would be compromised in almost any conceivable contingency**. Making bases more resilient to civilian power outages would reduce the incentive for an opponent to attack the grid**. An opponent might still attempt to take down the grid for the sake of disrupting civilian systems, but the powerful incentive to do so in order to win an ongoing battle or war would be greatly reduced.

### 1AC – New

#### CONTENTION 2: SHIPPING

#### Shipping industry’s declining---SMRs provide critical boost

Black 12 David, The National, 2/1, Atomic ships just over the horizon, www.thenational.ae/thenationalconversation/industry-insights/shipping/atomic-ships-just-over-the-horizon#full

The merchant shipping industry is hoping to go nuclear.¶ Despite the reactor disaster at the Fukushima power station in Japan last year and the fallout that blanketed the nuclear sector, the cargo ships and tankers of the future could one day be powered by atomic energy.¶ Last month, in the German port city of Hamburg, delegates at a conference on marine propulsion discussed the progress being made to design and build a new generation of merchant ships to be powered by onboard nuclear reactors.¶ The current research focus is on power plants for liquefied natural gas (LNG) carriers and oil tankers huge ships common in the waters of the Gulf. But that is not all as the shipping industry believes there is equal scope for container ships and bulk carriers to be fuelled by atomic energy. But they will not be cheap.¶ "The purchase price of the nuclear propelled ship would be considerably greater than that of an equivalent conventional ship," says John Carlton, a professor of marine engineering at the City University London, one of the keynote speakers at the forthcoming Hamburg conference.¶ However, for the conventionally propelled ship, the through-life fuel costs are high and are likely to rise further, especially with any introduction of carbon tax.¶ In contrast, the price of uranium enriched to commercial levels is much cheaper than conventional fuels. Therefore, the fuel costs become very much less for the nuclear ship.¶ The Russians already have two nuclear powered ice breakers-cum-cruise ships and a freighter plying their Arctic waters.¶ The marine engine manufacturers Babcock, and the international ship classification society Lloyd's Register, are already far advanced in research and development work and despite the technical and political hurdles they face, both believe the age of the nuclear-powered merchant ship will soon be with us.¶ The main drivers are the rising cost of traditional fuel, and the coming tranche of emissions regulations aimed at limiting the world's merchant fleet's power to pollute. And those are big problems, says Prof Carlton.¶ The world merchant fleet has an installed power capacity of 410 million kW; that is 9 per cent of world electricity generating capacity. It costs a lot to power that using fossil fuels, and it generates a lot of greenhouse gases in the process. "Also, it is clear that there is a perception that CO2 and greenhouse gases present a significant threat for the future. [In that context] there is growing acceptance that the use of nuclear power for ship propulsion is beneficial," says Prof Carlton.¶ "Some countries are suggesting that serious consideration should be given to nuclear propulsion for merchant ships. In a recently produced UK government memorandum detailing options for decarbonising Britain by 2050, the section on international shipping suggests 'building and maintaining a new fleet of nuclear-powered container ships and passenger ships.'"¶ Lloyd's Register is leading a consortium made up of the Greek tanker operator Enterprises Shipping and Trading, the US engine designer Hyperion Power Generation and the British naval architect BMT Nigel Gee, **to examine the marine applications for** small modular reactors (**SMRs**) in tankers. "Changes in oil regulation are driving the shipping industry's move to nuclear power," says Vince Jenkins, a Lloyd's Register global marine risk advisor.¶ "By 2020, ships will have to switch from today's heavy fuel oil to distillate fuels to reduce NOx [nitrogen oxide] and SOx [sulphur Oxide] greenhouse gases, which will be expensive. Unlike other low-carbon forms of energy, only nuclear power would be powerful enough to be able to completely replace a diesel engine."¶ Babcock International Group Marine Division has already completed a study to investigate the commercial implications of developing a nuclear-powered LNG carrier, based on its work as the support **contractor for the Royal Navy's nuclear submarine** fleet.

#### The plan causes spin-offs to commercial shipping

Femenia 12 Professor and Master of Marine Engineering Program Director at United States Merchant Marine Academy, “Is The Time Right For Commercial Nuclear Powered Vessels?” August, http://higherlogicdownload.s3.amazonaws.com/SNAME/ee3b8f97-c746-4d85-bede-cd348a202053/UploadedImages/Is%20The%20Time%20Is%20Right%20For%20Commercial%20Nuclear%20Powered%20Vessels-J.Femenia%20(Full%20Paper-080812).pdf

Most likely the development of one or more appropriately sized reactors, solely for use in powering commercial vessels, is economically unjustifiable. Fortunately there are a number of domestic and international individual and corporations interested in producing small modular reactors (SMRs). The goal of these individuals and companies is to essentially produce small nuclear “factory assemble” reactors that would primarily be used for distributed power generation to augment the gegawatt size reactors powering national electrical grids. At the Commercializing Small Modular Reactor Summit 2012, held in Washington, D.C. July 17-19 numerous papers and discussions were presented related to SMRs ranging from light water reactors system derivatives to high temperature gas cooled reactors. Topics ranging from fuel handling and reprocessing to regulatory issues were discussed at the conference. If and when the SMR’s become available, the marine industry could take advantage of their availability to design, build and operate nuclear powered commercial ships. This possibility could be greatly enhanced if there was a clear interest by the commercial shipping industry for fast, pollution free ships and were willing to consider nuclear powered vessels. If such an interest were expressed and an appropriate body of technical experts, such as T&R Panel M-48, opened discussions with nuclear industry representatives, regulatory agencies and classification societies, the design of the SMR’s could be influenced in a manner that would make one or more of the “off the shelf” SMRs relatively easily adopted for ship propulsion. The incentive for potential SMR manufactures to consider “marinizing” one or more of their units is simply to increase the potential market for appropriate units.

#### Solves extinction

Brownrigg 7 Director general of British Chamber of Shipping, “Speech to the Party Fringe meetings: Shipping – An Answer To Global Warming”, http://www.findthatdoc.com/search-20687997-hDOC/download-documents-d-g-labour-party-fringe-sep-2007-doc.htm

Somewhat provocatively, we’ve called this meeting ‘Shipping – an answer to Global Warming’. Before I explain why – and why we believe that statement is true – I’d like to look quickly at the nature of the industry we’re considering. Shipping is indispensable to the way we – both here in the UK and people all over the world – live our lives today. The great wealth and comfort we enjoy today is possible only because of the shipping industry. 95% of the UK’s goods, by volume, are transported by ship. I think that bears repeating – 95% of our goods are transported by ship. And internationally 90% of all world trade is moved by sea. Look around you – at the food you eat, the clothes you are wearing, your children’s toys, the car you drive, and probably even the chairs you’re sitting on – virtually everything has come here on a ship. In many cities, shipping is what keeps the lights on at night. Without shipping, half the world would starve and half the world would freeze. For the UK, a small country with a high population density and the 5th largest trading economy in the world, the simple truth is that the country does not have the capacity to sustain its population – even at subsistence level – without external input. Shipping isn’t just vital to our way of life; for us it’s vital to life itself. Just a temporary suspension of shipping and ports activities in the UK would cause panic buying, empty shelves and major food shortages. With the modern “just-in time” deliveries, many items would be unobtainable. Even the National Health Service would quickly run out of a wide range medicines and other supplies! Obviously then, unless we are willing to accept a slowdown in the economy, a significant decline in our standard of living – and even a rationing of essential supplies such as food, clothes and petrol – an improvement in shipping’s carbon footprint can’t be achieved by simply reducing the number of ships or the number of voyages. Shipping demand is a direct function of the demands of world trade. In fact, and as the title of title of today’s debate suggests, I believe that if we look at the issue of global warming more holistically, shipping’s efficiency in terms of greenhouse gas emissions means that, instead of looking at a reduction, we should look at ways of increasing the use of ships to transport our goods – and thereby reduce air and road transport. It is true that ships run on fossil fuels, that they emit carbon dioxide as a product of burning those fuels, and that carbon dioxide is a greenhouse gas. But it is also true that shipping is the most efficient way to transport goods in terms of CO2 emissions – this was clearly confirmed by Sir Nicholas Stern’s Report two years ago. Both we and he measure the potential harm done by reference both to the weight of cargo carried and the distance it is moved – for example, an over 8,000 tonne cargo ship emits about 15 grams of CO2 per tonne-kilometre compared to about 50 grams per tonne-kilometre for a heavy truck or 540 grams per tonne-kilometre for a modern aeroplane. Stern showed that globally all transport produces 14% of man-made CO2 emissions. All water transport – both inland and international shipping – produces 10% of this 14%, ie 1.4% of man-made emissions. And this is the industry that transports 90% of world trade.

#### Nuclear shipping revives US shipbuilding

Page 10 Former officer of British Navy & Columnist-The Register, 9/27, “Nuclear merchant ships could open up Arctic routes for real,” http://www.theregister.co.uk/2010/09/27/nuclear\_shipping/page4.html

Certainly a reappearance of nuclear merchant ships could be excellent news for the UK shipping business in particular for Babcock Marine, the sole British operator of dockyards with nuclear expertise, one of only a few such companies in the world. Nations like China and Korea, with their far lower labour costs, have stolen away most of Blighty's business in regular shipbuilding and maintenance: but, mostly lacking nuclear navies, they lack nuclear yards and expertise. China has a handful of nuclear subs, but they are considered primitive by Russian or Western standards and aren't thought to be very reliable or seaworthy. In a world of nuclear-powered commercial shipping, French, British and US dockyards accustomed to working on nuclear warships to high safety standards would have a major advantage. Lloyds and its US and French counterparts might find the associated knowhow a useful lever for winning business from cheaper (and perhaps even more unscrupulous) class societies elsewhere. In particular, a lot of flag-of-convenience states effectively delegate the running of their shipping safety bureaucracy to class societies, and international law requires a nuclear merchant ship's flag state to do a lot of paperwork. Extra nuclear training for crews would tend to offer more opportunities for Western sailors, too, even if the ships still tended to fly flags of convenience. Rolls-Royce, the UK's builder of nuclear reactors for ships, would also be one of very few competitors for lucrative new business.

#### That’s key to naval power

NLUS 12 Navy League of the United States, “America’s Maritime Industry The foundation of American seapower”, 2012, <http://www.navyleague.org/files/americas-maritime-industry.pdf>, Date Verification – http://gsship.org/industry-links/

Defense Industrial Base: Shipbuilding The American Maritime Industry also contributes to our national defense by sustaining the shipbuilding and repair sector of our national defense industrial base upon which our standing as a seapower is based. History has proven that without a strong maritime infrastructure—shipyards, suppliers, and seafarers—no country can hope to build and support a Navy of sufficient size and capability to protect its interests on a global basis. Both our commercial and naval fleets rely on U.S. shipyards and their numerous industrial vendors for building and repairs. The U.S. commercial shipbuilding and repair industry also impacts our national economy by adding billions of dollars to U.S. economic output annually. In 2004, there were 89 shipyards in the major shipbuilding and repair base of the United States, defined by the Maritime Administration as including those shipyards capable of building, repairing, or providing topside repairs for ships 122 meters (400 feet) in length and over. This includes six large shipyards that build large ships for the U.S. Navy. Based on U.S. Coast Guard vessel registration data for 2008, in that year U.S. shipyards delivered 13 large deep-draft vessels including naval ships, merchant ships, and drilling rigs; 58 offshore service vessels; 142 tugs and towboats, 51 passenger vessels greater than 50 feet in length; 9 commercial fishing vessels; 240 other self- propelled vessels; 23 mega-yachts; 10 oceangoing barges; and 224 tank barges under 5,000 GT. 11 Since the mid 1990’s, the industry has been experiencing a period of modernization and renewal that is largely market-driven, backed by long-term customer commitments. Over the six-year period from 2000-05, a total of $2.336 billion was invested in the industry, while in 2006, capital investments in the U.S. shipbuilding and repair industry amounted to $270 million.12 The state of the industrial base that services this nation’s Sea Services is of great concern to the U.S. Navy. Even a modest increase in oceangoing commercial shipbuilding would give a substantial boost to our shipyards and marine vendors. Shipyard facilities at the larger shipyards in the United States are capable of constructing merchant ships as well as warships, but often cannot match the output of shipyards in Europe and Asia. On the other hand, U.S. yards construct and equip the best warships, aircraft carriers and submarines in the world. They are unmatched in capability, but must maintain that lead. 13

#### Naval power solves nuclear war

Conway et al 7 James – General, US Marine Corps, Commandant of the Marine Corps, Gary Roughead – Admiral, U.S. navy, Chief of Naval Operations, Thad Allen – Admiral, U.S. Coast Guard, Commandant of the Coast Guard, A Cooperative Strategy for 21st Century Seapower, p. http://www.navy.mil/maritime/MaritimeStrategy.pdf

No other disruption is as potentially disastrous to global stability as war among major powers. Maintenance and extension of this Nation’s comparative seapower advantage is a key component of deterring major power war. While war with another great power strikes many as improbable, the near-certainty of its ruinous effects demands that it be actively deterred using all elements of national power. The expeditionary character of maritime forces—our lethality, global reach, speed, endurance, ability to overcome barriers to access, and operational agility—provide the joint commander with a range of deterrent options. We will pursue an approach to deterrence that includes a credible and scalable ability to retaliate against aggressors conventionally, unconventionally, and with nuclear forces. Win our Nation’s wars. In times of war, our ability to impose local sea control, overcome challenges to access, force entry, and project and sustain power ashore, makes our maritime forces an indispensable element of the joint or combined force. This expeditionary advantage must be maintained because it provides joint and combined force commanders with freedom of maneuver. Reinforced by a robust sealift capability that can concentrate and sustain forces, sea control and power projection enable extended campaigns ashore.

#### Now is key---industry collapse causes South China Sea conflict

Crospey 12 Dr. Seth – Senior Fellow at Hudson Institute, Former Assistant to the Secretary of Defense and Deputy Undersecretary of the Navy, ““The U.S. Navy Shipbuilding Plan: Assumptions and Associated Risks to National Security”, Statement before the Committee on Armed Services Subcommittee on Oversight & Investigations U.S. House of Representatives, 4/18, http://www.hudson.org/files/publications/SethCropsey--USNavyShipbuildingPlan--Testimony041812.pdf

If the Navy’s assumption is mistaken that current political leadership will agree to large future increases in shipbuilding we will be headed toward a kind of naval holiday. The equally optimistic expectation that average ship costs can be maintained at $2 billion dollars per vessel prolongs the holiday. This will not be a pleasant holiday. China’s economy has its problems but it continues to perform. Janes Defence Forecasts says that China will double its defense budget between now and 2015.iii Russia plans a $160 billion dollar naval expansion in the Pacific which is to include 36 new submarines and 40 surface ships.iv If a couple postpones needed repairs on their home for a decade and then decides to fix all that has broken they will be very lucky to finish the job in a year. They will also be fortunate because other more prudent owners will have sustained the home repair industry. Our shipbuilding industry does not have the benefit of other purchasers who can sustain it if Navy budgets prove unequal to the task. For the industrial base that supports U.S. shipbuilding a budget-induced naval holiday would be a disaster that could take decades—if ever—from which to recover. Knowledge of shipbuilding remains part of American manufacturing. But accelerating cost, an ageing workforce, reduced orders for warships, and an uncertain future risk the nation’s ability to turn out sufficient numbers of vessels at affordable prices and profitably enough to keep shipbuilding companies alive. The destabilization of the American shipbuilding industrial base is one reason that the cost of warships is outpacing the rate of inflation. The Navy’s reduced procurement of ships over the past twenty years has caused the industry to contract, lay off workers, and in general to become less reliable. This has driven up the cost of labor and the cost of construction materials. The fewer ships the Navy buys, the less lucrative the industry is for skilled workers. As the cost of labor rises shipbuilders are increasingly pressed to attract and train qualified personnel. The negative trends reinforce each other. As younger workers are dissuaded from seeking employment or remaining in the industry by the prospects of sporadic employment those who remain—the existing workers—age. The cycle is self-defeating. Paying older workers increases overhead costs and makes it increasingly expensive to invest in the training and education of a younger workforce. The destabilization of the industrial base also causes costs to rise since many of the materials and products that go into building Navy ships are not useful for other purposes. Since the Navy is buying far fewer ships now than it did in the 1980s, many shipyards rely on a single source for necessary materials. With a virtual monopoly on these products, the suppliers have in large part the ability to name their price. The inefficient manner in which the shipyards acquire these materials drives up labor and overhead costs. The solution lies in stabilizing the American shipbuilding industry. This means that the Navy must either increase its orders of ships and/or improve its business practices, for example disciplining the changes it requires of shipbuilders once orders have been placed and vessels are under construction. Buying and stockpiling spare parts for ships that are already in service and whose need for regular maintenance and repair is well known would also help provide stability for the American shipbuilding industry. In a study conducted on the subject in 2006, the RAND Corporation concluded that the rising costs of building ships is the result of a combination of unsteady U.S. Government procurement rates and a “monopsony relationship” between the government and the shipbuilders. In a monopsony a single purchaser is faced with a host of sellers. Because there is so little American shipbuilding outside of what the Navy purchases, U.S. firms are at the commercial mercy of the 9 percent of the Navy budget devoted to buying ships. A 2005 Government Accountability Office report attributed cost increases in shipbuilding to instability in the entire industry, the difficulty in recruiting and training qualified personnel, high rates of skilled personnel turnover and the shipbuilders’ dependence on a rapidly shrinking supplier base. Finally there are the consequences if U.S. seapower continues to decrease and proves unable to meet even the reduced goals it has set for itself. History is a good guide. Nations in the middle like to side with the winner. During our Civil War British political leadership considered recognizing the Confederacy but was eventually dissuaded by Union military success. In World War II Sweden declared neutrality but grew increasingly amenable to Allied requests as Germany’s military position worsened. Romania initially sided with Germany in the same war but changed sides following U.S. attacks on their oil fields and a coup that deposed the pro-German dictator, Antonescu. Bulgarians followed a similar path from siding with the Nazis to switching their allegiance to the Allies in 1944. Saudi Prince Bandar, acknowledging China’s increasing international prominence and power visited Beijing last year and met with President Hu. American weakness at sea, especially in the Indo-Pacific will change the current military, diplomatic, and commercial character of the region. Whether the U.S. fleet shrinks because of too little funding or because unreformed procurement practices have raised the price of ships or because ships have been called home to save on operational expense, the result is the same. While we were once present in strength, we would be no more. A nation burdened with massive debt whose ability to shape world events has been limited in tandem with its capacity to invest in research and technology will have more and more trouble finding markets. China’s potential hegemony would not only force its neighbors’ to reconsider whether the U.S. is a reliable ally. It would also become an increasingly powerful magnet for trade in the region—at the expense of U.S. commerce. Unlike the U.S. whose seapower has protected global sea lanes that other states have used to their benefit China has a different set of values. It views with suspicion a liberal trading system notwithstanding the benefits received from it. China’s friends include Iran and North Korea. Beijing is a poor candidate to support the international order that has been the keel of U.S. foreign and security policy for a century. Waning U.S. seapower is an invitation that China will regard as a complement to its rising military and navy in particular. It foreshadows a coercive resolution of territorial disputes in the South China Sea, the likelihood of an increased regional arms race, and the troubling international perception that the U.S. is—or has—abandoned its role as a great power. American seapower is the strategic keel of our foreign and security policy. Reducing it would be an exercise of history-making shortsightedness. Restoring it would be an act of statesmanship from which Americans and all who cherish political liberty would benefit for the remainder of this century. Thank you.

#### That’s the most likely scenario for US-China war

Glaser 12 Bonnie S., Senior Fellow – Center for Strategic and International Studies, “Armed Clash in the South China Sea,” CFR, April, http://www.cfr.org/east-asia/armed-clash-south-china-sea/p27883

The risk of conflict in the South China Sea is significant. China, Taiwan, Vietnam, Malaysia, Brunei, and the Philippines have competing territorial and jurisdictional claims, particularly over rights to exploit the region's possibly extensive reserves of oil and gas. Freedom of navigation in the region is also a contentious issue, especially between the United States and China over the right of U.S. military vessels to operate in China's two-hundred-mile exclusive economic zone (EEZ). These tensions are shaping—and being shaped by—rising apprehensions about the growth of China's military power and its regional intentions. China has embarked on a substantial modernization of its maritime paramilitary forces as well as naval capabilities to enforce its sovereignty and jurisdiction claims by force if necessary. At the same time, it is developing capabilities that would put U.S. forces in the region at risk in a conflict, thus potentially denying access to the U.S. Navy in the western Pacific. Given the growing importance of the U.S.-China relationship, and the Asia-Pacific region more generally, to the global economy, the United States has a major interest in preventing any one of the various disputes in the South China Sea from escalating militarily. The Contingencies Of the many conceivable contingencies involving an armed clash in the South China Sea, three especially threaten U.S. interests and could potentially prompt the United States to use force. The most likely and dangerous contingency is a clash stemming from U.S. military operations within China's EEZ that provokes an armed Chinese response. The United States holds that nothing in the United Nations Convention on the Law of the Sea (UNCLOS) or state practice negates the right of military forces of all nations to conduct military activities in EEZs without coastal state notice or consent. China insists that reconnaissance activities undertaken without prior notification and without permission of the coastal state violate Chinese domestic law and international law. China routinely intercepts U.S. reconnaissance flights conducted in its EEZ and periodically does so in aggressive ways that increase the risk of an accident similar to the April 2001 collision of a U.S. EP-3 reconnaissance plane and a Chinese F-8 fighter jet near Hainan Island. A comparable maritime incident could be triggered by Chinese vessels harassing a U.S. Navy surveillance ship operating in its EEZ, such as occurred in the 2009 incidents involving the USNS Impeccable and the USNS Victorious. The large growth of Chinese submarines has also increased the danger of an incident, such as when a Chinese submarine collided with a U.S. destroyer's towed sonar array in June 2009. Since neither U.S. reconnaissance aircraft nor ocean surveillance vessels are armed, the United States might respond to dangerous behavior by Chinese planes or ships by dispatching armed escorts. A miscalculation or misunderstanding could then result in a deadly exchange of fire, leading to further military escalation and precipitating a major political crisis. Rising U.S.-China mistrust and intensifying bilateral strategic competition would likely make managing such a crisis more difficult

#### Extinction

Lieven 12 Anatol, Professor in the War Studies Department – King’s College (London), Senior Fellow – New America Foundation (Washington), “Avoiding US-China War,” New York Times, 6-12, http://www.nytimes.com/2012/06/13/opinion/avoiding-a-us-china-war.html

Relations between the United States and China are on a course that may one day lead to war. This month, Defense Secretary Leon Panetta announced that by 2020, 60 percent of the U.S. Navy will be deployed in the Pacific. Last November, in Australia, President Obama announced the establishment of a U.S. military base in that country, and threw down an ideological gauntlet to China with his statement that the United States will “continue to speak candidly to Beijing about the importance of upholding international norms and respecting the universal human rights of the Chinese people.” The dangers inherent in present developments in American, Chinese and regional policies are set out in “The China Choice: Why America Should Share Power,” an important forthcoming book by the Australian international affairs expert Hugh White. As he writes, “Washington and Beijing are already sliding toward rivalry by default.” To escape this, White makes a strong argument for a “concert of powers” in Asia, as the best — and perhaps only — way that this looming confrontation can be avoided. The economic basis of such a U.S.-China agreement is indeed already in place. The danger of conflict does not stem from a Chinese desire for global leadership. Outside East Asia, Beijing is sticking to a very cautious policy, centered on commercial advantage without military components, in part because Chinese leaders realize that it would take decades and colossal naval expenditure to allow them to mount a global challenge to the United States, and that even then they would almost certainly fail. In East Asia, things are very different. For most of its history, China has dominated the region. When it becomes the largest economy on earth, it will certainly seek to do so. While China cannot build up naval forces to challenge the United States in distant oceans, it would be very surprising if in future it will not be able to generate missile and air forces sufficient to deny the U.S. Navy access to the seas around China. Moreover, China is engaged in territorial disputes with other states in the region over island groups — disputes in which Chinese popular nationalist sentiments have become heavily engaged. With communism dead, the Chinese administration has relied very heavily — and successfully — on nationalism as an ideological support for its rule. The problem is that if clashes erupt over these islands, Beijing may find itself in a position where it cannot compromise without severe damage to its domestic legitimacy — very much the position of the European great powers in 1914. In these disputes, Chinese nationalism collides with other nationalisms — particularly that of Vietnam, which embodies strong historical resentments. The hostility to China of Vietnam and most of the other regional states is at once America’s greatest asset and greatest danger. It means that most of China’s neighbors want the United States to remain militarily present in the region. As White argues, even if the United States were to withdraw, it is highly unlikely that these countries would submit meekly to Chinese hegemony. But if the United States were to commit itself to a military alliance with these countries against China, Washington would risk embroiling America in their territorial disputes. In the event of a military clash between Vietnam and China, Washington would be faced with the choice of either holding aloof and seeing its credibility as an ally destroyed, or fighting China. Neither the United States nor China would “win” the resulting war outright, but they would certainly inflict catastrophic damage on each other and on the world economy. If the conflict escalated into a nuclear exchange, modern civilization would be wrecked. Even a prolonged period of military and strategic rivalry with an economically mighty China will gravely weaken America’s global position. Indeed, U.S. overstretch is already apparent — for example in Washington’s neglect of the crumbling states of Central America.

