# 1AC

## 1AC adv

Contention one is warming—

#### Warming is real and anthropogenic–best climate data and models

Mueller 12

(The New York Times, Richard A. Mueller, July 28, 2012, “The Conversion of a Climate Change Skeptic” Richard A. Muller, a professor of physics at the University of California, Berkeley, and a former MacArthur Foundation fellow, is the author, most recently, of “Energy for Future Presidents: The Science Behind the Headlines.” <http://www.nytimes.com/2012/07/30/opinion/the-conversion-of-a-climate-change-skeptic.html?_r=1&pagewanted=all>)

CALL me a converted skeptic. Three years ago I identified problems in previous climate studies that, in my mind, threw doubt on the very existence of global warming. Last year, following an intensive research effort involving a dozen scientists, I concluded that global warming was real and that the prior estimates of the rate of warming were correct. I’m now going a step further: Humans are almost entirely the cause. My total turnaround, in such a short time, is the result of careful and objective analysis by the Berkeley Earth Surface Temperature project, which I founded with my daughter Elizabeth. Our results show that the average temperature of the earth’s land has risen by two and a half degrees Fahrenheit over the past 250 years, including an increase of one and a half degrees over the most recent 50 years. Moreover, it appears likely that essentially all of this increase results from the human emission of greenhouse gases. These findings are stronger than those of the Intergovernmental Panel on Climate Change, the United Nations group that defines the scientific and diplomatic consensus on global warming. In its 2007 report, the I.P.C.C. concluded only that most of the warming of the prior 50 years could be attributed to humans. It was possible, according to the I.P.C.C. consensus statement, that the warming before 1956 could be because of changes in solar activity, and that even a substantial part of the more recent warming could be natural. Our Berkeley Earth approach used sophisticated statistical methods developed largely by our lead scientist, Robert Rohde, which allowed us to determine earth land temperature much further back in time. We carefully studied issues raised by skeptics: biases from urban heating (we duplicated our results using rural data alone), from data selection (prior groups selected fewer than 20 percent of the available temperature stations; we used virtually 100 percent), from poor station quality (we separately analyzed good stations and poor ones) and from human intervention and data adjustment (our work is completely automated and hands-off). In our papers we demonstrate that none of these potentially troublesome effects unduly biased our conclusions. The historic temperature pattern we observed has abrupt dips that match the emissions of known explosive volcanic eruptions; the particulates from such events reflect sunlight, make for beautiful sunsets and cool the earth’s surface for a few years. There are small, rapid variations attributable to El Niño and other ocean currents such as the Gulf Stream; because of such oscillations, the “flattening” of the recent temperature rise that some people claim is not, in our view, statistically significant. What has caused the gradual but systematic rise of two and a half degrees? We tried fitting the shape to simple math functions (exponentials, polynomials), to solar activity and even to rising functions like world population. By far the best match was to the record of atmospheric carbon dioxide, measured from atmospheric samples and air trapped in polar ice. Just as important, our record is long enough that we could search for the fingerprint of solar variability, based on the historical record of sunspots. That fingerprint is absent. Although the I.P.C.C. allowed for the possibility that variations in sunlight could have ended the “Little Ice Age,” a period of cooling from the 14th century to about 1850, our data argues strongly that the temperature rise of the past 250 years cannot be attributed to solar changes. This conclusion is, in retrospect, not too surprising; we’ve learned from satellite measurements that solar activity changes the brightness of the sun very little. How definite is the attribution to humans? The carbon dioxide curve gives a better match than anything else we’ve tried. Its magnitude is consistent with the calculated greenhouse effect — extra warming from trapped heat radiation. These facts don’t prove causality and they shouldn’t end skepticism, but they raise the bar: to be considered seriously, an alternative explanation must match the data at least as well as carbon dioxide does. Adding methane, a second greenhouse gas, to our analysis doesn’t change the results. Moreover, our analysis does not depend on large, complex global climate models, the huge computer programs that are notorious for their hidden assumptions and adjustable parameters. Our result is based simply on the close agreement between the shape of the observed temperature rise and the known greenhouse gas increase.

#### It’s not too late—emissions reductions can avoid and delay catastrophic impacts.

Chestney 1/13/13

Nina, senior environmental correspondent, “Climate Change Study: Emissions Limits Could Avoid Damage By Two-Thirds,” <http://www.huffingtonpost.com/2013/01/13/climate-change-study-emissions-limits_n_2467995.html>, AM

The world could avoid much of the damaging effects of climate change this century if greenhouse gas emissions are curbed more sharply, research showed on Sunday. The study, published in the journal Nature Climate Change, is the first comprehensive assessment of the benefits of cutting emissions to keep the global temperature rise to within 2 degrees Celsius by 2100, a level which scientists say would avoid the worst effects of climate change. It found 20 to 65 percent of the adverse impacts by the end of this century could be avoided. "Our research clearly identifies the benefits of reducing greenhouse gas emissions - less severe impacts on flooding and crops are two areas of particular benefit," said Nigel Arnell, director of the University of Reading's Walker Institute, which led the study. In 2010, governments agreed to curb emissions to keep temperatures from rising above 2 degrees C, but current emissions reduction targets are on track to lead to a temperature rise of 4 degrees or more by 2100. The World Bank has warned more extreme weather will become the "new normal" if global temperature rises by 4 degrees. Extreme heatwaves could devastate areas from the Middle East to the United States, while sea levels could rise by up to 91 cm (3 feet), flooding cities in countries such as Vietnam and Bangladesh, the bank has said. The latest research involved scientists from British institutions including the University of Reading, the Met Office Hadley Centre and the Tyndall Centre for Climate Change, as well as Germany's Potsdam Institute for Climate Impact Research. It examined a range of emissions-cut scenarios and their impact on factors including flooding, drought, water availability and crop productivity. The strictest scenario kept global temperature rise to 2 degrees C with emissions peaking in 2016 and declining by 5 percent a year to 2050. FLOODING Adverse effects such as declining crop productivity and exposure to river flooding could be reduced by 40 to 65 percent by 2100 if warming is limited to 2 degrees, the study said. Global average sea level rise could be reduced to 30cm (12 inches) by 2100, compared to 47-55cm (18-22 inches) if no action to cut emissions is taken, it said. Some adverse climate impacts could also be delayed by many decades. The global productivity of spring wheat could drop by 20 percent by the 2050s, but the fall in yield could be delayed until 2100 if strict emissions curbs were enforced. "Reducing greenhouse gas emissions won't avoid the impacts of climate change altogether of course, but our research shows it will buy time **to** make things like buildings, transport systems and agriculture more resilient to climate change," Arnell said.

#### Extinction

Brandenberg 99 (John & Monica Paxson, Visiting Prof. Researcher @ Florida Space Institute, Physicist Ph.D., Science Writer, Dead Mars Dying Earth, Pg 232-233)

The ozone hole expands, driven by a monstrous synergy with global warming that puts more catalytic ice crystals into the stratosphere, but this affects the far north and south and not the major nations’ heartlands. The seas rise, the tropics roast but the media networks no longer cover it. The Amazon rainforest becomes the Amazon desert. Oxygen levels fall, but profits rise for those who can provide it in bottles. An equatorial high-pressure zone forms, forcing drought in central Africa and Brazil, the Nile dries up and the monsoons fail. Then inevitably, at some unlucky point in time, a major unexpected event occurs—a major volcanic eruption, a sudden and dramatic shift in ocean circulation or a large asteroid impact (those who think freakish accidents do not occur have paid little attention to life or Mars), or a **nuclear war** that starts between Pakistan and India and escalates to involve China and Russia . . . Suddenly the gradual climb in global temperatures goes on a mad excursion as the oceans warm and release large amounts of dissolved carbon dioxide from their lower depths into the atmosphere. Oxygen levels go down precipitously as oxygen replaces lost oceanic carbon dioxide. Asthma cases double and then double again. Now a third of the world fears breathing. As the oceans dump carbon dioxide, the greenhouse effect increases, which further warms the oceans, causing them to dump even more carbon. Because of the heat, plants die and burn in enormous fires, which release more carbon dioxide, and the oceans evaporate, adding more water vapor to the greenhouse. Soon, we are in what is termed a runaway greenhouse effect, as happened to Venus eons ago. The last two surviving scientists inevitably argue, one telling the other, “See! I told you the missing sink was in the ocean!” Earth, as we know it, dies. After this Venusian excursion in temperatures, the oxygen disappears into the soil, the oceans evaporate and are lost and the dead Earth loses its ozone layer completely. Earth is too far from the Sun for it to be the second Venus for long. Its atmosphere is slowly lost—as is its water—because of ultraviolet bombardment breaking up all the molecules apart from carbon dioxide. As the atmosphere becomes thin, the Earth becomes colder. For a short while temperatures are nearly normal, but the ultraviolet **sears any life** that tries to make a comeback. The carbon dioxide thins out to form a thin veneer with a few wispy clouds and dust devils. Earth becomes the second Mars—red, **desolate, with** perhaps a **few** hardy microbes surviving.

#### Warming causes hydrogen sulfide poisoning—extinction.

Ward 10

(Peter, PhD, professor of Biology and Earth and Space Sciences at the University of Washington, paleontologist and NASA astrobiologist, Fellow at the California Academy of Sciences, The Flooded Earth: Our Future in a World Without Ice Caps, June 29, 2010)

