### Plan

#### The United States Department of Defense should procure small modular reactors for the use of military bases in the United States.

### Grid

#### Grid disruptions are inevitable - only SMR’s can solve**Robitaille 12**

(George, Department of Army Civilian, United States Army War College, “Small Modular Reactors: The Army’s Secure Source of Energy?” 21-03-2012, Strategy Research Project)

In recent years, the U.S Department of Defense (DoD) has identified a security issue at our installations related to the dependence on the civilian electrical grid. 1 The DoD depends on a steady source of electricity at military facilities to perform the functions that secure our nation. The flow of electricity into military facilities is controlled by a public grid system that is susceptible to being compromised because of the age of the infrastructure, damage from natural disasters and the potential for cyber attacks. Although most major functions at military installations employ diesel powered generators as temporary backup, the public grid may not be available to provide electricity when it is needed the most. The United States electrical infrastructure system is prone to failures and susceptible to terrorist attacks. 2 It is critical that the source of electricity for our installations is reliable and secure. In order to ensure that our military facilities possess a secure source of electricity, either the public system of electric generation and distribution is upgraded to increase its reliability as well as reducing its susceptibility to cyber attack or another source of electricity should be pursued. Although significant investments are being made to upgrade the electric grid, the current investment levels are not keeping up with the aging system. Small modular reactors (SMRs) are nuclear reactors that are about an order of magnitude smaller than traditional commercial reactor used in the United States. SMRs are capable of generating electricity and at the same time, they are not a significant contributor to global warming because of green house gas emissions. The DoD needs to look at small modular nuclear reactors (SMRs) to determine if they can provide a safe and secure source of electricity. Electrical Grid Susceptibility to Disruptions According to a recent report by the Defense Science Board, the DoD gets ninety nine percent of their electrical requirements from the civilian electric grid. 3 The electric grid, as it is currently configured and envisioned to operate for the foreseeable future, may not be reliable enough to ensure an uninterrupted flow of electricity for our critical military facilities given the influences of the aging infrastructure, its susceptibility to severe weather events, and the potential for cyber attacks. The DoD dependency on the grid is reflected in the $4.01 Billion spent on facilities energy in fiscal year 2010, the latest year which data was available. 4 The electricity used by military installations amounts to $3.76 billion. 5 As stated earlier, the DoD relies on the commercial grid to provide a secure source of energy to support the operations that ensure the security of our nation and it may not be available when we need it. The system could be taken down for extended periods of time by failure of aging components, acts of nature, or intentionally by cyber attacks. Aging Infrastructure. The U.S electric power grid is made up of independently owned power plants and transmission lines. The political and environmental resistance to building new electric generating power plants combined with the rise in consumption and aging infrastructure increases the potential for grid failure in the future. There are components in the U.S. electric grid that are over one hundred years old and some of the recent outages such as the 2006 New York blackout can be directly attributed to this out of date, aging infrastructure. 6 Many of the components of this system are at or exceeding their operational life and the general trend of the utility companies is to not replace power lines and other equipment until they fail. 7 The government led deregulation of the electric utility industry that started in the mid 1970s has contributed to a three decade long deterioration of the electric grid and an increased state of instability. Although significant investments are being made to upgrade the electric grid, the many years of prior neglect will require a considerable amount of time and funding to bring the aging infrastructure up to date. Furthermore, the current investment levels to upgrade the grid are not keeping up with the aging system. 8 In addition, upgrades to the digital infrastructure which were done to increase the systems efficiency and reliability, have actually made the system more susceptible to cyber attacks. 9 Because of the aging infrastructure and the impacts related to weather, the extent, as well as frequency of failures is expected to increase in the future. Adverse Weather. According to a 2008 grid reliability report by the Edison Electric Institute, sixty seven per cent of all power outages are related to weather. Specifically, lightning contributed six percent, while adverse weather provided thirty one percent and vegetation thirty percent (which was predominantly attributed to wind blowing vegetation into contact with utility lines) of the power outages. 10 In 1998 a falling tree limb damaged a transformer near the Bonneville Dam in Oregon, causing a cascade of related black-outs across eight western states. 11 In August of 2003 the lights went out in the biggest blackout in North America, plunging over fifty million people into darkness over eight states and two Canadian provinces. Most areas did not have power restored four or five days. In addition, drinking water had to be distributed by the National Guard when water pumping stations and/or purification processes failed. The estimated economic losses associated with this incident were about five billion dollars. Furthermore, this incident also affected the operations of twenty two nuclear plants in the United States and Canada. 12 In 2008, Hurricane Ike caused approximately seven and a half million customers to lose power in the United States from Texas to New York. 13 The electric grid suffered numerous power outages every year throughout the United States and the number of outages is expected to increase as the infrastructure ages without sufficient upgrades and weather-related impacts continue to become more frequent. Cyber Attacks. The civilian grid is made up of three unique electric networks which cover the East, West and Texas with approximately one hundred eighty seven thousand miles of power lines. There are several weaknesses in the electrical distribution infrastructure system that could compromise the flow of electricity to military facilities. The flow of energy in the network lines as well as the main distribution hubs has become totally dependent on computers and internet-based communications. Although the digital infrastructure makes the grid more efficient, it also makes it more susceptible to cyber attacks. Admiral Mr. Dennis C. Blair (ret.), the former Director of National Intelligence, testified before Congress that “the growing connectivity between information systems, the Internet, and other infrastructures creates opportunities for attackers to disrupt telecommunications, electrical power, energy pipelines, refineries, financial networks, and other critical infrastructures. 14 ” The Intelligence Community assesses that a number of nations already have the technical capability to conduct such attacks. 15 In the 2009 report, Annual Threat Assessment of the Intelligence Community for the Senate Armed Services Committee, Adm. Blair stated that “Threats to cyberspace pose one of the most serious economic and national security challenges of the 21st Century for the United States and our allies.”16 In addition, the report highlights a growing array of state and non-state actors that are targeting the U.S. critical infrastructure for the purpose of creating chaos that will subsequently produce detrimental effects on citizens, commerce, and government operations. These actors have the ability to compromise, steal, change, or completely destroy information through their detrimental activities on the internet. 17 In January 2008, US Central Intelligence Agency senior analyst Tom Donahue told a gathering of three hundred international security managers from electric, water, oil & gas, and other critical industry, that data was available from multiple regions outside the United States, which documents cyber intrusions into utilities. In at least one case (outside the U.S.), the disruption caused a power outage affecting multiple cities. Mr. Donahue did not specify who executed these attacks or why, but did state that all the intrusions were conducted via the Internet. 18 During the past twenty years, advances in computer technologies have permeated and advanced all aspects of our lives. Although the digital infrastructure is being increasingly merged with the power grid to make it more efficient and reliable, it also makes it more vulnerable to cyber attack. In October 2006, a foreign hacker invaded the Harrisburg, PA., water filtration system and planted malware. 19 In June 2008, the Hatch nuclear power plant in Georgia shut down for two days after an engineer loaded a software update for a business network that also rebooted the plant's power control system. In April 2009, The Wall Street Journal reported that cyber spies had infiltrated the U.S. electric grid and left behind software that could be used to disrupt the system. The hackers came from China, Russia and other nations and were on a “fishing expedition” to map out the system. 20 According to the secretary of Homeland Security, Janet Napolitano at an event on 28 October 2011, cyber–attacks have come close to compromising the country’s critical infrastructure on multiple occasions. 21 Furthermore, during FY11, the United States Computer Emergency Readiness Team took action on more than one hundred thousand incident reports by releasing more than five thousand actionable cyber security alerts and information products. 22 The interdependence of modern infrastructures and digital based systems makes any cyber attacks on the U.S. electric grid potentially significant. The December 2008 report by the Commission on Cyber Security for the forty fourth Presidency states the challenge plainly: “America’s failure to protect cyberspace is one of the most urgent national security problems facing the new administration”. 23 The susceptibility of the grid to being compromised has resulted in a significant amount of resources being allocated to ensuring the systems security. Although a substantial amount of resources are dedicated to protecting the nation’s infrastructure, it may not be enough to ensure the continuous flow of electricity to our critical military facilities. SMRs as they are currently envisioned may be able to provide a secure and independent alternative source of electricity in the event that the public grid is compromised. SMRs may also provide additional DoD benefit by supporting the recent government initiatives related to energy consumption and by circumventing the adverse ramifications associated with building coal or natural gas fired power plants on the environment.\

#### Cyber-attack’s coming --- actors are probing US grid weaknesses

Reed 10/11

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", 2012, 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.

#### Disruptions cause nuclear lashout – SMRs solve but renewables fail

Andres and Breetz 11

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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** thevast 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.**

#### Grid failures risks terrorism

Defense Science Board 8

(The DSB is a Federal ¶ Advisory Committee established to provide independent advice to the Secretary of ¶ Defense, “More Fight – Less Fuel” <http://www.acq.osd.mil/dsb/reports/ADA477619.pdf>, SEH)

**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.** About 85% of the energy infrastructure upon which DoD ¶ depends is commercially owned, **and 99% of the electrical energy DoD installations ¶ consume originates outside the fence.¶** 3¶ As noted below, however, the grid 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. ¶ 2.3.1 State of the Grid ¶ The U.S.-Canadian electric grid is very efficient and cost effective but its design metric ¶ is efficiency more than resiliency. As a consequence, it is vulnerable to natural disaster or deliberate attack. The Task Force received several briefings from the Mission ¶ Assurance Division at Dahlgren (MAD), the Department of Energy and the utility ¶ industry. Based on these briefings, the Task Force is concerned about the condition of ¶ the grid and the ability to effect timely repairs. ¶ This concern extends not only to the complete dependency of critical national security ¶ missions on the grid, but also to its centrality to all facets of the nation’s economic life. ¶ To appreciate the seriousness of the impacts of an extended disruption, consider the ¶ 2003 Northeast blackout. At around 4:15pm EST on August 14, 2003 about 50 million ¶ people living in a 9,300 square mile area in the U.S. and Canada lost electrical power. ¶ More than 500 generating units at 265 power plants shut down during the outage, 22 of ¶ which were nuclear. Those plants took about two weeks to regain full capacity, and lost ¶ an average of more than half their capacity for 12 days. The shutdown was in part ¶ precautionary in nature. If an imbalance between load and supply occurs, power lines ¶ grow longer and sag from overheating and other hardware can fail. These imbalances ¶ can damage equipment that is hard-to-repair, requires long lead time to produce and is ¶ expensive. So, the grid quickly disconnects itself when a threatening imbalance is ¶ detected. Nuclear plants are required for safety reasons to shut down when the grid ¶ they’re connected to is de-energized.¶ 4¶ A U.S.-Canada Task Force found the main cause of the blackout to be the failure of a ¶ utility in Ohio to properly trim trees near a power line, causing the first in what became a ¶ set of cascading failures.¶ 5¶ Secretary of Energy Spencer Abraham said there would be ¶ no punishment for the utility because current U.S. law does not require electric reliability ¶ standards. However, the Energy Policy Act of 2005 (EPAct 2005) gave the Federal ¶ Energy Regulatory Commission (FERC) new authority to direct the industry to develop ¶ reliability standards. It directs FERC to designate an Electric Reliability Organization ¶ (ERO) to develop and propose reliability standards, which only after agreement by the ¶ industry become mandatory. The ERO chosen by the FERC is a volunteer, industry run ¶ organization. While FERC oversight of industry developed standards is an ¶ improvement over the previous situation, the Task Force remains concerned that FERC ¶ may be unable to reduce the risk to critical DoD missions to acceptable levels in a ¶ reasonable timeframe. ¶ **Some have argued that the August 2003 incident shows that the protections built into ¶ the grid worked. Within several hours electricity was restored to many areas, though a ¶ few areas waited nearly a week. However, the incident highlights how easily the power ¶ grid could be taken down. Also, quick restoration was possible because no significant ¶ equipment was damaged, something that might not occur in future incidents**. **Further, ¶ during the blackout most systems failed that would detect unauthorized border ¶ crossings, port landings, or unauthorized access to vulnerable sites. Future such blackouts could be exploited for terrorist activity, with potentially far more catastrophic ¶ results**. ¶ These risks exist elsewhere than in the U.S. For example, on September 28, 2003 Italy ¶ experienced the largest of a series of blackouts suffered through that year, affecting a ¶ total of 56 million people, and spilling into Switzerland.¶ 6¶ It was also the most serious ¶ blackout in Italy in 20 years. DoD installations located outside the continental United ¶ States (OCONUS) are dependent on the commercial grids serving their locations. ¶ Security of their power supplies and continuation of their missions is as important as ¶ within the U.S.