### 1AC – New

#### CONTENTION 3: HYDROGEN

#### SMR development results in military hydrogen

AET 12 Alternative Energy Today, “Alternative Energy The Ways that the Military is Using,” 10/25, http://www.alternative-energy-today.com/the-ways-that-the-military-is-using-alternative-energy/

One thing that the military leaders stress is the desire for the forces deployed in the theater to be able to be more alternative energy-independent. Currently the US military has policies and procedures in place to interact with allies or sympathetic local populaces to help its forces in the field get their needed energy and clean water when engaged in a foreign military campaign. However, this is not wholly reliable, as the US might well find itself facing unilateral military activities, or have itself in a situation where its allies cannot help it with the resources it needs to conduct its military actions successfully. The US military is very interested in certain alternative energy that, with the right research and development technologically, can make it energy independent, or at least a great deal more so, on the battlefield. One of the things that greatly interests the military along these lines is the development of small nuclear reactors, which could be portable, for producing theater-local electricity. The military is impressed with how clean-burning nuclear reactors are and how energy efficient they are. Making them portable for the typical warfare of today’s highly mobile, small-scaled military operations is something they are researching. The most prominent thing that the US military thinks these small nuclear reactors would be useful for involves the removal of hydrogen (for fuel cell) from seawater. It also thinks that converting seawater to hydrogen fuel in this way would have less negative impact on the environment than its current practices of remaining supplied out in the field. Seawater is, in fact, the military’s highest interest when it comes to the matter of alternative energy supply. Seawater can be endlessly “**mined” for hydrogen**, which in turn powers advanced fuel cells. Using OTEC, seawater can also be endlessly converted into desalinated, potable water. Potable water and hydrogen for power are two of the things that a near-future deployed military force will need most of all. In the cores of nuclear reactors—which as stated above are devices highly interesting, in portable form, to the US military—we encounter temperatures greater than 1000 degrees Celsius. When this level of temperature is mixed with a thermo-chemical water-splitting procedure, we have on our hands the most efficient means of breaking down water into its component parts, which are molecular hydrogen and oxygen. The minerals and salts that are contained in seawater would have to be extracted via a desalination process in order to make the way clear for the water-splitting process. These could then be utilized, such as in vitamins or in salt shakers, or simply sent back to the ocean (recycling). Using the power of nuclear reactors to extract this hydrogen from the sea, in order to then input that into fuel cells to power advanced airplanes, tanks, ground vehicles, and the like, is clearly high on the R & D priority list of the military.

#### SMRs make hydrogen feasible and economical

Science 12, quoting Dr. Ibrahim Khamis of the International Atomic Energy Agency (IAEA), 3/26, “One Day, You May Thank Nuclear Power For The Hydrogen Economy”, www.science20.com/news\_articles/one\_day\_you\_may\_thank\_nuclear\_power\_hydrogen\_economy-88334

The hydrogen economy has been ready to start for decades and could begin commercial production of hydrogen in this decade but, says Dr. Ibrahim Khamis of the International Atomic Energy Agency (IAEA) in Vienna, Austria, it will take heat from existing nuclear plants to make hydrogen economical.¶ Khamis said scientists and economists at IAEA and elsewhere are working intensively to determine how current nuclear power reactors — 435 are operational worldwide — and future nuclear power reactors could be enlisted in hydrogen production.¶ Most hydrogen production at present comes from natural gas or coal and results in releases of the greenhouse gas carbon dioxide. On a much smaller scale, some production comes from a cleaner process called electrolysis, in which an electric current flowing through water splits the H2O molecules into hydrogen and oxygen. This process, termed electrolysis, is more efficient and less expensive if water is first heated to form steam, with the electric current passed through the steam.¶ "There is rapidly growing interest around the world in hydrogen production using nuclear power plants as heat sources," Khamis said. "Hydrogen production using nuclear energy could reduce dependence on oil for fueling motor vehicles and the use of coal for generating electricity. In doing so, hydrogen could have a beneficial impact on global warming, since burning hydrogen releases only water vapor and no carbon dioxide, the main greenhouse gas. There is a dramatic reduction in pollution."¶ Khamis said that nuclear power plants are ideal for hydrogen production because they already produce the heat for changing water into steam and the electricity for breaking the steam down into hydrogen and oxygen. Experts envision the current generation of nuclear power plants using a low-temperature electrolysis which can take advantage of low electricity prices during the plant's off-peak hours to produce hydrogen. Future plants, designed specifically for hydrogen production, would use a more efficient high-temperature electrolysis process or be coupled to thermochemical processes, which are currently under research and development.¶ "Nuclear hydrogen from electrolysis of water or steam is a reality now, yet the economics need to be improved," said Khamis. He noted that some countries are considering construction of new nuclear plants coupled with high-temperature steam electrolysis (HTSE) stations that would allow them to generate hydrogen gas on a large scale in anticipation of growing economic opportunities.

#### Tech is viable—just need hydrogen fuel

Squatriglia 11 Chuck, Wired, 4/22, Discovery Could Make Fuel Cells Much Cheaper, www.wired.com/autopia/2011/04/discovery-makes-fuel-cells-orders-of-magnitude-cheaper/

One of the biggest issues with hydrogen fuel cells, aside from the lack of fueling infrastructure, is the high cost of the technology. Fuel cells use a lot of platinum, which is frightfully expensive and one reason we’ll pay $50,000 or so for the hydrogen cars automakers say we’ll see in 2015. That might soon change. Researchers at Los Alamos National Laboratory have developed a platinum-free catalyst in the cathode of a hydrogen fuel cell that uses carbon, iron and cobalt. That could make the catalysts “two to three orders of magnitude cheaper,” the lab says, thereby significantly reducing the cost of fuel cells. Although the discovery means we could see hydrogen fuel cells in a wide variety of applications, it could have the biggest implications for automobiles. Despite the auto industry’s focus on hybrids, plug-in hybrids and battery-electric vehicles — driven in part by the Obama administration’s love of cars with cords — several automakers remain convinced hydrogen fuel cells are the best alternative to internal combustion. Hydrogen offers the benefits of battery-electric vehicles — namely zero tailpipe emissions — without the drawbacks of short range and long recharge times. Hydrogen fuel cell vehicles are electric vehicles; they use a fuel cell instead of a battery to provide juice. You can fill a car with hydrogen in minutes, it’ll go about 250 miles or so and the technology is easily adapted to everything from forklifts to automobiles to buses. Toyota, Mercedes-Benz and Honda are among the automakers promising to deliver hydrogen fuel cell vehicles in 2015. Toyota has said it has cut the cost of fuel cell vehicles more than 90 percent by using less platinum — which currently goes for around $1,800 an ounce — and other expensive materials. It plans to sell its first hydrogen vehicle for around $50,000, a figure Daimler has cited as a viable price for the Mercedes-Benz F-Cell (pictured above in Australia). Fifty grand is a lot of money, especially something like the F-Cell — which is based on the B-Class compact — or the Honda FCX Clarity. Zelenay and Wu in the lab. In a paper published Friday in Science, Los Alamos researchers Gang Wu, Christina Johnston and Piotr Zelenay, joined by Karren More of Oak Ridge National Laboratory, outline their platinum-free cathode catalyst. The catalysts use carbon, iron and cobalt. The researchers say the fuel cell provided high power with reasonable efficiency and promising durability. It provided currents comparable to conventional fuel cells, and showed favorable durability when cycled on and off — a condition that quickly damages inferior catalysts. The researchers say the carbon-iron-cobalt catalyst completed the conversion of hydrogen and oxygen into water, rather than producing large amounts of hydrogen peroxide. They claim the catalyst created minimal amounts of hydrogen peroxide — a substance that cuts power output and can damage the fuel cell — even when compared to the best platinum-based fuel cells. In fact, the fuel cell works so well the researchers have filed a patent for it. The researchers did not directly quantify the cost savings their cathode catalyst offers, which would be difficult because platinum surely would become more expensive if fuel cells became more prevalent. But the lab notes that iron and cobalt are cheap and abundant, and so the cost of fuel cell catalysts is “definitely two to three orders of magnitude cheaper.” “The encouraging point is that we have found a catalyst with a good durability and life cycle relative to platinum-based catalysts,” Zelenay said in a statement. “For all intents and purposes, this is a zero-cost catalyst in comparison to platinum, so it directly addresses one of the main barriers to hydrogen fuel cells.”

#### Key to UAV effectiveness

NRL 10 Naval Research Laboratory, Fall, Fuel Cell Power Soar on Fuel Cell Power, http://www.nrl.navy.mil/content\_images/SPECTRA\_Fall2010.pdf

Piloted remotely or autonomously, unmanned aerial vehicles have long provided extra “eyes in the sky,” especially for missions that are too dangerous for manned aircraft. At the Naval Research Laboratory (NRL), scientists are merging UAV technology and alternative energy research to develop advanced, fuel-cell-powered UAVs that can fly longer, lower, quieter, and farther than their traditionally powered counterparts, offering significant tactical advantages.¶ Building on its extensive experience developing battery-powered electric UAVs, NRL began research into fuel cell UAVs in 2003. Starting with a small, 100-watt fuel cell from Protonex Technology Corporation, an NRL team assembled a power system from off-the-shelf parts such as tubing and aluminum foil to make the radiator, and a tank from a paintball gun to hold high-pressure hydrogen for¶ fuel. They retrofitted the system into a sailplane kit and called the vehicle the “Spider Lion.” In its November 2005 demonstration flight, the 6-pound Spider Lion flew for 3.3 hours with only a half-ounce of hydrogen in its tank. Although the Spider Lion was far from a useful military vehicle — it had no payload and was not very durable — it showed that fuel-cell-powered flight was possible for UAVs.¶ Why Fuel Cells?¶ Fuel cells offer clean, quiet, high-efficiency electric power for UAVs. Proton exchange membrane (PEM) fuel cells, also called polymer fuel cells, are electrochemical devices that create an electric current when they combine hydrogen and oxygen to make water. They consume only hydrogen and air, and their only emissions are water and heat.¶ Fuel cells are two to three times more efficient than internal combustion engines, and have much greater endurance than batteries. While batteries provide quiet and reliable electrical energy, and are used to power many of he small UAVs on the battlefield today, their low endurance translates into less time collecting intelligence and more time spent on “refueling” and turnaround. Fuel cell systems overcome these limitations.¶ The Navy is interested in harnessing fuel cell technology to increase power potential and energy efficiency across its operational spectrum — from air vehicles to ground vehicles to undersea vehicles; to man-portable power generation for Marine expeditionary missions; to meeting power needs afloat.¶ The Office of Naval Research (ONR), a major sponsor of NRL’s fuel cell research, has been supporting the development of innovative power and energy technologies for decades. “Pursuing energy efficiency and energy independence are core to ONR’s Power and Energy Focus Area,” said Rear Admiral Nevin Carr, Chief of Naval Research. “ONR’s investments in alternative energy sources, like fuel cell research, have application to the Navy and Marine Corps mission in future UAVs and vehicles. These investments also contribute directly to solving some of the same technology challenges faced at the national level.”¶ Lightweight, Durable, and Stealthy: XFC In 2006, through sponsorship of ONR and the Office of the Secretary of Defense’s Rapid Reaction Technology Office and Office of Technology Transition, NRL partnered with Protonex Technology Corporation to design and build a hydrogen fuel cell power plant for a battlefield-capable, payload-carrying UAV. They aimed to put the most power they could into the smallest and lightest package possible. The team first tested a new 2.2-pound, 300-watt fuel cell system onboard the eXperimental Fuel Cell unmanned aerial system, or XFC UAS. NRL’s Chemistry and Tactical Electronic Warfare divisions developed the XFC UAS as an affordably expendable surveillance platform. It is a folding-wing UAV that ejects from an 18” diameter transport tube and unfolds to its X-shaped flight configuration after launch. XFC is fully autonomous and weighs 19 pounds with a 2.5-pound payload. The hydro a vehicle called the Ion Tiger. For the Ion Tiger UAV, the mission goal was to fly for 24 hours and carry a 5-pound payload — the approximate weight of common payloads such as a day/night camera or a communication relay. NRL again teamed with Protonex Technology Corporation to improve the fuel cell system, along with the University of Hawaii for systems testing and modeling, HyperComp Engineering to build the hydrogen tanks, and Arcturus UAV to build the airframe. The team designed a 37-pound vehicle with a 17-foot wingspan, allowing 13 pounds (0.75 horsepower) fuel cell system still weighed only 2.2 pounds, but now was more efficient, converting 99 percent of the hydrogen fuel to electricity at 40 to 55 percent efficiency. NRL developed thermal and systems models and new methods to make custom hydrogen fuel tanks, making the entire fuel cell system design modular so it can be adapted to a variety of military and commercial platforms. In October 2009, at the U.S. Army’s Aberdeen Proving Ground on the northwestern shore of Maryland’s Chesapeake Bay, the Ion Tiger was launched for its much-anticipated test flight. The UAV stayed aloft for23 hours and 17 minutes to set an unofficial endurance record for fuelcell-powered flight, despite stormy and windy weather conditions. The Ion Tiger was flown again in November 2009 for an unprecedented 26 hours and 1 minute, beating its previous record and exceeding program goals. Through these demonstrations, NRL proved that polymer fuel cell technology can meet or surpass the performance of traditional power systems. In fact, the Ion Tiger fuel cell system provided seven times the endurance of the equivalent weight in batteries. “This is something that, until now, has not been achieved by anyone,” said ONR Program Manager Dr. Michele Anderson. “The Ion Tiger successfully demonstrates ONR’s vision to show how efficient, clean technology can be used to improve the warfighter’s capabilities.” NRL has come a long way since that first Spider Lion flight. “Today,” says NRL’s principal investigator for alternative energy research, Dr. Karen Swider-Lyons, “these long-endurance flights are made possible by the team’s sustained research on high-power fuel cell systems, lightweight hydrogen-gas storage tanks, improved thermal management, and the effective integration of these systems.” ¶ The Sky’s the Limit¶ NRL scientists and engineers are already working on the next generation of fuel cell UAVs. They are focusing on tripling the flight endurance of the present power system by using cryogenic liquid hydrogen, which can be stored at about a third the weight of the compressed hydrogen gas. They are also exploring a larger system with a 1.5-kilowatt (2-horsepower) fuel cell capable of carrying a 15to 30-pound payload.¶ Military planners want these stealthy, more capable, fuel-cell-powered UAVs. These aircraft will be able to stay on station for long periods of time, supplying commanders with continuous surveillance. Their long endurance will enable them to serve as communication relays. Their quiet propulsion will allow them to fly undetected at low altitudes, and thus perform high-quality surveillance with low-resolution imaging systems. The hydrogen fuel can be electrolyzed directly from seawater onboard Navy ships, so these UAVs could reduce some of the logistics burdens associated with traditional fuels.¶ The ultimate benefit will be to replace large, manned aircraft with smaller, less expensive fuel cell UAVs — keeping more personnel out of harm’s way and improving tactical capabilities, all by using a “green,” quiet, efficient, and affordable fuel system.

#### UAVs key to force projection, application, and battlefield awareness—fuel cells key

Gross et al 11 Thomas, Albert Poche, Kevin Ennis, DOD Defense Logistics Agency Research & Development, 10/19, Beyond Demonstration: The Role of Fuel Cells in DoD's Energy Strategy, http://www.chfcc.org/publications/reports/dod-fuel-cell\_10-19-11\_dlafuelcells.pdf

Future uses for unmanned vehicles may extend well beyond their current missions. The Integrated Roadmap maps projected unmanned systems against JCAs to determine how unmanned systems can contribute to DoD missions in the future. Its conclusions indicate that future unmanned systems could be key contributors to:¶ Battlefield awareness. Unmanned systems in all domains can significantly contribute to future battlefield awareness. Missions will include expeditionary runway evaluation, nuclear forensics, and special forces beach reconnaissance. Future applications will require longer mission endurance to conduct persistent reconnaissance and surveillance.¶ Force application. Unmanned systems are projected to have a large presence in this JCA. Future missions for UAVs include air-to-air combat and suppression and defeat of enemy air defense. UGVs are expected to conduct missions such as non-lethal and lethal crowd control, dismounted offensive operations, and armed reconnaissance and assault operations. UUV and unmanned surface vehicle missions are projected to include mine laying as well as mine neutralization.¶ Protection. Unmanned systems are projected to perform tasks such as firefighting, decontamination, forward operating base security, installation security, obstacle construction and breaching, vehicle and personnel search and inspection, mine clearance and neutralization, more sophisticated explosive ordnance disposal, casualty extraction and evacuation, and maritime interdiction.¶ Logistics. Unmanned systems are expected to transport supplies and perform maintenance tasks such as inspection, decontamination, and refueling. Future safety-related tasks will include munitions and material handling and combat engineering.¶ Force support. The capabilities of unmanned systems may allow them to have a significant impact on medical sup port. They also could contribute to nuclear and bio-weapon forensics and contaminated remains recovery.¶ In March 2011, ONR issued a BAA seeking proposals on longendurance unmanned undersea vehicle propulsion. The BAA states, “Greater breadth of mission profiles for current and future Naval UUVs require longer endurance stealthy propulsion systems that extend the current capability of 10–40 hours to several days or weeks.”¶ VALUE PROPOSITION FOR DoD BENEFITS¶ For the unmanned vehicle application, mission accomplishment is generally the highest priority consideration in making vehicle design and systems decisions. Compared to other power options, fuel cells can provide improved mission capability.¶ Increased mission endurance. Fuel cell systems can increase flight duration for UAVs; time on station for UAVs and UUVs; and range for all unmanned vehicles (“DoD Fuel Cell Activities” and “Other Fuel Cell Activities,” above.) Current power sources limit the ability of unmanned vehicles to support long-duration missions.¶ Reduced noise and heat signatures. The sound and heat that conventional power systems produce sometimes limit how well unmanned vehicles can accomplish their missions. Fuel cells can be an attractive option for vehicles where sound or operating temperature are considerations.¶ Increased efficiency. Fuel cells are significantly more energy efficient than internal combustion engines, which improves mission duration.[70]

#### Key to ISR—solves crisis management

Trefz 3 John L, Jr., LCDR, US Navy, From Persistent ISR to Precision Strikes: The Expanding Role of UAVs, http://www.dtic.mil/dtic/tr/fulltext/u2/a420264.pdf

“Operational intelligence is directed at collection, analysis, and evaluation of information dealing with all aspects of the situation in a given theater of operation plus adjacent areas of interest.”21 The ability to gather timely, relevant intelligence is critical to the success of any major operation or campaign. The capability to provide adequate coverage of the operational commander’s Area of Responsibility (AOR) or Area of Interest (AOI) depends on the integration of both manned and unmanned assets. The level of effort will vary with the size (factor space) of the AOR/AOI and the time available (factor time) for intelligence collection.¶ During the pre-hostility stage of a conflict, UAVs can assist manned assets in the Intelligence Preparation of the Theater (IPT). Easily transportable and rapidly deployable, both the Global Hawk and Predator systems can quickly respond to an emerging crisis. Their smaller “footprint” in a given theater allows the operational commander to gather intelligence with less diplomatic and political interference. The deployment of manned platforms such as the JSTARS or Rivet Joint aircraft to monitor a given crisis results in a very large support package to sustain operations. Once these aircraft are in theater, Operational Security (OPSEC) becomes more challenging and Military Deception (MILDEC) may be lost.¶ During the monitoring of adversary activity, the presence of easily identifiable, radar significant intelligence platforms makes easier the enemy’s job of hiding his activities. UAVs’ smaller size, combined with long endurance and unlimited sustainability, makes them the optimal platform during the pre-hostility phase of operations.¶ Once hostilities commence, the UAV remains the premier intelligence-gathering platform. The reduced risk to coalition aircraft and personnel in high-threat environments makes UAV employment ideal. Although systems such as the Global Hawk at $10 million per unit are not considered expendable, the cost of losing one of these assets is insignificant when compared to the loss of a manned asset and its aircrew. The ability of UAVs to provide real-time BDA to the operational commander will allow more efficient allocation of follow-on strike assets to maximize their effects on the enemy’s ability to continue to resist.¶ Command and Control Warfare (C2W)¶ Information Warfare (IW) is the “actions aimed at achieving information superiority by denying, exploiting, corrupting, or destroying the enemy’s information and information functions while protecting one’s own from enemy attack.”23 C2W uses OPSEC, MILDEC, PSYOPS, Electronic Warfare (EW) and Physical Destruction to defeat the enemy’s Command and Control (C2) functions while protecting one’s own.24 The UAV has the ability to accomplish all of these functions effectively.¶ As mentioned before, the employment of UAVs for monitoring and IPT missions improves both OPSEC and MILDEC activities. Additionally, the psychological impact to the enemy of constant monitoring and surveillance cannot be overlooked. The ability of the UAV to maintain 24/7 coverage of selected portions of the AOR will make it virtually impossible for the enemy to determine if or when he is being watched. The “CNN Factor” of constant coverage will make him think that all his movements are under scrutiny. When you add a limited strike capability to the UAV, such as armed Predators, the adversary commander would have to assume that all UAVs are armed.¶ Another subset of C2W is Electronic Warfare (EW). This is an area where the UAV can tackle the “dull” and the “dangerous” missions presently performed by manned aircraft. The three parts of EW are Electronic Attack (EA), Electronic Protect (EP), and Electronic Support (ES).25 EA serves to deny the enemy’s operational commander the use of the electromagnetic spectrum while EP serves to safeguard the use of the same spectrum for our operational commander. ES involves those activities which serve to identify our enemy’s activities and help locate the threats (SIGINT is a by-product). ES also helps to provide Indications and Warnings (I&W) to our forces of immediate threats or potential future threats enhancing overall Force Protection. The Global Hawk UAV is ideally suited for the mission of monitoring enemy electronic emissions and providing timely threat warnings to the operational commander. As UAV technology advances, they will prepare the battlefield by leading the way into high threat envelopes and neutralizing enemy air defense systems. As mentioned before, they are not expendable, but their loss would be more acceptable than that of a manned aircraft.