In the rest of this chapter I will support a contention that within several millennia (or less) the planet will see a changeover of the oceans from their current “mixed” states to something much different and dire. Oceans will become stratified by their oxygen content and temperature, with warm, oxygen-free water lining the ocean basins. **Stratified oceans** like this in the past (and they were present for most of Earth’s history) **have always been preludes to biotic catastrophe**. Because the continents were in such different positions at that time, models we use today to understand ocean current systems are still crude when it comes to analyzing the ancient oceans, such as those of the Devonian or Permian Periods. Both times witnessed major mass extinctions, and these extinctions were somehow tied to events in the sea. Yet catastrophic as it was, the event that turned the Canning Coral Reef of Devonian age into the Canning Microbial Reef featured at the start of this chapter was tame compared to that ending the 300 million- to 251 million-year-old Permian Period, and for this reason alone the Permian ocean and its fate have been far more studied than the Devonian. But there is another reason to concentrate on the Permian mass extinction: it took place on a world with a climate more similar to that of today than anytime in the Devonian. Even more important, it was a world with ice sheets at the poles, something the more tropical Devonian Period may never have witnessed. For much of the Permian Period, the Earth, as it does today, had abundant ice caps at both poles, and there were large-scale continental glaciations up until at least 270 million years ago, and perhaps even later.4 But from then until the end of the Permian, the planet rapidly warmed, the ice caps disappeared, and the deep ocean bottoms filled with great volumes of warm, virtually oxygen-free seawater. The trigger for disaster was a short-term but massive infusion of carbon dioxide and other greenhouse gases into the atmosphere at the end of the Permian from the spectacular lava outpourings over an appreciable portion of what would become northern Asia. The lava, now ancient but still in place, is called the “Siberian Traps,” the latter term coming from the Scandinavian for lava flows. The great volcanic event was but the start of things, and led to changes in oceanography. The ultimate kill mechanism seems to have been a lethal combination of rising temperature, diminishing oxygen, and influx into water and air of the highly poisonous compound hydrogen sulfide. The cruel irony is that this latter poison was itself produced by life, not by the volcanoes. The bottom line is that life produced the ultimate killer in this and surely other ancient mass extinctions. This finding was one that spurred me to propose the Medea Hypothesis, and a book of the same name.5 **Hydrogen sulfide poisoning might indeed be the worst biological effect of global warming**. There is no reason that such an event cannot happen again, given short-term global warming. And because of the way the sun ages, it may be that **such events will be ever easier to start** than during the deep past. How does the sun get involved in such nasty business as mass extinction? Unlike a campfire that burns down to embers, any star gets ever hotter when it is on the “main sequence,” which is simply a term used to described the normal aging of a star—something like the progression we all go through as we age. But new work by Jeff Kiehl of the University of Colorado shows that because the sun keeps getting brighter, amounts of CO2 that in the past would not have triggered the process result in stagnant oceans filled with H2S-producing microbes. His novel approach was to estimate the global temperature rise to be expected from carbon dioxide levels added to the energy hitting the earth from the sun. Too often we refer to the greenhouse effect as simply a product of the gases. But it is sunlight that actually produces the heat, and that amount of energy hitting the earth keeps increasing. He then compared those to past times of mass extinctions. The surprise is that a CO2 level of 1,000 ppm would—with our current solar radiation—make our world the second hottest in Earth history—**when the five hottest were each associated with mass extinction**. In the deep history of our planet, there have been at least five short intervals in which the majority of living species suddenly went extinct. Biologists are used to thinking about how environmental pressures slowly choose the organisms most fit for survival through natural selection, shaping life on Earth like an artist sculpting clay. However, mass extinctions are drastic examples of natural selection at its most ruthless, killing vast numbers of species at one time in a way hardly typical of evolution. In the 1980s, Nobel Prize-winning physicist Luis Alvarez, and his son Walter Alvarez, first hypothesized that the impact of comets or asteroids caused the mass extinctions of the past.6 Most scientists slowly come to accept this theory of extinction, further supported by the discovery of a great scar in the earth—an impact crater—off the coast of Mexico that dates to around the time the dinosaurs went extinct. An asteroid probably did kill off the dinosaurs, but the causes of the remaining four mass extinctions are still obscured beneath the accumulated effects of hundreds of millions of years, and no one has found any credible evidence of impact craters. Rather than comets and asteroids, it now appears that short-term **global warming was the culprit for the four other mass extinctions**. I detailed the workings of these extinctions first in a 1996 Discover magazine article,7 then in an October 2006 Scientific American article, and finally in my 2007 book, Under a Green Sky.8 In each I considered whether such events could happen again. In my mind, such extinctions constitute the worst that could happen to life and the earth as a result of short-term global warming. But before we get to that, let us look at the workings of these past events. The evidence at hand links the mass extinctions with a changeover in the ocean from oxygenated to anoxic bottom waters. The source of this was a change in where bottom waters are formed. It appears that in such events, the source of our earth’s deep water shifted from the high latitudes to lower latitudes, and the kind of water making it to the ocean bottoms was different as well: it changed from cold, oxygenated water to warm water containing less oxygen. The result was the extinction of deep-water organisms. Thus a greenhouse extinction is a product of a changeover of the conveyor-belt current systems found on Earth any time there is a marked difference in temperatures between the tropics and the polar regions. Let us summarize the steps that make greenhouse extinction happen. First, the world warms over short intervals due to a sudden increase in carbon dioxide and methane, caused initially by the formation of vast volcanic provinces called flood basalts. The warmer world affects the ocean circulation systems and disrupts the position of the conveyor currents. Bottom waters begin to have warm, low-oxygen water dumped into them. The warming continues, and the decrease of equator-to-pole temperature differences brings ocean winds and surface currents to a near standstill. The mixing of oxygenated surface waters with the deeper and volumetrically increasing low-oxygen bottom waters lessens, causing ever-shallower water to change from oxygenated to anoxic. Finally, the bottom water exists in depths where light can penetrate, and the combination of low oxygen and light allows green sulfur bacteria to expand in numbers, filling the low-oxygen shallows. The bacteria produce toxic amounts of H2S, with the flux of this gas into the atmosphere occurring at as much as 2,000 times today’s rates. The gas rises into the high atmosphere, **where it breaks down the ozone layer**. The subsequent increase in ultraviolet radiation from the sun kills much of the photosynthetic green plant phytoplankton. On its way up into the sky, the hydrogen sulfide also kills some plant and animal life, and the combination of high heat and hydrogen sulfide **creates a mass extinction on land**.9 Could this happen again? No, says one of the experts who write the RealClimate.org Web site, Gavin Schmidt, who, it turns out, works under Jim Hansen at the NASA Goddard Space Flight Center near Washington, DC. I disagreed and challenged him to an online debate. He refused, saying that the environmental situation is going to be bad enough without resorting to creating a scenario for mass extinction. But special pleading has no place in science. Could it be that global warming could lead to the extinction of humanity? That prospect cannot be discounted. To pursue this question, let us look at what might be the most crucial of all systems maintaining habitability on Planet Earth: the thermohaline current systems, sometimes called the conveyor currents.

#### It acidifies the oceans—extinction

Romm ‘9

(Joe, a Fellow at American Progress and is the editor of Climate Progress, which New York Times columnist Tom Friedman called "the indispensable blog" and Time magazine named one of the 25 “Best Blogs of 2010.″ In 2009, Rolling Stone put Romm #88 on its list of 100 “people who are reinventing America.” Time named him a “Hero of the Environment″ and “The Web’s most influential climate-change blogger.” Romm was acting assistant secretary of energy for energy efficiency and renewable energy in 1997, where he oversaw $1 billion in R&D, demonstration, and deployment of low-carbon technology. He is a Senior Fellow at American Progress and holds a Ph.D. in physics from MIT, “Imagine a World without Fish: Deadly ocean acidification — hard to deny, harder to geo-engineer, but not hard to stop — is subject of documentary ,” http://thinkprogress.org/romm/2009/09/02/204589/a-sea-change-imagine-a-world-without-fish-ocean-acidification-film/, AM)

Global warming is “capable of wrecking the marine ecosystem and depriving future generations of the harvest of the seas” (see Ocean dead zones to expand, “remain for thousands of years”). A post on ocean acidification from the new Conservation Law Foundation blog has brought to my attention that the first documentary on the subject, *A Sea Change:* Imagine a World without Fish, is coming out. Ocean acidification must be a core climate message, since it **is** hard to deny and **impervious** **to** the delusion that **geoengineering** is the silver bullet. Indeed, a major 2009 study GRL study, “Sensitivity of ocean acidification to geoengineered climate stabilization” (subs. req’d), concluded: The results of this paper support the view that climate engineering will not resolve the problem of ocean acidification, and that therefore deep and rapid cuts in CO2 emissions are likely to be the most effective strategy to avoid environmental damage from future ocean acidification. If you want to understand ocean acidification better, see this BBC story, which explains: **Man-made pollution is raising ocean acidity at least 10 times faster than previously thought**, a study says. Or see this *Science* magazine study, “Evidence for Upwelling of Corrosive “Acidified” Water onto the Continental Shelf” (subs. req’), which found Our results show for the first time that a large section of the North American continental shelf is impacted by ocean acidification. Other continental shelf regions may also be impacted where anthropogenic CO2-enriched water is being upwelled onto the shelf. Or listen to the Australia’s ARC Centre of Excellence for Coral Reef Studies, which warns: The world’s oceans are becoming more acid, with potentially devastating consequences for corals and the marine organisms that build reefs and provide much of the Earth’s breathable oxygen. The acidity is caused by the gradual buildup of carbon dioxide (CO2) in the atmosphere, dissolving into the oceans. Scientists fear it could be lethal for animals with chalky skeletons which make up more than a third of the planet’s marine life”¦. Corals and plankton with chalky skeletons are at the base of the marine food web. They rely on sea water saturated with calcium carbonate to form their skeletons. However, as acidity intensifies, the saturation declines, making it harder for the animals to form their skeletal structures (calcify). “Analysis of coral cores shows a steady drop in calcification over the last 20 years,” says Professor Ove Hoegh-Guldberg of CoECRS and the University of Queensland. “There’s not much debate about how it happens: put more CO2 into the air above and it dissolves into the oceans. “When CO2 levels in the atmosphere reach about 500 parts per million, you put calcification out of business in the oceans.” (Atmospheric CO2 levels are presently 385 ppm, up from 305 in 1960.) I’d like to see an analysis of what happens when you get to 850 to 1000+ ppm because that is where we’re headed (see U.S. media largely ignores latest warning from climate scientists: “Recent observations confirm “¦ the worst-case IPCC scenario trajectories (or even worse) are being realised” “” 1000 ppm). The CLF post notes: Dr. Jane Lubchenco, Administrator of the National Oceanic and Atmospheric Administration (NOAA) warns that an acidic ocean is the “equally evil twin” of climate change. Scott Doney, a senior scientist at the Woods Hole Oceanographic Institution noted in a public presentation that “New England is the most vulnerable region in the country to ocean acidification.” In June, dozens of Academies of Science, including ours and China’s, issued a joint statement on ocean acidification, warned “Marine food supplies are likely to be reduced with significant implications for food production and security in regions dependent on fish protein, and human health and wellbeing” and “Ocean acidification is irreversible on timescales of **at least** tens of thousands of years.” They conclude: Ocean acidification is a direct consequence of increasing atmospheric CO2 concentrations. To avoid substantial damage to ocean ecosystems, deep and rapid reductions of global CO2 emissions by at least 50% by 2050, and much more thereafter are needed. We, the academies of science working through the InterAcademy Panel on International Issues (IAP), call on world leaders to: “¢ Acknowledge that ocean acidification is a direct and real consequence of increasing atmospheric CO2 concentrations, is already having an effect at current concentrations, and is likely to cause **grave harm to important marine ecosystems as CO2 concentrations reach 450 ppm and above;** “¢ Recognise that reducing the build up of CO2 in the atmosphere is the only practicable solution to mitigating ocean acidification; “¢ Within the context of the UNFCCC negotiations in the run up to Copenhagen 2009, recognise the direct threats posed by increasing atmospheric CO2 emissions to the oceans and therefore society, and take action to mitigate this threat; “¢ Implement action to reduce global CO2 emissions by at least 50% of 1990 levels by 2050 and continue to reduce them thereafter. If we want to save life in the oceans “” **and save ourselves**, since we depend on that life “” the time to start slashing carbon dioxide emissions is now.

#### SMR-based nuclear power is safe and solves warming

Shellenberger 12

(Michael, founder of the Breakthrough Institute, graduate of Earlham College and holds a masters degree in cultural anthropology from the University of California, Santa Cruz, "New Nukes: Why We Need Radical Innovation to Make New Nuclear Energy Cheap", September 11, http://thebreakthrough.org/index.php/programs/energy-and-climate/new-nukes/)

Arguably, the biggest impact of Fukushima on the nuclear debate, ironically, has been to force a growing number of pro-nuclear environmentalists out of the closet, including us. The reaction to the accident by anti-nuclear campaigners and many Western publics put a fine point on the gross misperception of risk that informs so much anti-nuclear fear. Nuclear remains the only proven technology capable of reliably generating zero-carbon energy at a scale that can have any impact on global warming. Climate change -- and, for that matter, the enormous present-day health risks associated with burning coal, oil, and gas -- simply dwarf any legitimate risk associated with the operation of nuclear power plants. About 100,000 people die every year due to exposure to air pollutants from the burning of coal. By contrast, about 4,000 people have died from nuclear energy -- ever -- almost entirely due to Chernobyl. But rather than simply lecturing our fellow environmentalists about their misplaced priorities, and how profoundly inadequate present-day renewables are as substitutes for fossil energy, we would do better to take seriously the real obstacles standing in the way of a serious nuclear renaissance. Many of these obstacles have nothing to do with the fear-mongering of the anti-nuclear movement or, for that matter, the regulatory hurdles imposed by the U.S. Nuclear Regulatory Commission and similar agencies around the world. As long as nuclear technology is characterized by enormous upfront capital costs, it is likely to remain just a hedge against overdependence on lower-cost coal and gas, not the wholesale replacement it needs to be to make a serious dent in climate change. Developing countries need large plants capable of bringing large amounts of new power to their fast-growing economies. But they also need power to be cheap. So long as coal remains the cheapest source of electricity in the developing world, it is likely to remain king. The most worrying threat to the future of nuclear isn't the political fallout from Fukushima -- it's economic reality. Even as new nuclear plants are built in the developing world, old plants are being retired in the developed world. For example, Germany's plan to phase-out nuclear simply relies on allowing existing plants to be shut down when they reach the ends of their lifetime. Given the size and cost of new conventional plants today, those plants are unlikely to be replaced with new ones. As such, the combined political and economic constraints associated with current nuclear energy technologies mean that nuclear energy's share of global energy generation is unlikely to grow in the coming decades, as global energy demand is likely to increase faster than new plants can be deployed. To move the needle on nuclear energy to the point that it might actually be capable of displacing fossil fuels, we'll need new nuclear technologies that are cheaper and smaller. Today, there are a range of nascent, smaller nuclear power plant designs, some of them modifications of the current light-water reactor technologies used on submarines, and others, like thorium fuel and fast breeder reactors, which are based on entirely different nuclear fission technologies. Smaller, modular reactors can be built much faster and cheaper than traditional large-scale nuclear power plants. Next-generation nuclear reactors are designed to be incapable of melting down, produce drastically less radioactive waste, make it very difficult or impossible to produce weapons grade material, use less water, and require less maintenance. Most of these designs still face substantial technical hurdles before they will be ready for commercial demonstration. That means a great deal of research and innovation will be necessary to make these next generation plants viable and capable of displacing coal and gas. The United States could be a leader on developing these technologies, but unfortunately U.S. nuclear policy remains mostly stuck in the past. Rather than creating new solutions, efforts to restart the U.S. nuclear industry have mostly focused on encouraging utilities to build the next generation of large, light-water reactors with loan guarantees and various other subsidies and regulatory fixes. With a few exceptions, this is largely true elsewhere around the world as well. Nuclear has enjoyed bipartisan support in Congress for more than 60 years, but the enthusiasm is running out. The Obama administration deserves credit for authorizing funding for two small modular reactors, which will be built at the Savannah River site in South Carolina. But a much more sweeping reform of U.S. nuclear energy policy is required. At present, the Nuclear Regulatory Commission has little institutional knowledge of anything other than light-water reactors and virtually no capability to review or regulate alternative designs. This affects nuclear innovation in other countries as well, since the NRC remains, despite its many critics, the global gold standard for thorough regulation of nuclear energy. Most other countries follow the NRC's lead when it comes to establishing new technical and operational standards for the design, construction, and operation of nuclear plants. What's needed now is a new national commitment to the development, testing, demonstration, and early stage commercialization of a broad range of new nuclear technologies -- from much smaller light-water reactors to next generation ones -- in search of a few designs that can be mass produced and deployed at a significantly lower cost than current designs. This will require both greater public support for nuclear innovation and an entirely different regulatory framework to review and approve new commercial designs. In the meantime, developing countries will continue to build traditional, large nuclear power plants. But time is of the essence. With the lion's share of future carbon emissions coming from those emerging economic powerhouses, the need to develop smaller and cheaper designs that can scale faster is all the more important. A true nuclear renaissance can't happen overnight. And it won't happen so long as large and expensive light-water reactors remain our only option. But in the end, there is no credible path to mitigating climate change without a massive global expansion of nuclear energy. If you care about climate change, nothing is more important than developing the nuclear technologies we will need to get that job done.