#### Numerous attempts prove our impact

Wagner 9/11

(Dr. Abraham R. Wagner is a Professor of International and Public Affairs at the ¶ Arnold A. Saltzman Institute of War & Peace Studies at Columbia University. “Counter-Terrorism Technologies -- Taking Stock on 9/11” 09/11/2012 2:13 pm accessed online September 11, 2012 at <http://www.huffingtonpost.com/abraham-r-wagner/counterterrorism-technolo_b_1874521.html>, TSW)

On this 11th anniversary of the 9/11 attacks, it makes sense to take stock of where the nation has progressed in its effort to deter and combat future terrorist attacks, both at home and abroad. The **9/11 attacks came** as a shock, and **have** rightfully **come** **to be regarded as a major U.S. intelligence failure**. **In the aftermath**, **the nation undertook significant organizational reforms designed to enable more effective intelligence** and law enforcement operations against evolving terrorist threats. **The** **country also looked to see what science, engineering and technology could do to help addresses these threats**.¶ Technology has long been the nation's strong suit. Americans tend to believe that where there is a problem, there must certainly be a solution and it most likely involves technology and money. **During the decade that followed 9/11, billions of dollars were spent on a vast range of programs and technologies in the name of counter-terrorism**. For the first two years after 9/11, I joined with other scientists and engineers at the Department of Defense and the Intelligence Community in efforts to identify the most promising approaches to the problem. Ultimately we found that there was no magic bullet or perfect solution to this thorny problem, but were able to suggest a range of investments that could be made to address the evolving terrorist threat.¶ An honest assessment of these investments in counter-terrorism technologies reveals that the results have been mixed -- as one might well expect. A combination of **greatly improved intelligence** and law enforcement personnel have **employed some of the better technologies with considerable success**. Indeed, some **45 terrorist plots have been stopped** and others deterred. How much of **this has been** simply luck and how much can be traced to any **new technology program** is a matter of debate, and there are **clearl**y **examples** of both that **can be found.**¶ **One area where technology has made a significant contribution has been in new systems to aid in intelligence and surveillance against terrorist operations.** While terrorists may hold to an eighth century ideology, they have not been reluctant to employ 21st century communications and information technologies. They have utilized the Internet and cell phones for a number of purposes, and at the time of 9/11 the nation was in need of systems to intercept and sort out terrorist communications. While highly sensitive, public disclosures about several key programs show that considerable progress has been made in this critical area, giving the intelligence agencies some key tools in locating terrorists and stopping their plots. Aside from communications intercept, a new area of "data mining" has also shown considerable promise in locating terrorists and their plots.¶ At the same time, several of key surveillance programs used for counter-terrorism have come under fire from civil liberties groups as being unconstitutional violations of the Fourth Amendment privacy protections, and others. Critics of the Bush Administration saw this as "running roughshod over the Constitution." Even now there are still federal court challenges to laws such as the 2008 FISA Amendments Act and others that have enabled counter-terrorist efforts since 9/11. Ultimately a balance needs to be struck between the essential needs for intelligence to thwart future attacks and protected privacy rights, but as yet it remains an unsettled area where the Supreme Court will need to rule at some future point in time.¶ Less controversial have been efforts over the past decade to employ new information technologies to what has been termed the Information Sharing Environment -- collaborative efforts to best utilize available intelligence and other data among the various federal, state and local agencies with counter-terrorism responsibilities. While certainly some progress has been made over the past 11 years, the net result is largely a national embarrassment, and clearly a triumph of politics over physics. The information and communications technologies are all well-developed, but multiple bureaucracies have generated a set of plans and an even larger set of excuses as to why the fundamental problems in this area remain to be solved.

#### Terrorists are targeting Syrian bioweapons now and will use them

Blair ‘12

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As possible military action against Iran's suspected nuclear weapons program looms large in the public arena, far **more international concern should be directed toward Syria and its weapons of mass destruction.** When the Syrian uprising began more than a year ago, few predicted the regime of President Bashar al-Assad would ever teeter toward collapse. Now, though, **the demise of Damascus's** current **leadership** **appears inevitable**, **and Syria's revolution will likely be an unpredictable**, protracted, and grim affair. **Some see similarities with Libya's civil wa**r, **during which persistent fears revolved around terrorist seizure of Libyan chemical weapons**, or the Qaddafi regime's use of them against insurgents. **Those fears turned out to be unfounded**.¶ **But the Libyan chemical stockpile consisted of several tons of aging mustard gas** leaking from a half-dozen canisters **that would have been impossible to utilize as weapons**. **Syria** likely **has one of the largest and most sophisticated chemical weapon programs in the world**. Moreover, **Syria may also possess an offensive biol**ogical **weapons capability that Libya did not**.¶ While it is uncertain whether the Syrian regime would consider using WMD against its domestic opponents, Syrianinsurgents, unlike many of their Libyan counterparts, are increasingly sectarian and radicalized; indeed, many observers fear the uprising is being "hijacked" by jihadists. **Terrorist groups active in the Syrian uprising have already demonstrated little compunction about the acquisition and use of WMD**. In short, should Syria devolve into full-blown civil-war, **the security of** **its WMD should be of profound concern**, as sectarian insurgents and Islamist terrorist groups may **stand poised** **to seize** chemical and perhaps even **bio**logical **weapons.**¶ An enormous unconventional arsenal. Syria's chemical weapons stockpile is thought to be massive. One of only eight nations that is not a member of the Chemical Weapons Convention -- an arms control agreement that outlaws the production, possession, and use of chemical weapons -- Syria has a chemical arsenal that includes several hundred tons of blistering agents along with likely large stockpiles of deadly nerve agents, including VX, the most toxic of all chemical weapons. At least four large chemical weapon production facilities exist. Additionally, Syria likely stores its deadly chemical weapons at dozens of facilities throughout the fractious country. In contrast to Libya's unusable chemical stockpile, analysts emphasize that **Syrian** chemical **agents** **are weaponized and deliverable**. Insurgents and **terrorists** with past or present connections to the military **might feasibly be able to effectively disseminate** chemical **agents over large populations**. (The Global Security Newswire recently asserted that "[t]he Assad regime is thought to possess between 100 and 200 Scud missiles carrying warheads loaded with sarin nerve agent. The government is also believed to have several hundred tons of sarin agent and mustard gas stockpiled that could be used in air-dropped bombs and artillery shells, according to information compiled by the James Martin Center.")¶ Given its robust chemical weapons arsenal and its perceived need to deter Israel, **Syria has** long been suspected of having **an active biological weapons program**. Despite signing the Biological Weapons and Toxins Convention in 1972 (the treaty prohibits the development, production, and stockpiling of biological and toxin weapons), Syria never ratified the treaty. Some experts contend that any Syrian biological weapons program has not moved beyond the research and development phase. Still, **Syria's biotechnical infrastructure undoubtedly has the capability to develop numerous biological weapon agents**. After Israel destroyed a clandestine Syrian nuclear reactor in September 2007, Damascus may have accelerated its chemical and biological weapons programs.¶ **It's hard to guard WMD when a government collapses**. **Although the U**nited **S**tates and its allies **are** reportedly **monitoring** **Syria's** chemical **weapons**, **recent history warns that securing them from theft or transfer is an extraordinary challenge**. For example, during Operation Iraqi Freedom, more than 330 metric tons of military-grade high explosives vanished from Iraq's Al-Qaqaa military installation. Almost 200 tons of the most powerful of Iraq's high-explosives, HMX -- used by some states to detonate nuclear weapons -- was under International Atomic Energy Agency seal. Many tons of Al-Qaqaa's sealed HMX reportedly went missing in the early days of the war in Iraq. Forensic tests later revealed that some of these military-grade explosives were subsequently employed against US and coalition forces.¶ Even with a nationwide presence of 200,000 coalition troops, several other sensitive military sites were also looted, including Iraq's main nuclear complex, Tuwaitha. Should centralized authority crumble in Syria, it seems highly unlikely that the country's 50 chemical storage and manufacturing facilities -- and, possibly, biological weapon repositories -- can be secured. The US Defense Department recently estimated that it would take more than 75,000 US military personnel to guard Syria's chemical weapons. This is, of course, if they could arrive before any WMD were transferred or looted -- a highly unlikely prospect.¶ Complicating any efforts to secure Syria's WMD, post-Assad, are its porous borders. **With Syria's government distracted by internal revolt and US forces now fully out of Iraq**, **it is plausible that stolen** chemical or **bio**logical **weapons** **could find their way across the Syrian border** **into Iraq**. Similarly, Syrian WMD could be smuggled into southern Turkey, Jordan, Lebanon, the West Bank, Israel, and, potentially, the United States and Europe.¶ **At least six formal terrorist organizations have long maintained personnel within Syria.** **Three of these groups** -- **Hamas, Hizbollah, and Palestinian Islamic Jihad** -- **have already attempted to acquire** or use chemical or **biological agents**, or both. Perhaps more troubling, **Al Qaeda-affiliated fighters from Iraq have streamed into Syria**, acting, in part, on orders from Al Qaeda leader Ayman al-Zawahiri. In the past, Al Qaeda-in-Iraq fighters attempted to use chemical weapons, most notably attacks that sought to release large clouds of chlorine gas. The entry of Al Qaeda and other jihadist groups into the Syrian crisis underscores its increasingly sectarian manifestation. Nearly 40 percent of Syria's population consists of members of minority communities. Syria's ruling Alawite regime, a branch of Shia Islam, is considered heretical by many of Syria's majority Sunni Muslims -- even those who are not jihadists. Alawites, Druze, Kurds, and Christians could all become targets for WMD-armed Sunni jihadists. Similarly, Shiite radicals could conceivably employ WMD agents against Syria's Sunnis.¶ Religious fanaticism and WMD. Evidence of growing religious fanaticism is also reflected in recent Syrian suicide attacks. Since last December, at least five suicide attacks occurred in Syria. In the 40 years preceding, only two suicide attacks were recorded. Al Qaeda-linked mujahidin are believed to be responsible for all of these recent attacks. Civil wars are often the most violent and unpredictable manifestations of war. With expanding sectarian divisions, the use of seized WMD in Syria's uprising is plausible. To the extent that religious extremists believe that they are doing God's bidding, fundamentally any action they undertake is justified, no matter how abhorrent, since the "divine" ends are believed to legitimize PDF the means.¶ The situation in Syria is unprecedented. Never before has a WMD-armed country fallen into civil war. All states in the region stand poised to lose if these weapons find their way outside of Syria. The best possible outcome, in terms of controlling Syria's enormous WMD arsenal, would be for Assad to maintain power, but such an outcome seems increasingly implausible. And there is painfully little evidence that democratic forces are likely to take over in Syria. Even if they do eventually triumph, it will take months or years to consolidate control over the entire country.¶ If chaos ensues in Syria, the United States cannot go it alone in securing hundreds of tons of Syrian WMD. Regional leaders -- including some, such as Sunni Saudi Arabia and Shiite Iran, that are now backing the insurgency and the regime, respectively -- must come together and begin planning to avert a dispersion of Syrian chemical or **biological weapons** that would **threaten everyone**, of any political or religious persuasion, in the Middle East and around the world.

#### New gene manipulation takes out your defense

MSNBC 2011

(“Clinton warns of bioweapon threat from gene tech,” pg online @ http://www.msnbc.msn.com/id/45584359/ns/… “For an international verification system — akin to that for nuclear weapons — saying it is too complicated to monitor every lab's activities.”)