#### Key to de-escalate crises—the alternative is deterrence collapse and wars

Alcazar 12 Vincent, Colonel, USAF, Winter, Crisis Management and the Anti-Access/Area Denial Problem, http://www.au.af.mil/au/ssq/2012/winter/alcazar.pdf

America’s political and military leaders rely on unimpeded US force movements across strategic distances to stabilize regions and deter threatening regimes. That reliance depends on assured air and naval superiority as a precondition. US leaders assume that with air and naval superiority during wartime, the United States can secure its interests and attain its objectives through robust military intelligence, logistics, maneuver, and firepower. But the rise of anti-access (A2) and area denial (AD) strategies and capabilities poses a problem for US foreign policy: A2/AD thwarts US ability to project power and force on its own terms. By using an A2/ AD strategy, regional adversaries are able to contest US power projection and presence. This strategy and capability allows adversaries to oppose the United States across its operational and strategic depth.¶ When Pres. Barack Obama and Secretary of Defense Leon Panetta unveiled the new DoD strategic guidance, Sustaining US Global Leadership: Priorities For The 21st Century Defense, on 3 January 2012, Secretary Panetta wrote in his introduction, “this country is at a strategic turning point after a decade of war and, therefore, we are shaping a Joint Force for the future that will be smaller and leaner, but will be agile, flexible, ready, and technologically advanced.”1 Additionally, “it [joint force] will have cutting edge capabilities, exploiting our technological, joint, and networked advantage.” The document referenced the challenges to US power projection by A2/AD and identified competitors to US power projection. Specifically, China and Iran were cited as “[pursuing] asymmetric means to counter our power projection capabilities, while the proliferation of sophisticated weapons and technology will extend to nonstate actors as well.”2 The A2/AD verbiage in the document indicates what must be done: the United States must have assured methods of projecting military force where presence of that force will be contested.3 The DoD strategic guidance document also discussed the recently completed Joint Operational Access Concept (JOAC).4 While the JOAC addresses how US forces must be able to enter highly contested places, it is not a conceptual design that promotes strategic theories for shaping and deterring A2/AD adversaries.5¶ Without a better understanding of the A2/AD problem and new ideas to assure its power and force projection, the United States will gradually lose its ability to shape regions and deter A2/AD adversaries. The A2/ AD challenge demands an offsetting strategy, a retooling of US power and force projection concepts, and an examination of the ways US power projection can shape A2/AD crisis management. This article presents the concept of A2/AD, including the nature of the problem, and amplifies the A2/AD strategy. It then offers a new crisis management design framework, followed by planning considerations for the future of A2/AD.¶ The terms in figure 1 make the case for an applied design concept to better manage crises in A2/AD settings. They imply the notion of the “A2/AD portfolio”—an adversary’s all-of-their-government method of undermining regional stabilization that also blunts US projection of power and force. The US “offsetting strategy” refers to a multilinear whole-of-government method geared to overcome the resistance and effects of a rival’s A2/AD strategy. ¶ The primary benefit of this design concept for crisis management is to ensure the United States can continue to use assured military presence and whole-of-government synchronized effort to strengthen its influence in key regions. Other benefits include improved understanding and specified design that allow the United States to better shape a crisis with an A2/AD adversary; or alternatively, better position its entry into conflict against an A2/AD threat. There are three premises which underlie this concept for crisis management: (1) the nature of war does not change, but the character of war does change from era to era,6 (2) the United States will need fresh theories and concepts of shaping, deterring, and war fighting less tethered to its traditions of annihilation warfare, and (3) A2/AD will multiply US force attrition, erode its conventional deterrence, and undercut its ability to manage escalation and deescalation.

#### Nuclear war

Kagan and O’Hanlon 7 Frederick, resident scholar at AEI and Michael, senior fellow in foreign policy at Brookings, “The Case for Larger Ground Forces”, April 2007, http://www.aei.org/files/2007/04/24/20070424\_Kagan20070424.pdf

We live at a time when wars not only rage in nearly every region but threaten to erupt in many places where the current relative calm is tenuous. To view this as a strategic military challenge for the United States is not to espouse a specific theory of America’s role in the world or a certain political philosophy. Such an assessment flows directly from the basic bipartisan view of American foreign policy makers since World War II that overseas threats must be countered before they can directly threaten this country’s shores, that the basic stability of the international system is essential to American peace and prosperity, and that no country besides the United States is in a position to lead the way in countering major challenges to the global order. Let us highlight the threats and their consequences with a few concrete examples, emphasizing those that involve key strategic regions of the world such as the Persian Gulf and East Asia, or key potential threats to American security, such as the spread of nuclear weapons and the strengthening of the global Al Qaeda/jihadist movement. The Iranian government has rejected a series of international demands to halt its efforts at enriching uranium and submit to international inspections. What will happen if the US—or Israeli—government becomes convinced that Tehran is on the verge of fielding a nuclear weapon? North Korea, of course, has already done so, and the ripple effects are beginning to spread. Japan’s recent election to supreme power of a leader who has promised to rewrite that country’s constitution to support increased armed forces—and, possibly, even nuclear weapons— may well alter the delicate balance of fear in Northeast Asia fundamentally and rapidly. Also, in the background, at least for now, Sino Taiwanese tensions continue to flare, as do tensions between India and Pakistan, Pakistan and Afghanistan, Venezuela and the United States, and so on. Meanwhile, the world’s nonintervention in Darfur troubles consciences from Europe to America’s Bible Belt to its bastions of liberalism, yet with no serious international forces on offer, the bloodletting will probably, tragically, continue unabated. And as bad as things are in Iraq today, they could get worse. What would happen if the key Shiite figure, Ali al Sistani, were to die? If another major attack on the scale of the Golden Mosque bombing hit either side (or, perhaps, both sides at the same time)? Such deterioration might convince many Americans that the war there truly was lost—but the costs of reaching such a conclusion would be enormous. Afghanistan is somewhat more stable for the moment, although a major Taliban offensive appears to be in the offing. Sound US grand strategy must proceed from the recognition that, over the next few years and decades, the world is going to be a very unsettled and quite dangerous place, with Al Qaeda and its associated groups as a subset of a much larger set of worries. The only serious response to this international environment is to develop armed forces capable of protecting America’s vital interests throughout this dangerous time. Doing so requires a military capable of a wide range of missions—including not only deterrence of great power conflict in dealing with potential hotspots in Korea, the Taiwan Strait, and the Persian Gulf but also associated with a variety of Special Forces activities and stabilization operations. For today’s US military, which already excels at high technology and is increasingly focused on re-learning the lost art of counterinsurgency, this is first and foremost a question of finding the resources to field a large-enough standing Army and Marine Corps to handle personnel intensive missions such as the ones now under way in Iraq and Afghanistan. Let us hope there will be no such large-scale missions for a while. But preparing for the possibility, while doing whatever we can at this late hour to relieve the pressure on our soldiers and Marines in ongoing operations, is prudent. At worst, the only potential downside to a major program to strengthen the military is the possibility of spending a bit too much money. Recent history shows no link between having a larger military and its overuse; indeed, Ronald Reagan’s time in office was characterized by higher defense budgets and yet much less use of the military, an outcome for which we can hope in the coming years, but hardly guarantee. While the authors disagree between ourselves about proper increases in the size and cost of the military (with O’Hanlon preferring to hold defense to roughly 4 percent of GDP and seeing ground forces increase by a total of perhaps 100,000, and Kagan willing to devote at least 5 percent of GDP to defense as in the Reagan years and increase the Army by at least 250,000), we agree on the need to start expanding ground force capabilities by at least 25,000 a year immediately. Such a measure is not only prudent, it is also badly overdue.

#### UAVs key to interdictions in the Caribbean---solves the drug trade

Purdy 8 Ellen, director, Joint Ground Robotics Enterprise, within the Office of the Deputy Under Secretary of Defense for Acquisition and Technology, and is responsible for oversight and funding of ground robotics technology development, “The Increasing Role of Robots in National Security” May-June 2008, Defense AT&L, page 27

In U.S. Southern Command’s area of responsibility in Central and South America and the Caribbean, one of the most significant threats to national security is the drug trade and narco-terrorism. Drug revenues finance and equip terrorists and insurgents, so if the movement of drugs can be interdicted, then funding for insurgents dries up. A significant challenge for SOUTHCOM is the immense variety of mountainous and jungle terrain that is difficult to see and maneuver through, for which reasons, it is a haven for drug traffickers and insurgents. Since so much of the drug trade operates in jungle conditions, and transport is largely conducted by river, SOUTHCOM is exploring whether different robotic systems could operate together to conduct reconnaissance and interdiction missions.¶ Reduced Risk of Casualty¶ Unmanned aerial vehicles equipped with foliage-penetrating radar could potentially scout areas of interest. If suspicious activity is detected, the aerial vehicle would then send global positioning system coordinates to unmanned vehicles on the ground or on a river, enabling the vehicles to conduct reconnaissance closer to the area of interest. Vast areas could be covered by the unmanned systems, and personnel would be sent in only after confirmation that interdiction is warranted. This is an idea that capitalizes on the advantages of robotics. Robots can operate for long periods without becoming fatigued and losing their sharp perception—they don’t get tired or hungry—and they keep personnel from being detected and harmed by insurgents.

#### That’s key to prevent Latin American instability, bioterror, and LNG attacks

Flynn and Bryan 1 Stephen, Senior Fellow @ CFR and Commander in US Coast Guard, and Anthony, Dir. North-South Center’s Caribbean Program, “Terrorism, Porous Borders, and Homeland Security: The Case for U.S.-Caribbean Cooperation”, October 21

Terrorist acts can take place anywhere. The Caribbean is no exception. Already the linkages between drug trafficking and terrorism are clear in countries like Colombia and Peru, and such connections have similar potential in the Caribbean. The security of major industrial complexes in some Caribbean countries is vital. Petroleum refineries and major industrial estates in Trinidad, which host more than 100 companies that produce the majority of the world’s methanol, ammonium sulphate, and 40 percent of U.S. imports of liquefied natural gas (LNG), are vulnerable targets. Unfortunately, as experience has shown in Africa, the Middle East, and Latin America, terrorists are likely to strike at U.S. and European interests in Caribbean countries.¶ Security issues become even more critical when one considers the possible use of Caribbean countries by terrorists as bases from which to attack the United States. An airliner hijacked after departure from an airport in the northern Caribbean or the Bahamas can be flying over South Florida in less than an hour. Terrorists can sabotage or seize control of a cruise ship after the vessel leaves a Caribbean port. Moreover, terrorists with false passports and visas issued in the Caribbean may be able to move easily through passport controls in Canada or the United States. (To help counter this possibility, some countries have suspended "economic citizenship" programs to ensure that known terrorists have not been inadvertently granted such citizenship.) Again, Caribbean countries are as vulnerable as anywhere else to the clandestine manufacture and deployment of biological weapons within national borders.

#### Bioterror causes extinction

Ochs 2 | Past president of the Aberdeen Proving Ground Superfund Citizens Coalition, Member of the Depleted Uranium Task force of the Military Toxics Project, and M of the Chemical Weapons Working Group [Richard Ochs, , June 9, 2002, “Biological Weapons Must Be Abolished Immediately,” <http://www.freefromterror.net/other_articles/abolish.html>]

Of all the weapons of mass destruction, the genetically engineered biological weapons, many without a known cure or vaccine, are an extreme danger to the continued survival of life on earth. Any perceived military value or deterrence pales in comparison to the great risk these weapons pose just sitting in vials in laboratories. While a “nuclear winter,” resulting from a massive exchange of nuclear weapons, could also kill off most of life on earth and severely compromise the health of future generations, they are easier to control. Biological weapons, on the other hand, can get out of control very easily, as the recent anthrax attacks has demonstrated. There is no way to guarantee the security of these doomsday weapons because very tiny amounts can be stolen or accidentally released and then grow or be grown to horrendous proportions. The Black Death of the Middle Ages would be small in comparison to the potential damage bioweapons could cause. Abolition of chemical weapons is less of a priority because, while they can also kill millions of people outright, their persistence in the environment would be less than nuclear or biological agents or more localized. Hence, chemical weapons would have a lesser effect on future generations of innocent people and the natural environment. Like the Holocaust, once a localized chemical extermination is over, it is over. With nuclear and biological weapons, the killing will probably never end. Radioactive elements last tens of thousands of years and will keep causing cancers virtually forever. Potentially worse than that, bio-engineered agents by the hundreds with no known cure could wreck even greater calamity on the human race than could persistent radiation. AIDS and ebola viruses are just a small example of recently emerging plagues with no known cure or vaccine. Can we imagine hundreds of such plagues? HUMAN EXTINCTION IS NOW POSSIBLE. Ironically, the Bush administration has just changed the U.S. nuclear doctrine to allow nuclear retaliation against threats upon allies by conventional weapons. The past doctrine allowed such use only as a last resort when our nation’s survival was at stake. Will the new policy also allow easier use of US bioweapons? How slippery is this slope?

#### Latin American instability causes nuke war

Rochlin 94 James Francis, Professor of Political Science at Okanagan University College, “Discovering the Americas: the evolution of Canadian foreign policy towards Latin America,” p. 130-131.

While there were economic motivations for Canadian policy in Central America, security considerations were perhaps more important. Canada possessed an interest in promoting stability in the face of a potential decline of U.S. hegemony in the Americas. Perceptions of declining U.S. influence in the region – which had some credibility in 1979-1984 due to the wildly inequitable divisions of wealth in some U.S. client states in Latin America, in addition to political repression, under-development, mounting external debt, anti-American sentiment produced by decades of subjugation to U.S. strategic and economic interests, and so on – were linked to the prospect of explosive events occurring in the hemisphere. Hence, the Central American imbroglio was viewed as a fuse which could ignite a cataclysmic process throughout the region. Analysts at the time worried that in a worst case scenario, instability created by a regional war, beginning in Central America and spreading elsewhere in Latin America, might **preoccupy Washington** to the extent that the United States would be **unable to perform adequately its important hegemonic role** in the international arena – a concern expressed by the director of research for Canada’s Standing Committee Report on Central America. It was feared that such a predicament could generate **increased global instability and** perhaps even **a hegemonic war**. This is one of the motivations which led Canada to become involved in efforts at regional conflict resolution, such as Contadora, as will be discussed in the next chapter.

#### LNG accidents cause extinction

Lovins 1 Hunter and Amory Lovins work together as analysts, lecturers and consultants on energy, resource and security policy in over 30 countries. Hunter Lovins has degrees in Law, Political Studies and Sociology and an honorary doctorate, and is a member of the California Bar. For six years she was assistant Director of the California Conservation project. Amory Lovins is a consultant experimental physicist, educated at Harvard and Oxford, who has published 23 books (many co-authored with Hunter) and several hundred papers. He has held various academic chairs, received six honorary doctorates, served on the US Department of Energy's senior advisory board, and consulted (often with Hunter) for scores of energy companies, manufacturing firms, governments and international organisations. The Lovineses have received numerous awards for their work. Brittle Power : Energy Strategy for National Security – Rocky Mountain Institute -- http://www.rmi.org/images/other/S-BrPwr-Parts123.pdf -- also available @ http://www.transitcommerce.com/Harpswell/weeks.asp

LNG is less than half as dense as water, so a cubic meter of LNG (the usual unit of measure) weighs just over half a ton. LNG contains about thirty per-cent less energy per cubic meter than oil, but is potentially far more hazardous. Burning oil cannot spread very far on land or water, but a cubic meter of spilled LNG rapidly boils into about six hundred twenty cubic meters of pure natural gas, which in turn mixes with surrounding air. Mixtures of between about five and fourteen percent natural gas in air are flammable. Thus a single cubic meter of spilled LNG can make up to twelve thousand four hundred cubic meters of flammable gas-air mixture. A single modern LNG tanker typically holds one hundred twenty-five thousand cubic meters of LNG, equivalent to twenty-seven hundred million cubic feet of natural gas. That gas can form between about twenty and fifty billion cubic feet of flammable gas-air mixture—several hundred times the volume of the Great Pyramid of Cheops. About nine percent of such a tankerload of LNG will probably, if spilled onto water, boil to gas in about five minutes. (It does not matter how cold the water is; it will be at least two hundred twenty-eight Fahrenheit degrees hotter than the LNG, which it will therefore cause to boil violently.) The resulting gas, however, will be so cold that it will still be denser than air. It will therefore flow in a cloud or plume along the surface until it reaches an ignition source. Such a plume might extend at least three miles downwind from a large tanker spill within ten to twenty minutes. It might ultimately reach much farther—perhaps six to twelve miles. If not ignited, the gas is asphyxiating. If ignited, it will burn to completion with a turbulent diffusion flame reminiscent of the 1937 Hindenberg disaster but about a hundred times as big. Such a fireball would burn everything within it, and by its radiant heat would cause third-degree burns and start fires a mile or two away. An LNG fireball can blow through a city, creating “a very large number of ignitions and explosions across a wide area. No present or foreseeable equipment can put out avery large [LNG]... fire.” The energy content of a single standard LNG tanker (one hundred twenty-five thousand cubic meters) is equivalent to seven-tenths of a megaton of TNT, or about fifty-five Hiroshima bombs.

#### UAVs key to nuclear forensics

TRS 8 The Royal Society, 2008, “Detecting nuclear and radiological materials”, http://www.offiziere.ch/wp-content/uploads/Detecting-nuclear-and-radiological-materials.pdf

Airborne radiation surveys have a well developed history of use with applications ranging from mineral exploration and geological mapping, to fallout mapping, nuclear site characterisation and source searches under diverse conditions. They have a key role to play in emergency response to map areas after contamination, and UAV platforms are particularly suited to this application. The Israeli Caspar UAV prototype can fly at a height of up 700 m at speeds of 20-85 km/h for up to 1.5 hours, and its field of view is over 10 km. The Caspar includes an off-the-shelf, combined gamma and neutron CsI(TI) (caesium iodide doped with thalium iodide) radiation detector, in addition to a camera and a global positioning system (GPS). It can fly at low altitude and transmit both its detection data and position in real time to a ground based team. Advantages of UAV systems are that they are light weight and can be deployed rapidly from any site. They are also considerably less costly to operate than aircraft and helicopter based systems. Being unpiloted and remote-controlled, they minimise radiation exposure to personnel and can even be disposed of afterwards if contaminated. These features make UAVs ideal for fast scanning and mapping of large contaminated areas, and monitoring and sampling radioactive plumes. 5.3 Urban surveys Aerial detection has an important role to play in urban surveys and the manoeuvrability of rotary-wing systems means that they are particularly suited to this role. Helicopter based systems allow survey flights to be performed at low altitude of 50 m in open space and 100 m in urban areas, and at low speeds of approximately 70 km/h to ensure uniform coverage and to provide high detection sensitivities. A typical helicopter based system might incorporate at least one germanium detector, as well as NaI detectors, a radioThe Royal Society Detecting nuclear and radiological materials | March 2008 | 13 RS policy document 07/08 altimeter, and a GPS. These detectors need to be light, compact, and modular so that they can be easily attached to the helicopter. Urban surveys present particular difficulties due to the high levels of background NORM in cities. In the built urban environment, there are many point source signals and so aerial detection can trace a source to a general area but not to a particular building. A two-tiered detection approach is a potential solution to this problem, using aerial detection to identify hotspots followed by vehicle based and other mobile systems to isolate the location of sources for further investigation. 5.4 Vehicle and mobile systems The smaller fields of view of vehicle based and other mobile systems allow for a greater level of detail in detection operations to complement wide-range airborne systems. Vehicle based systems, as well as novel mobile platforms, such as suitcase and backpack systems, are more useful for variable terrain in cities and urban areas. However, deployment of these mobile systems is more labour intensive and time consuming. 5.5 Novel applications Airborne detection systems are valuable in protective and responsive roles when used in combination with other approaches, especially as part of a layered detection network. They can be particularly suited to protecting focal points, such as high-value facilities or key buildings. Intelligence plays an essential part in assisting searches for materials and devices, including updates once items have gone missing. Safeguards programmes may also provide useful forewarning. Tethered balloons and masts could provide elevated continuous detection over focal points. These may include important buildings, ports of entry and places where crowds gather for events. Airships could also provide a useful platform for urban surveys. Participants felt that there was a minimal role for adapting instrumentation to detect ionising radiation emitted from SNM using space based platforms. The only area that might merit further consideration could be the detection of Cerenkov radiation or fluorescence generated in the vicinity of sources that are able to penetrate the atmosphere. Remote satellite imaging may however have a potential role in monitoring declared nuclear materials and facilities, and identifying supply networks. 5.6 Future research and development priorities Baseline surveys of nuclear sites can show features related to fission products, activation products, fuel cycle products, machine sources, including shielded or collimated signals, under conditions which simulate urban areas. However, there is a need for greater attention to urban surveys where further operational studies and response modelling is needed. A regular programme of baseline mapping is essential to provide the location of fixed radiation sources before an incident or emergency. For example ongoing background radiation surveys are taken of nuclear sites in France. Some participants felt that the results of aerial surveys could be published for method validation, as well as educating and encouraging greater public understanding of the radiological environment of normal life. Baseline mapping therefore has an important role to play in enhancing resilience. The performance of aerial detection systems in source searches during international excerises has often been much lower than the theoretical performance capacities of sytems tested. Simulation and training exercises are key to using systems to their fullest. These can also provide important opportunities to enhance data exchange and to improve inter-operability under time constrained conditions. More systematic work is needed to improve response models and survey interpretation methods, particularly with regard to urban areas and radiation transport visualisation. Further modelling of operational scenarios may be helpful since search capacities that can cater for many scenarios are needed. Ideally such scenario modelling would be carried out at the international level. 6 Nuclear forensics Nuclear forensics is a multidisciplinary field, drawing on analytical methods adapted from safeguards, materials science, and isotope geology to investigate nuclear or radiological material for its isotopic and elemental composition, geometry, impurities, macroscopic appearance and microstructure. This information can be used to establish the material’s age, intended use, and method of production. Establishing the material’s age, surface roughness and identifying the reactor in which it was used are key signatures needed to determine: when the material was last chemically processed; if it was formed as fuel in a nuclear power reactor; and what type of reactor it was burnt in. If all this information can be compared with external reference data, then it is possible to determine where the material was produced. From that information, it may be possible to deduce its last legal owner, and the smuggling route. Nuclear forensics plays a central role in linking the prevention, detection, and response components of the nuclear security architecture, and ensuring its sustainability. This field has different research and development requirements to detection technologies that need to be supported. Reliable attribution leading to prosecution presents a strong preventative deterrent to potential smugglers. It also highlights vulnerabilities in the safeguards and physical security measures at the place of theft or diversion, which could then be strengthened to prevent future incidents. The Nuclear Smuggling International Technical Working Group (ITWG) is a multi-agency, interdisciplinary group, which advances the science of nuclear forensics as an integral part of the incident response process.

#### Attribution deters state-sponsored nuclear terror

Talmadge 7 IR & Government Prof-George Washington, PhD-MIT, Spring, “Deterring a Nuclear 9/11, Spring, www.twq.com/07spring/docs/07spring\_talmadge.pdf

If the United States develops a credible nuclear attribution capability, states that wish to protect their citizens, territory, and interests are more likely to re­frain from providing assistance to terrorists in the first place. Some might even find that they have a newly discovered interest in securing their nuclear mate­rials, weapons, or expertise. It is difficult to imagine that the Pakistani govern­ment would turn a blind eye to a future A. Q. Khan if it believed that nuclear material or technology could be traced definitively back to Pakistan and that its people and infrastructure would suffer the consequences if those items were used in an attack against the United States. A similar logic might caution Iran against transferring such items to Hizballah, a long-standing recipient of con­ventional Iranian military technology and armaments, or warn North Korea against selling parts of its emerging nuclear arsenal to the highest bidder.

#### Nuclear terrorism likely—state sponsorship key

Allison 12 Graham, Director, Belfer Center for Science and International Affairs; Douglas Dillon Professor of Government; Faculty Chair, Dubai Initiative, Harvard Kennedy School, 9/7, "Living in the Era of Megaterror", belfercenter.ksg.harvard.edu/publication/22302/living\_in\_the\_era\_of\_megaterror.html

Today, how many people can a small group of terrorists kill in a single blow? Had Bruce Ivins, the U.S. government microbiologist responsible for the 2001 anthrax attacks, distributed his deadly agent with sprayers he could have purchased off the shelf, tens of thousands of Americans would have died. Had the 2001 “Dragonfire” report that Al Qaeda had a small nuclear weapon (from the former Soviet arsenal) in New York City proved correct, and not a false alarm, detonation of that bomb in Times Square could have incinerated a half million Americans.¶ In this electoral season, President Obama is claiming credit, rightly, for actions he and U.S. Special Forces took in killing Osama bin Laden. Similarly, at last week’s Republican convention in Tampa, Jeb Bush praised his brother for making the United States safer after 9/11. There can be no doubt that the thousands of actions taken at federal, state and local levels have made people safer from terrorist attacks.¶ Many are therefore attracted to the chorus of officials and experts claiming that the “strategic defeat” of Al Qaeda means the end of this chapter of history. But we should remember a deeper and more profound truth. While applauding actions that have made us safer from future terrorist attacks, we must recognize that they have not reversed an inescapable reality: The relentless advance of science and technology is making it possible for smaller and smaller groups to kill larger and larger numbers of people.¶ If a Qaeda affiliate, or some terrorist group in Pakistan whose name readers have never heard, acquires highly enriched uranium or plutonium made by a state, they can construct an elementary nuclear bomb capable of killing hundreds of thousands of people. At biotech labs across the United States and around the world, research scientists making medicines that advance human well-being are also capable of making pathogens, like anthrax, that can produce massive casualties.¶ What to do? Sherlock Holmes examined crime scenes using a method he called M.M.O.: motive, means and opportunity. In a society where citizens gather in unprotected movie theaters, churches, shopping centers and stadiums, opportunities for attack abound. Free societies are inherently “target rich.”¶ Motive to commit such atrocities poses a more difficult challenge. In all societies, a percentage of the population will be homicidal. No one can examine the mounting number of cases of mass murder in schools, movie theaters and elsewhere without worrying about a society’s mental health. Additionally, actions we take abroad unquestionably impact others’ motivation to attack us.¶ As Faisal Shahzad, the 2010 would-be “Times Square bomber,” testified at his trial: “Until the hour the U.S. ... stops the occupation of Muslim lands, and stops killing the Muslims ... we will be attacking U.S., and I plead guilty to that.”¶ Fortunately, it is more difficult for a terrorist to acquire the “means” to cause mass casualties. Producing highly enriched uranium or plutonium requires expensive industrial-scale investments that only states will make. If all fissile material can be secured to a gold standard beyond the reach of thieves or terrorists, aspirations to become the world’s first nuclear terrorist can be thwarted.