#### Plan results in exports and is cost-competitive

Ken Silverstein, Forbes, 1/15/13, After Fukushima, U.S. Seeks to Advance Small Nuclear Reactors, www.forbes.com/sites/kensilverstein/2013/01/15/after-fukushima-u-s-seeks-to-advance-small-nuclear-reactors/

“Restarting the nation’s nuclear industry and advancing small modular reactor technologies will help create new jobs and export opportunities for American workers and businesses, and ensure we continue to take an all-of-the-above approach to American energy production,” says Energy Secretary Steven Chu. To that end, the Obama administration is partnering with Babcock & Wilcox and Bechtel to develop those smaller nuclear reactors for the federally-owned utility Tennessee Valley Authority. The Department of Energy is expected to invest about $450 million in the project, which equates to roughly half of the overall cost. Industry will pony up the other half. Babcock builds smaller nuclear units of 100 megawatts, which can also be aggregated together to supply as much power as a base-load nuclear generator, or 1,000 megawatts. The modules are stored underground. Christopher Mowry, president of Babcock, says that TVA should expect to have those units running by 2020. Beyond the federal wholesaler of electricity, he says that other potential clients exist: smaller utilities that can only afford to make “bite size” investments in nuclear energy that include the electric cooperatives and municipalities. “I’d like to rebuild the United States first and then sell oversees,” says Mowry, who spoke with this reporter. Smaller nuclear units are just as viable in other nations where the transmission grids can’t handle larger generation. Once the concept is shown to be feasible, the developers can then build on the smaller facilities to form a larger base-load plant. Currently, 104 nuclear reactors are located here in the United States. But half of them are nearing their retirement, although regulators will likely extend their lives to meet an expected increase in electricity demand. Southern Co. and Scana Corp. have gotten federal regulatory approval in the last year to expand their existing nuclear campuses. Smaller reactors, though, have a place: They might not only serve niche markets but they could also replace at least some of those bigger and more centralized nuclear generation. The right-sized reactors are expected to operate at high efficiencies and to have built-in advantages, ultimately giving those investments a respectable return. Such units, for example, generally come with a nuclear waste storage containment device. The facilities could also be used to create drinkable water supplies in those countries where such a resource is in short supply. According to the Sandia National Laboratory, these smaller reactors would be factory built and mass-assembled, with potential production of 50 a year. They would all have the exact same design, allowing for easier licensing and deployment than large-scale facilities. Mass production will keep the costs down to between $250 million and $500 million per unit. “This small reactor … could supply energy to remote areas and developing countries at lower costs and with a manufacturing turnaround period of two years as opposed to seven for its larger relatives,” says Tom Sanders, who has been working with Sandia. “It could also be a more practical means to implement nuclear base-load capacity **comparable to natural gas**-fired generating stations and with more manageable financial demands than a conventional power plant.” In the case of Sandia, the right-sized reactors would generate their own fuel as they operate. They are designed to have an extended operational life and would only need to be refueled a few times during its projected 60-year lifespan. At the same time, the reactor system would have no need for fuel handling, all of which helps to alleviate proliferation concerns. Conventional nuclear power plants in the U.S. have their reactors refueled once every 18 to 24 months. The issue that manufacturers of small reactors have is that they are relying on the venture capital community to back their ideas. While they may be worthy, they must still endure years of regulatory scrutiny before they would get the permission to be built in this country. Investors don’t want to tie up their money for that long. That’s why the Energy Department is getting involved. Consider NuScale: It says that by taking its smaller modules and ultimately forming a 540 megawatt plant that it would cost between $2.2 billion and $2.5 billion. That’s marginally less expensive than a traditional plant. At a few billion, the company says that utilities would not be taking the kind of risks they might otherwise be incurring if they were to build a larger $10 billion facility. For most companies, the amount of money is too great, especially in the aftermath of a recession, credit crunch and Japanese nuclear crisis. “**We saw the economic value of taking virtually the entire nuclear system, including its containment, to a factory where they could be manufactured under more controlled conditions**,” says Paul Lorenzini, founder of NuScale, in a previous talk with this writer. He goes on to say that smaller units are extremely safe because they are immune from the type of events that occurred in Japan. Right-sized nuclear reactors face the same financial and regulatory obstacles as do their bigger brothers. **But** if the smaller and scalable technologies prove effective, they will establish valuable niche markets for themselves not just among the TVAs of the world but also among those local utilities and less developed countries that need a clean and continuous source of power.

#### SMRs revitalize the US nuclear industry and overcome their export D

Fred McGoldrick, CSIS, Former Senior Official, U.S. Department of Energy and the U.S. Department of State, negotiated U.S. peaceful nuclear cooperation agreements, served in the U.S. Mission to the International Atomic Energy Agency, Jan 2013, Nuclear Trade Controls, http://csis.org/files/publication/130122\_McGoldrick\_NuclearTradeControls\_Web.pdf

Some argue that one of these impediments is the stricter conditions that the United States imposes on its nuclear exports compared to other suppliers. This charge may contain a grain of truth. Some foreign utilities and their governments may think twice about purchasing U.S. nuclear equipment and enrichment services because of the extensive nature of U.S. consent rights and the conservative exercise of those controls by the United States in the past. After the Carter administration’s grudging and protracted handling of reprocessing requests, some foreign utilities sought other sources of supply for enrichment services. Today, however, **the U**nited **S**tates **is not challenging the fuel-cycle choices of other** advanced **nuclear states**. Moreover, although members of the NSG do not implement the guidelines in a uniform manner, and some have loosely interpreted them, international nuclear trade rules among the major suppliers have been largely harmonized. Thus, the disparities in nuclear export controls between the United States and other suppliers have been greatly reduced. Whether the remaining existing disparities or new ones that may arise with new suppliers will affect U.S. competitiveness remains to be seen. The U.S. nuclear industry has recently published a report concluding that the U.S. nuclear export control system is more complex, inefficient, and restrictive and places more onerous burdens on U.S. exporters than some of its key competitors in the international market.61 The report concludes that the differences in the U.S. and non-U.S. export control regimes impose a competitive disadvantage on commercial nuclear exporters from the United States. While there is some validity to the report’s argument that U.S. export laws and regulations may impose unnecessarily burdensome requirements on U.S. companies and that the approval of export applications may take an unreasonably long time, **it is not clear that the U.S. system is causing serious damage to the competitiveness of the U**nited **S**tates **in the international market** at the present time. Moreover, although the American regime for controlling nuclear exports should be streamlined and made more efficient, it is not the main reason for the decline in the U.S. share of the international market. Other factors are far more important: ■ The emergence of other suppliers long ago undermined the monopoly of supply that the United States enjoyed in the early days nuclear energy. This was an inevitable development, and the future is likely to see the arrival of even more suppliers. ■ The international playing field is not level. The nuclear export industries of other major suppliers have strong governmental and financial support that the U.S. nuclear export industry does not enjoy. ■ The United States has not built new domestic nuclear power plants in over 30 years. Countries seeking to develop nuclear power are likely to turn for assistance to those states that have growing domestic nuclear power programs, offer competitive fuel-cycle services, and support the development of advanced technologies. Although U.S. skills in operating and regulating nuclear power plants are highly valued, manufacturing and construction effectiveness (which brings down costs) does not have the same credibility it once had. As a result, the ability of the United States to participate competitively in the international nuclear market has been weakened. Overcoming these developments and obstacles will not be easy. Subsidies for U.S. nuclear exports may be one way to put American industry on a more competitive footing with nuclear exporters in other countries. However, financial support for U.S. nuclear exports has long been controversial and is likely to become even more so in the future, particularly in light of severe constraints on the U.S. budget.62 To retain a role in the international marketplace, some U.S. companies have entered into alliances with foreign suppliers. Toshiba’s purchase of Westinghouse and the creation of General Electric1–Hitachi Nuclear Energy are examples of such ventures. However, it is not clear how the uncertain future of the post-Fukushima Japanese nuclear industry will affect these ventures. In any event, forging such alliances with foreign firms may be one avenue for promoting U.S. nuclear exports. Revitalizing and rebuilding the domestic nuclear industry also faces significant challenges. The low price of natural gas plants and the absence of a national nuclear waste policy will significantly slow the nuclear renaissance, and post-Fukushima public concerns and new safety regulations may create additional brakes on nuclear power plant construction. However, the development of small modular reactors, if they prove economically competitive and meet safety standards, **could not only** rejuvenate the U.S. domestic nuclear industry **but also boost the** competiveness **of the U**nited **S**tates **in the** international market**, particularly in** developing countries. Although some have expressed concerns about the proliferation implications of laser isotope separation technology, if the General Electric-Hitachi Global Laser Enrichment Uranium Enrichment Facility, a venture owned by GE, Hitachi, and Cameco Corporation, can satisfy proliferation concerns and meet the economic expectations of its supporters, it could give the United States a strong cost advantage in the global enrichment market. One step the United States could take to strengthen its role in the international market and promote its nonproliferation would be to establish a national nuclear waste program that would allow for taking back at least limited quantitites of spent fuel produced from U.S. nuclear exports. This may ultimately prove too hard to do, but it is well worth the effort.

## 1AC adv

#### Contention 2 is the grid—

Scenario 1 is blackouts—

#### Domestic DoD bases are vulnerable due to connectivity to the civilian grid–only SMRs 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.