GENEVA — New gene assembly technologythat offers great benefits for scientific research could also be used by terrorists to create biological weapons, U.S. Secretary of State Hillary Rodham Clinton warned Wednesday. **The** threat from bioweapons has drawn little attention in recent years, as governments focused more on the risk of nuclear weapons proliferation to countries such as Iran and North Korea. But experts have warned that the increasing ease with which bioweapons can be created might be used by terror groups to develop and spread new diseases that could mimic the effects of the fictional global epidemic portrayed in the Hollywood thriller **"**Contagion." Speaking at an international meeting in Geneva aimed at reviewing the 1972 Biological Weapons Convention, Clinton told diplomats that the challenge was to maximize the benefits of scientific research and minimize the risks that it could be used for harm. "The emerging gene synthesis industry is making genetic material more widely available**,"** she said. "This has many benefits for research, but it could also potentially be used to assemble the components of a deadly organism." Gene synthesis allows genetic material — the building blocks of all organisms — to be artificially assembled in the lab, greatly speeding up the creation of artificial viruses and bacteria. The U.S. government has cited efforts by terrorist networks such as al-Qaeda to recruit scientists capable of making biological weapons as a national security concern. "Acrude but effective terrorist weapon can be made using a small sample of any number of widely available pathogens, inexpensive equipment, and college-level chemistry and biology," Clinton told the meeting. "Less than a year ago**,** al-Qaeda in the Arabian Peninsula made a call to arms for, and I quote, 'brothers with degrees in microbiology or chemistry ... to develop a weapon of mass destruction**,'"** she said. Clinton also mentioned the Aum Shinrikyo cult's attempts in Japan to obtain anthrax in the 1990s, and the 2001 anthrax attack**s** in the United States that killed five people. Washington has urged countries to be more transparent about their efforts to clamp down on the threat of bioweapons. But U.S. officials have also resisted calls for an international verification system — akin to that for nuclear weapons — saying it is too complicated to monitor every lab's activities

#### Extinction

Ochs 2

**(**Richard, Naturalist – Grand Teton National park with Masters in Natural Resource Management – Rutgers, “Biological Weapons must be abolished immediately” 6-9, 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**.

### China

#### Global SMR development’s inevitable – only a question of whether the US leads

Hiruo 10
(Elaine, Managing Editor of Platts, "SMR technology gives US chance at market leadership, vendors say," 9-2-10, Lexis)

**The US** **nuclear industry lost its leadership** position **in the global market for large reactors and now has the opportunity to secure that role for s**mall **m**odular **r**eactor**s,** some SMR vendors told a subcommittee of the Blue Ribbon Commission on America's Nuclear Future August 30.¶ But they stressed their **companies will need the federal government's help to beat foreign competitors to the market.**¶ **"We're at a unique crossroads right now**," Christofer Mowry, president of Babcock and Wilcox Nuclear Energy, told the reactor and fuel cycle technology subcommittee during its two-day meeting in Washington. B&W is one of several US companies — including Hyperion Power Generation, NuScale and Westinghouse — developing an SMR design.¶ "Other countries want a technology that has been built in the host country first," Paul Lorenzini, CEO of NuScale, told the panel. "**There are lots of** small reactor **designs out there,**" he said. Both the Koreans and Japanese have SMR programs, according to industry executives on the speakers panel. **The question is**, Mowry said, **who enters the** global **market first with a reactor already operating on its home turf.**

#### Obama pushing SMRs now but its not enough to beat out China

Ervin 12/28

[Dan Ervin is a professor of finance at Salisbury University. <http://www.delmarvanow.com/article/20121230/OPINION03/312300005> ETB]

The Obama administration’s decision to kick-start commercial use of small modular reactors has made one thing clear: The notion that nuclear power is slipping away is wrong. Although nuclear power faces difficult challenges, industry and government are working together to forge a new path.¶ The Department of Energy has earmarked funds for a new public-private partnership to help develop innovative small reactors that are about one-third the size of those in large conventional nuclear plants. These small reactors are modular, meaning they will be built in factories before they are shipped and installed at nuclear sites. This production method has the potential to reduce the cost of nuclear power significantly.¶ Southern Co. has begun building two new nuclear plants in Georgia using new construction techniques that could convince other companies nuclear plants are easier to build than otherwise thought.¶ Congress is planning to take up comprehensive legislation on nuclear waste next year using a “consent-based approach” to finding a site for a deep-geologic repository or an interim storage facility. Both would hold high-level waste and used fuel. Such an approach was recommended earlier in the year by a high-level blue-ribbon commission.¶ With respect to nuclear safety, American companies are adopting lessons learned from the Fukushima nuclear accident in Japan.¶ US industry is playing an active role in the global market for nuclear technology, where as much as $740 billion in business is at stake over the next decade. With 104 reactors, America still leads the world in installed nuclear capacity. This represents about 30 percent of global nuclear generation. Congress needs to authorize funds for projects to demonstrate the feasibility of small modular reactors.¶ Global electricity requirements are projected to grow by an estimated 80 percent by 2030.¶ Nuclear power remains the only proven technology capable of reliably providing zero-carbon energy on a scale that can have a meaningful impact on global warming.¶ A serious threat to the future of American nuclear power is the shortage of government research and development funds for advanced nuclear technologies. Other countries, notably China, are devoting a larger share of their energy funding to nuclear research on fast reactors and other designs that are inherently safe and produce little or no waste. The US needs to do the same.

#### Delaying commercialization allows China to solidify their lead

Wheeler 12
(Brian, editor of Power Engineering magazine, "Developing Small Modular Reactor Designs in the U.S," 4-1-12, <http://www.power-eng.com/articles/npi/print/volume-5/issue-2/nucleus/developing-small-modular-reactor-designs-in-the-us.html>)

The development of small modular reactors in the U.S. continues to gain support as the country searches for clean energy options. Although concepts are still being designed, **the U.S. D**epartment **o**f **E**nergy **gave the sector a boost** in March **when it released** **a** Funding Opportunity Announcement to establish **cost-shared agreements** **to support the design and licensing of SMRs.** A total of $450 million will be made available to support two SMRs over five years.¶ "America's choice is clear," said Energy Secretary Steven Chu. "We can either develop the next generation of clean energy technologies, which will help create thousands of jobs and export opportunities here in America, or we can wait for other countries to take the lead."¶ The Energy Department said SMRs are about one-third the size of current nuclear power plants and are designed to offer a host of safety, siting, construction and economic benefits. The size, according to DOE, makes SMRs ideal for small electric grids and locations that cannot support large reactors. Also, the reduced cost due to factory production may make the SMR more attractive to utilities seeking to add a smaller amount of power.¶ "We really see a market right now that includes utilities that don't have a large financial base and that are interested in clean, sustainable power. They are looking at the SMR as an investment of a billion dollars versus several billion dollars for large nuclear," said John Goossen, vice president of Innovation and SMR Development at Westinghouse. "These utilities, in most cases, do not need large chunks of power and are looking to add power incrementally as part of their plans for growth." In February, the Electric Power Research Institute and the Oak Ridge National Laboratory released a study that stated the U.S. has the potential to generate 201 GW from SMRs. For their study, a small modular reactor was labeled as 350 MWe or less. The DOE defines an SMR as 300 MWe or less. The study stated that "350 MWe was considered a reasonable bounding estimate of an initial SMR installation."¶ **The U.S. is leading the world in the amount of SMR designs, but China could be the first country to have a SMR design operational.** Launched in 2011, **a** 200 MWe HTR-PM **reactor is under construction with the support of China Huaneng Group, China Nuclear Engineering and Construction, and Tsinghua University's INET,** according to the World Nuclear Association.¶ "**The U.S. needs to move faster if we are going to compete with the** South Koreans, the **Chinese** and the Russians," said Bob Prince, vice chairman and CEO, Gen4 Energy.

**Using the DOD as a first mover leads to rapid commercialization and allows the US to out-compete other countries**

Loudermilk ‘11

(Micah J. Loudermilk is a Research Associate for the Energy & Environmental Security Policy program with the Institute for National Strategic Studies at National Defense University, May 31, 2011, “Small Nuclear Reactors and US Energy Security: Concepts, Capabilities, and Costs,” Journal of Energy Security, <http://www.ensec.org/index.php?option=com_content&view=article&id=314:small-nuclear-reactors-and-us-energy-security-concepts-capabilities-and-costs&catid=116:content0411&Itemid=375>)

Path forward: Department of Defense as first-mover¶ Problematically, despite the immense energy security benefits that would accompany the wide-scale adoption of small modular reactors in the US, with a difficult regulatory environment, anti-nuclear lobbying groups, skeptical public opinion, and of course the recent Fukushima accident, the nuclear industry faces a tough road in the battle for new reactors. While President Obama and Energy Secretary Chu have demonstrated support for nuclear advancement on the SMR front, progress will prove difficult. However, a potential route exists by which small reactors may more easily become a reality: the US military.¶ The US Navy has successfully managed, without accident, over 500 small reactors on-board its ships and submarines throughout 50 years of nuclear operations. At the same time, serious concern exists, highlighted by the Defense Science Board Task Force in 2008, that US military bases are tied to, and almost entirely dependent upon, the fragile civilian electrical grid for 99% of its electricity consumption. To protect military bases’ power supplies and the nation’s military assets housed on these domestic installations, the Board recommended a strategy of “islanding” the energy supplies for military installations, thus ensuring their security and availability in a crisis or conflict that disrupts the nation’s grid or energy supplies.¶ DOD has sought to achieve this through decreased energy consumption and renewable technologies placed on bases, but these endeavors will not go nearly far enough in achieving the department’s objectives. However, by placing small reactors on domestic US military bases, DOD could solve its own energy security quandary—providing assured supplies of secure and constant energy both to bases and possibly the surrounding civilian areas as well. Concerns over reactor safety and security are alleviated by the security already present on installations and the military’s long history of successfully operating nuclear reactors without incident.¶ Unlike reactors on-board ships, small reactors housed on domestic bases would undoubtedly be subject to Nuclear Regulatory Commission (NRC) regulation and certification, however, with strong military backing, adoption of the reactors may prove significantly easier than would otherwise be possible. Additionally, as the reactors become integrated on military facilities, general fears over the use and expansion of nuclear power will ease, creating inroads for widespread adoption of the technology at the private utility level. Finally, and perhaps most importantly, action by DOD as a “first mover” on small reactor technology will preserve America’s badly struggling and nearly extinct nuclear energy industry. The US possesses a wealth of knowledge and technological expertise on SMRs and has an opportunity to take a leading role in its adoption worldwide. With the domestic nuclear industry largely dormant for three decades, the US is at risk of losing its position as the global leader in the international nuclear energy market. If the current trend continues, the US will reach a point in the future where it is forced to import nuclear technologies from other countries—a point echoed by Secretary Chu in his push for nuclear power expansion. Action by the military to install reactors on domestic bases will guarantee the short-term survival of the US nuclear industry and will work to solidify long-term support for nuclear energy.¶ Conclusions¶ In the end, small modular reactors present a viable path forward for both the expansion of nuclear power in the US and also for enhanced US energy security. Offering highly safe, secure, and proliferation-resistant designs, SMRs have the potential to bring carbon-free baseload distributed power across the United States. Small reactors measure up with, and even exceed, large nuclear reactors on questions of safety and possibly on the financial (cost) front as well. SMRs carry many of the benefits of both large-scale nuclear energy generation and renewable energy technologies. At the same time, they can reduce US dependence on fossil fuels for electricity production—moving the US ahead on carbon dioxide and GHG reduction goals and setting a global example. While domestic hurdles within the nuclear regulatory environment domestically have proven nearly impossible to overcome since Three Mile Island, military adoption of small reactors on its bases would provide energy security for the nation’s military forces and may create the inroads necessary to advance the technology broadly and eventually lead to their wide-scale adoption.