#### Terrorism causes extinction

Hellman 8(Martin E, emeritus prof of engineering @ Stanford, “Risk Analysis of Nuclear Deterrence” SPRING, THE BENT OF TAU BETA PI, http://www.nuclearrisk.org/paper.pdf)

The threat of nuclear terrorism looms much larger in the public’s mind than the threat of a full-scale nuclear war, yet this article focuses primarily on the latter. An explanation is therefore in order before proceeding. A terrorist attack involving a nuclear weapon would be a catastrophe of immense proportions: “A 10-kiloton bomb detonated at Grand Central Station on a typical work day would likely kill some half a million people, and inflict over a trillion dollars in direct economic damage. America and its way of life would be changed forever.” [Bunn 2003, pages viii-ix]. The likelihood of such an attack is also significant. Former Secretary of Defense William Perry has estimated the chance of a nuclear terrorist incident within the next decade to be roughly 50 percent [Bunn 2007, page 15]. David Albright, a former weapons inspector in Iraq, estimates those odds at less than one percent, but notes, “We would never accept a situation where the chance of a major nuclear accident like Chernobyl would be anywhere near 1% .... A nuclear terrorism attack is a low-probability event, but we can’t live in a world where it’s anything but extremely low-probability.” [Hegland 2005]. In a survey of 85 national security experts, Senator Richard Lugar found a median estimate of 20 percent for the “probability of an attack involving a nuclear explosion occurring somewhere in the world in the next 10 years,” with 79 percent of the respondents believing “it more likely to be carried out by terrorists” than by a government [Lugar 2005, pp. 14-15]. I support increased efforts to reduce the threat of nuclear terrorism, but that is not inconsistent with the approach of this article. Because terrorism is one of the potential trigger mechanisms for a full-scale nuclear war, the risk analyses proposed herein will include estimating the risk of nuclear terrorism as one component of the overall risk. If that risk, the overall risk, or both are found to be unacceptable, then the proposed remedies would be directed to reduce which- ever risk(s) warrant attention. Similar remarks apply to a number of other threats (e.g., nuclear war between the U.S. and China over Taiwan). his article would be incomplete if it only dealt with the threat of nuclear terrorism and neglected the threat of full- scale nuclear war. If both risks are unacceptable, an effort to reduce only the terrorist component would leave humanity in great peril. In fact, society’s almost total neglect of the threat of full-scale nuclear war makes studying that risk all the more important. The cosT of World War iii The danger associated with nuclear deterrence depends on both the cost of a failure and the failure rate.3 This section explores the cost of a failure of nuclear deterrence, and the next section is concerned with the failure rate. While other definitions are possible, this article defines a failure of deterrence to mean a full-scale exchange of all nuclear weapons available to the U.S. and Russia, an event that will be termed World War III. Approximately 20 million people died as a result of the first World War. World War II’s fatalities were double or triple that number—chaos prevented a more precise deter- mination. In both cases humanity recovered, and the world today bears few scars that attest to the horror of those two wars. Many people therefore implicitly believe that a third World War would be horrible but survivable, an extrapola- tion of the effects of the first two global wars. In that view, World War III, while horrible, is something that humanity may just have to face and from which it will then have to recover. In contrast, some of those most qualified to assess the situation hold a very different view. In a 1961 speech to a joint session of the Philippine Con- gress, General Douglas MacArthur, stated, “Global war has become a Frankenstein to destroy both sides. … If you lose, you are annihilated. If you win, you stand only to lose. No longer does it possess even the chance of the winner of a duel. It contains now only the germs of double suicide.” Former Secretary of Defense Robert McNamara ex- pressed a similar view: “If deterrence fails and conflict develops, the present U.S. and NATO strategy carries with it a high risk that Western civilization will be destroyed” [McNamara 1986, page 6]. More recently, George Shultz, William Perry, Henry Kissinger, and Sam Nunn4 echoed those concerns when they quoted President Reagan’s belief that nuclear weapons were “totally irrational, totally inhu- mane, good for nothing but killing, possibly destructive of life on earth and civilization.” [Shultz 2007] Official studies, while couched in less emotional terms, still convey the horrendous toll that World War III would exact: “The resulting deaths would be far beyond any precedent. Executive branch calculations show a range of U.S. deaths from 35 to 77 percent (i.e., 79-160 million dead) … a change in targeting could kill somewhere between 20 million and 30 million additional people on each side .... These calculations reflect only deaths during the first 30 days. Additional millions would be injured, and many would eventually die from lack of adequate medical care … millions of people might starve or freeze during the follow- ing winter, but it is not possible to estimate how many. … further millions … might eventually die of latent radiation effects.” [OTA 1979, page 8] This OTA report also noted the possibility of serious ecological damage [OTA 1979, page 9], a concern that as- sumed a new potentiality when the TTAPS report [TTAPS 1983] proposed that the ash and dust from so many nearly simultaneous nuclear explosions and their resultant fire- storms could usher in a nuclear winter that might erase homo sapiens from the face of the earth, much as many scientists now believe the K-T Extinction that wiped out the dinosaurs resulted from an impact winter caused by ash and dust from a large asteroid or comet striking Earth. The TTAPS report produced a heated debate, and there is still no scientific consensus on whether a nuclear winter would follow a full-scale nuclear war. Recent work [Robock 2007, Toon 2007] suggests that even a limited nuclear exchange or one between newer nuclear-weapon states, such as India and Pakistan, could have devastating long-lasting climatic consequences due to the large volumes of smoke that would be generated by fires in modern megacities. While it is uncertain how destructive World War III would be, prudence dictates that we apply the same engi- neering conservatism that saved the Golden Gate Bridge from collapsing on its 50th anniversary and assume that preventing World War III is a necessity—not an option.

### 1AC – Solvency

#### CONTENTION 4: SOLVENCY

#### Plan’s solves SMRs in the military -- doesn’t pick winners

Andres and Breetz 11 Richard B, Professor of National Security Strategy at the National War College and a Senior Fellow and Energy and Environmental Security and Policy Chair in the Center for Strategic Research, Institute for National Strategic Studies, at the National Defense University and Hanna L, doctoral candidate in the Department of Political Science at The Massachusetts Institute of Technology, February, "Small Nuclear Reactors for Military Installations: Capabilities, Costs, and Technological Implications", www.ndu.edu/press/lib/pdf/StrForum/SF-262.pdf

DOD as First Mover¶ Thus far, this paper has reviewed two of DOD’s most pressing energy vulnerabilities—grid insecurity and fuel convoys—and explored how they could be addressed by small reactors. We acknowledge that there are many uncertainties and risks associated with these reactors. On the other hand, failing to pursue these technologies raises its own set of risks for DOD, which we review in this section: first, small reactors may fail to be commercialized in the United States; second, the designs that get locked in by the private market may not be optimal for DOD’s needs; and third, expertise on small reactors may become concentrated in foreign countries. By taking an early “first mover” role in the small reactor market, DOD could mitigate these risks and secure the long-term availability and appropriateness of these technologies for U.S. military applications.¶ The “Valley of Death.” Given the promise that small reactors hold for military installations and mobility, DOD has a compelling interest in ensuring that they make the leap from paper to production. However, if DOD does not provide an initial demonstration and market, there is a chance that the U.S. small reactor industry may never get off the ground. The leap from the laboratory to the marketplace is so difficult to bridge that it is widely referred to as the “Valley of Death.” Many promising technologies are never commercialized due to a variety of market failures— including technical and financial uncertainties, information asymmetries, capital market imperfections, transaction costs, and environmental and security externalities— that impede financing and early adoption and can lock innovative technologies out of the marketplace. 28 In such cases, the Government can help a worthy technology to bridge the Valley of Death by accepting the first mover costs and demonstrating the technology’s scientific and economic viability.29¶ Historically, nuclear power has been “the most clear-cut example . . . of an important general-purpose technology that in the absence of military and defense related procurement would not have been developed at all.”30 Government involvement is likely to be crucial for innovative, next-generation nuclear technology as well. Despite the widespread revival of interest in nuclear energy, Daniel Ingersoll has argued that radically innovative designs face an uphill battle, as “the high capital cost of nuclear plants and the painful lessons learned during the first nuclear era have created a prevailing fear of first-of-a-kind designs.”31 In addition, Massachusetts Institute of Technology reports on the Future of Nuclear Power called for the Government to provide modest “first mover” assistance to the private sector due to several barriers that have hindered the nuclear renaissance, such as securing high up-front costs of site-banking, gaining NRC certification for new technologies, and demonstrating technical viability.32¶ It is possible, of course, that small reactors will achieve commercialization without DOD assistance. As discussed above, they have garnered increasing attention in the energy community. Several analysts have even argued that small reactors could play a key role in the second nuclear era, given that they may be the only reactors within the means of many U.S. utilities and developing countries.33 However, given the tremendous regulatory hurdles and technical and financial uncertainties, it appears far from certain that the U.S. small reactor industry will take off. If DOD wants to ensure that small reactors are available in the future, then it should pursue a leadership role now.¶ Technological Lock-in. A second risk is that if small reactors do reach the market without DOD assistance, the designs that succeed may not be optimal for DOD’s applications. Due to a variety of positive feedback and increasing returns to adoption (including demonstration effects, technological interdependence, network and learning effects, and economies of scale), the designs that are initially developed can become “locked in.”34 Competing designs—even if they are superior in some respects or better for certain market segments— can face barriers to entry that lock them out of the market. If DOD wants to ensure that its preferred designs are not locked out, then it should take a first mover role on small reactors**.**¶ It is far too early to gauge whether the private market and DOD have aligned interests in reactor designs. On one hand, Matthew Bunn and Martin Malin argue that what the world needs is cheaper, safer, more secure, and more proliferation-resistant nuclear reactors; presumably, many of the same broad qualities would be favored by DOD.35 There are many varied market niches that could be filled by small reactors, because there are many different applications and settings in which they can be used, and it is quite possible that some of those niches will be compatible with DOD’s interests.36¶ On the other hand, DOD may have specific needs (transportability, for instance) that would not be a high priority for any other market segment. Moreover, while DOD has unique technical and organizational capabilities that could enable it to pursue more radically innovative reactor lines, DOE has indicated that it will focus its initial small reactor deployment efforts on LWR designs.37¶ If DOD wants to ensure that its preferred reactors are developed and available in the future, it should take a leadership role now. Taking a first mover role does not necessarily mean that DOD would be “picking a winner” among small reactors, as the market will probably pursue multiple types of small reactors. Nevertheless, DOD leadership would likely have a profound effect on the industry’s timeline and trajectory.

#### Military is best at advancing SMRs

Cohen 12 Armond, Executive Director for the Clean Air Task Force, "DoD: A Model for Energy Innovation?", May 21, energy.nationaljournal.com/2012/05/powering-our-military-whats-th.php

Unlike most other agencies, including the Energy Department, the Pentagon is the ultimate customer for the new technology it helps create, spending some $200 billion each year on R&D and procurement. The implications of DoD’s role as customer have not been widely appreciated, as:¶ · DoD, uniquely in government, supports multi-year, billion-dollar “end to end” innovation efforts that produce technology that is continuously tested, deployed and refined on bases and in the field, providing real world feedback that leads to increases in performance and reductions in cost. By contrast, most of the federal government’s civilian energy innovation efforts involve research loosely connected at best with the few commercialization efforts that it supports.¶ · DoD and its contractors know how to bring together multiple innovations to achieve system-level advances leading to big performance gains (examples range from nuclear submarines to unmanned aircraft to large-scale information systems). This systems approach is precisely what is needed to advance clean energy technologies.¶ · Relatively stable, multi-year funding allows the Pentagon to pursue “long cycle” innovation that is necessary for large, capital- intensive technologies and supports a highly capable contractor base that can respond to changing national security demands.¶ · The Pentagon’s scope and budget has allowed it to experiment with new and creative innovation tools such as the well-known Defense Advanced Projects Research Agency, which has produced extraordinary technological breakthroughs; and the Environmental Security Technology Certification Program, which develops and demonstrates cost-effective improvements in environmental and energy technologies for military installations and equipment.¶ · Because of DoD’s size and demands for performance and reliability, it is unique among government and private sector organizations as a demonstration test-bed. Smart-grid technologies and advanced energy management systems for buildings are already poised to benefit from this aspect of the Pentagon’s innovation system.¶ · DoD has collaborated effectively with other federal agencies, including the Department of Energy and its predecessors (for example, to advance nuclear energy technologies). Continuing competition and cooperation between DoD and DOE will spur energy innovation. DoD’s innovation capabilities can enhance U.S. national security, improve U.S. international competitiveness, and spur global energy restructuring and greenhouse gas emissions reductions.¶ At the same time, while providing enormous opportunities to develop and test energy efficiency technologies and small scale distributed energy appropriate to forward bases, the Pentagon is unlikely to become an all-purpose hub for advancing all categories of clean-energy technologies, because its energy innovation activities will be sustainable only where they can support the nation’s defense capabilities.¶ Therefore, many other large-scale technologies that are of great importance to improving the environment, such as carbon-free central station generation or zero carbon transportation, may not as easily fit with DoD’s mission. Possible exceptions might include small modular nuclear reactors that can be used for producing independent, non-grid power at military bases, or, conceivably, zero-carbon liquid fuels other than anything resembling current generation biofuels.¶ In any case, the challenge for military-led energy innovation is to further define and delineate avenues for improved clean-energy performance that are linked to the national strategic mission. History shows that when such linkages are strong, DoD’s innovation capabilities are second to none.

#### SMRs solve nuclear downsides

Ringle 10 John, Professor Emeritus of Nuclear Engineering at Oregon State University, "Reintroduction of reactors in US a major win", November 13, robertmayer.wordpress.com/2010/11/21/reintroduction-of-reactors-in-us-a-major-win/

Small nuclear reactors will probably be the mechanism that ushers in nuclear power’s renaissance in the U.S.¶ Nuclear plants currently supply about 20 percent of the nation’s electricity and more than 70 percent of our carbon-free energy. But large nuclear plants cost $8 billion to $10 billion and utilities are having second thoughts about how to finance these plants.¶ A small modular reactor (SMR) has several advantages over the conventional 1,000-megawatt plant:¶ 1. It ranges in size from 25 to 140 megawatts, hence only costs about a tenth as much as a large plant.¶ 2. It uses a cookie-cutter standardized design to reduce construction costs and can be built in a factory and shipped to the site by truck, railroad or barge.¶ 3. The major parts can be built in U.S. factories, unlike some parts for the larger reactors that must be fabricated overseas.¶ 4. Because of the factory-line production, the SMR could be built in three years with one-third of the workforce of a large plant.¶ 5. More than one SMR could be clustered together to form a larger power plant complex. This provides versatility in operation, particularly in connection with large wind farms. With the variability of wind, one or more SMRs could be run or shut down to provide a constant base load supply of electricity.¶ 6. A cluster of SMRs should be very reliable. One unit could be taken out of service for maintenance or repair without affecting the operation of the other units. And since they are all of a common design, replacement parts could satisfy all units. France has already proved the reliability of standardized plants.¶ At least half a dozen companies are developing SMRs, including NuScale in Oregon. NuScale is American-owned and its 45-megawatt design has some unique features. It is inherently safe. It could be located partially or totally below ground, and with its natural convection cooling system, it does not rely on an elaborate system of pumps and valves to provide safety. There is no scenario in which a loss-of-coolant accident could occur.

#### DOE funding SMRs now---more to come

Holly 12/6 Derrill, ECT Staff Writer, "DOE Advances Small Nuclear Reactors", 2012, [www.ect.coop/power-supply/power-plants/doe-funds-small-nuclear-reactors-project/50667](http://www.ect.coop/power-supply/power-plants/doe-funds-small-nuclear-reactors-project/50667)

The Department of Energy has agreed to help fund a small modular nuclear reactor design backed by a consortium that includes several generation and transmission electric cooperatives.¶ After reviewing several proposals, DOE selected a project led by Bechtel Corp., Babcock & Wilcox and the Tennessee Valley Authority. The mPower Consortium was formed in in 2010 to support the Generation mPower small modular nuclear reactor design. The consortium includes investor-owned FirstEnergy, TVA, and 13 G&Ts.¶ The lead companies have proposed deployment of up to five 180 megawatt Babcock & Wilcox mPower reactors at TVA’s abandoned Clinch River Breeder Reactor site in Oak Ridge, Tenn.¶ “DOE will match future engineering and design development, design certification and licensing activities up to a cap of $452 million,” said Sandra Byrd, vice president of member and public relations for Little Rock-based Arkansas Electric Cooperative Corp. “Although the mPower design is already far along, it still requires more testing and the design certification documents have to be developed and submitted to the Nuclear Regulatory Commission for approval.”¶ Plans call for the consortium to submit documentation to NRC by December 2013. An early site permit and a construction and operating license application will also be developed for submission over the next year.¶ “This will be the first time that a small nuclear design has been submitted to NRC for review and approval,” said Byrd, adding that commercial operation could begin between 2020 and 2022. Successful deployment of the technology is expected to lead to development of nuclear power plants roughly one-third the size of existing facilities, and DOE plans to issue additional funding opportunities.¶ “More is obviously better. Different designs may lend themselves to different utility operating situations,” said Byrd. Co-ops supported proposals from three of the four companies that sought consideration under the initial DOE cost-sharing grant.¶ Arkansas Electric Cooperative Corp. is among mPower Consortium backers also supporting the NexStart SMR Alliance led by Westinghouse and investor-owned Ameren Missouri. Springfield, Mo.-based Associated Electric Cooperative is also supporting the group.

# 2AC

## Shipping

### AT: Navy Strong

#### Naval power declining---overstretch

Mahnken 12 Tom, visiting scholar at the Philip Merrill Center for Strategic Studies at The Johns Hopkins University's School of Advanced International Studies, Foreign Policy, “Avoiding sea blindness: The decline of American naval power”, 2012, http://shadow.foreignpolicy.com/posts/2012/09/13/avoiding\_sea\_blindness

It is at times like this that the erosion of American sea power is most apparent. Today, the U.S. Navy is the smallest it has been since 1916 and is stretched thin beyond prudence and good operational sense. We should all hope that the United States will not need to evacuate American citizens or use force to defend them, for if we do, we may very well regret the neglect of sea power.

### AT: Personnel Tradeoff

#### No tradeoff

Robitaille 12 George E, Department of Army Civilian, March 21, "Small Modular Reactors: The Army’s Secure Source of Energy?", [www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA561802](http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA561802)

Section 332 of the FY2010 National Defense Authorization Act (NDAA), “Extension and Expansion of Reporting Requirements Regarding Department of Defense Energy Efficiency Programs,” requires the Secretary of Defense to evaluate the cost and feasibility of a policy that would require new power generation projects established on installations to be able to provide power for military operations in the event of a commercial grid outage.28 A potential solution to meet this national security requirement, as well as the critical needs of nearby towns, is for DoD to evaluate SMRs as a possible source for safe and secure electricity. Military facilities depend on reliable sources of energy to operate, train, and support national security missions. The power demand for most military facilities is not very high, and could easily be met by a SMR. Table 1 provides the itemized description of the annual energy requirements in megawatt of electricity (MWe) required for the three hundred seventy four DoD installations.29 DoD History with SMRs The concept of small reactors for electrical power generation is not new. In fact, the DoD built and operated small reactors for applications on land and at sea. The U.S. Army operated eight nuclear power plants from 1954 to 1977. Six out of the eight reactors built by the Army produced operationally useful power for an extended period, including the first nuclear reactor to be connected and provide electricity to the commercial grid. 30 The Army program that built and operated compact nuclear reactors was ended after 1966, not because of any safety issues, but strictly as a result of funding cuts in military long range research and development programs. In essence, it was determined that the program costs could only be justified if there was a unique DoD specific requirement. At the time there were none.31 Although it has been many years since these Army reactors were operational, the independent source of energy they provided at the time is exactly what is needed again to serve as a secure source of energy today. Many of the nuclear power plant designs used by the Army were based on United States Naval reactors. Although the Army stopped developing SMRs, the Navy as well as the private sector has continued to research, develop, and implement improved designs to improve the safety and efficiency of these alternative energy sources. The U.S. Navy nuclear program developed twenty seven different power plant systems and almost all of them have been based on a light water reactor design.32 This design focus can be attributed to the inherent safety and the ability of this design to handle the pitch and roll climate expected on a ship at sea. To date, the U. S Navy operated five hundred twenty six reactor cores in two hundred nineteen nuclear powered ships, accumulated the equivalent of over six thousand two hundred reactor years of operation and safely steamed one hundred forty nine million miles. The U.S. Navy has never experienced a reactor accident.33 All of the modern Navy reactors are design to use fuel that is enriched to ninety three percent Uranium 235 (U235) versus the approximate three percent U235 used in commercial light water reactors. The use of highly enriched U235 in Navy vessels has two primary benefits, long core lives and small reactor cores.34 The power generation capability for naval reactors ranges from two hundred MWe (megawatts of electricity) for submarines to five hundred MWe for an aircraft carrier. A Naval reactor can expect to operate for at least ten years before refueling and the core has a fifty year operational life for a carrier or thirty to forty years for a submarine.35 As an example, the world’s first nuclear carrier, the USS Enterprise, which is still operating, celebrated fifty years of operations in 2011.36 The Navy nuclear program has set a precedent for safely harnessing the energy associated with the nuclear fission reaction. In addition, the Navy collaborates with the private sector to build their reactors and then uses government trained personnel to serve as operators. Implementing the use of SMRs as a secure source of energy for our critical military facilities will leverage this knowledge and experience.

## Hydrogen

### Flow

#### No impact and not anthro

Ridley 12 [Matt Ridley, columnist for The Wall Street Journal and author of *The Rational Optimist: How Prosperity Evolves,* 8/17, “Apocalypse Not: Here’s Why You Shouldn’t Worry About End Times”, http://www.wired.com/wiredscience/2012/08/ff\_apocalypsenot/all/]

The threat to the ozone layer came next. In the 1970s scientists discovered a decline in the concentration of ozone over Antarctica during several springs, and the Armageddon megaphone was dusted off yet again. The blame was pinned on chlorofluorocarbons, used in refrigerators and aerosol cans, reacting with sunlight. The disappearance of frogs and an alleged rise of melanoma in people were both attributed to ozone depletion. So too was a supposed rash of blindness in animals: Al Gore wrote in 1992 about blind salmon and rabbits, while The New York Times reported “an increase in Twilight Zone-type reports of sheep and rabbits with cataracts” in Patagonia. But all these accounts proved incorrect. The frogs were dying of a fungal disease spread by people; the sheep had viral pinkeye; the mortality rate from melanoma actually leveled off during the growth of the ozone hole; and as for the blind salmon and rabbits, they were never heard of again.¶ There was an international agreement to cease using CFCs by 1996. But the predicted recovery of the ozone layer never happened: The hole stopped growing before the ban took effect, then failed to shrink afterward. The ozone hole still grows every Antarctic spring, to roughly the same extent each year. Nobody quite knows why. Some scientists think it is simply taking longer than expected for the chemicals to disintegrate; a few believe that the cause of the hole was misdiagnosed in the first place. Either way, the ozone hole cannot yet be claimed as a looming catastrophe, let alone one averted by political action.