#### Multiple threats will cause year-long blackouts

Magnuson 12

(Stew Magnuson, managing editor of National Defense Magazine, Washington, D.C.-based journalist and the author of The Death of Raymond Yellow Thunder: And Other True Stories from the Nebraska-Pine Ridge Border Towns, the Nebraska Nonfiction Book of the Year for 2009, bronze medal in the regional nonfiction category, September 2012, “Feds Fear Coordinated Physical, Cyber-Attacks on Electrical Grids,” http://www.nationaldefensemagazine.org/archive/2012/september/Pages/FedsFearCoordinatedPhysical,Cyber-AttacksonElectricalGrids.aspx)

Electrical grids in the United States are vulnerable to both cyber-attacks and space weather, federal officials have said. But an assault that combines the skills of a hacker with a physical attack on key parts of a grid’s infrastructure may result in hundreds of millions of U.S. homes and businesses losing electricity. “I am most concerned about coordinated physical and cyber-attacks intended to disable elements of the power grid or deny electricity to specific targets, such as government or business centers, military installations, or other infrastructures,” Gerry Cauley, president and CEO of the North American Electric Reliability Corp., said at a recent Senate hearing. Scott Pugh, of the Department of Homeland Security’s interagency program office, said at an energy conference in April that there are maps — not available for public viewing — that “show you a handful of substations — six or so — [where] you could take out those six substations and black out most of the U.S. east of the Mississippi, if you knew which six [they] were. And in many cases you could do it **with a hunting rifle from a couple hundred yards away**.” There are some 1,500 companies that generate electricity in the United States, and the hodgepodge of federal agencies that oversee them have limited statutory authorities to force them to protect themselves against attacks, the Senate Energy and Natural Resources Committee hearing revealed. “Limitations in federal authority do not fully protect the grid against physical and cyberthreats,” Joseph McClelland, director of the office of reliability at the Federal Energy Regulatory Commission, said. Legislation passed in 2005 gave the agency the authority to impose reliability standards on “bulk,” or large-scale, power systems. That law excludes local distribution facilities, federal installations located inside grids, and major cities such as New York. Hawaii and Alaska also don’t fall under the commission’s jurisdiction. Officials are concerned about two threats: electromagnetic pulses, which come from solar storms or weapons, and cyber-attacks, particularly on “smartgrids,” which it turns out, are not very “smart” when it comes to protecting against hackers. “No single security asset, technique, procedure or standard — even if strictly followed — will protect an entity from all potential cyberthreats,” said Gregory Wilshusen, director of information security issues at the Government Accountability Office. “The cybersecurity threat environment is constantly changing and our defenses must keep up.” However, in the case of smartgrids, utilities continue to employ them without the necessary safeguards, the GAO has found. There is a lack of security features consistently being integrated into smartgrids and the current regulatory environment makes it difficult to ensure that power companies are properly protecting them. Physical attacks against the grid can cause equal or greater destruction than cyber-attacks, McClelland said. An electromagnetic pulse, or EMP event, could seriously degrade or shut down large swaths of the nation. Depending on the attack, **a significant part of the infrastructure could be “out of service for** periods measured in months to **a year or more**,” he said. “The self-reporting requirements, the enforcement provisions under the existing standards are important,” he said. “But at the end of the day, if there’s no enforcement provisions, there’s no teeth behind the provisions.” The National Institute of Standards and Technology has guidelines for utilities to gird themselves from physical and cyber-attacks, but they do not address coordinated attacks, said Wilshusen. NIST “guidelines did not address an important element essential to securing smartgrid systems — the risk of attacks using both cyber and physical means.” Meanwhile, there have been three major studies that looked at the possible effects of a massive solar storm on U.S. electrical grids. They reached different conclusions, Pugh said at the National Defense Industrial Association Environment, Energy Security and Sustainability symposium in New Orleans. Experts are trying to map the grid and figure out what would happen in the event of an attack or solar storm, Pugh said. But there is nothing that requires the 1,500 companies to share proprietary data about their equipment, so coming to firm conclusions is difficult. Transformers — which number about 2,000 nationwide — are a key vulnerability. Strong electrical pulses caused by a weapon or solar storm can irreparably damage them, he said. “If you need a dozen of those tomorrow because somebody attacked the grid, or we had a space weather event that took out a dozen, you might be waiting quite a while,” he said. They weigh about 300 tons, can only be delivered by special rail car, and most are now manufactured overseas.

#### Those communication breakdowns go nuclear and decimate military operations

Andres 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)

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

#### Scenario two is Hawaii—

#### Hawaiian military bases highly vulnerable to supply disruptions and grid breakdowns---must switch to SMR to ensure energy security

Butler, 10

(Director-Operations & Training-Marine Corps Base Hawaii, “The Nuclear Option,” http://www.armedforcesjournal.com/2010/11/4847032/)

Even so, as U.S. armed forces parallel the business world with increasing investments and interest in all things green and “sustainable,” there remains a dirty word many of our military leaders have yet to utter with serious consideration: nuclear. Long the readily dismissed yet oft-misunderstood stepchild of Three Mile Island and Chernobyl, nuclear energy today is finally undergoing the beginning of a renaissance in political and entrepreneurial circles. But even as our commander-in-chief and energy secretary deliver guidance and vision for a U.S. future that includes expanded nuclear energy, our service chiefs have yet to embrace the potential watershed opportunity. This is a mistake. Our military forces should take a hard look at the promise of modern nuclear energy technology as integral parts of their long-term plans for installations’ sustainment across the homeland. To be fair, each service has a fairly new and comprehensive energy strategy. The Marine Corps has operated under the Department of the Navy’s strategy announced in October 2009, but recently stood up an Expeditionary Energy Office (E2O) and unveiled its energy strategy at a summit in August. The Air Force has a new energy strategy; the Army’s Energy Strategy for Installations and Campaign Plan was signed in 2005, but recent updates include five Strategic Energy Security Goals (ESGs) of their Energy Security and Implementation Strategy; and the Navy’s Five Strategic Energy Goals include sailing a “Great Green Fleet” of “nuclear ships, surface combatants with hybrid electric power systems using biofuel, and aircraft flying only on biofuels” by 2016. However, nuclear energy exploration is not mentioned in any of these otherwise innovative and overarching service strategies. Why? NUCLEAR GHOSTS One of the two main issues is likely a lingering fear of the old nuclear ghosts (harkening back to apprehension stirred by the movie The China Syndrome, and the TMI incident, of 1979), and an underlying collective misunderstanding about the capabilities and risks of modern nuclear technology. The second, more understandable hurdle likely stems from the question of funding and a fear of the unknown. With personnel, dollars and other resources already stretched thin, it is hard for many to envision the pursuit of sensitive, bold and perhaps radical concepts such as nuclear power on our military bases. But the focus on more widely accepted “renewable” energy sources, while a step in the right direction, does not go far enough. Not only will the services be unable to achieve their ambitious goals with these more traditional renewable energy sources, but each source is burdened with its own share of problems. The wind and sun are intermittent (the sun does not always shine; the wind does not always blow), and at best they will provide no more than 20 percent to 30 percent of our electricity, after many years. (In 2009, wind contributed only 2 percent of total generation, and solar gave us less than 0.1 percent of total U.S electrical production.) Wind farms cause conflicts with low-flying aircraft, surveillance radars and sensitive land areas, and they don’t solve the storage problem. Northern Command’s former commanding officer, Gen. Gene Renuart, recently voiced some of these concerns when he told the House Armed Services Committee that wind farms cause radar interference and can inhibit the defense of North America. They also often require significant new electrical distribution lines, a challenge daunting enough it famously convinced investor T. Boone Pickens to abandon his massive Texas wind farm plan last year. Solar power causes some similar, overlapping concerns, and also suffers from vulnerability of photovoltaic and solar technology systems. Ocean Thermal Energy Conversion raises fears of restricted fishing access and dangers to sea life, and because the technology is still fairly new, wave power can cost as much as five or six times as wind power. To be sure, most every other form of emerging, renewable energy suffers some degree of restrictions and has challenges — including potential conflict with local utility providers and unassured grid interface. Given all of these issues, the likelihood of actually achieving our ambitious energy goals without additional generation sources and technology is questionable. Beyond these limitations and the obvious “doing the right thing” aspect of traditional renewable energy, another reason — **the key reason — for the military to consider nuclear energy on our installations is to strengthen national security**. President Obama, former National Security adviser James Jones and other political and military leaders have said energy security is national security. If this is true, then our bases and stations — so largely reliant on external power sources — are at risk, and there is much work to be accomplished. The elephant in today’s energy room is the fact that many military communities rely disproportionately on foreign oil for energy**. Hawaii is a prime example, a state strategically located in the middle of the Pacific** (and where the military passed tourism last year as the No. 1 economic source), **yet a state with the highest dependence in the nation on fossil fuels — approximately 90 percent, mostly from Indonesian oil**. To achieve the kind of energy independence — and thus security — our leaders are calling for requires much more than compact fluorescent light bulbs, photovoltaic panels, biofuel plants and wind farms. Nuclear energy is a promising, yet rarely mentioned, option. Of course, the U.S. is not the only country striving for energy advancements. China, India, Brazil, Japan, South Korea, France and many other nations, including our adversaries, are ambitiously moving forward with renewable — and yes, nuclear — power production. France generates almost 80 percent of its power from nuclear energy. Some sources indicate that the nuclear energy sector is likely to grow to a trillion-dollar market by 2030. This means there will be growing international competition to provide this energy source. American entrepreneurs understand the nature of this competition, too. Bill Gates identified nuclear power as one attractive avenue while discussing energy and climate issues. He specifically mentioned new technology he was investing in — developing nuclear technology that ran on its own waste. However, recognizing the lack of apparent interest and expertise in the U.S., he acknowledged that he’s been looking to Russia, India and China for ideas. SMALL MODULAR REACTORS While fears of nuclear energy remain, some forward thinkers are pressing on and helping emerging technology to gain momentum. Small Modular Reactors (SMRs) are being developed by several companies and offer attractive energy options for military installations. These reactors are defined by the Department of Energy (DoE) as “nuclear power plants that are smaller in size [300 megawatts or less] than current generation base load plants [1,000 megawatts or higher]. These smaller, compact designs are factory-fabricated reactors that can be transported by truck or rail to a nuclear power site … ‘modular’ ... refers to a single reactor that can be grouped with other modules to form a larger nuclear power plant ... [they] require limited on-site preparation ... [and will be] ‘plug and play.’” Although acquiring SMRs might remain fiscally prohibitive for individual bases, there are ways to make this option feasible. U.S. Rep. Jim Marshall inserted text into the fiscal 2010 National Defense Authorization Act that directed the defense secretary to “conduct a study to assess the feasibility of developing nuclear power plants on military installations ... summarize options available to the Department to enter into public-private partnerships or other transactions for the construction and operation of the nuclear power plants; estimate the potential cost per kilowatt-hour and life-cycle cost savings to the Department; consider the potential energy security advantages of generating electricity on military installations through the use of nuclear power plants.” In October 2009, the president signed a provision to facilitate a study on the development of nuclear power plants for military installations. Despite a less-than-enthusiastic reception of this provision by the Pentagon, sources indicate the study is ongoing but will not be completed until later this year. Energy Secretary Steven Chu, meanwhile, has proven to be a nuclear energy champion. He has emphatically advocated SMRs, and penned a Wall Street Journal op-ed (“America’s New Nuclear Option,” March 23, 2010), which highlighted the potential significant advantages of SMR technology. Chu called SMRs “one of the most promising areas” in new energy technologies, and said “most importantly, investing in nuclear energy will position America to lead in a growing industry. ... Our choice is clear: develop these technologies today or import them tomorrow.” In the fiscal 2010 budget, no funds were allocated to the U.S. SMR program, but $38.9 million has been allocated for fiscal 2011. This is to support two primary activities: public/private partnerships to advance SMR designs, and for research and development and demonstrations. According to the DoE’s website, one of the planned program accomplishments for fiscal 2011 is to “collaborate with the Department of Defense ... to assess the feasibility of SMR designs for energy resources at DoD installations.” HOW TO PROCEED So how should the military begin exploring the advantages of SMRs on their installations? First, a multiservice nuclear energy working group should be formed, perhaps similar in spirit to the Global Nuclear Energy Partnership. This joint group should include knowledgeable and empowered individuals from each branch of the service interested in exploring nuclear energy possibilities, and would develop a plan of action and milestones for required resources and the way ahead for this endeavor. The Air Force has installations and experts dedicated to far-reaching, advanced technology such as space research, quantum physics, nuclear fission and even the holy energy grail of nuclear fusion. With places like Albuquerque’s Sandia National Laboratories, and an energy strategy vision catchphrase “make energy a consideration in all we do” as one of its centerpieces, this technologically savvy service might make a good partner with which to cross into SMR exploration. The Marines pride themselves on innovation and “out-of-the-box” approaches, and with their naval partners including many experts in the nuclear propulsion and power fields, offer not only enthusiasm but expertise and possibly even administrative acceleration, if plant certifications can be achieved through the Naval Nuclear Propulsion Program (NNPP; “Naval Reactors”) and not the Nuclear Regulatory Commission. The NRC is responsible for “licensing and regulating the operation of commercial nuclear power plants in the United States.” Military installations, however, offer unique platforms that could very possibly bypass an extended certification process. This option should be explored. With established expertise and a long safety record in nuclear reactor certification, operations, training and maintenance, “Naval Reactors” 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.” The program responsibilities are specified in Executive Order 12344 (Feb. 1, 1982) and Public Laws 98-525 (Oct. 19, 1984) and 106-65 (Oct. 5, 1999). E.O. 12344 explains that the NNPP is an “integrated program carried out by two organizational units, one in the Department of Energy (DOE) and the other in the Department of the Navy.” So, Naval Reactors should adopt an additional mission: coordinating with the Joint Nuclear Energy Working Group to research and pursue SMR technology on military installations. Finally, partnerships and Enhanced Use Leases (EULs) to support SMR deployments should be explored. As the overall expertise in SMR technology grows, additional capabilities such as expeditionary and vehicular power sources should be explored. Other technologies — including hybrid/electric vehicle power storage and recharging facilities, and water desalination plants — could possibly even co-locate with nuclear plants on installations to co-use the energy. Many external challenges do exist; compliance with the National Environmental Policy Act (NEPA) of 1969 takes time, and community support would be a critical piece of this undertaking — but neither are impediments to success if planning and execution are conducted smartly. The idea of putting nuclear power plants on military installations is by no means new, yet the time has never been better and the technology never as promising as now. The president and Chu continue to voice support for new nuclear energy initiatives, and a large, bipartisan group of political leaders stands poised to back such a plan. This inviting climate is the open door and momentum the DoD should capitalize on by aggressively pursuing what could truly be the next Apollo program. If we fail to explore this promising frontier, we are likely to lose this modern energy “space race” to the Chinese and other eager competitors. That is something the U.S. cannot afford to do. Look no further for guidance than the current National Military Strategy, released in May, in which the commander in chief declares: The United States has a window of opportunity to lead in the development of clean energy technology. If successful, the United States will lead in this new Industrial Revolution in clean energy that will be a major contributor to prosperity ... We must continue to transform our energy economy ... increase use of renewable and nuclear power. ... We will invest in research and next-generation technology. ... Our effort begins with the steps we are taking at home. We will stimulate our energy economy at home, reinvigorate the U.S. domestic nuclear industry ... and provide incentives that make clean energy the profitable kind of energy. The military, with its self-sufficient mini-communities across the country, **offers perfect beta-test platforms** and has the requisite expertise and pioneering spirit to take the nuclear energy helm. Beyond the economic value cited above by the president, putting nuclear SMRs on military installations would greatly improve our energy security — which, in turn, would strengthen our national security. After all, energy security is national security. The time for the long-anticipated nuclear renaissance is now … and the **military should enthusiastically seize the opportunity to lead the way**. AFJ