#### SMR commercialization recovers leadership lost to china

Rosner and Goldberg 11

(Robert Rosner, astrophysicist and founding director of the Energy Policy Institute at Chicago. He was the director of Argonne National Laboratory from 2005 to 2009, Stephen Goldberg, Special Assistant to the Director, Argonne National Laboratory ¶ Senior Fellow, Energy Policy Institute at Chicago¶ Research Coordinator, Global Nuclear Future Initiative ¶ American Academy of Arts and Sciences, “Small Modular Reactors – Key to Future Nuclear Power ¶ Generation in the U.S.” Energy Policy Institute at Chicago, <http://csis.org/files/attachments/111129_SMR_White_Paper.pdf>, SEH)

As stated earlier, SMRs have the potential to achieve significant greenhouse gas emission¶ reductions. They could provide alternative baseload power generation to facilitate the retirement¶ of older, smaller, and less efficient coal generation plants that would, otherwise, not be good¶ candidates for retrofitting carbon capture and storage technology. They could be deployed in¶ regions of the U.S. and the world that have less potential for other forms of carbon-free¶ electricity, such as solar or wind energy. There may be technical or market constraints, such as¶ projected electricity demand growth and transmission capacity, which would support SMR¶ deployment but not GW-scale LWRs. From the on-shore manufacturing perspective, a key point¶ is that the manufacturing base needed for SMRs can be developed domestically. Thus, while the¶ large commercial LWR industry is seeking to transplant portions of its supply chain from current¶ foreign sources to the U.S., **the SMR industry offers the potential to establish a large domestic¶ manufacturing base building upon already existing U.S. manufacturing infrastructure and¶ capability,** **including the Naval shipbuilding and underutilized domestic nuclear component and¶ equipment plants**. The study team learned that a number of sustainable domestic jobs could be¶ created – that is, the full panoply of design, manufacturing, supplier, and construction activities –¶ if the U.S. can establish itself as a credible and substantial designer and manufacturer of SMRs.¶ While many SMR technologies are being studied around the world, a **strong U.S.¶ commercialization** program **can enable U.S. industry to be first to market SMRs,** thereby **serving¶ as a fulcrum for** export growth as well as a lever in **influencing international decisions on¶ deploying both** nuclear **reactor and** nuclear **fuel cycle tech**nology. **A** viable **U.S.-centric SMR¶ industry would** enablethe U.S. to **recapture** technological **leadership in** commercial **nuclear¶ tech**nology, **which has been lost to** suppliers in France, Japan, Korea, Russia, and, now rapidly¶ emerging, **China**.

**Ceding nuclear leadership to China leads to unchecked Chinese hege in Asia – kills US regional leadership**

**Cullinane ‘11**

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Due to a confluence of events the United States has recently focused more attention on nuclear weapons policy than it has in previous years; however, the proliferation of commercial nuclear technology and its implications for America’s strategic position have been largely ignored. While the Unites States is currently a participant in the international commercial nuclear energy trade, **America’s** own **domestic construction of nuclear power plants has atrophied severely and the US risks losing its competitive edge in** the **nuclear energy** arena.¶ Simultaneously, the People’s Republic of **China** (PRC) **has made great strides in closing the nuclear** energy **development gap with America**. **Through a combination of importing technology, research from within China itself, and a disciplined policy approach the PRC is increasingly able to leverage the export of commercial nuclear power as part of its national strategy**. **Disturbingly, China does not share America’s commitment to stability, transparency, and responsibility when exporting nuclear technology**. This is a growing strategic weakness and risk for the United States**. To remain competitive and to be in a position to offset the PRC when required the American government should encourage** the **domestic** use of **nuclear power and spur** the forces of **tech**nological **innovation**.¶ History has recorded well American wartime nuclear developments which culminated in the July 1945 Trinity Test, but what happened near Arco, Idaho six years later has been overlooked. In 1951, scientists for the first time produced usable electricity from an experimental nuclear reactor. Once this barrier was conquered the atom was harnessed to generate electricity and permitted America to move into the field of commercial nuclear power. In the next five years alone the United States signed over 20 nuclear cooperation agreements with various countries. Not only did the US build dozens of power plants domestically during the 1960s and 1970s, the US Export-Import Bank also distributed $7.1 billion dollars in loans and guarantees for the international sale of 49 reactors. American built and designed reactors were exported around the world during those years. Even today, more than 60% of the world’s 440 operating reactors are based on technology developed in the United States. The growth of the US civilian nuclear power sector stagnated after the Three Mile Island incident in 1979 – the most serious accident in American civilian nuclear power history. Three Mile Island shook America’s confidence in nuclear power and provided the anti-nuclear lobby ample fuel to oppose the further construction of any nuclear power plants. In the following decade, 42 planned domestic nuclear power plants were cancelled, and in the 30 years since the Three Mile Island incident the American nuclear power industry has survived only through foreign sales and merging operations with companies in Asia and Europe. Westinghouse sold its nuclear division to Toshiba and General Electric joined with Hitachi. Even the highest levels of the American government came to cast nuclear power aside. President Bill Clinton bragged in his 1993 State of the Union Address that “we are eliminating programs that are no longer needed, such as nuclear power research and development.” ¶ **America’s slow pace of reactor construction over the past three decades has stymied innovation and caused the nuclear sector and its industrial base to shrivel**. While some aspects of America’s nuclear infrastructure still operate effectively, **many critical areas have atrophied.** For example, one capability that America has entirely lost is the means to cast ultra heavy forgings in the range of 350,000 – 600,000 pounds, which impacts the construction of containment vessels, turbine rotors, and steam generators. In contrast, Japan, China, and Russia all possess an ultra heavy forging capacity and South Korea and India plan to build forges in this range. Likewise, the dominance America enjoyed in uranium enrichment until the 1970s is gone. The current standard centrifuge method for uranium enrichment was not invented in America and today 40% of the enriched uranium US power plants use is processed overseas and imported. Another measure of how much the US nuclear industry has shrunk is evident in the number of companies certified to handle nuclear material. In the 1980s the United States had 400 nuclear suppliers and 900 holders of N-stamp certificates (N-stamps are the international nuclear rating certificates issued by the American Society of Mechanical Engineers). By 2008 that number had reduced itself to 80 suppliers and 200 N-stamp holders. A recent Government Accountability Office report, which examined data from between 1994 and 2009, found the US to have a declining share of the global commercial nuclear trade. However, during that same period over 60 reactors were built worldwide. Nuclear power plants are being built in the world increasingly by non-American companies.¶ The American nuclear industry entered the 1960s in a strong position, yet over the past 30 years other countries have closed the development gap with America. **The implications of this change go beyond economics or prestige to include national security. These changes would be less threatening if friendly allies were the ones moving forward with developing a nuclear export industry; however, the quick advancement of the PRC in nuclear energy changes the strategic calculus for America.**¶ The shifting strategic landscape¶ **While America’s nuclear industry has languished, current changes in the world’s strategic layout no longer allow America the option of maintaining the status quo without being surpassed.** The drive for research, development, and scientific progress that grew out of the Cold War propelled America forward, but those priorities have long since been downgraded by the US government. **The economic development of formerly impoverished countries means that the US cannot assume continued dominance by default**. **The rapidly industrializing PRC is seeking its own place among the major powers of the world and is vying for hegemony in Asia; nuclear power is an example of their larger efforts to marshal their scientific and economic forces as instruments of national power.**¶ The rise of China is a phrase that connotes images of a backwards country getting rich off of exporting cheap goods at great social and environmental costs. Yet, this understanding of the PRC has lead many in the United States to underestimate China’s capabilities. The Communist Party of China (**CPC) has undertaken a comprehensive long-term strategy to transition from a weak state that lags behind the West to a country that is a peer-competitor to the United States. Nuclear technology provides a clear example of this.** ¶ In 1978, General Secretary Deng Xiaoping began to move China out of the destructive Mao era with his policies of 'reform and opening.' As part of these changes during the 1980s, the CPC began a concerted and ongoing effort to modernize the PRC and acquire advanced technology including nuclear technology from abroad. This effort was named Program 863 and included both legal methods and espionage. By doing this, the PRC has managed to rapidly catch up to the West on some fronts. In order to eventually surpass the West in scientific development the PRC launched the follow-on Program 973 to build the foundations of basic scientific research within China to meet the nation’s major strategic needs. These steps have brought China to the cusp of the next stage of technological development, a stage known as “indigenous innovation.”¶ ¶ In 2006 the PRC published their science and technology plan out to 2020 and defined indigenous innovation as enhancing original innovation, integrated innovation, and re-innovation based on assimilation and absorption of imported technology in order improve national innovation capability. The Chinese seek to internalize and understand technological developments from around the world so that they can copy the equipment and use it as a point to build off in their own research. This is a step beyond merely copying and reverse engineering a piece of technology. The PRC sees this process of absorbing foreign technology coupled with indigenous innovation as a way of leapfrogging forward in development to gain the upper hand over the West. **The PRC’s official statement on energy policy lists nuclear power as one of their target fields. When viewed within this context, the full range of implications from China’s development of nuclear technology becomes evident**. **The PRC is** now **competing with the U**nited **St**ates **in the areas of innovation and high-technology, two fields that have driven American power since World War Two**. **China’s economic appeal** is no longer merely the fact that it has cheap labor, but **is expanding its economic power in a purposeful way that directly challenges America’s position in the world**.¶ ¶ **The CPC uses the market to their advantage to attract nuclear technology and intellectual capital to China**. The PRC has incentivized the process and encouraged new domestic nuclear power plant construction with the goal of having 20 nuclear power plants operational by 2020. The Chinese Ministry of Electrical Power has described PRC policy to reach this goal as encouraging joint investment between State Owned Corporations and foreign companies. 13 reactors are already operating in China, 25 more are under construction and even more reactors are in the planning stages. ¶ In line with this economic policy, China has bought nuclear reactors from Westinghouse and Areva and is cooperating with a Russian company to build nuclear power plants in Taiwan. By stipulating that Chinese companies and personnel be involved in the construction process, China is building up its own domestic capabilities and expects to become self-sufficient. **China’s** State Nuclear Power Technology Corporation has **partnered with Westinghouse to build a new and larger reactor** based on the existing Westinghouse AP 1000 reactor. **This will give the PRC a reactor design of its own to then export**. **If the CPC is able to combine their control over raw materials, growing technical know-how, and manufacturing base, China will not only be a powerful economy, but be able to leverage this power to service its foreign policy goals as well.**¶ Even though the PRC is still working to master third generation technology, their scientists are already working on what they think will be the nuclear reactor of the future. China is developing Fourth Generation Fast Neutron Reactors and wants to have one operational by 2030. Additionally, a Chinese nuclear development company has announced its intentions to build the “world’s first high-temperature, gas-cooled reactor” in Shandong province which offers to possibility of a reactor that is nearly meltdown proof. A design, which if proved successful, could potentially redefine the commercial nuclear energy trade.¶ The risk to America¶ **The international trade of nuclear material is hazardous in that every sale and transfer increases the chances for an accident or for willful misuse of the material. Nuclear commerce must be kept safe in order for the benefits of nuclear power generation to be realized. Yet, China has a record of sharing dangerous weapons and nuclear material with unfit countries**. **It is a risk for America to allow China to become a nuclear exporting country with a competitive technical and scientific edge. In order to limit Chinese influence and the relative attractiveness of what they can offer, America must ensure its continuing and substantive lead in reactor technology.**¶ ¶ The PRC’s record of exporting risky items is well documented. It is known that during the 1980s **the Chinese shared nuclear weapon designs with Pakistan and continues to proliferate WMD-related material.** According to the Office of the Director of National Intelligence to Congress, **China sells technologies and components in the Middle East and South Asia that are dual use and could support WMD and missile programs.** Jane’s Intelligence Review reported in 2006 that China,¶ Despite a 1997 promise to Washington to halt its nuclear technology sales to Iran, such assistance is likely to continue. In 2005, Iranian resistance groups accused China of selling Iran beryllium, which is useful for making nuclear triggers and maraging steel (twice as hard as stainless steel), which is critical for fabricating centrifuges needed to reprocess uranium into bomb-grade material. ¶ **China sells dangerous materials in order to secure its geopolitical objectives, regardless if those actions harm world stability. There is little reason to believe China will treat the sale of nuclear reactors any differently. Even if the PRC provides public assurances that it will behave differently in the future, the CPC has not been truthful for decades about its nuclear material and weapons sales and hence lacks credibility**. For example, in 1983 Chinese Vice Premier Li Peng said that China does not encourage or support nuclear proliferation. In fact, it was that same year that China contracted with Algeria, then a non-NPT [Non-Proliferation Treaty] state, to construct a large, unsafeguarded plutonium production reactor. In 1991 a Chinese Embassy official wrote in a letter to the The Washington Post that 'China has struck no nuclear deal with Iran.' In reality, China had provided Iran with a research reactor capable of producing plutonium and a calutron, a technology that can be used to enrich uranium to weapons-grade. It has been reported that even after United Nation sanctions were put on Iran, Chinese companies were discovered selling “high-quality carbon fiber” and “pressure gauges” to Iran for use in improving their centrifuges.¶ In 2004 the PRC joined the Nuclear Suppliers Groups (NSG), gaining international recognition of their growing power in the nuclear field. In spite of this opportunity for China to demonstrate its responsibility with nuclear energy, it has not fulfilled it NSG obligations. The PRC has kept the terms of its nuclear reactor sale to Pakistan secret and used a questionable legal technicality to justify forgoing obtaining a NSG waiver for the deal. Additionally, China chose to forgo incorporating new safety measures into the reactors in order to avoid possible complications.¶ A further consequence of China exporting reactors is that these countries may wish to control the fuel cycle which provides the uranium to power their new reactors. The spread of fuel cycle technology comes with two risks: enrichment and reprocessing. Uranium can be enriched to between 3% and 5% for reactor use, but the process can be modified to produce 90% enriched uranium which is weapons-grade. Even if a country only produces low enriched uranium they could easily begin enriching at a higher level if they so choose**. Every new country that nuclear technology or information is spread to exponentially increases the risk of material being stolen, given to a third party or being used as the launching point for a weapons program**. **China’s history of proliferation and willingness to engage economically with very unsavory governments seems likely to increase the risks involving nuclear material.**