## CP

### 2AC Grid CP

#### DTN networks facilitate DoS attacks and infinite bundle storms – latency resistance and node-based architecture make attacks uniquely likely

Farrell 6 (Stephen Farrell, Vinny Cahill Distributed Systems Group Department of Computer Science Trinity College Dublin, 2006, “Security Considerations in Space and Delay Tolerant Networks”, <https://www.netlab.tkk.fi/opetus/s383151/articles/01659530.pdf>)

The first set of threats to consider are those coming from network elements that are not directly part of the DTN. As an overlay network, bundles may traverse multiple underlying network elements on each DTN “hop.” Of course, any vulnerability in the bundle protocol can be exploited at any of those network elements. DTN security must take into account the usual range of such potential exploits (masquerading, modified bundles etc.), but compared to most network protocols, as an overlay protocol, the bundle protocol probably represents an easier target. In particular, if it is possible to insert new bundles at such lower-layer “hops,” then many DTN nodes will have to be capable of countering such insertions by, where possible, detecting and quickly deleting such spurious bundles. Conversely, it is also possible to take advantage of lower-layer security services, but this won’t necessarily be visible from the DTN layer, and requires coordinated administration in order to be really effective. Due to the resource-scarcity that characterizes many DTNs, unauthorized access and use of DTN resources can be a serious concern. For example, if an unauthorized application were able to control some DTN infrastructure, perhaps by attacking a routing control protocol, then the resource consumption could be catastrophic for the network. In addition to these threats, DTN nodes can unwittingly be used to assist or amplify resource consuming behavior for example by not detecting unplanned replays or other misbehaviors. In the Internet, there have been recent cases where so-called amplification attacks [10] make use of larger DNS records sending a small packet to a DNS server (with a forged origin) can cause the server to send the large packet to a victim. While DoS attacks can be mounted at any network layer, from physical to application, generally, when developing a new protocol, we should be attempting to do two things. Firstly, we should try to increase the effort to successfully launch an “off-path” DoS attack by making it hard to “guess” valid values for messages, e.g., through using random values instead of counters for identifying messages. Secondly, we should make it easier to withstand “on-path” DoS attacks by providing a way to choke-off DoS traffic, e.g., by changing to a mode of operation where only fresh, authenticated messages are accepted, and all others are dropped. In a DTN environment, the generally longer latencies involved will probably act to make DoS attempts more effective, so protocol developers and deployments need to explicitly consider DoS at all times. As with all networks, security mechanisms will themselves create new DoS opportunities. So whatever services and mechanisms are defined for DTN security should also explicitly consider DoS. For example, mechanisms that involve looking up the status of some key (via some protocol to a key server) based on received messages create new DoS opportunities since such lookups consume resources on both the receiving node and the key server as well as on network nodes in between. So long as DTN protocols include traffic generated as an artifact of other traffic, then the possibility exists that manipulation of (genuine, forged or modified) bundle content can be used to create a storm of unwanted traffic. Given a DTN operating sufficiently “close to the wire,” such traffic could have serious effects. In particular, the current bundle protocol includes various messages (bundle status reports and custody signals) that can be produced in greater numbers than the original traffic. For example, if a DTN node (or other network element) could modify a single “forwarding report,” such that the forwarding of that report bundle will generate another bundle, and if the new bundles’ forwarding report bit will also be set, and if the route that these bundles will take includes a loop, then an infinite bundle storm could result. Responding to this potential problem, the bundle specification now includes a requirement that no report should generate another report. This removes the vulnerability, though it does allow implementation bugs to easily recreate the problem. However, it may be wiser to entirely remove some of these supposedly useful reporting “capabilities”. In addition to the resource consuming threats, DTN applications can also be vulnerable to the usual threats against confidentiality and integrity, for example changing the intended destination or a bundle’s control fields.

#### That devastates DTN satellites---no solvency

Farrell 6 (Stephen Farrell, Vinny Cahill Distributed Systems Group Department of Computer Science Trinity College Dublin, 2006, “Security Considerations in Space and Delay Tolerant Networks”, <https://www.netlab.tkk.fi/opetus/s383151/articles/01659530.pdf>)

Problems encountered on the Internet today show that security must be a consideration for all networking technologies. Although current space mission networks are significantly less threatened, proper consideration of current Internet threats and countermeasures can help avoid future pitfalls. We can therefore usefully leverage the Internet security knowledge-base built up over the last decade to analyze the security considerations for space missions, and in particular the generalization of those represented by delay tolerant networks (DTN). Currently, the main venue for DTN related security work is the Internet Research Task Force’s (IRTF) [1] Delay Tolerant Networking Research Group (DTNRG) [2]. Our primary objective here is to engender a discussion between space mission IT specialists and those defining security services for DTNs and similar networks. As with any network, a DTN or space-mission network may use cryptographic data confidentiality and integrity services. However the lack of end-to-end connectivity and the potentially extreme asymmetries in terms of capability and connectivity mean that we need an unusual formulation for such services, where we not only have sources and destinations for data, but potentially different security-sources and security destinations. We review current work [3, 4, and 5] on this topic and related open issues, for example, key management for high-delay environments where there is currently no clear solution available. In addition to cryptographic security services, we have learned from the Internet to also pay attention to implementation issues, leading, for example, to firewalls separating the network into different security domains that offer assurance that only approved traffic is present in each domain. However, there is always a trade-off between “being secure” and “being usable” in such environments and the experience on the Internet is that it is generally possible to insert unapproved traffic into any security domain. We therefore also outline some implementation-related vulnerabilities, in particular those that may require specific consideration in space missions. We also examine some of the potential trade-offs arising as more complex space based networks are more intimately connected to the Internet. For example, space missions require various ways to re-initialize spacecraft, practically all of which can form a denial of-service (DoS) attack vector whose impact on a space mission could be catastrophic.

#### Long delay for DTN---not feasible

Jonson et al 8 -- Jonah Pezeshki, Victor Chao, Kristofer Smith, James Fazio, Booz Allen Hamilton @ IEEE, "APPLICATION OF DELAY TOLERANT NETWORKING (DTN) IN AIRBORNE NETWORKS," http://202.194.20.8/proc/milcom08/milcom08/pdfs/1211.pdf)

While DTNs are a promising solution to most of the current AN considerations, **significant work must still be done prior to widespread deployment**. Specifically, steps must be taken to ensure that the deployed network operates well within a single classification level, and that the addition of store and forward routing does not adversely affect network performance. Also, given that the National Security Agency (NSA) will likely require data-at-rest protection mechanisms to be employed, local storage devices (used to support the store-and-forward functionality) must be developed so that a compromised device cannot be tampered with (i.e. will not allow unauthorized access to stored data). Since ANs are currently deployed, special consideration must be given to an implementation plan to integrate DTN. This integration plan must enable the transition to DTN over AN, without substantially disrupting currently deployed AN services. In addition, since some traffic types (e.g. VOIP) cannot be used reliably over DTN, this DTN over AN implementation must allow some applications to be capable of bypassing the DTN overlay.

### 2AC Second Advantage CP

#### Can’t solve---obstacles and low carbon footprint

Motavalli 9 Jim, NYT, "Fight for Hydrogen Funding", May 12, wheels.blogs.nytimes.com/2009/05/12/fight-for-hydrogen-funding/

Mr. Hanson touched on the biggest obstacle to a hydrogen energy economy: the daunting need for a national network of hydrogen refueling stations. There are an estimated 65 hydrogen stations in the United States, and only 180 around the world. Electric car recharging is also embryonic, but a number of companies (including the Renault-Nissan Alliance and Better Place) are signing contracts with local, state and federal governments to put that infrastructure into place.¶ “It’s safe to say that over the last four or five years, fuel-cell technology has progressed at a faster rate than battery technology,” Mr. Hanson said. “The hard parts are reducing costs, developing an infrastructure and figuring out a hydrogen process with a low carbon footprint. These are challenges, but we’re making progress.”

#### Links to politics

Fuhrmans 11 Vanessa, “Hydrogen Fuel Cells Are Down, but Perhaps Not Out,” 5-22, <http://online.wsj.com/article/SB10001424052748703778104576286620950028178.html>

Hydrogen still faces plenty of practical challenges. The biggest may be creating a refueling infrastructure. While battery-powered cars can be plugged into the electricity grid, building even a basic network of hydrogen refueling stations would cost billions. And as California's experience shows, such initiatives are highly dependent on political will. But other initiatives are making progress, albeit slowly. In Germany, the federal government has pledged to spend some $2 billion over the next decade on a public-private plan to build at least 1,000 hydrogen stations, while a Hawaiian plan partially backed by [General Motors](http://online.wsj.com/public/quotes/main.html?type=djn&symbol=GM) Co. [GM +0.51%](http://online.wsj.com/public/quotes/main.html?type=djn&symbol=GM?mod=inlineTicker) calls for building as many as 25 stations on the island of Oahu by 2016.

### Water – Disease

#### SMRs solve water wars---causes disease

**Palley 11** Reese Palley, The London School of Economics, 2011, The Answer: Why Only Inherently Safe, Mini Nuclear Power Plans Can Save Our World, p. 168-71

The third world has long been rent in recent droughts, by the search for water. In subsistence economies, on marginal land, water is not a convenience but a matter of life and death. As a result small **wars have been fought, rivers diverted, and wells poisoned in what could be a warning of what is to come as industrialized nations begin to face failing water supplies.** Quite aside from the demand for potable water is the dependence of enormous swaths of industry and agriculture on oceans of water used for processing, enabling, and cleaning a thousand processes and products. It is interesting to note that fresh water used in both industry and agriculture is reduced to a nonrenewable resource as agriculture adds salt and industry adds a chemical brew unsuitable for consumption. More than one billion people in the world already lack access to clean water, and things are getting worse. Over the next two decades, the average supply of water per person will drop by a third, **condemning millions** of people **to** waterborne **diseases** and an avoidable premature death.81 So **the stage is set for water access wars between** the **first and the third worlds**, between **neighbors** downstream of supply, between **big industry** and big agriculture, between **nations**, between **population** centers, and ultimately between you and the people who live next door for an already inadequate world water supply that is not being renewed. **As populations inevitably increase, conflicts will intensify**.82 It is only by virtue of the historical accident of the availability of nuclear energy that humankind now has the ability to remove the salt and other pollutants to supply all our water needs. The problem is that **desalination is an intensely local process**. Some localities have available sufficient water from renewable sources to take care of their own needs, but not enough to share with their neighbors, and it **is here that the scale of nuclear energy production must be defined locally.** Large scale 1,000 MWe plants can be used to desalinate water as well as for generating electricity However we cannot build them fast enough to address the problem, and, if built they would face the extremely expensive problem of distributing the water they produce. Better, much better, would be to use small desalinization plants sited locally. Beyond desalination for human use is the need to green some of the increasing desertification of vast areas such as the Sahara. Placing twenty 100 MWe plants a hundred miles apart along the Saharan coast would green the coastal area from the Atlantic Ocean to the Red Sea, a task accomplished more cheaply and quickly than through the use of gigawatt plants.83 This could proceed on multiple tracks wherever deserts are available to be reclaimed. Leonard Orenstein, a researcher in the field of desert reclamation, speculates: If most of the Sahara and Australian outback were planted with fast-growing trees like eucalyptus, the forests could draw down about 8 billion tons of carbon a year—nearly as much as people emit from burning fossil fuels today. As the forests matured, they could continue taking up this much carbon for decades.84 **The use of small, easily transported**, easily **sited**, and walk away **safe nuclear reactors dedicated to desalination is the only answer** to the disproportionate distribution of water resources that have distorted human habitation patterns for millennia. Where there existed natural water, such as from rivers, great cities arose and civilizations flourished. Other localities lay barren through the ages. We now have the power, by means of SMRs profiled to local conditions, not only to attend to existing water shortages but also to smooth out disproportionate water distribution and create green habitation where historically it has never existed. **The endless wars that have been fought**, first over solid bullion gold and then over oily black gold, **can now engulf us in the desperate reach for liquid blue gold. We need never fight these wars again as we now have the nuclear power to fulfill the** biblical **ability to “strike any local rock and have water gush forth**.”

#### Extinction---their impact D doesn’t apply

Quammen 12 David, award-winning science writer, long-time columnist for Outside magazine for fifteen years, with work in National Geographic, Harper's, Rolling Stone, the New York Times Book Review and other periodicals, 9/29, “Could the next big animal-to-human disease wipe us out?,” The Guardian, pg. 29, Lexis

Infectious disease is all around us. It's one of the basic processes that ecologists study, along with predation and competition. Predators are big beasts that eat their prey from outside. Pathogens (disease-causing agents, such as viruses) are small beasts that eat their prey from within. Although infectious disease can seem grisly and dreadful, under ordinary conditions, it's every bit as natural as what lions do to wildebeests and zebras. But conditions aren't always ordinary. Just as predators have their accustomed prey, so do pathogens. And just as a lion might occasionally depart from its normal behaviour - to kill a cow instead of a wildebeest, or a human instead of a zebra - so a pathogen can shift to a new target. Aberrations occur. When a pathogen leaps from an animal into a person, and succeeds in establishing itself as an infectious presence, sometimes causing illness or death, the result is a zoonosis. It's a mildly technical term, zoonosis, unfamiliar to most people, but it helps clarify the biological complexities behind the ominous headlines about swine flu, bird flu, Sars, emerging diseases in general, and the threat of a global pandemic. It's a word of the future, destined for heavy use in the 21st century. Ebola and Marburg are zoonoses. So is bubonic plague. So was the so-called Spanish influenza of 1918-1919, which had its source in a wild aquatic bird and emerged to kill as many as 50 million people. All of the human influenzas are zoonoses. As are monkeypox, bovine tuberculosis, Lyme disease, West Nile fever, rabies and a strange new affliction called Nipah encephalitis, which has killed pigs and pig farmers in Malaysia. Each of these zoonoses reflects the action of a pathogen that can "spillover", crossing into people from other animals. Aids is a disease of zoonotic origin caused by a virus that, having reached humans through a few accidental events in western and central Africa, now passes human-to-human. This form of interspecies leap is not rare; about 60% of all human infectious diseases currently known either cross routinely or have recently crossed between other animals and us. Some of those - notably rabies - are familiar, widespread and still horrendously lethal, killing humans by the thousands despite centuries of efforts at coping with their effects. Others are new and inexplicably sporadic, claiming a few victims or a few hundred, and then disappearing for years. Zoonotic pathogens can hide. The least conspicuous strategy is to lurk within what's called a reservoir host: a living organism that carries the pathogen while suffering little or no illness. When a disease seems to disappear between outbreaks, it's often still lingering nearby, within some reservoir host. A rodent? A bird? A butterfly? A bat? To reside undetected is probably easiest wherever biological diversity is high and the ecosystem is relatively undisturbed. The converse is also true: ecological disturbance causes diseases to emerge. Shake a tree and things fall out. Michelle Barnes is an energetic, late 40s-ish woman, an avid rock climber and cyclist. Her auburn hair, she told me cheerily, came from a bottle. It approximates the original colour, but the original is gone. In 2008, her hair started falling out; the rest went grey "pretty much overnight". This was among the lesser effects of a mystery illness that had nearly killed her during January that year, just after she'd returned from Uganda. Her story paralleled the one Jaap Taal had told me about Astrid, with several key differences - the main one being that Michelle Barnes was still alive. Michelle and her husband, Rick Taylor, had wanted to see mountain gorillas, too. Their guide had taken them through Maramagambo Forest and into Python Cave. They, too, had to clamber across those slippery boulders. As a rock climber, Barnes said, she tends to be very conscious of where she places her hands. No, she didn't touch any guano. No, she was not bumped by a bat. By late afternoon they were back, watching the sunset. It was Christmas evening 2007. They arrived home on New Year's Day. On 4 January, Barnes woke up feeling as if someone had driven a needle into her skull. She was achy all over, feverish. "And then, as the day went on, I started developing a rash across my stomach." The rash spread. "Over the next 48 hours, I just went down really fast." By the time Barnes turned up at a hospital in suburban Denver, she was dehydrated; her white blood count was imperceptible; her kidneys and liver had begun shutting down. An infectious disease specialist, Dr Norman K Fujita, arranged for her to be tested for a range of infections that might be contracted in Africa. All came back negative, including the test for Marburg. Gradually her body regained strength and her organs began to recover. After 12 days, she left hospital, still weak and anaemic, still undiagnosed. In March she saw Fujita on a follow-up visit and he had her serum tested again for Marburg. Again, negative. Three more months passed, and Barnes, now grey-haired, lacking her old energy, suffering abdominal pain, unable to focus, got an email from a journalist she and Taylor had met on the Uganda trip, who had just seen a news article. In the Netherlands, a woman had died of Marburg after a Ugandan holiday during which she had visited a cave full of bats. Barnes spent the next 24 hours Googling every article on the case she could find. Early the following Monday morning, she was back at Dr Fujita's door. He agreed to test her a third time for Marburg. This time a lab technician crosschecked the third sample, and then the first sample. The new results went to Fujita, who called Barnes: "You're now an honorary infectious disease doctor. You've self-diagnosed, and the Marburg test came back positive." The Marburg virus had reappeared in Uganda in 2007. It was a small outbreak, affecting four miners, one of whom died, working at a site called Kitaka Cave. But Joosten's death, and Barnes's diagnosis, implied a change in the potential scope of the situation. That local Ugandans were dying of Marburg was a severe concern - sufficient to bring a response team of scientists in haste. But if tourists, too, were involved, tripping in and out of some python-infested Marburg repository, unprotected, and then boarding their return flights to other continents, the place was not just a peril for Ugandan miners and their families. It was also an international threat. The first team of scientists had collected about 800 bats from Kitaka Cave for dissecting and sampling, and marked and released more than 1,000, using beaded collars coded with a number. That team, including scientist Brian Amman, had found live Marburg virus in five bats. Entering Python Cave after Joosten's death, another team of scientists, again including Amman, came across one of the beaded collars they had placed on captured bats three months earlier and 30 miles away. "It confirmed my suspicions that these bats are moving," Amman said - and moving not only through the forest but from one roosting site to another. Travel of individual bats between far-flung roosts implied circumstances whereby Marburg virus might ultimately be transmitted all across Africa, from one bat encampment to another. It voided the comforting assumption that this virus is strictly localised. And it highlighted the complementary question: why don't outbreaks of Marburg virus disease happen more often? Marburg is only one instance to which that question applies. Why not more Ebola? Why not more Sars? In the case of Sars, the scenario could have been very much worse. Apart from the 2003 outbreak and the aftershock cases in early 2004, it hasn't recurred. . . so far. Eight thousand cases are relatively few for such an explosive infection; 774 people died, not 7 million. Several factors contributed to limiting the scope and impact of the outbreak, of which humanity's good luck was only one. Another was the speed and excellence of the laboratory diagnostics - finding the virus and identifying it. Still another was the brisk efficiency with which cases were isolated, contacts were traced and quarantine measures were instituted, first in southern China, then in Hong Kong, Singapore, Hanoi and Toronto. If the virus had arrived in a different sort of big city - more loosely governed, full of poor people, lacking first-rate medical institutions - it might have burned through a much larger segment of humanity. One further factor, possibly the most crucial, was inherent in the way Sars affects the human body: symptoms tend to appear in a person before, rather than after, that person becomes highly infectious. That allowed many Sars cases to be recognised, hospitalised and placed in isolation before they hit their peak of infectivity. With influenza and many other diseases, the order is reversed. That probably helped account for the scale of worldwide misery and death during the 1918-1919 influenza. And that infamous global pandemic occurred in the era before globalisation. Everything nowadays moves around the planet faster, including viruses. When the Next Big One comes, it will likely conform to the same perverse pattern as the 1918 influenza: high infectivity preceding notable symptoms. That will help it move through cities and airports like an angel of death. The Next Big One is a subject that disease scientists around the world often address. The most recent big one is Aids, of which the eventual total bigness cannot even be predicted - about 30 million deaths, 34 million living people infected, and with no end in sight. Fortunately, not every virus goes airborne from one host to another. If HIV-1 could, you and I might already be dead. If the rabies virus could, it would be the most horrific pathogen on the planet. The influenzas are well adapted for airborne transmission, which is why a new strain can circle the world within days. The Sars virus travels this route, too, or anyway by the respiratory droplets of sneezes and coughs - hanging in the air of a hotel corridor, moving through the cabin of an aeroplane - and that capacity, combined with its case fatality rate of almost 10%, is what made it so scary in 2003 to the people who understood it best. Human-to-human transmission is the crux. That capacity is what separates a bizarre, awful, localised, intermittent and mysterious disease (such as Ebola) from a global pandemic. Have you noticed the persistent, low-level buzz about avian influenza, the strain known as H5N1, among disease experts over the past 15 years? That's because avian flu worries them deeply, though it hasn't caused many human fatalities. Swine flu comes and goes periodically in the human population (as it came and went during 2009), sometimes causing a bad pandemic and sometimes (as in 2009) not so bad as expected; but avian flu resides in a different category of menacing possibility. It worries the flu scientists because they know that H5N1 influenza is extremely virulent in people, with a high lethality. As yet, there have been a relatively low number of cases, and it is poorly transmissible, so far, from human to human. It'll kill you if you catch it, very likely, but you're unlikely to catch it except by butchering an infected chicken. But if H5N1 mutates or reassembles itself in just the right way, if it adapts for human-to-human transmission, it could become the biggest and fastest killer disease since 1918. It got to Egypt in 2006 and has been especially problematic for that country. As of August 2011, there were 151 confirmed cases, of which 52 were fatal. That represents more than a quarter of all the world's known human cases of bird flu since H5N1 emerged in 1997. But here's a critical fact: those unfortunate Egyptian patients all seem to have acquired the virus directly from birds. This indicates that the virus hasn't yet found an efficient way to pass from one person to another. Two aspects of the situation are dangerous, according to biologist Robert Webster. The first is that Egypt, given its recent political upheavals, may be unable to staunch an outbreak of transmissible avian flu, if one occurs. His second concern is shared by influenza researchers and public health officials around the globe: with all that mutating, with all that contact between people and their infected birds, the virus could hit upon a genetic configuration making it highly transmissible among people. "As long as H5N1 is out there in the world," Webster told me, "there is the possibility of disaster. . . There is the theoretical possibility that it can acquire the ability to transmit human-to-human." He paused. "And then God help us." We're unique in the history of mammals. No other primate has ever weighed upon the planet to anything like the degree we do. In ecological terms, we are almost paradoxical: large-bodied and long-lived but grotesquely abundant. We are an outbreak. And here's the thing about outbreaks: they **end**. In some cases they end after many years, in others they end rather soon. In some cases they end gradually, in others they end with a crash. In certain cases, they end and recur and end again. Populations of tent caterpillars, for example, seem to rise steeply and fall sharply on a cycle of anywhere from five to 11 years. The crash endings are dramatic, and for a long while they seemed mysterious. What could account for such sudden and recurrent collapses? One possible factor is infectious disease, and viruses in particular.

## DA

### Nuclear Now

#### Nuclear now and inevitable

Tirone 12 Jonathan, AP, “Nuclear Power Production Set to Grow Even After Japan Phase-Out (Vienna)”, 9/19, <http://www.northjersey.com/news/international/170334006_Nuclear_Power_Production_Set_to_Grow_Even_After_Japan_Phase-Out__Vienna_.html?page=all>

Nuclear power is set to grow over the next four decades even after Japan shuts down its reactor fleet, the International Atomic Energy Agency says. Global installed capacity is set to rise to at least 469 gigawatts of energy by 2050 from 370 GWe today, according to the IAEA's most pessimistic scenario. Nuclear capacity may reach as much as 1,137 GWe in a more favorable investment climate, the Vienna-based agency said. "We are a little bit more optimistic," said Holger Rogner, IAEA head of planning and economic studies, late Tuesday in the Austrian capital. "There is still a case for nuclear power." Japan has about 46 GWe of capacity at 50 reactors and plans to phase out nuclear power in the next three decades in response to the Fukushima Dai-ichi reactor meltdowns last year. The IAEA, established in 1957 to promote the peaceful uses of atomic power, sees growth driven by new reactor projects in China and in newcomer nations such as Turkey and the United Arab Emirates A gigawatt is equivalent to 1 billion watts of electricity. The driving forces that brought about the renaissance in nuclear power — growing demand in emerging economies, energy security, elevated fossil-fuel prices and climate pressures — haven't changed, Rogner said. The IAEA presented its findings to the organization's 155 members, meeting at their general conference in Vienna. "The feedback we receive is that there is no real retraction from most national power programs," Rogner said. "What we do see is that some newcomer states have a much better understanding for the need to get things right. Before Fukushima they were a little too optimistic how fast you can move forward the technology." Japan's new policy follows public pressure since the Fukushima disaster caused mass evacuations and left areas north of Tokyo uninhabitable for decades. Germany and Switzerland announced plans to phase out nuclear power after the meltdowns.