#### The plan leads to rapid deployment and adoption of SMR’s on the islands

Ferguson, 10

(PhD and President, Federation of American Scientists, 5/19, Charting the Course for American Nuclear Technology: Evaluating the Department of Energy's Nuclear Energy Research and Development Roadmap, http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg57172/html/CHRG-111hhrg57172.htm)

Q2. Should the Federal Government conduct a Federal demonstration program for SMR technology? What is the appropriate scale for a demonstration program to prove small modular reactor technology, reduce the technology risk, and encourage mobilization of private capital? A2. Yes, I think the time is ripe for the Federal Government to conduct a demonstration program. Utilities may be reluctant to purchase an SMR without seeing one demonstrated because the dominant paradigm is for large reactors. **One demo option is for the Defense Department to purchase an SMR**. While that would show the reactor in operation, such a plan may not satisfy the need to encourage mobilization of private capital. Another option is to demonstrate one or more SMRs in a location where the Federal Government has authority but also where the states and the commercial sectors have jurisdiction. One location that comes to mind is the Tennessee Valley Authority, which has a defense mission in its charter. The Oak Ridge National Laboratory with expertise in nuclear energy technologies may be the natural partner with TVA to demonstrate SMRs. The SMRs could provide electrical power to ORNL as well as the local communities. ORNL and the communities could share costs in paying for the electricity generated. Q3. You mention that small markets like Alaska and **Hawaii may benefit most from SMRs and that this technology would be attractive to small markets with weak grids**. But other panelists here suggest that SMRs and their ability to be ``stacked'' or used in tandem would make them a logical choice for scaled deployment of nuclear generation across the board. What is your response? A3. I think this is not an either/or choice. As indicated in my written testimony, there may be considerable merit in stacking or building sequentially several SMRs at one location as long as there are economic advantages. The International Atomic Energy Agency study that I cited in the testimony suggests that four SMRs at one location could be stacked in such a way to be very cost competitive with one large power reactor with the equivalent amount of power of the four SMRs. Concerning communities in Alaska and Hawaii, the electricity markets at those locations are relatively small and thus may not be able to handle a large power reactor or several SMRs in a stacked configuration. Nonetheless, as long as one SMR is cost competitive with alternative energy choices, then those communities may find value in purchasing an SMR. Both Alaska and Hawaii rely significantly on fossil fuels for electricity generation. So, nuclear power could serve to reduce reliance on these greenhouse gas generating sources. Concerning reliance on oil for electricity generation, **Hawaii has the highest dependency** in the United States. Consequently, alternative electricity generation sources would help alleviate this dependency. In addition to considering nuclear power in the form of SMRs, Hawaii should examine increased use of geothermal and solar sources, which are ideal in Hawaii's location. A systems analysis would be useful for Hawaii in determining what combination of geothermal, nuclear, and solar sources are environmentally sound and cost competitive with fossil fuels.

#### It’s cost effective

Ferguson, 10

(PhD and President, Federation of American Scientists, 5/19, Charting the Course for American Nuclear Technology: Evaluating the Department of Energy's Nuclear Energy Research and Development Roadmap, http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg57172/html/CHRG-111hhrg57172.htm)

It is also worth pointing out that in the United States, Alaska and **Hawaii may derive the most benefit from SMRs**. Based on a 2001 DOE assessment, ``SMRs could be a competitive option'' in those states because ``the industrial rate for electricity charged by selected Alaska and Hawaii utilities varied from 5.9 to 36.0 cents per kWh'' and for a generic 50 MWe SMR, ``the range of electricity cost is estimated at 5.4 to 10.7 cents per kWh,'' while the ``range of cost for a 10 MWe SMR is 10.4 to 24.3 cents per kWh.'' \18\ Moreover, **SMRs could help Hawaii reduce its substantial dependence on imported oil to generate electricity.** According to the Energy Information Administration, petroleum provides about three-fourths of Hawaii's electricity.\19\ In comparison, petroleum is used in the United States as a whole to generate about two percent of the nation's electricity.

#### Otherwise vulnerability collapses military capabilities

Cooney, 11

(Columnist at Triple Pundit and Author of Building a Green Small Business, 9/28, “The U.S. Military’s Plans to Assure Energy Independence,” http://www.triplepundit.com/2011/09/whats-military-doing-assure-energy-independence/)

George Kai’iliwai, Director, Resources and Assessment, of the U.S. Pacific Command, recently spoke at the Asia Pacific Clean Energy Summit and Expo, addressing the role of the military in helping solve the world’s energy challenges. According to Ka’iliwai, **military technologies are potential game-changers in the energy world. This talk is especially relevant in Hawaii, given the state’s strategic military importance and preponderance of bases.** Military spending accounts for the number two source of money in the state, second only to tourism. According to Ka’iliwai, it was clear after a short term shutdown of the grid on Oahu in December 2008 **that the military here was completely dependent on a fragile energy infrastructure, which doesn’t bode well for how we could respond to an attack that targets our aging electricity system**. So what’s the military doing? The US Pacific Command (PaCom) includes 36 countries and islands. It includes some of the world’s largest developing nations (China and India). There is an insufficient supply of fossil fuel energy in the region, and most countries in the region are net importers of oil. There are, however, abundant renewables, with commercially viable sun and wind power resources throughout.

#### Hawaii’s key to regional power projection

Terry, 12

(U.S. Army-Pacific, “USARPAC outlines Hawaii’s importance to Army, Pacific,” 1/13, http://www.hawaiiarmyweekly.com/2012/01/13/usarpac-outlines-hawaiis-importance-to-army-pacific/)

Lt. Gen. Francis Wiercinski, commander, U.S. Army-Pacific, and other Pacific Command component commanders from each of the services based in Hawaii, presented an overview of current and projected posturing of the U.S. military in Asia and the Pacific to the Military Affairs Council, the Chamber of Commerce and other officials. Wiercinski stressed the importance of Army forces in the Pacific. “I’m here today to talk about the Army,” he said. “What is a fact is that **in a geopolitical and economic sense, the Pacific is the future**. And it is, in this century, because you are seeing a fundamental shift from Europe to the Pacific of our forces, of our priorities and where we’re headed.” He stressed the significance of Hawaii to USARPAC. “Obviously, **our center of gravity is here in Hawaii**,” he said. “It’s where the majority of our forces are; it’s where the majority of our families live; it’s where our headquarters are located. But we have forces prepositioned and stationed around the entire Pacific realm.” Solider deployments from USARPAC have played a critical role in the wars in Iraq and Afghanistan, Wiercinski said. Since 2001, USARPAC has deployed 115,000 Soldiers into those areas. The commander also praised the success of U.S. Army Garrison-Hawaii and its partnership with the local community. “Our garrison here in Hawaii is the fourth largest garrison that we have in the Army,” he said. “Just like we’ve signed a U.S. Army Covenant to our families and our Soldiers, we’ve signed a Hawaii Covenant that is also a commitment to the people here in Hawaii, the local community and the ohana that we all belong. “We have many forums that we conduct monthly, quarterly and yearly to make sure we’re staying on that path to meet our requirements and responsibilities,” he said. “Some of the things that we do (are) teaching partnership and watching out for the environment and culture that is so rich here in Hawaii.” The keynote speaker at the conference was Adm. Robert Willard, commander, PACOM. He said **Hawaii, as the forward-most state, is the most strategic in terms of entry into Asia and is an important region in the world**.

#### Key to solve Asian war

Murray, 12

(Columnist MidWeek, 6/5, “The Army’s Growing Role In The Pacific,” http://www.midweek.com/lt-gen-francis-wiercinski/)

**North Korea. China. Philippines. Indonesia. Myanmar**. Not to mention natural disasters. Lt. Gen. Francis Wiercinski, Commander U.S. Army Pacific, doesn’t have to look hard to see potential trouble spots. As the Army celebrates its 237th birthday, this proud Ranger is as focused on keeping his troops trained and ready as he is on making friends in the region **Hawaii’s importance to the U.S. Army is greater than ever**, says Lt. Gen. Francis Wiercinski Lt. Gen. Francis J. Wiercinski, the commanding general U.S. Army Pacific, seems straight out of central casting. Square-jawed, thick-chested and possessing a grip any blacksmith would admire, he exudes old school toughness. Those who work with him on a daily basis say he’s the complete opposite: humorous, passionate and someone who loves hanging out talking story. While that may be true, when you’re responsible for the health and safety of 70,000 soldiers and their families, untold billions of dollars in equipment, and half the world’s surface, not to mention being a diplomat who must deal with rogue nations, drug trafficking, terrorism, environmental threats, territorial disputes, and being called to action with little or no warning, toughness is a necessary and admirable quality. And like most in his position, nothing breaks down the stoic walls of strength faster than discussions of the young men and women who time and again go back into the fight without question or complaint. “I’ve seen acts of bravery and courage that would bring you to your knees, and these are young kids,” said Wiercinski. “It is amazing. When I jumped into Panama as a young company commander as a Ranger, nobody had been in combat for years. Today, just look at the right shoulder of every uniform out there and everyone is wearing a combat patch. It’s amazing.” The Pennsylvania native says that while military operations are winding down in Iraq and Afghanistan, very little will change for Hawaii-based troops. After a decade of missed birthdays, graduations and anniversaries and more than 140,000 deployed troops, Hawaii’s soldiers will finally be able to make long-term plans. But because the mission can change without warning and because personnel, tactics and technology are constantly changing, training will continue unabated. “We will continue to drive hard. We don’t have the luxury to wait. What we will be able to do more of is engage with our other partners in the Pacific which we’ve not had the opportunity to do very much over the last 10 or 11 years.” In a 2011 article, a Rand Corporation study put the economic impact of the military in Hawaii at $12.2 billion in 2009. It also placed Department of Defense personnel in the state at 75,473, of which 47,677 were active-duty personnel and 9,427 National Guard or reservists. While some have argued over the necessity of having so many military personnel in such a small area, Wiercinski says Hawaii’s location **makes it of critical importance** to keep an eye on the bad guys while helping friends and building relationships. “This is a 9,000-miles-across AOR (area of responsibility). If something happens, you are not going to get there (in time from a Mainland base), it’s just physically impossible. If you’re not engaged, if you’re not working together, if you don’t understand the culture, if you’re not building relationships its very easy for someone to tell you no. It is easy for someone to make friends somewhere else. We have to settle conflicts long before they get to a level before you can’t turn them around anymore. Bullets downrange, that is expensive. Blood, life, equipment. You don’t want to get into phase three, let’s keep it in phase zero. Are there threats? Yep, a lot of them. They range from pandemics, to transnational terroristic threats to nuclear threats like in North Korea. But we are talking.” The general points to Operation Tomodachi, the combined effort between the U.S. and Japan to provide relief following last year’s earthquake and tsunami as another example of the importance of location and familiarity.