**U.S. leadership in Asia checks escalation in multiple hostpots**

**Goh 8**

(Evelyn, Lecturer in International Relations in the Department of Politics and International Relations at the Univ of Oxford, International Relations of the Asia-Pacific, “Hierarchy and the role of the United States in the East Asian security order,” 2008 8(3):353-377, Oxford Journals Database)

This is the main structural dilemma: **as long as the U**nited **S**tates **does not give up its primary position in the Asian regional hierarchy**, China is very unlikely to act in a way that will provide comforting answers to the two questions. Yet**, the East Asian regional order has been and still is constituted by US hegemony**, and **to change that could be extremely disruptive and may lead to regional actors acting in highly destabilizing ways**. **Rapid Japanese remilitarization, armed conflict across the Taiwan Straits, Indian nuclear brinksmanship directed toward Pakistan, or a highly destabilized Korean peninsula are all illustrative of potential regional disruptions**. 5 Conclusion To construct a coherent account of East Asia’s evolving security order, I have suggested that the United States is the central force in constituting regional stability and order. **The major patterns of equilibrium and turbulence in the region since 1945 can be explained by the relative stability of the US position at the top of the regional hierarchy**, **with periods of greatest insecurity being correlated with greatest uncertainty over the American commitment to managing regional order**. Furthermore, relationships of hierarchical assurance and hierarchical deference explain the unusual character of regional order in the post-Cold War era. However, **the greatest contemporary challenge to East Asian order is the potential conflict between China and the United States over rank ordering in the regional hierarchy**, a contest made more potent because of the intertwining of regional and global security concerns. Ultimately, though, investigating such questions of positionality requires conceptual lenses that go beyond basic material factors because it entails social and normative questions. How can China be brought more into a leadership position, while being persuaded to buy into shared strategic interests and constrain its own in ways that its vision of regional and global security may eventually be reconciled with that of the United States and other regional players? How can Washington be persuaded that its central position in the hierarchy must be ultimately shared in ways yet to be determined? The future of the East Asian security order is tightly bound up with the durability of the United States’ global leadership and regional domination. **At the regional level, the main scenarios of disruption are an outright Chinese challenge to US leadership, or the defection of key US allies, particularly Japan**. Recent history suggests, and the preceding analysis has shown, that challenges to or defections from **US leadership will come at junctures where it appears that the US commitment to the region is in doubt**, which in turn destabilizes the hierarchical order. At the global level, American geopolitical over-extension will be the key cause of change. This is the one factor that Hierarchy and the role of the United States in the East Asian security order 373lead to both greater regional and global turbulence, if only by the attendant strategic uncertainly triggering off regional challenges or defections. However, it is notoriously difficult to gauge thresholds of over-extension. More positively, East Asia is a region that has adjusted to previous periods of uncertainty about US primacy. Arguably, the regional consensus over the United States as primary state in a system of benign hierarchy could accommodate a shifting of the strategic burden to US allies like Japan and Australia as a means of systemic preservation. **The alternatives that could surface as a result of not doing so would appear to be much worse.**

**Those go nuclear**

**Landy 2k**

 National Security Expert @ Knight Ridder, 3/10 ¶ (Jonathan, Knight Ridder, lexis)

Few if any experts think China and Taiwan, North Korea and South Korea, or India and Pakistan are spoiling to fight. But **even a minor miscalculation** by any of them **could destabilize Asia,** jolt the global economy **and** even **start** a **nuclear war. India, Pakistan and** **China all have nuclear weapons, and North Korea** may have a few, **too. Asia lacks the** kinds of organizations, negotiations and diplomatic **relationships that helped keep** an uneasy **peace** for five decades **in Cold War Europe. “Nowhere else** on Earth **are the stakes as high and relationships so fragile,”** said Bates Gill, director of northeast Asian policy studies at the Brookings Institution, a Washington think tank. “We see the convergence of great power interest overlaid with lingering confrontations with no institutionalized security mechanism in place. There are elements for potential disaster.” In an effort to cool the region’s tempers, President Clinton, Defense Secretary William S. Cohen and National Security Adviser Samuel R. Berger all will hopscotch Asia’s capitals this month. For America, the stakes could hardly be higher. **There are 100,000 U.S. troops in Asia** committed to defending Taiwan, Japan and South Korea, and **the U**nited **St**ates **would instantly** **become embroiled** if Beijing moved against Taiwan or North Korea attacked South Korea. While Washington has no defense commitments to either **India or Pakistan**, a conflict between the two **could end the** global **taboo against using nuclear weapons** and demolish the already shaky international nonproliferation regime. In addition, globalization has made a stable Asia \_ with its massive markets, cheap labor, exports and resources \_ indispensable to the U.S. economy. Numerous U.S. firms and millions of American jobs depend on trade with Asia that totaled $600 billion last year, according to the Commerce Department.

#### China will risk open conflict by asserting hegemony in the South China Sea- US leadership key to solve

Hung December ‘12

[Nguyen Manh Hung is associate professor of government and international politics, and faculty associate of the Center of Global Studies, George Mason University. <http://www.globalasia.org/V7N4_Winter_2012/Nguyen_Manh_Hung.html> ETB]¶

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| By 2009-2010, the heightened tension between China and the ASEAN claimants over the contested islands led to an internationalization of the conflict, with the US and other powers beginning to express a view on the disputes. That’s understandable, given that the South China Sea is the world’s second-busiest sea-lane, with more than half of the world’s super tankers and $5.3 trillion in annual trade passing through the area (US trade alone accounts for $1.2 trillion of that figure). The concern over China’s claims and assertive behavior, coupled with China’s lack of transparency in its military modernization program, have created an arms race in Southeast Asia and elicited strong reactions from major powers worried about the situation. India and Japan, for their part, are also concerned over freedom of navigation. Both countries have advocated peaceful resolution of the disputes, but have also increased their diplomatic, economic and naval presence in the area. The US, meanwhile, is in the midst of a policy pivot to the Asia-Pacific, committing 60 percent of its naval assets to the Pacific Ocean, and taking actions to strengthen and modernize “historic alliances” with Japan, South Korea, Australia, the Philippines and Thailand, as well as building “robust partnerships” throughout the region.4 Russia has also begun to voice its concern over the issue of freedom of navigation and “outside meddling” in the South China Sea. In May 2009, as the deadline for claims based on the United Nations Convention on the Law of the Sea (UNCLOS) approached, China was forced to put its cards on the table and Beijing officially presented its nine-dashed-line map, claiming control over 80 percent of the South China Sea and encroaching on territories claimed by other Southeast Asian countries. Almost immediately, the US Senate held a hearing on the South China Sea and in June unanimously passed a resolution “deploring China’s use of force in the South China Sea and supporting the continuation of operations by US armed forces in support of freedom of navigation rights in international water and air space in the South China Sea.” In June 2010, at the Shangri-La Dialogue in Singapore, heated exchanges over the South China Sea took place between China and the US, joined by other ASEAN countries. A month earlier, at the Strategic and Economic Dialogue between the US and China in Beijing, Chinese officials, in a move viewed as raising the stakes in the conflict, declared the country’s claims in the South China Sea to be a “core interest.”5 Influential elites in China view the South China Sea as “blue territory” — that is, as much a part of China’s sovereign territory as Tibet, Xinjiang or Taiwan.6 The US response came in the form of a speech by US Secretary of State Hillary Clinton at the ASEAN Regional Forum (ARF) in Hanoi in July, in which she made it clear that “The United States has a national interest in freedom of navigation, open access to Asia’s maritime commons and respect for international law in the South China Sea.” Significantly, American and Chinese understandings of “freedom of navigation” differ. The US believes it includes the right to conduct military exercises and collect intelligence and militarily useful data, while China wants foreign naval ships and aircraft to seek China’s permission before entering its “internal waters” in the South China Sea.7 Since conflicts of national interests between major world powers can easily lead to friction and war, the escalating tensions between China and the US over these maritime disputes should be a serious cause for concern. The Systemic Conflict From a systemic perspective, the US-China conflict over the South China Sea may be seen as conflict between a rising power and a status quo power. For decades the US, through its Seventh Fleet and its Pacific Command, was the undisputed naval power in the Pacific. The American defeat in Vietnam in the 1970s and its later involvement in the wars in Afghanistan and Iraq have changed the situation. While the US reduced its military presence in Asia and got bogged down in two costly and draining wars, China’s economy was growing and its military modernization program was gaining momentum; Beijing, as a result, has become a dominant regional power economically, politically and militarily. Chinese leaders departed from Deng Xiaoping’s famous dictum to “hide your intention, bide for time,” and began to flex China’s muscles, particularly over the South China Sea. China’s assertion of its “historical right” to claim the sea is weak and doesn’t conform to either UNCLOS or customary international law. What China has been doing represents nothing less than an attempt to rewrite international law and impose its will on the region, shape global political realities and influence the “rules of the road” for the international order.8 The US, in both words and deeds, has signaled that it does not accept this. It has strengthened its military presence in Asia, revitalized its strategic relations with old allies and helped improve the defense capabilities of small countries in the region. In July 2012, when China created a prefectural-level city at Sansha, a small island in the South China Sea, and established a military garrison there to “exercise sovereignty over all land features inside the South China Sea,” the US State Department reacted by publicly denouncing China’s action as “counter to collaborative diplomatic efforts to resolve differences and risks further escalating tensions in the region,” while Congressman Howard Berman, a leading member of the House Committee on Foreign Relations, confirmed that the administration of US President Barack Obama had “repeatedly made clear to Beijing that the US will not allow China to assert hegemony over the region.”9 Conflicts of interests between rising powers and status quo powers have in the past accelerated arms races and led to war. The key questions are, can such a collision course be altered, and can the core conflicts between the two powers be resolved? **Possible End Games** There are a number of possible scenarios for resolving the South China Sea disputes. The first is that China moderates its excessive claims and strikes a deal with other coastal nations, with third-party arbitration or adjudication if necessary, based on recognized international law on territorial seas, exclusive economic zones and continental shelves. Before adopting its nine-dashed line, China had drawn an eleven-dashed line map, two lines of which were in the Gulf of Tonkin.10 This, however, did not prevent China and Vietnam from achieving an agreement on the demarcation of sea borders in that gulf. Moreover, Chinese officials have repeatedly denied that China has officially declared the South China Sea its “core interest,” leaving open the possibility of coming to an understanding regarding conflicting claims. Some Chinese scholars and experts working in government think tanks have privately acknowledged “the problematic nature of China’s policy in the South China Sea,” particularly with regard to “the status of the nine-dotted line.” These analysts and strategic thinkers have expressed concern that the tense situation in the South China Sea could sidetrack China’s “course of reform.”11 This leaves the door open for discussion and provides the space in which China might entertain possible concessions that would avoid embroiling China and its Southeast Asian neighbors in a long argument over China’s excessive claims. The second scenario is one in which China, taking advantage of the differential in power between it and other rival claimants, relies on a combination of unilateral actions, brinkmanship, piecemeal advances and divide-and-conquer tactics to gradually and steadily establish actual control of the sea area within the nine-dashed line. The standoff between China and the Philippines at Scarborough Shoal was a perfect example of how this possible scenario might unfold. The Scarborough Shoal standoff began in May 2012 when a Philippine Navy frigate was sent to investigate the area and boarded Chinese fishing boats in an area it claimed belonged to the Philippines’ EEZ. China responded by sending two unarmed China Maritime Surveillance vessels to interpose themselves between the frigate and the fishing boats and let them escape. Both sides sent in reinforcements. At the height of the standoff, there were a handful of Philippine boats facing almost 100 Chinese vessels. Faced with the overwhelming number of Chinese ships and without international support, the Philippine had to cut a deal in which both sides withdrew their ships. But after all the Philippine boats had withdrawn, China roped off the entrance to the shoal, effectively establishing its de facto control over the contested area. With that fait accompli, a new status quo in favor of China was established. This tactic of resorting to low-grade pressure to create a series of new “facts” may lead to what Toshi Yoshihara termed “strategic fatigue,” which could, in the long run, weaken resistance by rival claimants and lead to a grudging acceptance by the US of China’s claims.12 With this achieved, China would have effective control of navigation in the South China Sea and could dictate the use of that important sea-lane of communication. This approach is being resisted by ASEAN claimants and by other major powers that share the Pacific Ocean. Its success or failure will depend on two things: 1) whether China succeeds in its “divide-and-conquer” approach to ASEAN; and 2) whether ASEAN can summon the determination and capacity to act with a united front to resist China’s pressure and involve other major powers, especially the US. China’s current aggressive approach has caused friction and tension and, if unrestrained, may lead to military conflicts.13 In the long run, it will push many Asian countries closer to the US and may lead to a new kind of Cold War and containment, pitting a bloc of countries supporting the American vision of an Asian regional order against a group supporting the Chinese vision of an Asian regional order. This scenario is a nightmare for Southeast Asian countries that have worked so hard to strengthen ASEAN solidarity and promote the concept of ASEAN centrality, in order to avoid being caught up in the rivalry between the US and China. The third scenario is that China reaches an accommodation with the US, based on American recognition of China as an undisputed leader in the South China Sea, and a peaceful transition of leadership in the Asia-Pacific area from the US to China occurs. If this were to happen, it would unsettle all other Asian nations, big and small, but once the US began the accommodation process, other countries would simply have to fall in line. This process, however, would be dangerous globally and regionally. There is no guarantee, however, that if China were to dominate Asia, she would stop there. In response to the reality of a spectacularly rising China and an America burdened with economic problems and a dysfunctional government, scholars such as Adam Quinn have focused on the beginning of a power transition from the US, a declining power, to China, a rising power.14 Chinese strategic thinkers have not missed the possibility that the current contest over the South China Sea may represent the first steps toward this transition. Ding Gang, a senior editor at the Communist Party’s People’s Daily, commented: “It’s still unknown if the US plans to input equally massive manpower and financial resources as China has injected into this region. It’s very likely that the US lacks the motivation to do this in the long run. And China may become the strongest economic, political and military power in Asia.”15 The problem with this scenario is that it neglects the extent to which the two key players involved in this transition — China and the US — are regimes that represent incompatible visions of the future of the region and the world. A peaceful transition of power took place from the British Empire to the American Empire, largely because it was a case of one democracy replacing another, trading roles as the sentinels of shared regional interests. The British were willing to relinquish their dominance and were assured that, with another democracy taking the helm, its security and wellbeing were not threatened. But the clash between undemocratic revisionist powers (Germany, Italy and Japan) and democratic powers in the 1930s led to the Second World War. Regionally, this scenario would be most undesirable for smaller ASEAN countries and is unlikely to occur so long as the US has the capacity and the determination to maintain its supremacy in the Asia-Pacific region, a determination that has been strongly restated by US leaders, from the president to the secretaries of defense and state as well as by leading members of Congress.16 Aaron Friedberg points out that the ideological gap between China and the US is too great and the level of trust too low to facilitate an accommodation. He makes the case that China’s ultimate goal of regional hegemony would run counter to the US “grand strategy, which has remained constant for decades: to prevent the domination of either end of the Eurasian landmass by one or more potentially hostile powers.”17  |