### 2AC Beryllium DA

#### No supply shortages

Vaporean 7 Carole, “Supplies of new chip metal hafnium remain untested”, February 13, http://www.reuters.com/article/2007/02/14/us-hafnium-supply-idUSN1339983720070214

The question **drew laughter from those in the know**. Not from ridicule, but because the minuscule amounts used in even billions of transistors boggles the imagination.¶ "Even if you took all the hafnium on a 12-inch (chip) wafer you'd be hard pressed to see it with the human eye," said Jim McGregor, analyst at technology research organization In-Stat.¶ Hafnium oxide will replace the layer of silicon oxide in tiny transistors or microprocessors that go into a chip. One chip requires hundreds of millions or even billions of them.¶ IBM Chief Technologist Bernard Meyerson put the supply situation in greater perspective: **the hafnium in a cubic centimeter, the size of a small sugar cube, could be spread across 10 U.S. football fields worth of silicon wafers used to make chips.**

#### No impact---alt causes

Barnaby 5, 9-29, Hugh, electrical engineering professor at Arizona State University, Will Radiation-Hardening-By-Design (RHBD) Work?, http://www.ieee.org/organizations/pubs/newsletters/npss/0305/rhbd.html

The continuing shrinkage in the “rad-hard” foundry market is making it more difficult to secure qualified parts that meet the power, performance, and low cost demands of the modern radiation-hardened system. Today’s relatively small market for rad-hard components makes it difficult for the few remaining suppliers of these parts to offer state-of-the-art products (e.g., G4 microprocessors or high speed and density memory) to the manufacturers of satellites and other space systems. This has prompted the designers of these systems to adopt a variety of strategies to ensure the viability of their electronics in the harsh radiation environment of space while simultaneously controlling costs. These strategies range from up-screening commercial parts to the radiation-hardening-by-design (RHBD) approach. ¶ In RHBD, electronic components are manufactured to meet specified radiation performance criteria, but the techniques employed to meet these criteria are implemented either in layout or in the application architecture and not in the fabrication process. RHBD is typically considered distinct from radiation-hardening-by-process (RHBP). Radiation hardening via process modifications is the traditional approach used by rad-hard foundries (although it should be noted that these foundries typically implement both RHBP and RHBD techniques). While RHBP has the advantage of being an extremely reliable means of achieving hardened components, RHBP is susceptible to low volume concerns such as yield, process instability, and high manufacturing costs. These drawbacks, when coupled with the post Cold War contraction of the government electronics market, caused a dramatic industrial exodus from rad-hard manufacturing. The number of rad-hard foundries has gone from more than ten in 1985 to two dedicated foundries today [1].¶ In order to leverage the economy-of-scale provided by the commercial electronics industry, some rad-hard electronics customers are looking at RHBD as a potentially lower cost solution to persistent radiation threats. The RHBD approach makes sense in today’s evolving electronics marketplace where semiconductor fabrication is becoming more detached from integrated circuit design. IC developers, in companies both large and small, now submit their ASIC designs to external foundries for fabrication. The growth of the field programmable gate array market is another good example of the increasing detachment between design and fabrication. The RHBD methodology fits this new model for IC development, i.e., custom circuits are designed for optimal performance in a targeted radiation environment and fabricated separately in a high volume commercial technology. ¶ **However, it is still an open question whether RHBD alone will ultimately work.** Ideally, the RHBD approach can produce hardened devices on standard commercial foundry flows, without any modification to the existing process or violation of design and layout rules. However, recent R&D efforts have indicated that the discovery of effective, design rule “clean,” techniques that meet targeted specifications is a more daunting task than originally thought. Many § Marked 12:54 § of the conventional RHBD techniques such as re-entrant geometries for total ionizing dose mitigation or dual interlocked storage cells (DICE) for reducing single event upsets are difficult to implement without corresponding electrical performance and area penalties of greater than one generation [2]. Designers for a number of satellite payload manufacturers are now engaged in activities to identify the design practices that will minimize the impact of RHBD on their power, speed, and area targets. Much of this effort relies on detailed understanding of the available commercial technologies and how these technologies respond to a specific set of radiation threats. Designers must often perform detailed modeling and experiments to determine which RHBD technique needs to be implemented to meet mission requirements. ¶ It is generally believed that the greatest radiation-related threats to modern electronic components are single event effects caused by individual energetic particles. Reduced device dimensions and accompanying technological changes have resulted in increased sensitivity to single event strikes. Many of the RHBD techniques available for SEE mitigation rely on redundant architectures, which can have a deleterious effect on performance and area. ¶ Prohibitive performance, power, and area penalties are not the only problems that may impact the ultimate efficacy of RHBD. Indeed, there are other, perhaps larger, unresolved questions including: **costs to the end-user, part traceability, and security**. With respect to the first question, it is still unknown whether the high costs of commercial parts qualification will be significantly reduced with the RHBD approach. Thus, even though manufacturing expenses may be substantially reduced via RHBD, the need to qualify designs **may in the long run erase any cost benefits to the end user.** Another benefit of RHBP and the use of rad-hard foundries is their dedication to the rad-hard electronics user. In RHBP, problems associated with the hardness of a particular process or lot may be traced and corrected for the customer. The commercial foundry is unlikely to provide this level of support. Lastly with the rad-hard foundry approach, the lifetime of a classified IC is fairly easy to track, from design, to manufacturing in a cleared facility, and to ultimate insertion into a strategic system. By contrast, the manufacturing cost advantage of RHBD is exactly what makes it a potentially greater security risk, i.e., fabricating the classified IC in a low cost commercial un-cleared foundry.

#### Slow commercialization means no link

Reitenbach 12 Dr. Gail, POWER's Managing Editor, "The U.S. Military Gets Smart Grid", January 1, www.powermag.com/smart\_grid/The-U-S-Military-Gets-Smart-Grid\_4228\_p3.html

There should be no question about the importance of more self-reliant, sophisticated, and flexible power grids for the military. However, the trickle-down benefits of DOD smart grid technology pilots for non-military electricity customers—in terms of new technologies and lower prices—may be limited.¶ To take a small example, the EVs currently being developed for the military are custom builds (as so much is for the military) by a new entrant, which suggests that the likely tech transfer between REV and the dozens of mainstream "legacy" automakers with better consumer brand awareness could be minimal. What could transfer to the civilian grid from V2G pilots is a better understanding of how to handle the distribution-level technical issues involved in using EV-stored energy to provide grid-balancing ancillary services. The regulatory and economic aspects of that transaction would be another matter. ¶ Other energy storage technologies developed for military applications may not translate quickly into civilian life because of cost constraints, whereas the military's primary reason for deploying energy storage is security rather than least cost. Over time, however, we can hope that experience gained in military applications leads to cheaper technologies.¶ Another limiting factor is that even for technologies that work technically, working practically can mean different things in military and civilian contexts. Microgrids, for example, are likely to remain relegated to energy users who put a premium on reliable power supply—including various types of industrial, corporate, and educational campuses. ¶ Though the size of military renewable generation installations is smaller than most utility-scale projects beyond base gates, military microgrid projects may provide valuable lessons about balancing renewable and fossil-fueled generation sources. They could also accelerate greater deployment of distributed renewable generation, something that at least one leading utility CEO, NRG Energy Inc.'s David Crane, already has his eye on. According to an interview with Yale Environment 360, "The electricity future, says Crane, will be transformed by the widespread adoption of three innovations: solar panels on residential and commercial roofs, electric cars in garages, and truly 'smart meters' that will seamlessly transfer power to and from homes, electric vehicles, and the grid."

#### Alliance doesn’t solve foreign policy challenges

Techau10/6/11Jan**,** director of Carnegie Europe, the European centre of the Carnegie Endowment for International Peace, “The Dirty Secret of US European relations” http://carnegieendowment.org/2011/10/06/dirty-secret-of-u-s-european-relations/8l1h

For the internal psychology of the transatlantic relationship, this is undoubtedly good news. The more interesting question, however, seems to be whether all this new love translates into a more meaningful partnership on shared foreign-policy challenges. Here the answer is less clear. While cooperation on issues such as the Middle East, Iran and terrorism was and is constructive, one of the most crucial items on the Euro-American agenda remains untouched by the improved atmosphere: transatlantic burden sharing in the field of security and defense. Here, Europeans have for the last sixty years been in a position of utter dependence on the Washington’s willingness and ability to guarantee their security. And even though the global strategic framework has drastically changed since the beginning of this transatlantic bargain in the 1950s, Europeans still conduct their defense planning as if American generosity were the most naturally abundant and easily accessible political commodity. By doing so, they increase their reliance on U.S. guarantees, and they become less and less interesting as an ally for their American counterparts. All attempts to wake Europeans up and make them rethink their priorities have died away without much impact.¶ It would be easy to blame President Obama for not using his popularity with allies intelligently enough to induce them to get their act together. But the European passivity on security and defense issues goes far beyond the reach of even the most popular American president. By and large, Europeans are unaware of their utter dependency; they don’t feel particularly threatened, they hold a deep mistrust in all things military, and they have learned to look at the world without regard to strategic considerations. Despite Libya, their willingness for an active approach to the world around them and for intervention on behalf of values and interests is small. Their political leaders—to the extent that they are aware of today’s realities—shy away from the enormous budgetary and political costs that a realistic security and defense posture would create.The dirty little secret of transatlantic relations is that, under these circumstances, they will undoubtedly become a whole lot less boring very soon. Both America and Europe are broke. Their ability to shape the world around them is getting weaker. The global center of gravity is shifting towards the Pacific. Americans are ultimately better suited to master this process of relative decline. But it is in Washington’s fundamental interest to keep Europe safe and stable, to keep its best allies strong and to defend the enormous economic investments it has placed in the old world. Obsessing about perceptions and sympathy ratings will soon look like frivolous luxury. The ball is in the European court. For Americans, a Europe with a grown-up strategic culture will be more important than one that produces high approval ratings for the United States. For Europeans, investing in a relevant and workable transatlantic future will be more important than an American president they find easy to like.

### 2AC Russia Gas DA

#### Russian energy is over because of the massive shale gas revolution

Tucker 13 Aviezer, Assistant Director of the Energy Institute at the University of Texas at Austin, 1/9, “The New Power Map: World Politics After the Boom in Unconventional Energy,” http://www.foreignaffairs.com/articles/138597/aviezer-tucker/the-new-power-map?page=show

The energy map of the world is being redrawn -- and the global geopolitical order is adrift in consequence. **We are moving away from a world dominated by** a few **energy** mega-**supplier**s, such as **Russia**, Saudi Arabia, and Venezuela, and toward one in which **most countries have some domestic resources to meet their energy needs** and can import the balance from suppliers in their own neighborhood. This new world will feature considerably lower energy prices, and in turn, **geopolitics will hinge less on** oil and **gas**. Within the next five to ten years, regimes that are dependent on energy exports will see their power diminished. No longer able to raise massive sums from energy sales to distribute patronage and project power abroad, they will have to tax their citizens.¶ **The revolution in unconventional energy production results from technologies that make drilling and extraction from underground shale formations increasingly easy and cheap**. One cutting-edge procedure, hydraulic fracturing, involves injecting a mixture of sand, chemicals, and either water, gel, or liquefied greenhouse gases into shale rock formations to extract hydrocarbons. Although the technique was first conceptualized in 1948, only recently have other technologies arrived to make it commercially viable. (One such procedure, horizontal drilling, allows operators to tap into shallow but broad deposits with remarkable precision.)¶ Hydraulic fracturing has been used widely for only about the past five years. But the result -- **a staggering glut of natural gas in the** United States -- **is already clear**. The price of natural gas in the country has plunged to a quarter of what it was in 2008. The low price has prompted changes throughout the U.S. economy, including the projected retirement of one-sixth of U.S. coal power generation capacity by 2020, the conversion of hundreds of thousands of vehicles from gasoline to compressed gas, and the construction and repatriation from China of chemical, plastic, and fertilizer factories that use natural gas as both raw material and fuel. By 2025, the professional services firm PricewaterhouseCoopers predicts, energy-intensive industries will create a million new U.S. jobs.¶ Meanwhile, the United States is using innovative energy technologies ever more frequently to extract shale oil, tight oil, and methane from coal beds. Accordingly, the share of U.S. oil consumption that is imported from abroad has fallen sharply, from about 60 percent in 2005 to less than 45 percent this year. It will likely continue to decrease until the country, or at least North America, is energy self-sufficient.¶ **The economic and geopolitical shockwaves will be felt worldwide**. **Decreasing demand in the U**nited **S**tates for liquid natural gas, oil imports, and domestic coal **is already reducing global prices for these commodities**. As a result, European countries have a stronger position in negotiations over natural gas imports with Russia, from which they receive a quarter of their supply. The newfound leverage might have emboldened the European Union to open an investigation in September into a possible price-fixing scheme by Gazprom, the Russian energy giant. In addition, European countries have been negotiating fewer long-term gas contracts with Russia in which the agreed-upon price for the gas is pegged to that of oil -- the kind that Gazprom favors. Instead, they are opting for spot purchases -- short-term acquisitions based on market prices -- in the expectation of rising supplies and falling prices. Russia has already granted some countries roughly ten percent discounts on existing contracts.

#### Gas shipments are already being diverted from the US---Russia is in trouble

Riley 12, professor of energy law at The City Law School at City University London, 12/31, <http://www.thehindu.com/opinion/op-ed/the-shale-revolutions-shifting-geopolitics/article4256348.ece>

The incentives to develop shale oil and natural gas are very great. But so far, the United States has only experienced the first stage of low natural-gas prices and the reimportation of energy intensive industries such as chemicals and steel because of low gas prices. The next stage of the shale revolution’s impact is going to be felt as major stimulus gets under way from lower oil prices. More broadly, the shale revolution will grant the United States a greater range of options in dealing with foreign states.¶ For the Europeans, the shale revolution is also largely positive. A greater variety of gas supplies from liquefied natural gas **originally destined for the U**nited States has been dumped in European markets; by 2020, shale gas in the form of liquefied natural gas is likely to begin arriving in Europe in significant quantities, and there is also the prospect of some domestic shale gas becoming available. Europe will also benefit from the second stage of the shale revolution as oil prices come under pressure.¶ However, American self-sufficiency in oil is of greatest concern to the European Union. The danger is that the United States will no longer have any direct interest in ensuring supply flows out of the Gulf. At the very least this will mean that Washington is likely to demand greater European investment in its own energy security. One option for the European Union is to develop natural gas transportation as an energy security hedge. This would also increase pricing pressure on oil producers.¶ About China¶ China has even greater incentives to develop its shale gas resources. According to the U.S. Energy Department’s Energy Information Administration, the country’s recoverable resources are larger than those of the United States at 36 trillion cubic meters. The main geostrategic reason for Beijing to develop shale gas for transportation is that the U.S. Navy controls the Pacific and most Chinese oil arrives by tanker. Large-scale use of natural gas for transportation would protect China from much of the effect of a U.S. blockade.¶ By contrast, **the outlook for Russia** and Saudi Arabia **seems bleak**. As the decade progresses, shale will be developed worldwide and natural gas infrastructures will be constructed. It is difficult to see how the markets will avoid dropping oil prices.

#### Nuclear doesn’t tradeoff---it allows gas to be used in suitable markets

Parker 9—President, American Gas Association (David, Nuclear Vital To Electricity Grid, http://energy.nationaljournal.com/2009/10/does-nuclear-fit-the-bill.php)

Fuel diversity in electricity generation is critical to the success of a sustainable grid, and nuclear power can and should play a key role in producing clean, baseload energy for the nation. But the reality is that the last new nuclear reactor built in America was 32 years ago—in 1977—and today, despite having received applications for 26 new nuclear reactors, the Nuclear Regulatory Commission has yet to approve a single one, let alone the hundreds that would be needed to do the job that Sens. Kerry and Boxer seem to envision.¶ The reasons are no secret—many in the environmental community consider nuclear power a danger to both the natural and man-made environment, even though nuclear power emits no carbon-dioxide or other greenhouse gas emissions, making it, from a global warming perspective, the most environmentally benign way to generate electricity. It is also important to note that since the 1970s rapid advances in technology have made nuclear power far safer and more efficient—and the nuclear industry's safety and security standards are the highest in the world.¶ The American Gas Association (AGA) believes that any climate change legislation should support the increased use of nuclear power as a way to enhance fuel diversity in the generation of electricity, while at the same time meeting our national goal of reducing greenhouse gas emissions. Currently natural gas, the most environmentally friendly fossil fuel, is the fuel of choice in electricity generation. Yet the best use of natural gas—meaning its most efficient and environmentally superior use— is directly in America's homes and businesses.¶ AGA does not believe that natural gas should not be a part of the electricity generation mix. Rather, we believe that increased fuel diversity, including the increased use of nuclear power, would allow more natural gas to be used directly in the residential and commercial market, where, for more than 40 years, natural gas customers have led the way in increasing energy efficiency and conservation.

#### China fills in

Levine 12 Steve, Quartz’s Washington correspondent, writes about the intersection of energy, technology and geopolitics, a juncture of some of the most important and quickly developing events and trends on the planet. LeVine teaches the subject as an adjunct professor in Georgetown University’s Security Studies Program in the Graduate School of Foreign Service. He is a Schwartz Fellow at the New America Foundation, “Five ways a new age of cheap energy could shift the power balance on the planet,” 9/24, <http://qz.com/3416/five-ways-a-new-age-of-cheap-energy-could-shift-the-power-balance-on-the-planet-2/>

On current industry forecasts, global energy consumption should rise by some 39% by 2030, and China alone will account for about 40% of the jump. But two things could change China’s energy consumption enough to alter the geopolitical status quo. One, according to Bernstein, is if the Chinese economy weakens so much that GDP growth drops below 4.5% (though it hasn’t been even close to that low in more than 20 years), and oil consumption drops with it. Second, China could simply change its fuels mix. Right now it burns a lot of coal, and will account for two thirds of the global growth in coal-burning through 2030, according to the BP Statistical Review. But the country is already shifting towards gas-burning power plants, and that could happen faster if gas gets cheaper, as it very well could. Asian liquefied natural gas (LNG) is the most expensive in the world by far—$17 and more per 1,000 cubic feet compared with about $3 in the US. A vast new natural gas supply will flow into Asia in the 2020s from east Africa, and possibly the United States, Cyprus and Israel. That could push down Asian gas prices, and be a tipping point for China to cut its use of coal much faster. Domestic politics could especially motivate China to embrace this cheaper gas. Public protests have been growing over air and water pollution, in part caused by the burning of coal and oil. On current trends, that pollution is going to get considerably worse, and so might the unrest. The Communist Party first decreed a reduction of emissions in 2005, partly because of the political fallout. Now, China’s rulers are doing “everything they can” to reduce CO2, among other pollution, says David Fridley, a scientist in the China Energy Group at Lawrence Berkeley National Laboratory. The impact of China’s reducing its oil consumption and CO2 emissions would be far reaching. The OPEC countries would weaken, as would their rulers’ grip on power. The global economy would surge, as energy-consuming countries right their balance of payments thanks to lower energy prices across the board. And slower-growing CO2 emissions are a geopolitical impact in themselves, since global warming affects the economics, the way of life and even the very survival of certain nations.

#### No impact to Russian econ

Stent 3 – Angela E. Stent, professor of government and foreign service, and director of the Center for Eurasian, Russian and East European Studies at Georgetown University, Winter 2003, World Policy Journal, p. 75-76

Using extensive interviews with participants in all three administrations, and memoirs by former officials, they paint a compelling picture of officials often overwhelmed by the challenge of an entirely new reality. The unexpected collapse of communism and of the Soviet Union, coming just after the Gulf War, left them with no road map to understand how Russia and other post-Soviet states might develop. Nightmare scenarios suggested themselves: nuclear war between Russia and Ukraine; weapons proliferation on a terrifying scale; Yugoslav-type ethnically based civil war on the territory of the former Soviet Union; mass starvation; economic collapse—the ominous possibilities were endless. That these “dogs did not bark” is testimony to the unwillingness of people in the post-Soviet space to engage in armed conflict and to Western assistance that staved off famine and economic collapse. The failure of catastrophic scenarios to come about is one indicator of success—but if one were to measure America’s contribution to transforming Russia in more positive ways, the evidence is more mixed. If a minimalist definition of success was the absence of catastrophe, the maximalist definition was the creation of a fully functioning democracy in Russia with a transparent market economy and the rule of law. That has not happened yet, and it is unclear when it will. So far, there is no consensus about what would constitute a realistic timetable for Russia’s democratic development.

### 2AC Immigration DA (Normal)

#### **Won’t pass---both parties have incentives to prevent a deal**

Koons 2-1 – Andy Koons, writer for the Daily Iowan, February 1st, 2013, "Koons: Immigration reform not done" [www.dailyiowan.com/2013/02/01/Opinions/31576.html](http://www.dailyiowan.com/2013/02/01/Opinions/31576.html)

Immigration reform is not a done deal, though it should be. America’s immigration system has been a travesty for decades. Despite being a nation of immigrants, needing workers to fill unpopular jobs and needing to remain competitive in a global economy in which education and knowledge are paramount, we haven’t found it in ourselves to move to a more fair pro-economic growth immigration system.¶ Why has it been so difficult? **Powerful forces stand against fixing immigration. Democrats benefit from Latinos refusing to vote for anti-reform Republicans, businesses appreciate low cost under-the-table labor and the conservative base treasures American citizenship and is loath to give it to what they consider “lawbreakers.”**¶ I am concerned that current reform efforts will not be successful because those forces are still present. Reform is being considered now because of a single change in dynamics. National Republican leaders are stinging from Obama’s substantial re-election victory and know that they have a diminishing chance of winning future national elections unless the growing Latino vote is put in play.¶ The Latino vote will never be attainable by the right as long as national Republican nominees are pressured to position themselves against immigration reform. Is that realization by Republican leaders enough to pass reform? The conservative base is very skeptical about reform proposals — will they include enough border protection, be too lenient on undocumented immigrants, contain left-leaning provisions such as allowing foreign same-sex couples a pathway to citizenship — and don’t want to hand Obama another historic win.¶ And make no mistake: Obama will be given credit if immigration reform passes. A big win this early in his second term will strengthen the wind already at his back from his election. Obamacare passed after almost two years of work and sucked the president dry of electoral goodwill. If Republicans don’t use immigration to sap Obama’s political capital, Obama will have enough remaining momentum to take on climate change before the midterms.¶ Don’t discount the intelligence of Republican strategists either — they know that there is a real possibility that the Latino vote may never join the Republican big tent even after reforming immigration. That vote may be religious, generally, but they are also composed of a great deal of low-income workers who may feel more at home with Democrats and be against changing safety-net policies.¶ Republican **House members come from solidly conservative districts in which the only** re-election threats are challenges by people more extreme than themselves**.** Will those members risk their seats **to give party leaders a chance to win the presidency in four years? House Speaker John Boehner hasn’t had much luck leading his members so far.**¶ If we could stop politicking for a moment and let the right thing happen, immigration reform would pass — but **politics never ends**. The best that can be hoped is that the political balance has shifted enough after Obama’s re-election that Republican leaders feel vulnerable without reform and that Republican House members are receptive. I’m afraid that may be asking a lot.

#### Won’t pass---Obama’s strategy

Munro 12-31 – Neil Munro, reporter for the Daily Caller, December 31st, 2012, "Obama promises new immigration plan but keeps endgame close to his vest" dailycaller.com/2012/12/31/obama-promises-new-immigration-plan-but-keeps-endgame-close-to-his-vest/?print=1

President Barack Obama promised Dec. 30 to introduce an immigration bill during 2013, but activists on all sides of the debate are trying to understand his strategy.¶ **He may be gunning for a victory in the mid-term elections by introducing** a bill so radical that it will **spark an emotional controversy from whites**, which would then **spur many angry Latino**s to vote Democratic in the 2014 midterm elections, said Robert de Posada, former head of a GOP-affiliated group, The Latino Coalition.¶ **“The word that I’ve heard from many, is [that** he will] submit a very, very liberal plan that most Republicans will not support, that most southern and moderate Democrats will not support**,”** he said.¶ When the bill fails**, “they can announce once again that they tried [and that Latinos] need to rally in the next election**,” said Posada, who helped President George W. Bush win 40 percent of the Latino vote in 2004, during the housing boom.