#### Goes nuclear

**Campbell et al 8** (Kurt M, Assistant Secretary of State for East Asian and Pacific Affairs, Dr. Campbell served in several capacities in government, including as Deputy Assistant Secretary of Defense for Asia and the Pacific, Director on theNational Security Council Staff, previously the Chief Executive Officer and co-founder of the Center for a New American Security (CNAS), served as Director of the Aspen Strategy Group and the Chairman of the Editorial Board of the Washington Quarterly, and was the founder and Principal of StratAsia, a strategic advisory company focused on Asia, rior to co-founding CNAS, he served as Senior Vice President, Director of the International Security Program, and the Henry A. Kissinger Chair in National Security Policy at the Center for Strategic and International Studies, doctorate in International Relation Theory from Oxford, former associate professor of public policy and international relations at the John F. Kennedy School of Government and Assistant Director of the Center for Science and International Affairs at Harvard University, member of Council on Foreign Relations and  International Institute for Strategic Studies, “The Power of Balance: America in iAsia” June 2008, <http://www.cnas.org/files/documents/publications/CampbellPatelSingh_iAsia_June08.pdf>)

Asian *investment* is also at record levels. Asian countries lead the world with unprecedented infra­structure projects. With over $3 trillion in foreign currency reserves, Asian nations and businesses are starting to shape global economic activity. Indian firms are purchasing industrial giants such as Arcelor Steel, as well as iconic brands of its once-colonial ruler, such as Jaguar and Range Rover. China’s Lenovo bought IBM’s personal computer

We call the transformations across the Asia-Pacific the emergence of “iAsia” to reflect the adoption by countries across Asia of fundamentally new stra­tegic approaches to their neighbors and the world. Asian nations are pursuing their interests with real power in a period of both tremendous potential and great uncertainty. iAsia is: *Integrating:* iAsia includes increasing economic interdependence and a flowering of multinational forums to deal with trade, cultural exchange, and, to some degree, security. *Innovating:* iAsia boasts the world’s most successful manufacturing and technology sectors and could start taking the lead in everything from finance to nanotech to green tech. *Investing:* Asian nations are developing infrastruc­ture and human capital at unprecedented rates. But the continent remains plagued by: Insecurity: Great-power rivalry is alive in Asia. Massive military investments along with historic suspicions and contemporary territorial and other conflicts make war in Asia plausible. Instability: From environmental degradation to violent extremism to trafficking in drugs, people, and weapons, Asian nations have much to worry about. *Inequality:* Within nations and between them, inequality in Asia is more stark than anywhere else in the world. Impoverished minorities in countries like India and China, and the gap in governance and capacity within countries, whether as back­ward as Burma or as advanced as Singapore, present unique challenges. A traditional approach to Asia will not suffice if the United States is to both protect American interests and help iAsia realize its potential and avoid pitfalls. business and the Chinese government, along with other Asian financial players, injected billions in capital to help steady U.S. investment banks such as Merrill Lynch as the American subprime mortgage collapse unfolded. Chinese investment funds regional industrialization, which in turn creates new markets for global products. Asia now accounts for over 40 percent of global consumption of steel 4 and China is consuming almost half of world’s available concrete. 5 Natural resources from soy to copper to oil are being used by China and India at astonishing rates, driving up commodity prices and setting off alarm bells in Washington and other Western capitals. Yet Asia is not a theater at peace. On average, between 15 and 50 people die every day from causes tied to conflict, and suspicions rooted in rivalry and nationalism run deep. The continent harbors every traditional and non-traditional challenge of our age: it is a cauldron of religious and ethnic tension; a source of terror and extrem­ism; an accelerating driver of the insatiable global appetite for energy; the place where the most people will suffer the adverse effects of global climate change; the primary source of nuclear proliferation; and the most likely theater on Earth for a major conventional confrontation and even a nuclear conflict. Coexisting with the optimism of iAsia are the ingredients for internal strife, non-traditional threats like terrorism, and traditional interstate conflict, which are all magnified by the risk of miscalculation or poor decision-making.

#### DoD procurement of SMR’s solves security and islands military bases.

Loudermilk 11

Micah J. Loudermilk, Research Associate for the Energy & Environmental Security Policy program with the Institute for National Strategic Studies at National Defense University, 5/31/11, Small Nuclear Reactors and US Energy Security: Concepts, Capabilities, and Costs, [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](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.

## 1AC adv

#### Contention 3 is hydrogen—

#### Hydrogen fuel cells critical to UAV operational effectiveness via endurance and stealth

NRL, Naval Research Laboratory, Fall 2010, Fuel Cell Power Soar on Fuel Cell Power, http://www.nrl.navy.mil/content\_images/SPECTRA\_Fall2010.pdf

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

#### UAVs key to a host of DoD capabilities—fuel cells key

-nuclear forensics

-mine neutralization / clearance

-forward operating base security

-recon

**Gross et al 11**

Thomas Gross, Albert Poche, Kevin Ennis, DOD Defense Logistics Agency Research & Development, 10/19/2011, Beyond Demonstration: The Role of Fuel Cells in DoD's Energy Strategy, http://www.chfcc.org/publications/reports/dod-fuel-cell\_10-19-11\_dlafuelcells.pdf

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

#### Specifically key to effective ISR capabilities—key to effective military operations in a crisis

John L. Trefz, Jr., LCDR, US Navy, 2003, From Persistent ISR to Precision Strikes: The Expanding Role of UAVs, http://www.dtic.mil/dtic/tr/fulltext/u2/a420264.pdf

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

#### Effective military operations solve nuclear conflict

Kagan and O’Hanlon 7

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

We live at a time when wars not only rage in nearly every region but threaten to erupt in many places where the current relative calm is tenuous. To view this as a strategic military challenge for the United States is not to espouse a specific theory of America’s role in the world or a certain political philosophy. Such an assessment flows directly from the basic bipartisan view of American foreign policy makers since World War II that overseas threats must be countered before they can directly threaten this country’s shores, that the basic stability of the international system is essential to American peace and prosperity, and that no country besides the United States is in a position to lead the way in countering major challenges to the global order. Let us highlight the threats and their consequences with a few concrete examples, emphasizing those that involve key strategic regions of the world such as the Persian Gulf and East Asia, or key potential threats to American security, such as the spread of nuclear weapons and the strengthening of the global Al Qaeda/jihadist movement. The Iranian government has rejected a series of international demands to halt its efforts at enriching uranium and submit to international inspections. What will happen if the US—or Israeli—government becomes convinced that Tehran is on the verge of fielding a nuclear weapon? North Korea, of course, has already done so, and the ripple effects are beginning to spread. Japan’s recent election to supreme power of a leader who has promised to rewrite that country’s constitution to support increased armed forces—and, possibly, even nuclear weapons— may well alter the delicate balance of fear in Northeast Asia fundamentally and rapidly. Also, in the background, at least for now, SinoTaiwanese tensions continue to flare, as do tensions between India and Pakistan, Pakistan and Afghanistan, Venezuela and the United States, and so on. Meanwhile, the world’s nonintervention in Darfur troubles consciences from Europe to America’s Bible Belt to its bastions of liberalism, yet with no serious international forces on offer, the bloodletting will probably, tragically, continue unabated. And as bad as things are in Iraq today, they could get worse. What would happen if the key Shiite figure, Ali al Sistani, were to die? If another major attack on the scale of the Golden Mosque bombing hit either side (or, perhaps, both sides at the same time)? Such deterioration might convince many Americans that the war there truly was lost—but the costs of reaching such a conclusion would be enormous. Afghanistan is somewhat more stable for the moment, although a major Taliban offensive appears to be in the offing. Sound US grand strategy must proceed from the recognition that, over the next few years and decades, the world is going to be a very unsettled and quite dangerous place, with Al Qaeda and its associated groups as a subset of a much larger set of worries. The only serious response to this international environment is to develop armed forces capable of protecting America’s vital interests throughout this dangerous time. Doing so requires a military capable of a wide range of missions—including not only deterrence of great power conflict in dealing with potential hotspots in Korea, the Taiwan Strait, and the Persian Gulf but also associated with a variety of Special Forces activities and stabilization operations. For today’s US military, which already excels at high technology and is increasingly focused on re-learning the lost art of counterinsurgency, this is first and foremost a question of finding the resources to field a large-enough standing Army and Marine Corps to handle personnel intensive missions such as the ones now under way in Iraq and Afghanistan.

#### SMR development allows hydrogen fuel cell transition—spills over to military transportation

**Alt Energy Today, 10/25**

(“Alternative Energy The Ways that the Military is Using,” http://www.alternative-energy-today.com/the-ways-that-the-military-is-using-alternative-energy/)

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

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

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

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

## Plan

The United States Federal Government should obtain electricity from small modular reactors for military bases in the United States.

## 1AC Solvency

Contention 4 is solvency—

#### DoD acquisition of SMR’s ensures rapid military adoption, commercialization, and U.S. leadership

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

#### The plan cuts costs and supercharges commercialization

Fitzpatrick 11

Ryan Fitzpatrick, Senior Policy Advisor for Clean Energy at Third Way, Josh Freed, Vice President for Clean Energy at Third Way, and Mieke Eoyan, Director for National Security at Third Way, June 2011, Fighting for Innovation: How DoD Can Advance CleanEnergy Technology... And Why It Has To, content.thirdway.org/publications/414/Third\_Way\_Idea\_Brief\_-\_Fighting\_for\_Innovation.pdf

The DoD has over $400 billion in annual purchasing power, which means **the Pentagon could provide a sizeable market for new technologies**. **This can increase a technology’s scale of production,** bringing down costs, and making the product more likely **to successfully reach commercial markets**. **Unfortunately**, many potentially significant clean energy **innovations never get to the marketplace, due to a lack of** capital during the development and **demonstration stages. As a** result, technologies that **could help the military** meet its clean energy security and cost goals **are being abandoned or co-opted by competetors like China** before they are commercially viable here in the U.S. **By focusing its purchasing power on innovative products that will** help **meet its energy goals, DoD can provide** more **secure** and **cost-effective energy to the military—producing tremendous long-term savings**, while also **bringing** potentially **revolutionary technologies to the public**. Currently, many of these **technologies are passed over during** the **procurement** process **because of** higher **upfront costs—even if these technologies can reduce life-cycle costs** to DoD. The Department has only recently begun to consider life-cycle costs and the “fullyburdened cost of fuel” (FBCF) when making acquisition decisions. However, initial reports from within DoD suggest that the methodology for determining the actual FBCF needs to be refined and made more consistent before it can be successfully used in the acquisition process.32 The Department should fast-track this process to better maximize taxpayer dollars. Congressional appropriators— and the Congressional Budget Office—should also recognize the **savings that can be achieved by procuring advanced technologies to promote DoD’s energy goals**, even if these procurements come with higher upfront costs. Even if the Pentagon makes procurement of emerging clean energy technologies a higher priority, it still faces real roadblocks in developing relationships with the companies that make them. Many clean energy innovations are developed by small businesses or companies that have no previous experience working with military procurement officers. Conversely, many procurement officers do not know the clean energy sector and are not incentivized to develop relationships with emerging clean energy companies. Given the stakes in developing domestic technologies that would help reduce costs and improve mission success, the Pentagon should develop a program to encourage a better flow of information between procurement officers and clean energy companies—especially small businesses. Leverage Savings From Efficiency and Alternative Financing to Pay for Innovation. **In an age of government-wide austerity and tight** Pentagon **budgets**, current congressional **appropriations are simply not sufficient** to fund clean energy innovation. **Until Congress decides to direct additional resources** for this purpose, the **Defense** Department **must leverage** the money and other **tools it already has** to help develop clean energy. This can take two forms: repurposing money that was saved through energy efficiency programs for innovation and using alternative methods of financing to reduce the cost to the Pentagon of deploying clean energy. For several decades **the military has made** modest **use alternative financing** mechanisms t**o fund** clean **energy** and efficiency **projects when appropriated funds were insufficient**. In a 2010 report, GAO found that while only 18% of renewable energy projects on DoD lands used alternative financing, these projects account for 86% of all renewable energy produced on the Department’s property.33 This indicates that alternative financing can be particularly helpful to DoD in terms of bringing larger and more expensive projects to fruition. One advanced financing tool available to DoD is the energy savings performance contract (ESPC). These agreements allow DoD to contract a private firm to make upgrades to a building or other facility that result in energy savings, reducing overall energy costs without appropriated funds. The firm finances the cost, maintenance and operation of these upgrades and recovers a profit over the life of the contract. While mobile applications consume 75% of the Department’s energy,34 DoD is only authorized to enter an ESPC for energy improvements done at stationary sites. As such, Congress should allow DoD to conduct pilot programs in which ESPCs are used to enhance mobile components like aircraft and vehicle engines. This could accelerate the needed replacement or updating of aging equipment and a significant reduction of energy with no upfront cost. To maximize the potential benefits of ESPCs, DoD should work with the Department of Energy to develop additional training and best practices to ensure that terms are carefully negotiated and provide benefits for the federal government throughout the term of the contract.35 This effort could possibly be achieved through the existing memorandum of understanding between these two departments.36 The Pentagon should also consider using any long-term savings realized by these contracts for other energy purposes, including the promotion of innovative technologies to further reduce demand or increase general energy security. In addition to ESPCs, **the Pentagon** also **can enter into** extended agreements with utilities to use DoD land to generate electricity, or for the **long-term purchase of energy**. **These** **innovative financing mechanisms**, known respectively as enhanced use leases (EULs) and power purchase agreements (PPAs), **provide a valuable degree of certainty to third party generators**. In exchange, the **Department can leverage its existing resources**—either its land or its purchasing power—**to negotiate lower electricity rates** and dedicated sources of locallyproduced power with its utility partners. **DoD has** unique authority **among federal agencies to enter extended 30-year PPAs**, but only for geothermal energy projects and only with direct approval from the Secretary of Defense. Again, limiting incentives for clean energy generation to just geothermal power inhibits the tremendous potential of other clean energy sources to help meet DoD’s energy goals. Congress should consider opening this incentive up to other forms of clean energy generation, including the production of advanced fuels. Also, given procurement officials’ lack of familiarity with these extended agreements and the cumbersome nature of such a high-level approval process, the unique authority to enter into extended 30-year PPAs is very rarely used.37 DoD should provide officials with additional policy guidance for using extended PPAs and Congress should simplify the process by allowing the secretary of each service to approve these contracts. Congress should also investigate options for encouraging regulated utility markets to permit PPA use by DoD. Finally, when entering these agreements, the Department should make every effort to promote the use of innovative and fledgling technologies in the terms of its EULs and PPAs. CON C L U S ION **The Defense Department is in a unique position to foster and deploy innovation in clean energy technologies**. This has two enormous benefits for our military: it will make our troops and our facilities more secure and it will reduce the amount of money the Pentagon spends on energy, freeing it up for other mission critical needs. If the right steps are taken by Congress and the Pentagon, the military will be able to put its resources to work developing technologies that will lead to a stronger fighting force, a safer nation, and a critical emerging sector of the American economy. **The Defense Department has helped give birth to technologies and new economic sectors dozens of times before**. For its own sake and the sake of the economy, **it should make clean energy innovation its newest priority**.