#### SCS is on the brink of conflict- Chinese provocations mean risk of miscalc and escalation are high- even Chinese security experts agree

Pradhan 12/11/12

[S D Pradhan has served as chairman of India's Joint Intelligence Committee. He has also been the country's deputy national security adviser. He was chairman of the Task Force on Intelligence Mechanism (2008-2010), which was constituted to review the functioning of the intelligence agencies. He has taught at the departments of defence studies and history at the Punjabi University, Patiala. He was also a visiting professor at the University of Illinois, US, in the department of arms control and disarmament studies. <http://blogs.timesofindia.indiatimes.com/ChanakyaCode/entry/china-pushes-south-china-sea-closer-to-a-conflict> ETB]

China following a well-crafted strategy is systematically moving to establish its control over the area it claims in SCS. As a first step, it formed a Committee of thirteen agencies/departments in February 2012 to fabricate evidence and publicise its claims over the most area in SCS shown through the nine dotted lines. After it made recommendations, China in its new biometric passports projected all the areas in the SCS as belonging to China. These passports also show parts of India as belonging to China. This act of China generated a strong reaction in the neighbouring countries as also in other countries using SCS for trade. While both Vietnam and the Philippines refused to stamp the Chinese travel documents, India began to stamp its own version of the Indian Territory. Jakarta called the Chinese act as counter-productive and the US described these Chinese passports as unhelpful to the resolution of disputes. The second step was the establishment of the prefectural level city of Sansha to administer the Paracel and Spratly Islands in June 2012. Soon after this, China created a military command base there. And as the third step of its strategy, China declared that its police in the Southern Chinese Island of Hainan on the SCS has been authorised to board and search any ship they deem illegal in the "Chinese waters". The new regulations are to be enforced from the 1st January 2013. All these acts of China are in fact potential triggers for conflicts in the region. China is also continuing with its provocative actions. On 30th November, 2012 Vietnam accused a Chinese fishing boat for cutting the cables of its exploration vessel Binh Minh 02. On expected lines, China on the other hand stated that Vietnam expelled its fishing vessels from its waters. The cutting of cables by China has been criticised even by Chinese security experts like Professor Zhu Feng of International Relations at Peking University. China has also stated that its patrol boats would be around Scarborough Shoal. Such provocative acts can result into a conflict. China is now seen as creator of hurdles in the steps being taken by ASEAN to resolve the issue peacefully. The Chinese reluctance to discuss the issue at multilateral forums continues. The ASEAN July meeting in Cambodia clearly established that China keeps on using its influence on Cambodia, the present Chair of ASEAN to ensure that the SCS disputes are not properly discussed. Even the recent ASEAN Summit reflected that the issue remains hostage to the Chinese policy of not allowing proper discussion and projection of the disputes. The neighbours of China also see that the Chinese modernisation of the armed forces at a break-neck speed is not meant to defend its interests but to threaten them into submission. The recent landing of J 15 on the newly acquired air-craft carrier has alarmed the powers interested in the region. They also note that Chinese official defence budget has crossed $106 bn this year. The Chinese policies and posture are causing an armed race in the SCS region. While Vietnam and Philippines are looking to acquire arms to counter the Chinese activities, Japan is also re-orienting its defence policy. Outside powers are now becoming more assertive in stating that they intend to protect the freedom of navigation. In addition, they are also guided by their strategic objectives. US not only have Asia pivot policy but are clearly taking steps to protect the US interests by enhancing their presences in this region. The situation can be rightly termed as alarming. The security experts in China's neighbouring nations are getting seriously concerned about the Chinese activities. Their security experts point out that modernisation of the Chinese Navy is a major security concern. They point out that the Chinese rise is not peaceful. They are suggesting that suitable up-gradation of their armed forces is imperative in view of developing security environment. An assessment of the situation reveal clearly that the Chinese posturing and activities have moved up from being merely "a concern" to "a serious threat" to the region's stability. Such Chinese activities have made the situation highly explosive. Even an unintended incident can act as a trigger for a conflict. Today the South China Sea stands very close to a conflict than ever before. The moot question is whether something can be done at this stage or not to save the world from a conflict. The Chinese leaders, who have great sense for learning from historical experiences, should be able to see that their activities are not in their interests. They are getting marginalised in the International Community. The present policy of International Community of managing and engaging China has limits and the moment China crosses the proverbial Rubicon, the concerned powers would abandon this policy and resort to arms to protect their interests. It may be recalled that before the Second World War, UK had adopted the policy of "Appeasement" which was also followed by France and others to a point but when Hitler's Germany decided to attack Poland, they abandoned it and the war followed. Peace loving people do not like to hear the "sound of cannons" but when it comes to protecting their national interests, they would not mind listening to cancerous sound of guns.

#### Emerging dynamics means conflict will escalate- 6 reasons

- no cooling off periods

- New ASEAN secretary general is anti-China

- New ASEAN chair is too weak to hammer out a deal

- India getting involved

- more resources will be found

- new Chinese leadership won’t back down

Kurlantzick 12/6/12

[Joshua Kurlantzick, Fellow for Southeast Asia @ Council on Foreign Relations. <http://blogs.cfr.org/asia/2012/12/06/south-china-sea-going-to-get-worse-before-it-might-gets-better/> ETB]

This week’s latest South China Sea incident, in which a Chinese fishing boat cut a Vietnamese seismic cable —at least according to Hanoi— is a reminder that, despite the South China Sea dominating nearly every meeting in Southeast Asia this year, the situation in the Sea appears to be getting worse. This is in contrast to flare-ups in the past, when after a period of tension, as in the mid-1990s, there was usually a cooling-off period. Although there have been several brief cooling-off periods in the past two years, including some initiated by senior Chinese leaders traveling to Southeast Asia, they have not stuck, and the situation continues to deteriorate and get more dangerous.¶ In the new year, it will likely get even worse. Here’s why:¶ The new Association of Southeast Asian Nations (ASEAN) secretary-general comes from Vietnam. Over the past three years, a more openly forceful China has found it difficult to deal with ASEAN leaders who even voice ASEAN concerns. But these leaders, like former Thai foreign minister and ASEAN Secretary-General Surin Pitsuwan, were nothing compared to the new ASEAN secretary-general, Vietnamese Deputy Foreign Minister Le Luong Minh. Although he is a career diplomat and certainly can be suave and attentive, he is still a former Vietnamese official, and undoubtedly will bring with him some of the Vietnamese perspective toward China, which is quickly turning more acrid.¶ This year’s ASEAN chair is Brunei. Keeping to its tradition of rotating the chair every year, in 2013 ASEAN will be headed by Brunei. Although some might think Brunei’s leadership will be better for stability than the 2012 ASEAN leadership of Cambodia, perceived by many other ASEAN members as carrying China’s water, the fact that Brunei is just as much of a diplomatic minnow as Cambodia will mean there is no powerful wrangler in the chair’s seat to hammer out a common ASEAN perspective. Were Indonesia or Singapore the chair, the situation might be different.¶ India is playing a larger and larger role in the South China Sea, adding even more potential players to the mix, and more powerful navies. The recent warning by Beijing that India and Vietnam should not engage in joint exploration is only going to lead to a harsher Indian response, since Indian elites pay far more attention to —and are more easily aggrieved by— China than the reverse.¶ The more they look, the more likely they will find. As reported by the New York Times, “On Monday, China’s National Energy Administration named the South China Sea as the main offshore site for natural gas production. Within two years, China aims to produce 150 billion cubic meters of natural gas from fields in the sea, a significant increase from the 20 billion cubic meters produced so far, the agency said.” Although I do not think that the oil and gas potential in the Sea is the biggest driver of conflict, compared to its strategic value, the more China (and anyone else) explores for energy in the Sea, the more likely they will (eventually) come up with potential deposits that will only raise the stakes, if the forecasts of the Sea’s petroleum potential are to be believed.¶ A new Chinese leadership is unlikely to want to show any weakness. With the leadership of this generation even more split than in the past, following a contentious Party Congress, continued infighting among acolytes of the major Chinese leaders, and the Bo Xilai fiasco, the new leadership is in no position, with Party members and the general educated public, to give any room on a contentious issue like the South China Sea.¶ The Obama administration has passed its period of focusing on more effective dialogue and crisis mediation with China. Officials from the administration’s first term, who naturally had the highest hopes for better dialogue, are gone, with many of them leaving just as convinced as their Bush predecessors that real dialogue was difficult if not impossible. Don’t expect a second term to yield better results with such a dialogue.