#### Gas exports pounder

Gardett 2/6 [“Natural Gas Exports: 'Whats the Rush?' Asks Dow”, 2013, <http://energy.aol.com/2013/02/06/natural-gas-exports-whats-the-rush-asks-dow/>]

The debate over [natural gas exports](http://energy.aol.com/2012/10/30/us-natural-gas-exports/) from the US has broken out of the energy sector and begun to raise temperatures across the political spectrum, with a high profile [Congressional hearing](http://energycommerce.house.gov/hearing/AESI-assessment-north-americas-energy-resources) this week underlining the stakes at play in a Department of Energy policy decision on the economic standing of natural gas export projects.

#### **Gun control and debt**

Cillizza 2-6 Chris, writer for the Washington Post, 2013, "President Obama is enjoying a second political honeymoon. But how long will it last?" [www.washingtonpost.com/blogs/the-fix/wp/2013/02/06/president-obama-is-enjoying-a-second-political-honeymoon-but-how-long-will-it-last/](http://www.washingtonpost.com/blogs/the-fix/wp/2013/02/06/president-obama-is-enjoying-a-second-political-honeymoon-but-how-long-will-it-last/)

Regardless of the reason, it’s clear that Obama has a limited time — six months perhaps? — to take legislative advantage of his second political honeymoon.¶ He seems committed to taking on three separate and distinct fights during that time: 1) gun control 2) immigration reform 3) debt and spending. **Each of those legislative scraps will shorten his honeymoon as he** expends political capital to try to get what he wants out of a Congress — particularly in the House — that seems likely to be resistant.¶ And, it’s possible — given the glacially slow pace at which Congress works and the aforementioned partisanship that seems to seize any and every issue — that Obama’s honeymoon will fade well before he gets all three of those priorities accomplished.¶ A look back at **the trend line on his job approval in his first term is telling in that regard**.¶ 2013-02-06 Obama honeymoon 1Even though Obama started off considerably higher in his first term than he began his second term, by August 2009 he had dropped to 54 percent approval in WaPo-ABC polling — thanks to the bailout of the American auto industry, the fight over the economic stimulus package and the earlier positioning over his health-care bill.¶ Considering that Obama is — at best — in the mid-50s in terms of job approval at the moment and the fact that the past showdowns on fiscal issues have revealed the massively different approaches advocated by the two parties, it’s not at all far fetched to assume that taking on just one of those fights might be enough to end **the president’s second term honeymoon.**

#### **Nominations**

Thurlow 2-5 – Tom Thurlow, writer for Red State, February 5th, 2013, "Obama’s Political Capital" www.redstate.com/tfthurlow/2013/02/05/obamas-political-capital/

President Obama blows through his own political capital just as fast as he blows through America’s financial capital. Neither case of over-spending is sustainable, and we will just have to wait to see which spending spree is forced to end first.¶ But this further confirms my suspicion that President Obama’s brains are the most over-rated to occupy the Oval Office in generations. Take **his recent** nominations, which are a mess.¶ Last week’s Senate **hearings on Senator Hagel’s** confirmation as defense secretary were a disaster. Senator McCain pressed Senator Hagel to confirm or deny Hagel’s earlier statement that the Surge in Iraq was “the greatest foreign policy blunder since the Vietnam War.” Senator Ted Cruz pointed out that Senator Hegal, during an interview with the Al Jazeera English network in 2009 had agreed with a questioner who said that the United States appeared and acted like the world’s bully. As Paul Mirengoff at the Powerline Blog wrote, “if he were a Broadway play, Hagel would close after one performance.”¶ There were also a number of past anti-Semitic, or at least anti-Israel statements about which Senator Hagel was questioned. About the only thing about the hearing that was reassuring to those who take national defense seriously was that Hagel bumbled so much he sounded like he may have dementia. Let’s face it, a demented defense secretary may not be as bad as an anti-American defense secretary who is purposefully soft on defense and unconcerned about looming problems with Iran’s nuclear program.¶ Senator Lindsey Graham has threatened a hold on the Hagel nomination, and he should. Not only is a defense secretary an important policy position, but as has been pointed out by Republican critics that in any given foreign crisis, the defense secretary will be one of the few advisors in the room, advising the president.¶ Next up: **a nomination battle for a Treasury secretary nominee, Jacob Lew**, who has never worked in a bank except as an attorney for Citibank, and has held many different government jobs, most recently President Obama’s chief of staff. Definitely a financial industry lightweight. Lew has also been accused of misleading the public on deficits. About the only thing that stands out about Jacob Lew as Treasury secretary is the fact that his signature — which will appear on all of our currency – looks like a bunch of circles. Oddly enough, it doesn’t appear as if Lew has had any medical training.¶ After that, brace yourself for President Obama’s **nominee for director of the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), Todd Jones**. Jones is the current acting director of ATF and has been criticized by a local Democratic FBI office director as being politically well-connected but incompetent and soft on gun and violent crime prosecutions.¶ Past presidents have had difficult times in their second terms, but the difficulty is usually with big proposals. President George W. Bush unsuccessfully tried to pass privatization of Social Security and immigration reform in his second term. President Reagan spent his second term solidifying his victory in the Cold War and simplified the tax code, lowering the top marginal tax rate to 28%. Meanwhile, President Obama is trying to get Charles Hagel approved as defense secretary, Jacob Lew at Treasury secretary, and Todd Jones as ATF director, not grand plans by any means.¶ President Obama may get these nominees approved by a majority of senators. But the question is: why is he fighting these particular battles? He could have easily found better qualified nominees for these positions and fought bigger battles on some substantive legislative proposals. Why spend what remaining political capital he has on these problematic appointments? I have a theory, and here goes.

#### Executive military action shields

Davenport 12 Coral, energy and environment correspondent for National Journal, Prior to joining National Journal in 2010, Davenport covered energy and environment for Politico, and before that, for Congressional Quarterly. In 2010, she was a fellow with the Metcalf Institute for Marine and Environmental Reporting. From 2001 to 2004, Davenport worked in Athens, Greece, as a correspondent for numerous publications, including the Christian Science Monitor and USA Today, covering politics, economics, international relations and terrorism in southeastern Europe. She also covered the 2004 Olympic Games in Athens, and was a contributing writer to the Fodor’s, Time Out, Eyewitness and Funseekers’ guidebook series. Davenport started her journalism career at the Daily Hampshire Gazette in Northampton, Massachusetts, after graduating from Smith College with a degree in English literature. National Journal, 2/10, White House Budget to Expand Clean-Energy Programs Through Pentagon, ProQuest

The White House believes it has figured out how to get more money for clean-energy programs touted by President Obama without having it become political roadkill in the wake of the Solyndra controversy: **Put it in the Pentagon**. While details are thin on the ground, lawmakers who work on both energy- and defense-spending policy believe the fiscal 2013 budget request to be delivered to Congress on Monday probably won't include big increases for wind and solar power through the Energy Department, a major target for Republicans since solar-panel maker Solyndra defaulted last year on a $535 million loan guarantee. But they do expect to see increases in spending on alternative energy in the Defense Department, such as programs to replace traditional jet fuel with biofuels, supply troops on the front lines with solar-powered electronic equipment, build hybrid-engine tanks and aircraft carriers, and increase renewable-energy use on military bases. While Republicans will instantly shoot down requests for fresh spending on Energy Department programs that could be likened to the one that funded Solyndra, many support alternative-energy programs for the military. "I do expect to see the spending," said Rep. Jack Kingston, R-Ga., a member of the House Defense Appropriations Subcommittee, when asked about increased investment in alternative-energy programs at the Pentagon. "I think in the past three to five years this has been going on, but that it has grown as a culture and a practice - and it's a good thing." "If Israel attacks Iran, and we have to go to war - and the Straits of Hormuz are closed for a week or a month and the price of fuel is going to be high," Kingston said, "the question is, in the military, what do you replace it with? It's not something you just do for the ozone. It's strategic." Sen. Lindsey Graham, R-S.C., who sits on both the Senate Armed Services Committee and the Defense Appropriations Subcommittee, said, "I don't see what they're doing in DOD as being Solyndra." "We're not talking about putting $500 million into a goofy idea," Graham told National Journal . "We're talking about taking applications of technologies that work and expanding them. I wouldn't be for DOD having a bunch of money to play around with renewable technologies that have no hope. But from what I understand, there are renewables out there that already work." A senior House Democrat noted that this wouldn't be the first time that the **Pentagon has been utilized to advance policies that wouldn't otherwise be supported**. "They did it in the '90s with medical research," said Rep. Henry Waxman, D-Calif., ranking member of the House Energy and Commerce Committee. In 1993, when funding was frozen for breast-cancer research programs in the National Institutes of Health, Congress boosted the Pentagon's budget for breast-cancer research - to more than double that of the health agency's funding in that area. **Politically, the strategy makes sense**. Republicans are ready to fire at the first sign of any pet Obama program, and renewable programs at the Energy Department are an exceptionally ripe target. That's because of Solyndra, but also because, in the last two years, the Energy Department received a massive $40 billion infusion in funding for clean-energy programs from the stimulus law, a signature Obama policy. When that money runs out this year, a request for more on top of it would be met with flat-out derision from most congressional Republicans. Increasing renewable-energy initiatives at the Pentagon can also help Obama advance his broader, national goals for transitioning the U.S. economy from fossil fuels to alternative sources. As the largest industrial consumer of energy in the world, the U.S. military can have a significant impact on energy markets - if it demands significant amounts of energy from alternative sources, it could help scale up production and ramp down prices for clean energy on the commercial market. Obama acknowledged those impacts in a speech last month at the Buckley Air Force Base in Colorado. "The Navy is going to purchase enough clean-energy capacity to power a quarter of a million homes a year. And it won't cost taxpayers a dime," Obama said. "What does it mean? It means that the world's largest consumer of energy - the Department of Defense - is making one of the largest commitments to clean energy in history," the president added. "That will grow this market, it will strengthen our energy security." Experts also hope that Pentagon engagement in clean-energy technology could help yield breakthroughs with commercial applications. Kingston acknowledged that the upfront costs for alternative fuels are higher than for conventional oil and gasoline. For example, the Air Force has pursued contracts to purchase biofuels made from algae and camelina, a grass-like plant, but those fuels can cost up to $150 a barrel, compared to oil, which is lately going for around $100 a barrel. Fuel-efficient hybrid tanks can cost $1 million more than conventional tanks - although in the long run they can help lessen the military's oil dependence, Kingston said Republicans recognize that the up-front cost can yield a payoff later. "It wouldn't be dead on arrival. But we'd need to see a two- to three-year payoff on the investment," Kingston said. Military officials - particularly Navy Secretary Ray Mabus, who has made alternative energy a cornerstone of his tenure - have been telling Congress for years that the military's dependence on fossil fuels puts the troops - and the nation's security - at risk. Mabus has focused on meeting an ambitious mandate from a 2007 law to supply 25 percent of the military's electricity from renewable power sources by 2025. (Obama has tried and failed to pass a similar national mandate.) Last June, the DOD rolled out its first department-wide energy policy to coalesce alternative and energy-efficient initiatives across the military services. In January, the department announced that a study of military installations in the western United States found four California desert bases suitable to produce enough solar energy - 7,000 megawatts - to match seven nuclear power plants. And so far, those **moves have met with approval from congressional Republicans**. Even so, any request for new Pentagon spending will be met with greater scrutiny this year. The Pentagon's budget is already under a microscope, due to $500 billion in automatic cuts to defense spending slated to take effect in 2013. But even with those challenges, clean-energy spending probably won't stand out as much in the military budget as it would in the Energy Department budget. Despite its name, the Energy Department has traditionally had little to do with energy policy - its chief portfolio is maintaining the nation's nuclear weapons arsenal. Without the stimulus money, last year only $1.9 billion of Energy's $32 billion budget went to clean-energy programs. A spending increase of just $1 billion would make a big difference in the agency's bottom line. But it would probably be easier to tuck another $1 billion or $2 billion on clean-energy spending into the Pentagon's $518 billion budget. Last year, the Pentagon spent about $1 billion on renewable energy and energy-efficiency programs across its departments.

#### SMRs are popular

Nelson and Northey 12 Gabriel and Northey, energy and environment reports for Greenwire, “DOE funding for small reactors languishes as parties clash on debt,” <http://www.eenews.net/public/Greenwire/2012/09/24/3>

It's not just wind and solar projects that are waiting for federal help as Congress duels over the importance of putting taxpayer dollars on the line for cutting-edge energy projects. Some of the nation's largest nuclear power companies are anxious to hear whether they will get a share of a $452 million pot from the Department of Energy for a new breed of reactors that the industry has labeled as a way to lessen the safety risks and construction costs of new nuclear power plants. The grant program for these "small modular reactors," which was announced in January, would mark the official start of a major U.S. foray into the technology even as rising construction costs -- especially when compared to natural-gas-burning plants -- cause many power companies to shy away from nuclear plants. DOE received four bids before the May 21 deadline from veteran reactor designers Westinghouse Electric Co. and Babcock & Wilcox Co., as well as relative newcomers Holtec International Inc. and NuScale Power LLC. Now the summer has ended with no announcement from DOE, even though the agency said it would name the winners two months ago. As the self-imposed deadline passed, companies started hearing murmurs that a decision could come in September, or perhaps at the end of the year. To observers within the industry, it seems that election-year calculations may have sidelined the contest. "The rumors are a'flying," said Paul Genoa, director of policy development at the Nuclear Energy Institute, in an interview last week. "All we can imagine is that this is now caught up in politics, and the campaign has to decide whether these things are good for them to announce, and how." Small modular reactors do not seem to be lacking in political support. The nuclear lobby has historically courted both Democrats and Republicans and still sees itself as being in a strong position with key appropriators on both sides of the aisle. Likewise, top energy officials in the Obama administration have hailed the promise of the new reactors, and they haven't shown any signs of a change of heart. DOE spokeswoman Jen Stutsman said last week that the department is still reviewing applications, but she did not say when a decision will be made.

#### Rubio loves nuclear power

Luimbe 12 November 20, "Rubio wants more nuclear energy, doesn't believe in radiocarbon dating", www.luimbe.com/blog/2012/11/20/rubio-wants-more-nuclear-energy-doesnt-believe-in-radio-carbon-dating/

Rubio on nuclear energy:¶ I support a comprehensive energy plan that encourages nuclear energy, exploration in the Arctic National Wildlife Refuge and environmentally safe leasing of oil and natural gas fields in the outer continental shelf and on federally owned lands with oil shale in the West. As senator, I will stand for policies that make us more energy efficient, less reliant on foreign sources of oil, create jobs and ease the burden on family budgets.¶ source: Marco Rubio on Energy & Oil.

#### Rubio’s key to immigration

Drucker and Trygstad 1/30 David M and Kyle, "Rubio Must Sell Immigration Changes to GOP, Grass Roots", 2013, www.rollcall.com/news/rubio\_must\_sell\_immigration\_changes\_to\_gop\_grass\_roots-222044-1.html?pos=hftxt

The fate of an immigration overhaul rests almost exclusively with Sen. Marco Rubio, the Florida Republican whose star power with conservatives is crucial to moving a bill through Congress.¶ President Barack Obama retains veto power, and Democrats hold the Senate floor. But no comprehensive immigration changes are likely to pass Congress without the healthy support of House Republicans. And Florida’s junior senator, perhaps more than any other Republican serving in Washington today, has the political credibility and communication skills to sell such complicated, sensitive legislation to skeptical conservative members, grass-roots voters and influential media commentators.¶ Rubio’s position is all the more unique because congressional Democrats and Obama need him, too, and appear to realize his importance to the legislative endgame.¶ Republicans warn that Obama and congressional Democrats could sink Washington’s immigration policy rewrite by attaching controversial social provisions or watering down the border enforcement and security measures included in the bipartisan Senate framework that Rubio helped negotiate. The Florida lawmaker has said he’ll pull his support from any bill if that occurs, and Republicans say comprehensive policy changes will fail to garner meaningful GOP support without Rubio’s backing.¶ “If Rubio signals any mistrust or misgivings, the whole thing collapses,” GOP pollster Brock McCleary said.

#### Obama PC fails now---plan generates GOP support for other priorities like immigration

CSM 1-20 – Christian Science Monitor, 1/20/13, “Obama’s second term: Can he work with Congress? (+video),” http://www.csmonitor.com/layout/set/print/USA/DC-Decoder/2013/0120/Obama-s-second-term-Can-he-work-with-Congress-video

“The president has been criticized by many people for his inability or unwillingness to spend a lot of time stroking members of Congress,” says Ross Baker, a congressional historian at Rutgers University who is writing a book on bipartisanship in the US Senate. “I think a lot of this is based upon the widely-accepted theory [that the] power of a presidency is the power to persuade – which is perfectly plausible, and it was certainly plausible in the 1950s.... The problem is, there are no persuadables" today. ¶ But by focusing on issues of common ground with the GOP, Washington could generate some bipartisan successes in the next four years. ¶ Immigration and Energy¶ For one, the president could team up with Republican moderates and much of the party’s leadership on immigration reform. ¶ “We believe that immigration reform is different in that it has a past, present, and future of bipartisan support,” said Ali Noorani, executive director of the National Immigration Forum. “What we’ve seen over the last two years is conservatives, moderates, and liberals want this president and this Congress to act, and that’s different from any other issue.” ¶ And the president could perhaps turn down the bellicosity on the Hill by working with some of his loudest critics (though risking the ire of environmentalists in his political base) in one area that the deeply-red right and the president could agree: energy policy.

#### No PC loss from pushing nuclear

Hinckley 12 Elias, partner with the law firm of Kilpatrick Townsend & Stockton. Additionally, he is an adjunct professor of international energy policy at Georgetown University, “Hard Choices Ahead for US Energy”, <http://www.ourenergypolicy.org/wp-content/uploads/2012/03/EHinckley-policy-article.pdf>

What remains unclear is how policymakers will react. Some amount of policymaking support has been lost, as there has been simply too much discourse devoted to the potential hazards of nuclear power. However, the downside to continuing to champion the role of nuclear energy as part of a secure US energy future appears limited at this stage. There is little nationalized resistance and, as a result, no clear political cost to support nuclear policies, and possibly the benefit of the impression of proactivity on broad energy policy initiatives, and the results may be politicians continuing to champion nuclear power with no real expectation of new facilities being developed over the near or midterm.

#### Winner’s win

Hirsh 2/7 Michael, chief correspondent for National Journal; citing Ornstein, a political scientist and scholar at the American Enterprise Institute and Bensel, gov’t prof at Cornell, "There's No Such Thing as Political Capital", 2013, [www.nationaljournal.com/magazine/there-s-no-such-thing-as-political-capital-20130207](http://www.nationaljournal.com/magazine/there-s-no-such-thing-as-political-capital-20130207)

But the abrupt emergence of the immigration and gun-control issues illustrates how suddenly shifts in mood can occur and how political interests can align in new ways just as suddenly. Indeed, the pseudo-concept of political capital masks a larger truth about Washington that is kindergarten simple: You just don’t know what you can do until you try. Or as Ornstein himself once wrote years ago, “Winning wins.” In theory, and in practice, depending on Obama’s handling of any particular issue, even in a polarized time, he could still deliver on a lot of his second-term goals, depending on his skill and the breaks. Unforeseen catalysts can appear, like Newtown. Epiphanies can dawn, such as when many Republican Party leaders suddenly woke up in panic to the huge disparity in the Hispanic vote.¶ Some political scientists who study the elusive calculus of how to pass legislation and run successful presidencies say that political capital is, at best, an empty concept, and that almost nothing in the academic literature successfully quantifies or even defines it. “It can refer to a very abstract thing, like a president’s popularity, but there’s no mechanism there. That makes it kind of useless,” says Richard Bensel, a government professor at Cornell University. Even Ornstein concedes that the calculus is far more complex than the term suggests. Winning on one issue often changes the calculation for the next issue; there is never any known amount of capital. “The idea here is, if an issue comes up where the conventional wisdom is that president is not going to get what he wants, and he gets it, then each time that happens, it changes the calculus of the other actors” Ornstein says. “If they think he’s going to win, they may change positions to get on the winning side. It’s a bandwagon effect.”

### AT: Budget Impact

#### SMR expansion solves growth

MSCR 11 US Department of Commerce International Trade Administration Manufacturing and Services Competitiveness Report, February 2011, “The Commercial Outlook for U.S. Small Modular Nuclear Reactors”, http://trade.gov/mas/ian/build/groups/public/@tg\_ian/@nuclear/documents/webcontent/tg\_ian\_003185.pdf

A primary advantage of SMRs is in their production. Their small size means that they do not need the ultra-heavy forged components that currently can be made only by Japan Steel Works and Doosan Heavy Industries in South Korea.7 In most of the current U.S. SMR designs, the reactor pressure vessels and other large forgings could be supplied by **domestic vendors**, which would create U.S. jobs and potential exports of SMR components to international customers. In addition, most SMR designs allow for factory manufacturing, which could potentially provide opportunities for cost savings, for increased quality, and for more efficient production. Those attributes mean that **SMRs could be a** significant source of economic growth **in the United States.**

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## Grid

### Grid Not Resilient

#### Grid’s vulnerable and threats are growing---insiders vote aff

Merica 12 Dan, CNN, "DoD official: Vulnerability of U.S. electrical grid is a dire concern", July 27, security.blogs.cnn.com/2012/07/27/dod-official-vulnerability-of-u-s-electrical-grid-is-a-dire-concern/

Speaking candidly at the Aspen Security Forum, one defense department official expressed great concern about the possibility of a terrorist attack on the U.S. electric grid that would cause a “long term, large scale outage.”¶ Paul Stockton, assistant secretary for Homeland Defense and Americas’ Security Affairs at the Department of Defense, said such an attack would affect critical defense infrastructure at home and abroad – a thought that Stockton said was keeping him up at night.¶ “The DOD depends on infrastructure in order to be able to operate abroad. And to make those operations function, we depend on the electric grid,” Stockton said.¶ The concern, Stockton continued, was that America’s adversaries would avoid attacking “the pointy end of the spear,” meaning combat troops, and would instead look for homeland, possibly non-military, targets.¶ “Our adversaries, state and non-state, are not stupid. They are clever and adaptive,” Stockton said. “There is a risk that they will adopt a profoundly asymmetric strategy, reach around and attack us here at home, the critical infrastructure that is not owned by the Department of Defense.”¶ But Stockton’s concerns were not solely limited to terrorist attacks. Other concerning scenarios, said the assistant secretary, include geomagnetic disturbances, earthquakes and other natural disasters that could take down the grid.¶ According to Stockton, a recurrence of a massive earthquake, like the New Madrid earthquake of 1812, “would cause a power outage for weeks to months across a multi-state area, rolling blackouts in the East Coast…”

#### Squo back-ups fail---only last a few days

Kleber 9 Drexel, Journal of Energy Security, "The US Department of Defense: Valuing Energy Security", June 18, www.ensec.org/index.php?option=com\_content&view=article&id=196:the-us-department-of-defense-valuing-energy-security&catid=96:content&Itemid=345

Most DoD installations have contingency plans in the event of a grid failure that can provide backup power to the installations’ critical infrastructure using, in most cases, diesel powered generators. However, the expected duration for these contingency plans are on the magnitude of days and weeks not months. These single-option contingency plans are outdated in today’s environment. Diesel generators are not designed to run for weeks at a time.¶ As the Defense Science Board Task Force noted, “….any assessment of the risk to military missions from grid failure must also take into account the ability of the national pipeline to provide fuel to installations where it critically warrants.” In energy security terms, energy supplies at today’s military installations lack survivability and sustainability and our contingency plans lack sufficiency and surety. In combination, this situation presses DoD to take a holistic viewpoint of our energy infrastructure and energy use in order to create energy security.