#### DoD needs to lead

Energy Washington Week 10

(“DOD STRESSING NEED FOR NRC COLLABORATION ON 'MINI' REACTOR BUILD OUT” July 5, 2010, Vol. 7 No. 27)

The U.S. Army is rejecting arguments by some industry and government officials who say military bases could proceed to build small modular reactors (SMRs) on military bases without Nuclear Regulatory Commission (NRC) certification and license approvals. Instead, the Department of Defense (DOD) believes it must work closely with NRC and that legislation will likely be needed to clearly define the various agency roles before the novel nuclear energy systems are constructed, according to DOD and industry sources. A senior DOD source also says that a collaborative arrangement between DOE, DOD, and NRC will be needed to begin constructing reactors that currently have not been licensed by the NRC -- including all prominent SMR models being examined by the three agencies for potential licensing and deployment. Small reactor industry and government proponents have been struggling to find ways to accelerate the development of small reactors, including through the use of military bases as a test bed for building and demonstrating the reactors ahead of NRC certification of SMR designs, according to industry sources, who note that NRC approval is required before a utility can apply for a license to build a small reactor. One senior industry consultant says **the NRC does not have authority over military bases and therefore a non-certified reactor could be built there without the technology being vetted by NRC.** While industry proponents want NRC certification, they see it as slow because of a lack of resources to review the new reactors and certify the designs, says the industry consultant. **Building the reactors on military bases would help demonstrate SMR functionality** that would eventually help accelerate commercial licensing, says the source.

#### SMR’s are safe

Ringle 10

(John C. Ringle of Corvallis is professor emeritus of nuclear engineering at Oregon State University, “Reintroduction of reactors in US a major win” November 13, 2010, http://robertmayer.wordpress.com/2010/11/21/reintroduction-of-reactors-in-us-a-major-win/)

Small nuclear reactors will probably be the mechanism that ushers in nuclear power’s renaissance in the U.S. Nuclear plants currently supply about 20 percent of the nation’s electricity and more than 70 percent of our carbon-free energy. But large nuclear plants c ost $8 billion to $10 billion and utilities are having second thoughts about how to finance these plants. A small modular reactor (SMR) has several advantages over the conventional 1,000-megawatt plant: 1. It ranges in size from 25 to 140 megawatts, hence only costs about a tenth as much as a large plant. 2. It uses a cookie-cutter standardized design to reduce construction costs and can be built in a factory and shipped to the site by truck, railroad or barge. 3. The major parts can be built in U.S. factories, unlike some parts for the larger reactors that must be fabricated overseas. 4. Because of the factory-line production, the SMR could be built in three years with one-third of the workforce of a large plant. 5. More than one SMR could be clustered together to form a larger power plant complex. This provides versatility in operation, particularly in connection with large wind farms. With the variability of wind, one or more SMRs could be run or shut down to provide a constant base load supply of electricity. 6. A cluster of SMRs should be very reliable. One unit could be taken out of service for maintenance or repair without affecting the operation of the other units. And since they are all of a common design, replacement parts could satisfy all units. France has already proved the reliability of standardized plants. At least half a dozen companies are developing SMRs, including NuScale in Oregon. NuScale is American-owned and its 45-megawatt design has some unique features. It is inherently safe. It could be located partially or totally below ground, and with its natural convection cooling system, it does not rely on an elaborate system of pumps and valves to provide safety. There is no scenario in which a loss-of-coolant accident could occur. Tests conducted on a one-third model of the NuScale reactor at Oregon State University have confirmed the effectiveness of this cooling system. Small reactors haven’t been built for commercial use since the very early days of nuclear power development, when the very first power reactors were of this size. For more than 50 years, however, small reactors have been built and operated successfully and safely by the Navy in submarines and aircraft carriers. The Nuclear Regulatory Commission anticipates getting applications from two to three companies within the next two years for approval of SMR designs. Energy Secretary

# 2AC

## Grid

Not politically viable

Downey, Lt Col – USAFR, Forestier, Wg Cdr – RAAF, and Miller, Lt Col – USAF, April ‘4

(James, Anthony, and David, “Flying Reactors: The Political Feasibility of Nuclear Power in Space,” A Research Report Submitted to Air Force Fellows, CADRE/AR In Partial Fulfillment of the Graduation Requirements)

For more than 50 years the United States has explored the possibility of space borne

nuclear fission reactors. The advantages of reactors are light weight, high power, long life, and

lower comparative costs. A nuclear reactor could simultaneously support large space vehicle

electrical power requirements, and enable either electric or ionic propulsion. Nevertheless as

technologically attractive as Space Nuclear Power (SNP) may be as a mission enabling

technology, the use of SNP systems is currently politically challenging. Today, the United States

has **no** active SNP systems, although there are missions that would benefit from SNP technology.

Conclusions and Recommendations

• Modern society is risk adverse, especially so regarding nuclear technologies.

• Carte blanche permission for the U.S. government to develop nuclear

technologies has been withdrawn.

• For SNP to be feasible there must be a compelling mission requirement and a

reasonable level of popular political support.

• The Values-Focused Decision Strategy should be employed by both NASA and

Department of Defense SNP missions.

• NASA should carry SNP public policy forward with a focus on deep space

explorationa mission that requires SNP technology.

• Department of Defense also has a strong case for SNP arising from emerging

security concerns and should leverage NASA’s experience.

This paper advocates a Values-Focused Decision Strategy for SNP within a transscientific

context. If properly applied, the strategy should improve NASA’s or the Department

of Defense’s chances of satisfying Congress of the political feasibility of an SNP program. The

Values-Focused Decision Strategy outlines a democratically legitimate and scientifically

rigorous mechanism to assist policy-makers in considering SNP as a trans-scientific policy

option.

The Values-Focused decision strategy seeks a reasonable political compromise based on

stakeholder values regarding potential consequences. While the Values-Focused decision

strategy is only one possible approach, experiments using this process indicate that using it

greatly improves the chances of program acceptance over non-participatory decision processes

currently used. The strategy has five steps:

1. Carefully define the decision to be made

2. Identify ‘what matters’ in the context of an impending decision in the form of the

stakeholders’ objectives

3. Create a set of appealing and purposeful alternatives

4. Employ the best available technical information to characterize the consequences

of the alternatives, including the associated uncertainty

5. Carry out an in-depth evaluation of the alternatives addressing the tradeoffs they

entail.

The political environment has changed fundamentally from the Cold War era of the

1950s and 1960s. The Cold War focus was on a monolithic, nuclear capable, external threat that

is now diffused. As a consequence, the tacit permission that was granted to the government by

society during the Cold War to pursue nuclear programs has been curtailed. That is especially

true for programs that are perceived to pose trans-scientific public risks such as SNP.

Ultimately, it was a political judgment that ended every SNP program.

The primary factor influencing the current political debate over SNP is the increasing fear

of technology that has developed in society over the past few decades. Our society perceives

great risk in nuclear technology, yet paradoxically willingly enjoys the benefits. Some

politically active groups perceive cataclysmic outcomes from SNP and are prepared to

**vigorously protest against it, in all of its forms.** SNP opponents claim with some justification

that a failure of a space launch system carrying a nuclear powered space vehicle would produce

the equivalent of a “dirty” nuclear bomb. The reality is likely to be far less dire, but the

perception of excessive risk is in the public arena. Therefore, the political battle is over

perceived risks instead of empirical fact, with the judgment further complicated because not all

of the consequences pertaining to an accident with a nuclear powered vehicle in the Earth’s

atmosphere can be verified by current scientific techniques.

For example, the consequences of a nuclear payload breaking up in the Earth’s

atmosphere cannot today be empirically quantified. Therefore, experts have considerable scope

to argue over the risk. Program opponents and proponents use their own experts to present risk

analyses that cover an extraordinarily broad range. The trans-scientific doubt about the SNP

enterprise also places the policy-maker in the unenviable position of needing to make a decision

without sufficient empirical data.

Meanwhile, the unscientific public remains unaware or unconvinced of the reward of the

enterprise being supported by the nuclear power source and certainly uncomfortable with the

potential risks. As well, **they are not sure about the relative merit of a nuclear power source** for

space applications versus competing technologies.

Looking towards the future, the policy-maker must consider emerging missions that will

require SNP to be feasible. Such missions include space science undertaken by NASA, and

national security undertaken by the Department of Defense. The first proposed scientific mission

is NASA’s Jupiter Icy Moon Orbiter (JIMO) planned for 2012. JIMO is designed to search for

the precursors of life in the waters under the surface ice on Jupiter’s moons Callisto, Ganymede,

and Europa. For Department of Defense, SNP-enabled hyper-spectral satellites could transform

space based intelligence, surveillance and reconnaissance (ISR) improving U.S. and allied

security profoundly.

If SNP is necessary for the U.S. to extend space based capabilities for science and

security, then a political engagement strategy is required because nuclear SNP is a scientific

problem that has entered the political realm of trans-science. Similar to other nuclear

technologies, SNP has significant political risks that cannot be scientifically verified. Therefore,

we believe that the most certain way to cultivate the unscientific public’s trust is to improve both

the underlying safety and robustness of nuclear and space technologies while engaging the public

politically in an open and democratically transparent way.