**Territorial disputes snowball - causes nuclear conflict**

**Chakraborty 10**

(Tuhin Subhro Chakraborty, Research Associate at Rajiv Gandhi Institute for Contemporary Studies (RGICS), his primary area of work is centered on East Asia and International Relations. His recent work includes finding an alternative to the existing security dilemma in East Asia and the Pacific and Geo Political implications of the ‘Rise of China’. Prior to joining RGICS, he was associated with the Centre for Strategic Studies and Simulation, United Service Institution of India (USI) where he examined the role of India in securing Asia Pacific. He has coordinated conferences and workshops on United Nation Peacekeeping Visions and on China’s Quest for Global Dominance. He has written commentaries on issues relating to ASEAN, Asia Pacific Security Dilemma and US China relations. He also contributed in carrying out simulation exercise on the ‘Afghanistan Scenario’ for the Foreign Service Institute (FSI). Tuhin interned at the Indian Council of World Affairs (ICWA), Sapru House, wherein he worked on the Rise of People’s Liberation Army (PLA) military budget and its impact on India. He graduated from St. Stephen’s College, Delhi and thereafter he undertook his masters in East Asian Studies from University of Delhi. His areas of interest include China, India-Japan bilateral relations, ASEAN, Asia Pacific security dynamics and Nuclear Issues, The United States Service Institution of India, 2010, “The Initiation & Outlook of ASEAN Defence Ministers Meeting (ADMM) Plus Eight”, <http://www.usiofindia.org/Article/?pub=Strategic%20Perspective&pubno=20&ano=739>)

The first ASEAN Defence Ministers Meeting Plus Eight (China, India, Japan, South Korea, Australia, New Zealand, Russia and the USA) was held on the 12th of October. When this frame work of ADMM Plus Eight came into news for the first time it was seen as a development which could be the initiating step to a much needed security architecture in the Asia Pacific. Asia Pacific is fast emerging as the economic center of the world, consequently securing of vulnerable economic assets has becomes mandatory. The source of threat to economic assets is basically unconventional in nature like natural disasters, terrorism and maritime piracy. This coupled with the conventional security threats and **flashpoints** **based on territorial disputes** and political differences **are** very much a part of the region posing **a major security challenge.¶** As mentioned ADMM Plus Eight can be seen as the first initiative on such a large scale where the security concerns of the region can be discussed and areas of cooperation can be explored to keep the threats at bay. The defence ministers of the ten ASEAN nations and the eight extra regional countries (Plus Eight) during the meeting have committed to cooperation and dialogue to counter insecurity in the region. One of the major reasons for initiation of such a framework has been the new face of threat which is non-conventional and transnational which makes it very difficult for an actor to deal with it in isolation. Threats related to violent extremism, maritime security, vulnerability of SLOCs, transnational crimes have a direct and indirect bearing on the path of economic growth. Apart from this the existence of **territorial** **disputes** especially **on the maritime** **front** **plus** **the** issues related to political differences, **rise of China** and dispute on the Korean Peninsula **has aggravated the security dilemma** in the region **giving rise to** areas of **potential** **conflict**. This can be seen as a more of a conventional threat to the region.¶ The question here is that how far this ADMM Plus Eight can go to address the conventional security threats or is it an initiative which would be confined to meetings and passing resolution and playing second fiddle to the ASEAN summit. It is very important to realize that when one is talking about effective security architecture for the Asia Pacific one has to talk in terms of addressing the conventional issues like the **territorial** and political **disputes**. These issues **serve as bigger flashpoint which can snowball into** a major conflict which has the possibility of turning into a **nuclear conflict.**

#### US gets drawn in

Peimani ‘12

[Dr Hooman Peimani is head of the Energy Security Division and a principal fellow at the Energy Studies Institute, National University of Singapore. <http://www.scmp.com/comment/insight-opinion/article/1102286/indias-claim-south-china-sea-further-polarises-rows> ETB]

Any conflict between China, the Philippines and Vietnam over the disputed South China Sea islands would inevitably damage all three parties. That may well lead to intervention by an outsider, particularly the US, given its interests in the region. This would internationalise the dispute and legitimise a long-term US military presence in China's proximity, which Beijing has sought to avoid.¶ Within this context, any deployment of the Indian navy in the South China Sea in defence of its oil interests would also contribute to such "internationalisation" while increasing the possibility of naval clashes.¶ The ownership disputes are already having a polarising effect in the region, along pro-China and pro-US lines, and the Indian navy's announcement will only intensify this. And that can't be good news for Beijing, which has been trying to prevent the US from further upsetting the regional balance of power, which is already in Washington's favour.

**US-China war goes nuclear**

**Hunkovic 9**

Lee J. Hunkovic -- professor at American Military University, 09, [“The Chinese-Taiwanese Conflict Possible Futures of a Confrontation between China, Taiwan and the United States of America”, American Military University, p.54]

**A war between China**, Taiwan **and the U**nited **S**tates **has the potential to escalate into a nuclear conflict and a third world war**, therefore, **many countries other than the primary actors could be affected by such a conflict, including Japan, both Koreas, Russia, Australia, India and Great Britain,** if they were drawn into the war, as well as all other countries in the world that participate in the global economy, in which the United States and China are the two most dominant members. If China were able to successfully annex Taiwan, the possibility exists that they could then plan to attack Japan and begin a policy of aggressive expansionism in East and Southeast Asia, as well as the Pacific and even into India, which could in turn create an international standoff and deployment of military forces to contain the threat. In any case, **if China and the U**nited **S**tates **engage in** a full-scale **conflict, there are few countries** in the world **that will not be** economically and/or militarily **affected by it.** However, China, Taiwan and United States are the primary actors in this scenario, whose actions will determine its eventual outcome, therefore, other countries will not be considered in this study.

### Solvency

#### DoD acquisition of SMR’s ensures rapid military adoption and commercialization, and prevents unfavorable tech lock-in

**Andres and Breetz 11**

Richard Andres, 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 Breetz, doctoral candidate in the Department of Political Science at The Massachusetts Institute of Technology, Small Nuclear Reactorsfor Military Installations:Capabilities, Costs, andTechnological Implications, [www.ndu.edu/press/lib/pdf/StrForum/SF-262.pdf](http://www.ndu.edu/press/lib/pdf/StrForum/SF-262.pdf)

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 U**nited **S**tates; 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 [FOOTNOTE 29: **There are** numerous **actions that the Federal Government could take**, such as conducting or funding research and development, stimulating private investment, demonstrating technology, mandating adoption, and guaranteeing markets. **Military procurement** is thus only one option, but it has often **played a decisive role in technology development and is likely to be the catalyst for the U.S. small reactor industry.** See Vernon W. Ruttan, Is War Necessary for Economic Growth? (New York: Oxford University Press, 2006); Kira R. Fabrizio and David C. Mowery, “The Federal Role in Financing Major Inventions: Information Technology during the Postwar Period,” in Financing Innovation in the United States, 1870 to the Present, ed. Naomi R. Lamoreaux and Kenneth L. Sokoloff (Cambridge, MA: The MIT Press, 2007), 283–316.] 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, **M**assachusetts **I**nstitute of **T**echnology 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.** Domestic Nuclear Expertise. From the perspective of larger national security issues, **if DOD does not catalyze the small reactor industry, there is a risk that expertise in small reactors could become dominated by foreign companies**. A 2008 Defense Intelligence Agency report warned that the United States will become totally dependent on foreign governments for future commercial nuclear power unless the military acts as the prime mover to reinvigorate this critical energy technology with small, distributed power reactors.38 **Several of the most prominent small reactor concepts rely on technologies perfected at Federally funded laboratories and research programs**, including the Hyperion Power Module (Los Alamos National Laboratory), NuScale (DOE-sponsored research at Oregon State University), IRIS (initiated as a DOE-sponsored project), Small and Transportable Reactor (Lawrence Livermore National Laboratory), and Small, Sealed, Transportable, Autonomous Reactor (developed by a team including the Argonne, Lawrence Livermore, and Los Alamos National Laboratories). **However, there are scores of competing designs under development from over a dozen countries. If DOD does not act early to support the U.S. small reactor industry, there is a chance that the industry could be dominated by foreign companies**. Along with other negative consequences, **the decline of the U.S. nuclear industry decreases the NRC’s influence on the technology that supplies the world’s rapidly expanding demand for nuclear energy. Unless U.S. companies begin to retake global market share, in coming decades France, China, South Korea, and Russia will dictate standards on nuclear reactor reliability, performance, and proliferation resistance**.

**DoD key- avoids regulations**

Butler 11

Glen Butler, Lt. Col., 2011, Not Green Enough, [www.mca-marines.org/gazette/not-green-enough](http://www.mca-marines.org/gazette/not-green-enough)

**SMRs have relatively low plant cost**, can replace aging fossil plants, and do not emit greenhouse gasses. Some are as small as a “hot tub” and can be stored underground, dramatically increasing safety and security from terrorist threats.25 Encouragingly, in fiscal year 2010 (FY10) the **DoE allocated** $0 to **the U.S. SMR Program**; in FY11, they’ve requested $38.9 million. This **funding is to support** two main activities—**public/private partnerships to advance** SMR **designs and research** **and** development and **demonstrations**. According to the DoE’s website, one of the planned program accomplishments for FY11 is to “collaborate with the Department of Defense (DoD) . . . to assess the feasibility of SMR designs for energy resources at DoD installations.”26 The Marine Corps should vigorously seek the opportunity to be a DoD entity providing one platform for this feasibility assessment.27 Fourth, **SMR** technology **offers** the Marine Corps **a**nother **unique means to lead from the front**—not just of the other Services but also of **the Nation, and** even **the world**.28 **This** potential Pete Ellis **moment should be seized**. There are simple steps we could take, and others stand ready to lead if we are not.30 But **the temptation to “wait and see” and “let the others do it; then we’ll adopt it” mentality is not** always **best**. **Energy security demands boldness**, not timidity. To be fair, nuclear technology comes with challenges, of course, and with questions that have been kicked around for decades. An April 1990 Popular Science article asked, “Next Generation Nuclear Reactors—Dare we build them?” and included some of the same verbiage heard in similar discussions today.31 Compliance with National Environment Policy Act requirements necessitates lengthy and detailed preaction analyses, critical community support must be earned, and disposal challenges remain. Still, none of these hurdles are insurmountable. Yet despite the advances in safety, security, and efficiency in recent years, nuclear in the energy equation remains the new “n-word” for most military circles. And despite the fact that the FY10 National Defense Authorization Act called on the DoD to “conduct a study [of] the feasibility of nuclear plants on military installations,” the Office of the Secretary of Defense has yet to fund the study. Fifth**, the** **cumbersome, bureaucratic certification** **process** **of** **the** Nuclear Regulatory Commission (**NRC**), often **enough to scare away potential entrepreneurs and investors, is not** **necessarily** **a roadblock to success**. The NRC is “responsible for licensing and regulating the operation of commercial nuclear power plants in the United States.” **Military installations offer unique platforms that** could likely **bypass** an extended **certification** process. **With established expertise and a long safety record in nuclear reactor certification**, operations, training, and maintenance, the Naval Nuclear Propulsion Program comprises the civilian and military personnel who: . . . design, build, operate, maintain, and manage the nuclear-powered ships and the many facilities that support the U.S. nuclear-powered naval fleet.”34 **Bypassing the NRC and initiating SMR experimentation** under ADM Hyman Rickover’s legacy umbrella of naval reactors **could shorten the process to a reasonable level for** Marine and naval **installations**.35

#### They have the personnel and expertise

Robitaille 12

(George, Department of Army Civilian, United States Army War College, “Small Modular Reactors: The Army’s Secure Source of Energy?” 21-03-2012, Strategy Research Project)

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**.