## Hydrogen

### Tech Works

#### New fuel cell tech makes it affordable—old evidence irrelevant

CO 11 Commodity Online, US researchers claim breakthrough in Hydrogen Fuel Cell tech , www.commodityonline.com/news/us-researchers-claim-breakthrough-in-hydrogen-fuel-cell-tech-37501-3-37502.html

U.S. researchers say they've made a breakthrough in the development of low-cost hydrogen fuel cells that one day could power electric cars.¶ Researchers at Case Western Reserve University in Cleveland say catalysts made of carbon nanotubes dipped in a polymer solution can outperform traditional platinum catalysts in fuel cells at a fraction of the cost.¶ The scientists say the new technology can remove one of the biggest roadblocks to widespread cell use: the cost of the catalysts.¶ Platinum, which represents at least a quarter of the cost of fuel cells, currently sells for about $30,000 per pound, while the activated carbon nanotubes cost about $45 per pound, a Case release said Tuesday.¶ "This is a breakthrough," Liming Dai, a professor of chemical engineering and the research team leader, said.

## Natural Gas DA

### Shale gas

#### Russian gas dominance is structurally dead---the shale revolution’s locked in

Aviezer Tucker 12/19, Assistant Director of the Energy Institute at the University of Texas at Austin, 12/19/12, “The New Power Map: World Politics After the Boom in Unconventional Energy,” http://www.foreignaffairs.com/print/135945

The energy map of the world is being redrawn -- and the global geopolitical order is adrift in consequence. We are moving away from a world dominated by a few energy mega-suppliers, such as Russia, Saudi Arabia, and Venezuela, and toward one in which most countries have some domestic resources to meet their energy needs and can import the balance from suppliers in their own neighborhood. This new world will feature considerably lower energy prices, and in turn, geopolitics will hinge less on oil and gas. Within the next five to ten years, regimes that are dependent on energy exports will see their power diminished. No longer able to raise massive sums from energy sales to distribute patronage and project power abroad, they will have to tax their citizens.

The revolution in unconventional energy production results from technologies that make drilling and extraction from underground shale formations increasingly easy and cheap. One cutting-edge procedure, hydraulic fracturing, involves injecting a mixture of sand, chemicals, and either water, gel, or liquefied greenhouse gases into shale rock formations to extract hydrocarbons. Although the technique was first conceptualized in 1948, only recently have other technologies arrived to make it commercially viable. (One such procedure, horizontal drilling, allows operators to tap into shallow but broad deposits with remarkable precision.)

Hydraulic fracturing has been used widely for only about the past five years. But the result -- a staggering glut of natural gas in the United States -- is already clear. The price of natural gas in the country has plunged to a quarter of what it was in 2008. The low price has prompted changes throughout the U.S. economy, including the projected retirement of one-sixth of U.S. coal power generation capacity by 2020, the conversion of hundreds of thousands of vehicles from gasoline to compressed gas, and the construction and repatriation from China of chemical, plastic, and fertilizer factories that use natural gas as both raw material and fuel. By 2025, the professional services firm PricewaterhouseCoopers predicts, energy-intensive industries will create a million new U.S. jobs.

Meanwhile, the United States is using innovative energy technologies ever more frequently to extract shale oil, tight oil, and methane from coal beds. Accordingly, the share of U.S. oil consumption that is imported from abroad has fallen sharply, from about 60 percent in 2005 to less than 45 percent this year. It will likely continue to decrease until the country, or at least North America, is energy self-sufficient.

The economic and geopolitical shockwaves will be felt worldwide. Decreasing demand in the United States for liquid natural gas, oil imports, and domestic coal is already reducing global prices for these commodities. As a result, European countries have a stronger position in negotiations over natural gas imports with Russia, from which they receive a quarter of their supply. The newfound leverage might have emboldened the European Union to open an

 investigation in September into a possible price-fixing scheme by Gazprom, the Russian energy giant. In addition, European countries have been negotiating fewer long-term gas contracts with Russia in which the agreed-upon price for the gas is pegged to that of oil -- the kind that Gazprom favors. Instead, they are opting for spot purchases -- short-term acquisitions based on market prices -- in the expectation of rising supplies and falling prices. Russia has already granted some countries roughly ten percent discounts on existing contracts.

Until recently, Gazprom was in denial about the shale gas revolution, claiming that unconventional gas technology was not commercially viable, and that it posed severe risks to the environment. Given that Russia raises most of its federal revenue from energy exports -- about 60 percent, according to most estimates -- a reduction in natural gas sales would be politically catastrophic. Both the collapse of the Soviet Union and the downfall of former Russian President Boris Yeltsin in the late 1990s coincided with periods of low energy prices; Vladimir Putin, the current president, knows this history all too well.

The problem is that all of his options in a world awash with cheap energy are bad. His regime could try to maintain Russia's market share in Europe by continuing to reduce prices, but that would mean accepting drastically smaller revenues. To make matters worse, Gazprom's profit margins are low. Given that it sells 60 percent of its gas domestically at a loss [1], Gazprom must obtain wide profit margins from its European exports to stay afloat. (Currently, it sells gas in Europe at about a 66 percent profit margin.)

On its exports to Europe, Gazprom needs to earn $12 per thousand cubic feet of natural gas just to break even. (The price of natural gas in the United States today is below $3 per thousand cubic feet.) Part of the reason for this is that the state and the elite siphon billions from the politicized, inefficient, and opaque monopoly. Such plain corruption coincides with geopolitical maneuvering in large pipeline projects: just as neighboring Alaska has its infamous bridge, Russia has pipelines to nowhere.

Consider, for example, Nord Stream, the undersea natural gas pipeline that connects Russia directly to Germany, bypassing both Ukraine and Poland. The project had no economic rationale; it would have been far cheaper for Moscow to come to terms with Kiev over transit fees. But Russia was unwilling to do so. As usual, corruption played a role, too: Arkady Rotenberg, the owner of the company that laid the pipelines, is Putin's childhood friend, and the Russian government paid him an exorbitant fee -- amounting to a profit margin of 30 percent -- for his work. Now, Gazprom is planning another pipeline folly, South Stream, which will again bypass Ukraine by traveling under the Black Sea to southern Europe.

Such outrageous infrastructure projects might become even more routine if Gazprom attempts to recoup its falling revenues in Europe by upping its sales to China [2]. To do that, it would have to build long pipelines across unforgiving Siberian terrain. That task would pale in comparison to the challenge of convincing China to pay anything close to what Russia currently charges European countries -- not only because the Chinese are tough negotiators but also because China possesses the largest deposits of shale gas of any country in the world (886 trillion cubic feet compared with the United States' 750 trillion, the world's second-largest deposits). Although China is just beginning to tap its gas deposits, by the time any Sino-Russian pipeline project could be completed, it might be churning out enough unconventional gas to be energy self-sufficient. According to Chinese government estimates, the country has enough natural gas to provide for its domestic needs for up to two centuries. The only hope for Gazprom is that Chinese shale rock formations will not respond well to the new technologies -- but there is no reason to believe that this will be the case.

For now, Russia has been attempting to protect its market share by simply preventing unconventional energy technologies from spreading. For its part, the United States, through its 2010 Unconventional Gas Technical Engagement Program, transfers technologies to nations that it would like to see become more energy independent, such as India, Jordan, Poland, and Ukraine. Countries that achieve greater energy independence, Washington assumes, will be less susceptible to bullying from unfriendly petro-states.

Russia, meanwhile, is attempting to block or at least slow the process. One of Moscow's favorite tactics involves pressuring companies that want to do business in Russia not to explore for shale gas elsewhere. For example, Moscow might have pressed ExxonMobil to pull out of Poland [3], which could have the largest shale gas deposits in all of Europe, in exchange for a cooperation agreement with Rosneft. As always in the free market, however, when one company exits, another rushes to fill the void. The U.S. company Chevron has commenced shale gas and oil exploration throughout the region between the Baltic and Black Seas. The financier George Soros, moreover, has already invested $500 million in unconventional energy projects in Poland.

A more effective Russian tactic involves financing environmentalist groups to lobby against shale gas. So far, there is no credible scientific evidence that hydraulic fracturing has adverse effects on either air or water. Several studies, including ones conducted by the Royal Society, the U.S. Secretary of Energy Advisory Board, and the International Energy Agency, have concluded that hydraulic fracturing is reasonably safe when properly regulated. Yet, following a swell of environmentalist protests, both Bulgaria and the Czech Republic recently imposed moratoria on the use of the technology. The mark of outside influence is clear: In Bulgaria, there are rarely demonstrations of any kind, and in the Czech Republic, environmentalist groups have remained mum on other major issues, namely, the planned expansions of the nuclear power station in Temelín.

The former members of the Soviet bloc -- such as Bulgaria, the Czech Republic, Poland, and Ukraine -- still purchase all or most of their natural gas from Gazprom. Poland and Ukraine have enough potential shale deposits to free themselves entirely from this dependency. Although Bulgaria and the Czech Republic are not so blessed, even modest domestic production can challenge Gazprom's monopoly power and reduce the price of imported natural gas.

Some analysts have predicted that Asian demand for energy is virtually endless, and thus that energy prices are unlikely to fall substantially. But as the Morgan Stanley analyst Ruchir Sharma has argued [4], Asian economic growth is slowing and might soon flatten. Meanwhile, with ever-growing energy supplies from unconventional sources, newly discovered undersea gas fields off the coast of East Africa and Israel, and increased drilling in the Arctic, the world may soon enjoy an energy glut. At the very least, an era of lower global energy prices appears inevitable.

For Russia, the best scenario is that the energy glut will force structural reforms akin to those that Estonia and Poland underwent in the 1990s and that Russia started but never completed. Such changes could eventually lead to the establishment of real democracy and the rule of law there. In the coming years, sheer economic necessity and looming bankruptcy will force Russia to reform. But throughout Russian history, modernization has not normally resulted in liberalization; and there is little evidence that this time will be any different.

Nevertheless, unconventional energy technology has not only arrived -- it is here to stay. As new lines are drawn on the energy map of the world, many of the oldest and most stable geopolitical truths will be turned on their heads. It would be prudent for the tyrants who depend on revenues from energy exports to start planning for retirement.

### AT US-Russia War

#### No impact

David E. Hoffman 10/22/12, contributing editor to Foreign Policy and the author of The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy, which won the 2010 Pulitzer Prize for general non-fiction, "Hey, Big Spender," Foreign Policy, www.foreignpolicy.com/articles/2012/10/22/hey\_big\_spender?page=full

Despite tensions that flare up, the United States and Russia are no longer enemies; the chance of nuclear war or surprise attack is nearly zero. We trade in each other's equity markets. Russia has the largest audience of Facebook users in Europe, and is open to the world in a way the Soviet Union never was.

### AT Russia Instability

#### Kremlin can crush any opposition

Goodrich and Zeihan 9 [Lauren Goodrich, Stratfor's Director of Analysis and Senior Eurasia analyst, and Peter Zeihan, Vice President of Analysis at Stratfor, “The Financial Crisis and the Six Pillars of Russian Strength,” March 3 2009, <http://www.stratfor.com/weekly/20090302_financial_crisis_and_six_pillars_russian_strength>]

Politics: It is no secret that the Kremlin uses an iron fist to maintain domestic control. There are few domestic forces the government cannot control or balance. The Kremlin understands the revolutions (1917 in particular) and collapses (1991 in particular) of the past, and it has control mechanisms in place to prevent a repeat. This control is seen in every aspect of Russian life, from one main political party ruling the country to the lack of diversified media, limits on public demonstrations and the infiltration of the security services into nearly every aspect of the Russian system. This domination was fortified under Stalin and has been re-established under the reign of former President and now-Prime Minister Vladimir Putin. This political strength is based on neither financial nor economic foundations. Instead, it is based within the political institutions and parties, on the lack of a meaningful opposition, and with the backing of the military and security services. Russia's neighbors, especially in Europe, cannot count on the same political strength because their systems are simply not set up the same way. The stability of the Russian government and lack of stability in the former Soviet states and much of Central Europe have also allowed the Kremlin to reach beyond Russia and influence its neighbors to the east. Now as before, when some of its former Soviet subjects -- such as Ukraine -- become destabilized, Russia sweeps in as a source of stability and authority, regardless of whether this benefits the recipient of Moscow's attention.

## Water Turns

### Yes Water War

#### Countries cheat and climate is a game changer—old ev doesn’t apply

Tir 10 (Jaroslav, PhD, University of Illinois, Urbana-Champaign, 2001) Dr. Tir's specialty is international relations, with a focus on causes and management of armed conflicts. His research spans the topics of territorial disputes, environmental conflict and security, domestic and ethnic conflict, and diversionary theory of war. Dr. Tir's work has been published in outlets such as the American Journal of Political Science, Journal of Politics, Journal of Conflict Resolution, Journal of Peace Research, International Studies Quarterly, Conflict Management and Peace Science, and others, and Douglas, assistant professor in the Department of International Affairs in the School of Public and International Affairs at the University of Georgia, “Coping with the Consequences of Climate Change: International Institutions as Strategies for Mitigating Conflict over Water Resources”)

Nevertheless, river treaties will be effective conflict management tools only to the extent that the signatories actually comply. In this respect, they face several limitations. First, states might engage in intentional cheating. The same incentives that necessitate formalized cooperation in the first place can also tempt parties to cheat on the obligations created by a river treaty. This incentive structure is typical of common pool resources, where cheating on an agreement will allow the cheater to enjoy the collective benefits created by other parties‟ actions, while avoiding the private costs of compliance. Cheating might include, for example, drawing more water for irrigation and industrial purposes than is permitted under the terms of the treaty. Second, even if the parties to an agreement do not cheat in a calculated manner, failure to comply can occur because the language of the agreement is imprecise and open to multiple interpretations in specific situations (Chayes and Chayes 1995). For example, Fischhendler (2008b)observes that the water use provisions in the 1994 Israel-Jordan peace treaty were left intentionally vague to facilitate domestic acceptance of the agreement. While ambiguity may give a treaty some flexibility, it also allows multiple interpretations of an agreement by the parties. Combined with imprecise treaty language, unforeseen conditions can lead to disagreements over treaty compliance. This is uniquely problematic for river management treaties, given both annual and seasonal variability of river conditions. Third, failure to comply with a river treaty can result from a lack of the technical, regulatory, or economic capacity needed to implement it (Chayes and Chayes, 1995). For example, improvements in water infrastructure typically require long-term, capital-intensive investments (Dombrowski 2007).Achieving compliance can be a difficult proposition even under the best circumstances, but climate change – and its consequences for the availability of freshwater– will greatly complicate

both the willingness and the ability of the parties to adhere to a river treaty. By increasing the value of water, scarcity will raise the incentive to violate treaty provisions that prohibit unilateral infrastructure development or limit the consumption of river water. It might also prompt small-scale diversion by non-state actors, resulting in unintended defection. Climate change will also exacerbate problems of treaty ambiguity by creating hydrological conditions that were not anticipated when an agreement was formed. When unexpected circumstances in river volume arise, ambiguity can create to disputed interpretations of how to behave under these conditions and lead one or more parties abrogate an agreement. Finally, the lack of capacity to deal with drought may also lead to treaty violations. In 1999, for example, drought reduced Israel‟s ability to deliver water to Jordan under the terms of the 1994 peace agreement (Kilgour and Dinar 2001). In short, the effects of climate change may exacerbate the causes of noncompliance and compromise the ability of river treaties to manage riparian conflicts.

### AT: Desal Bad – Top Shelf

#### No offense—fossil fuel desal inevitable, but is unsustainable—nuclear key

Khamis 9 I, IAEA, A global overview on nuclear desalination, Int. J. Nuclear Desalination, Vol. 3, No. 4

As desalination and water reuse expansion in the Middle East and the world continues at a rapid pace, these innovations must be integrated into the next generation of water facilities. The integrated nuclear energy systems would lead to considerably lower power and water costs than the corresponding coal-based systems. When external costs for different energies are internalised in power and water costs, the relative cost differences are considerably increased in favour of the nuclear systems. Financial analysis further confirms these conclusions (Nisan et al., 2007; Wade, 2001). Integrated seawater desalination systems are likely to be deployed intensively in the future in view of the very high demands for water and electrical energy in many regions of the world. A future desalination strategy based uniquely on the utilisation of fossil-fuelled systems is not sustainable because of the high carbon footprint from both power generation and desalination. At the moment, the only solution to reduce the carbon footprint of integrated desalination systems appears to be by utilising nuclear and renewable energies (International Atomic Energy Agency, 2008b).

#### No damage to the ocean and the alt is worse

Schiffler 4 Manuel, economist in the World Bank's Middle East and North Africa Region, Perspectives and challenges for desalination in the 21st century, Desalination 165, 1-9

The environmental footprint of desalination has been reduced through technological progress. However, some significant environmental impacts remain, in particular during the operating phase of the plants. One major impact is the discharge of brine — a concentrated salt solution that may be hot and may contain various chemicals — on coastal or marine eco-systems or, in the case of inland brackish water desalination, on rivers and aquifers. Another major impact is the emission of greenhouse gases in the production of electricity and steam needed to power the desalination plants. Furthermore, abstraction of brackish groundwater for desalination can have significant environ- mental impacts. Other impacts of usually more limited nature include noise, visual disturbance, interference with public access and recreation, possible impacts from seawater intakes, as well as various environmental impacts during the construction phase and potential impacts from accidental spills. There can also be positive environmental impacts from desalination, if desalination reduces the pressure on conventional water resources. In particular, seawater desalination can help to relieve the pressure on overexploited coastal aquifers and thus prevents seawater intrusion, a widespread phenomenon causing quasi-irreversible damage in coastal areas around the world. In some cases, seawater desalination can be an alternative to the use of fossil groundwater further inland or to the construction of large dams and inter-basin transfers that are usually associated with significant social and environmental costs. An internationally agreed environmental assessment methodology for desalination plants does not exist so far and its development would be desirable. In assessing the environmental impact of numerous desalination projects on the marine environment, it is important to assess the cumulative impacts of new and existing plants as well as of discharges from other sources. A strategic environmental assessment is more appropriate for that purpose than a series of isolated, project- related environmental assessments. In many of the focal countries of the present study, the legal basis and institutional capacity for environmental assessments in general is weak and there is no or very little experience with environmental assessments of individual desalination projects, not to speak of strategic environmental assessments. To the author’s best knowledge, no stra- tegic environmental assessment of brine dis- charges into the Arab Gulf (Persian Gulf), which is a shallow, nearly closed water body that receives the highest discharge of brine from desalination processes in the world, has been undertaken to date. While impacts obviously differ depending on the characteristics and sensitivity of the local marine environment, future impacts from brine discharge into the Mediterranean are expected to be relatively limited compared to impacts in the Arab Gulf, but may be more restrictive if European directives are applied in future EuroMed agreements. Mitigation measures include preventive mea- sures, such as the strengthening of environmental institutions and water conservation, and reactive measures, which involve physical changes to a plant or process. The latter include optimized siting in the construction phase, the use of more energy-efficient technologies, design and treatment techniques to reduce damage to the marine environment, including the appropriate design of sea outfalls and the mixing of brine with seawater before discharge, and architectural measures to reduce visual impact especially for tourism purposes.

### AT: Desalination Bad – Coastal Destruction

#### Nuclear desalination avoids environmental/coastal problems

IAEA 10 International Atomic Energy Agency, “Environmental Impact Assessment of Nuclear Desalination”, March, <http://www-pub.iaea.org/MTCD/publications/PDF/te_1642_web.pdf>

Nuclear desalination presents an environmentally sound option for addressing water and energy shortages. It encompasses the benefits that co-location of power and desalination facilities offers, while avoiding some of the issues that still impede such projects, as summarized below. ¶ Marine impacts of nuclear desalination are, generally speaking, a matter of trade-off between intake and discharge impacts on the environment. Compared with other co-location options it does not prove as a solution to the associated adverse environmental impacts due to the intake. It must be remembered that suitable design can solve the problem of adverse marine impacts for any co-location option. On the other hand, when the standard once-through cooling system is applied, as stated earlier, it provides large quantities of seawater necessary for dilution of the rejected brine and it also cools down the warm discharge from the nuclear power plant, which mitigates the largest problems that stand-alone power and desalination facilities have. Yet, large quantities of water for dilution imply large entrainment and impingement effects on the marine ecosystems. Deciding which one is less harmful to the environment is a site specific matter dependant on the intake and outfall locations and techniques. Combined use of indirect and direct intakes is also a mitigating option. ¶ Coastal and atmospheric impacts of nuclear desalination though, can be considered as smaller or even minor, if compared to other co-location options. Especially in the area of mitigating atmospheric impacts from desalination processes, nuclear desalination offers huge opportunities due to the fact that fossil fuel co-located desalination options cannot achieve low levels of atmospheric impact, while renewable energy sources are not the better choice as well. Nuclear power plants, with very low atmospheric impacts, have large heat losses in the power generating process which can be used for seawater desalination with virtually no additional atmospheric impacts. The land use impact by the nuclear desalination facility, from the perspective of production quantity for potable water and energy, is currently the best option available. ¶ In conclusion, nuclear desalination is particularly recommendable as a retrofitting option in existing nuclear power plants. As for building new nuclear desalination plants, for reasons discussed in more detail in the following section, policies addressing energy demands will have to be the main criteria. If then the choice lies with nuclear power while desalination is required to address shortage of good quality water, than a nuclear desalination facility definitely presents environmentally the most benign option for doing so.

### 1NC Oceans

#### Oceans resilient

Kennedy 2 - Environmental science prof, Maryland. Former Director, Cooperative Oxford Laboratory. PhD. (Victor, Coastal and Marine Ecosystems and Global Climate Change, http://www.pewclimate.org/projects/marine.cfm)

There is evidence that marine organisms and ecosystems are resilient to environmental change. Steele (1991) hypothesized that the biological components of marine systems are tightly coupled to physical factors, allowing them to respond quickly to rapid environmental change and thus rendering them ecologically adaptable. Some species also have wide genetic variability throughout their range, which may allow for adaptation to climate change.

### Desal Good

#### Desal key to prevent billions from dying

Beller 4 Dr. Denis E, Beller, 2004 - Department of Mechanical Engineering, University of Nevada, Las Vegas, "Atomic Time Machines: Back to the Nuclear Future," 24 J. Land Resources & Envtl. L. 41

Our global neighbors need much more energy to achieve the standards of living of the developed world. One-third of the six billion people on Earth today lack access to electricity.3 Another two billion use just 1000 kilowatt hours (kWh) per year, which is barely enough to keep a single 100-watt light bulb lit.4 In addition, one billion people have no sanitary water,5 which could be provided easily and inexpensively if energy were available to operate desalination and/or purification plants. Energy is needed for development, prosperity, health, and international security. The alternative to development, which is easily sustained with ample energy, is suffering in the form of poverty, disease, and death. This suffering creates instability and the potential for widespread violence, such that national security requires developed nations to help increase energy production in their more populous developing counterparts. The relationship between energy use and human well being is demonstrated by correlating the United Nations’ Human Development Index (HDI) with the annual per capita use of electricity. The UN compiles the HDI for almost every nation annually. It is a composite of average education level, health and well being (average life expectancy), and per capita income or gross domestic product. One such correlation that was done a few years ago showed that electric consumption first increases human well being, then people who are well off increase their electric consumption.6 Figure 1 illustrates this for almost every nation on Earth (the data includes more than 90 percent of the Earth’s population). Note there is a threshold at about 4000 kWh per capita. Below this threshold, human development increases rapidly with increases in available electricity (there are, of course, exceptions to every rule). Above this threshold, use of electricity increases rapidly as people become more healthy, wealthy, and educated. A deeper investigation into the data underlying the HDI reveals the effects of what Dr. Eric Loewen, a delegate to the United Nations 2002 World Summit on Sustainable Development in Johannesburg, South Africa, now calls “energy apartheid.”7 People in the Western world, who have and use large amounts of energy, have a life expectancy of about eighty years, while those on the lower left side of this graph, undeveloped nations where most people have no access to electricity, will die decades earlier. Thus, billions of our global neighbors without sufficient electricity die decades before they should. Those who live in poverty live in the most dangerous of conditions. Without substantial increases in electricity generation, the proportion of the Earth’s population without sufficient electricity will increase in the next fifty years as it grows by 50 percent to near 9 billion people.8 Preventing global conflict will require even more addition of electricity. The product of increased population and increased per capita energy usage by people who today have access to nearly none is a great growth in global electricity usage. Estimates for future increases in energy and electricity use, even with substantial efficiency improvements and conservation efforts, range between doubling and tripling in the next fifty years.9 Even with conservation, “energy star” appliances and homes, mandated fuel economy, massive government purchases of “renewables,” and energy saving and efficiency measures, our use of electrical energy has been growing faster than total energy usage; electricity use in the United States increased 57 percent between 1980 and 2000, while total energy use increased just 27 percent.10