**SMRs are cost-effective, safe, can be quickly deployed, and solve waste**

**Szondy 12**

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One way of getting around many of these problems is through the development of small modular reactors (**SMR**). These **are** reactors **capable of generating** about **300 megawatts** of power or less, **which is enough to run 45,000** US **homes**. Though small, SMRs are proper reactors. They are quite different from the radio-thermal generators (RTG) used in spacecraft and remote lighthouses in Siberia. Nuclear reactors such as **SMRs use controlled nuclear fission to generate power while RTGs use** natural **radioactive decay to power a** relatively simple **thermoelectric generator that can only produce**, at most, about **two kilowatts.¶** In terms of power, RTGs are the equivalent of batteries while small nuclear reactors are only "small" when compared to conventional reactors. They are hardly the sort that you would keep in the garage. In reality, SMR power plants would cover the area of a small shopping mall. Still, such an installation is not very large as power plants go and a reactor that only produces 300 megawatts may not seem worth the investment, but the US Department of Energy is offering US$452 million in matching grants to develop SMRs and private investors like the Bill Gates Foundation and the company of Babcock and Wilcox are putting up money for their own modular reactor projects.¶ The 60-year old breakthrough¶ **One reason for government and private industry to take an interest in SMRs is that they've** **been successfully employed for much longer than most people realize.** In fact, **hundreds have been steaming around the world inside** the hulls **of nuclear submarines and other warships for sixty years. They've also been used in merchant ships, icebreakers and as research and medical isotope reactors** at universities. There was even one installed in the Antarctic at McMurdo Station from 1962 to 1972. Now they're being considered for domestic use.¶ The case for SMRs¶ SMRs have a number of advantages over conventional reactors. For one thing, **SMRs are cheaper to construct and run.** This makes them very attractive to poorer, energy-starved countries; small, growing communities that don't require a full-scale plant; and remote locations such as mines or desalination plants. Part of the reason for this is simply that the reactors are smaller. Another is that, not needing to be custom designed in each case, the **reactors can be standardized and some types built in factories that are able to employ economies of scale.** The factory-built aspect is also important because **a factory is more efficient than on-site construction by as much as eight to one in terms of building time.** **Factory construction also allows SMRs to be built, delivered to the site, and then returned to the factory for dismantling** at the end of their service lives - **eliminating a major problem with old** conventional **reactors, i.e. how to dispose of them.¶** **SMRs** also **enjoy** a good deal of **design flexibility. Conventional reactors are** usually **cooled by water** - a great deal of water - **which means that the reactors need to be situated near rivers or coastlines. SMRs**, on the other hand, **can be cooled by air, gas, low-melting point metals or salt.** This means that **SMRs can be placed in remote**, inland **areas** where it isn't possible to site conventional reactors.¶ Safety¶ This cooling system is often passive. In other words, it relies more on the natural circulation of the cooling medium within the reactor's containment flask than on pumps. This passive cooling is one of the ways that **SMRs can improve safety**. Because modular reactors are smaller than conventional ones, **they contain less fuel**. This means that **there's less of a mass to be affected if an accident occurs.** If one does happen, **there's less radioactive material that can be released** into the environment and makes it easier to design emergency systems. Since they are smaller and use less fuel, **they are easier to cool effectively, which** greatly **reduces the likelihood of a catastrophic accident or meltdown** in the first place.¶ This also means that **accidents proceed much slower in modular reactors** than in conventional ones. **Where the latter need accident responses in** a matter of hours or **minutes**, **SMRs can be responded to in** hours or **days**, which reduces the chances of an accident resulting in major damage to the reactor elements.¶ **The SMR designs that reject water cooling in favor of gas, metal or salt have their own safety advantages**. Unlike water-cooled reactors, **these media operate at a lower pressure.** **One of the hazards of water cooling is that a cracked pipe or a damaged seal can blow radioactive gases out** like anti-freeze out of an overheated car radiator**. With low-pressure media, there's less force to push gases out and there's less stress placed on the containment vessel. It** also **eliminates one of the** frightening **episodes of the Fukushima accident where the water in the vessel broke down into hydrogen and oxygen and then exploded.¶** Another advantage of modular design is that some **SMRs are small enough to be installed below ground.** That is cheaper, faster to construct and less invasive than building a reinforced concrete containment dome. There is also the point that **putting a reactor in the ground makes it less vulnerable to earthquakes. Underground installations make modular reactors easier to secure and install** in a much smaller footprint. **This makes SMRs particularly attractive to military customers who need to build power plants for bases quickly.** **Underground installation also enhances security** with fewer sophisticated systems needed, which also helps bring down costs.¶ **SMRs can help with proliferation, nuclear waste and fuel supply issues because, while some modular reactors are based on conventional pressurized water reactors and burn enhanced uranium, others use less conventional fuels. Some**, for example, can **generate power from** what is now regarded as "**waste", burning depleted uranium and plutonium left over** from conventional reactors. **Depleted uranium is** basically U-238 from which the fissible U-235 has been consumed. It's also much **more abundant** in nature than U-235, **which has the potential of providing the world with energy for thousands of years. Other reactor design**s don't even use uranium. Instead, they **use thorium**. This fuel is also incredibly abundant, is easy to process for use as fuel and has the added bonus of being utterly useless for making weapons, so it can provide power even to areas where security concerns have been raised.¶ But there's still the sticking point that modular reactors are, by definition, small. That may be fine for a submarine or the South Pole, but what about places that need more? Is the alternative conventional nuclear plants? It turns out that the answer is no. **Modular reactors don't need to be used singly. They can be set up in batteries of five or six** or even more, **providing as much power as an area needs.** And if one unit needs to be taken off line for repairs or even replacement, it needn't interfere with the operation of the others.

**Nuclear power is inevitable**

IAEA applications

Middle class

Population growth

Urbanization

Warming

Desal

**Ebinger and Squassoni 11**

Charles K Ebinger and Sharon Squassoni 11, Charles is senior fellow and director of the Energy Security Initiative at the Brookings Institution, Sharon is senior fellow and director of the Proliferation Prevention Program at the Center for Strategic and International Studies, “Industry and Emerging Nuclear Energy Markets” in “Business and Nonproliferation”, googlebooks

As mentioned previously, **a notable feature of the nuclear renaissance is the widespread interest in nuclear power, especially in countries without a commercial nuclear infrastructure. According to the** International Atomic Energy Agency (**IAEA**), at least **sixty-five countries have expressed** such **interest**, most from outside the industrialized economies of the Organization of Economic Cooperation and Development (OECD), the main locus of nuclear power capacity at present. **Most of the capacity growth up to 2030 is expected to occur in the Middle East, South Asia, Southeast Asia, and the Far East**. As part of this growth, **eleven developing countries are serious candidates for first reactors**, although progress in carrying out their plans varies widely (see table 4-1). **These countries are drawing new suppliers into the nuclear market** (notably China, India, and South Korea) **and sparking activity among existing suppliers** such as Russia and Japan. Overall, however, many countries will not be able to follow through on growth plans owing to cost, limited grid capacity, and perhaps public resistance. **Countries are moving toward nuclear energy**, not the mention other sources of primary fuel, in large part **because of mounting demand: between 2008 and 2035 global electricity consumption is expected to increase 80 percent, and 80 percent of that growth will take place in non-OECD countries**. **Underlying this large increase in electricity demand are population growth, urbanization, concerns about CO2 emissions from fossil fuel combustion, energy security, and pressure from a growing middle class for goods and services using or produced by electricity**. **Over this period, global population will rise from 6.7 billion to 8.5 billion, with 7.2 billion of the total living in non-OECD countries**. **Most of this increase will take place in China, India, and the Middle East**, with the balance in the rest of the developing world, while the share of the global population in the OECD and Russia will decline. Today nearly 1.4 billion people have no electricity, a figure that may well increase with further population growth, despite movement into the modern energy economy. **Urbanization will undoubtedly push demand up as well**. For the first time in history, a majority of the world’s population is living in urban areas, a trend likely to continue, especially in developing countries. **With the movement of hundreds of millions of people from rural areas to cities, more communities will turn from traditional** and often free **fuels** (wood, forest residues, agricultural wastes, bagasse, and dung) **to modern fuels such as electricity, natural gas, and petroleum products**. **The dramatic growth of the middle class in a number of emerging market nations is also having a large impact on energy consumption. The World Bank predicts that by 2030 the middle class in these nations will jump to 1.2 billion from 430 million in 2000**. It is estimated that in India alone, a country that before Fukushima was developing plans for nuclear power, the number of households with an annual disposal income of $5,000-$15,000 will increase from 36 percent of the population in 2010 to more than 58 percent by 2020. **Climate change**, too, **will have some of its largest impact in developing countries**, which, according to the International Energy Agency (IEA), will be responsible for nearly all of the projected global increase in CO2 emissions by 2035. In large part, the cause of this rise is coal-fired power in China and India. **The urgency of finding alternatives to coal is recognized by** others as well, including **Indonesia, Pakistan, Poland, South Africa, and Russia**. Compared with developed countries, developing nations rely far more on imported fossil fuels, especially oil, to generate power. When the price of oil on the world market rose to $147 a barrel in 2008, it became clear that dependence on imported fossil fuels for electricity generation can destroy a nation’s economy and that fuel diversification is vital for energy security. As prices climbed beyond $100 a barrel, Jordan, a country committed to introducing civilian nuclear energy, was particularly hard hit: 99 percent of its electricity is generated from either oil or gas, 96 percent of which is imported. **Developing countries also see nuclear energy as a possible source of power for desalination plants, especially in the** Gulf Cooperation Council (**GCC**) **countries and elsewhere in the Middle East**. **As the demand for freshwater supplies increases** – along with the emphasis on limited the use of fossil fuels to generates electricity because of the impact of emissions, price volatility, and supply disruptions – **the nuclear option will be considered even more viable**. Moreover, some **countries with large resources of oil or gas**, **such as the** United Arab Emirates (**UAE**) **and Saudi Arabia**, **are hoping nuclear power will help reduce their domestic use of these fuels in generating power and will boost the financial benefits of exporting them**. **For some developing countries, status and geopolitics are undoubtedly important factors in considering the development or expansion of a civilian nuclear energy program**. **In the view of Turkey’s energy minister** Hilmi Guler, for instance, **nuclear technology is a requirement for a seat at the table with the ten most developed countries in the world**.

**Natural gas isn’t a solvency take out**

**Lamonica 12**

Martin Lamonica is a senior writer covering green tech and cutting-edge technologies [August 9, 2012, “A Glut of Natural Gas Leaves Nuclear Power Stalled,” http://www.technologyreview.com/news/428737/a-glut-of-natural-gas-leaves-nuclear-power/]

**Outside the U**nited **S**tates, it's a different story. Unconventional sources of **natural gas also threaten the expansion of nuclear, although the potential impact is less clear-cut. Around the world, there are 70 plants now under construction, but shale gas also looms as a key factor in planning for the future. Prices for natural gas are already higher in Asia and Europe, and shale gas resources are not as fully developed as they are the U**nited **S**tates.¶ **Some countries are** also **blocking the development of** new **natural gas resources**. France, for instance, which has a strong commitment to nuclear, has banned fracking in shale gas exploration because of concerns over the environmental impact.¶ Fast-growing **China, meanwhile, needs all the energy sources available and is building nuclear power plants as fast as possible**.¶ **Even in** **U**nited **S**tates, of course, **super cheap natural gas will not last forever.** **With supply exceeding demand, some drillers are said to be losing money on natural gas, which could push prices back up.** **Prices will also be pushed upward by utilities, as they come to rely on more natural gas for power generation**, says James.¶ Ali **Azad, the chief business development officer at** energy company **Babcock & Wilcox, thinks the answer is making nuclear power smaller**, cheaper, and faster. His is one of a handful of companies developing **s**mall **m**odular **r**eactor**s** that **can be built in three years, rather than 10 or more, for a fraction of the cost of gigawatt-size reactors.** Although this technology is not yet commercially proven, the company has a customer in the Tennessee Valley Authority, which expects to have its first unit online in 2021 (see "A Preassembled Nuclear Reactor").¶ "When we arrive, **we will have a level cost of energy on the grid, which competes** favorably **with a brand-new combined-cycle natural gas plants** when gas prices are between $6 to $8," said Azad. **He sees strong demand in power-hungry China and places such as Saudia Arabia, where power is needed for desalination.¶ Even if natural gas remains cheaper, utilities don't want to find themselves with an overreliance on gas, which has been volatile on price in the past, so nuclear power will still contribute to the energy mix.** "[**Utilities**] **still continue** [**with nuclear**] **but with a lower level of enthusiasm—it's a hedging strategy," says** Hans-Holger **Rogner from** the Planning and Economics Studies section of **the I**nternational **A**tomic **E**nergy **A**gency. "**They don't want to pull all their eggs in one basket** because of the new kid on the block called shale gas."¶