## UAVs

#### Pursuit of hegemony’s locked-in

Zach Dorfman 12, assistant editor of Ethics and International Affairs, the journal of the Carnegie Council, and co-editor of the Montreal Review, “What We Talk About When We Talk About Isolationism”, May 18, <http://dissentmagazine.org/online.php?id=605>

The rise of China notwithstanding, the United States remains the world’s sole superpower. Its military (and, to a considerable extent, political) hegemony extends not just over North America or even the Western hemisphere, but also Europe, large swaths of Asia, and Africa. Its interests are global; nothing is outside its potential sphere of influence. There are an estimated 660 to 900 American military bases in roughly forty countries worldwide, although figures on the matter are notoriously difficult to ascertain, largely because of subterfuge on the part of the military. According to official data there are active-duty U.S. military personnel in 148 countries, or over 75 percent of the world’s states. The United States checks Russian power in Europe and Chinese power in South Korea and Japan and Iranian power in Iraq, Afghanistan, and Turkey. In order to maintain a frigid peace between Israel and Egypt, the American government hands the former $2.7 billion in military aid every year, and the latter $1.3 billion. It also gives Pakistan more than $400 million dollars in military aid annually (not including counterinsurgency operations, which would drive the total far higher), Jordan roughly $200 million, and Colombia over $55 million. U.S. long-term military commitments are also manifold. It is one of the five permanent members of the UN Security Council, the only institution legally permitted to sanction the use of force to combat “threats to international peace and security.” In 1949 the United States helped found NATO, the first peacetime military alliance extending beyond North and South America in U.S. history, which now has twenty-eight member states. The United States also has a trilateral defense treaty with Australia and New Zealand, and bilateral mutual defense treaties with Japan, Taiwan, the Philippines, and South Korea. It is this sort of reach that led Madeleine Albright to call the United States the sole “indispensible power” on the world stage. The idea that global military dominance and political hegemony is in the U.S. national interest—and the world’s interest—is generally taken for granted domestically. Opposition to it is limited to the libertarian Right and anti-imperialist Left, both groups on the margins of mainstream political discourse. Today, American supremacy is assumed rather than argued for: in an age of tremendous political division, it is a bipartisan first principle of foreign policy, a presupposition. In this area at least, one wishes for a little less agreement. In Promise and Peril: America at the Dawn of a Global Age, Christopher McKnight Nichols provides an erudite account of a period before such a consensus existed, when ideas about America’s role on the world stage were fundamentally contested. As this year’s presidential election approaches, each side will portray the difference between the candidates’ positions on foreign policy as immense. Revisiting Promise and Peril shows us just how narrow the American worldview has become, and how our public discourse has become narrower still. Nichols focuses on the years between 1890 and 1940, during America’s initial ascent as a global power. He gives special attention to the formative debates surrounding the Spanish-American War, U.S. entry into the First World War, and potential U.S. membership in the League of Nations—debates that were constitutive of larger battles over the nature of American society and its fragile political institutions and freedoms. During this period, foreign and domestic policy were often linked as part of a cohesive political vision for the country. Nichols illustrates this through intellectual profiles of some of the period’s most influential figures, including senators Henry Cabot Lodge and William Borah, socialist leader Eugene Debs, philosopher and psychologist William James, journalist Randolph Bourne, and the peace activist Emily Balch. Each of them interpreted isolationism and internationalism in distinct ways, sometimes deploying the concepts more for rhetorical purposes than as cornerstones of a particular worldview. Today, isolationism is often portrayed as intellectually bankrupt, a redoubt for idealists, nationalists, xenophobes, and fools. Yet the term now used as a political epithet has deep roots in American political culture. Isolationist principles can be traced back to George Washington’s farewell address, during which he urged his countrymen to steer clear of “foreign entanglements” while actively seeking nonbinding commercial ties. (Whether economic commitments do in fact entail political commitments is another matter.) Thomas Jefferson echoed this sentiment when he urged for “commerce with all nations, [and] alliance with none.” Even the Monroe Doctrine, in which the United States declared itself the regional hegemon and demanded noninterference from European states in the Western hemisphere, was often viewed as a means of isolating the United States from Europe and its messy alliance system. In Nichols’s telling, however, modern isolationism was born from the debates surrounding the Spanish-American War and the U.S. annexation of the Philippines. Here isolationism began to take on a much more explicitly anti-imperialist bent. Progressive isolationists such as William James found U.S. policy in the Philippines—which it had “liberated” from Spanish rule just to fight a bloody counterinsurgency against Philippine nationalists—anathema to American democratic traditions and ideas about national self-determination. As Promise and Peril shows, however, “cosmopolitan isolationists” like James never called for “cultural, economic, or complete political separation from the rest of the world.” Rather, they wanted the United States to engage with other nations peacefully and without pretensions of domination. They saw the United States as a potential force for good in the world, but they also placed great value on neutrality and non-entanglement, and wanted America to focus on creating a more just domestic order. James’s anti-imperialism was directly related to his fear of the effects of “bigness.” He argued forcefully against all concentrations of power, especially those between business, political, and military interests. He knew that such vested interests would grow larger and more difficult to control if America became an overseas empire. Others, such as “isolationist imperialist” Henry Cabot Lodge, the powerful senator from Massachusetts, argued that fighting the Spanish-American War and annexing the Philippines were isolationist actions to their core. First, banishing the Spanish from the Caribbean comported with the Monroe Doctrine; second, adding colonies such as the Philippines would lead to greater economic growth without exposing the United States to the vicissitudes of outside trade. Prior to the Spanish-American War, many feared that the American economy’s rapid growth would lead to a surplus of domestic goods and cause an economic disaster. New markets needed to be opened, and the best way to do so was to dominate a given market—that is, a country—politically. Lodge’s defense of this “large policy” was public and, by today’s standards, quite bald. Other proponents of this policy included Teddy Roosevelt (who also believed that war was good for the national character) and a significant portion of the business class. For Lodge and Roosevelt, “isolationism” meant what is commonly referred to today as “unilateralism”: the ability for the United States to do what it wants, when it wants. Other “isolationists” espoused principles that we would today call internationalist. Randolph Bourne, a precocious journalist working for the New Republic, passionately opposed American entry into the First World War, much to the detriment of his writing career. He argued that hypernationalism would cause lasting damage to the American social fabric. He was especially repulsed by wartime campaigns to Americanize immigrants. Bourne instead envisioned a “transnational America”: a place that, because of its distinct cultural and political traditions and ethnic diversity, could become an example to the rest of the world. Its respect for plurality at home could influence other countries by example, but also by allowing it to mediate international disputes without becoming a party to them. Bourne wanted an America fully engaged with the world, but not embroiled in military conflicts or alliances. This was also the case for William Borah, the progressive Republican senator from Idaho. Borah was an agrarian populist and something of a Jeffersonian: he believed axiomatically in local democracy and rejected many forms of federal encroachment. He was opposed to extensive immigration, but not “anti-immigrant.” Borah thought that America was strengthened by its complex ethnic makeup and that an imbalance tilted toward one group or another would have deleterious effects. But it is his famously isolationist foreign policy views for which Borah is best known. As Nichols writes: He was consistent in an anti-imperialist stance against U.S. domination abroad; yet he was ambivalent in cases involving what he saw as involving obvious national interest….He also without fail argued that any open-ended military alliances were to be avoided at all costs, while arguing that to minimize war abroad as well as conflict at home should always be a top priority for American politicians. Borah thus cautiously supported entry into the First World War on national interest grounds, but also led a group of senators known as “the irreconcilables” in their successful effort to prevent U.S. entry into the League of Nations. His paramount concern was the collective security agreement in the organization’s charter: he would not assent to a treaty that stipulated that the United States would be obligated to intervene in wars between distant powers where the country had no serious interest at stake. Borah possessed an alternative vision for a more just and pacific international order. Less than a decade after he helped scuttle American accession to the League, he helped pass the Kellogg-Briand Pact (1928) in a nearly unanimous Senate vote. More than sixty states eventually became party to the pact, which outlawed war between its signatories and required them to settle their disputes through peaceful means. Today, realists sneer at the idealism of Kellogg-Briand, but the Senate was aware of the pact’s limitations and carved out clear exceptions for cases of national defense. Some supporters believed that, if nothing else, the law would help strengthen an emerging international norm against war. (Given what followed, this seems like a sad exercise in wish-fulfillment.) Unlike the League of Nations charter, the treaty faced almost no opposition from the isolationist bloc in the Senate, since it did not require the United States to enter into a collective security agreement or abrogate its sovereignty. This was a kind of internationalism Borah and his irreconcilables could proudly support. The United States today looks very different from the country in which Borah, let alone William James, lived, both domestically (where political and civil freedoms have been extended to women, African Americans, and gays and lesbians) and internationally (with its leading role in many global institutions). But different strains of isolationism persist. Newt Gingrich has argued for a policy of total “energy independence” (in other words, domestic drilling) while fulminating against President Obama for “bowing” to the Saudi king. While recently driving through an agricultural region of rural Colorado, I saw a giant roadside billboard calling for American withdrawal from the UN. Yet in the last decade, the Republican Party, with the partial exception of its Ron Paul/libertarian faction, has veered into such a belligerent unilateralism that its graybeards—one of whom, Senator Richard Lugar of Indiana, just lost a primary to a far-right challenger partly because of his reasonableness on foreign affairs—were barely able to ensure Senate ratification of a key nuclear arms reduction treaty with Russia. Many of these same people desire a unilateral war with Iran. And it isn’t just Republicans. Drone attacks have intensified in Yemen, Pakistan, and elsewhere under the Obama administration. Massive troop deployments continue unabated. We spend over $600 billion dollars a year on our military budget; the next largest is China’s, at “only” around $100 billion. Administrations come and go, but the national security state appears here to stay.

## warming

#### Coal use is decreasing globally—plan is key to CO2 reduction

Levine 9/24/12

Steve, Quartz’s Washington correspondent, writes about the intersection of energy, technology and geopolitics, a juncture of some of the most important and quickly developing events and trends on the planet. LeVine teaches the subject as an adjunct professor in Georgetown University’s Security Studies Program in the Graduate School of Foreign Service. He is a Schwartz Fellow at the New America Foundation. LeVine comes to the beat after 18 years as a foreign correspondent in the former Soviet Union, Afghanistan, Pakistan and the Philippines, where he wrote for The Wall Street Journal, The New York Times, the Financial Times, and Newsweek. Most recently, LeVine founded and ran The Oil and the Glory, a blog on energy and geopolitics at Foreign Policy magazine. He is the author of two books: The Oil and the Glory, a history of oil told through the 1990s-2000s oil rush on the Caspian Sea; and Putin’s Labyrinth, a profile of Russia through the lives and deaths of six Russians, “Five ways a new age of cheap energy could shift the power balance on the planet,” <http://qz.com/3416/five-ways-a-new-age-of-cheap-energy-could-shift-the-power-balance-on-the-planet-2/>, AM

Yet the age of abundance also brings with it some changes in the way energy is produced and consumed. Moving from coal- to gas-burning power plants has reduced US greenhouse gas emissions to a projected 5.2 billion tons in 2012, according to the International Energy Agency. That is the lowest level since 1992. The greenhouse gas buildup won’t start to abate until 2030, when experts forecast that the emerging world’s consumption of coal and oil will begin a long decline, and most of the growth until then will come from China. But, as I’ve suggested, environmental protests could make Beijing accelerate its efforts to burn less coal, which produces three times as much CO2 as natural gas. Fridley’s China Energy Group at Lawrence Berkeley has built a climate model that suggests that China take further measures, such as greater efficiencies and the replacement of dirty power plants with non-polluting sources of electricity including nuclear. “The results [of the model] show a plateauing of emissions in the 2020s as a result with absolute declines” in CO2, Fridley told me by email.

#### SO2 leads to warming

World Climate Report 5 (4/22 “Change of Direction: Do SO2 Emissions Lead to Warming?”

<http://www.worldclimatereport.com/index.php/2005/04/22/change-of-direction-do-so2-emissions-lead-to-warming/>)

Many scientists believe that sulfur dioxide emissions, either from un-scrubbed power plants or from large-scale agricultural burning, serve to cool the planet’s surface temperature. The cooling mechanism is fairly straightforward. Sulfur dioxide is transformed in the atmosphere into sulfate aerosol, a fine particle that reflects away the sun’s radiation. The particles also serve as the condensation nuclei for cloud droplets which also reflect away the sun’s energy. On the other hand, no one really knows the magnitude of these cooling effects (if any). So we have argued that sulfate cooling is simply a fudge factor put into climate models in order to chill the overly- hot projections they make if left to their own devices. Now comes evidence that sulfur dioxide actually can enhance global warming. While this doesn’t mean that sulfates aren’t also cooling things by reflecting away radiation, the parent, sulfur dioxide, can do some other things that make the surface warmer. According to research just published in Geophysical Research Letters by J. Notholt and his co-authors, sulfur dioxide is converted to sulfuric acid (remember “acid rain”?), which leads to more ice crystals in the upper atmosphere. Some of these are eventually lifted upwards into the stable stratosphere where they increase the amount of water vapor found there. Water vapor in the stratosphere serves as a greenhouse gas and is involved in the destruction of ozone, resulting in a stratospheric cooling and a warming of the lower atmosphere and surface.

#### Aerosols from volcanos account for their impact—assumes satellite data

Vernier et al ‘11

J.P., NASA Langley Research Center, Hampton, Virginia, USA LATMOS, CNRS, INSU, Université de Versailles Saint Quentin, Université de Paris 6, Guyancourt, France L. W. Thomason NASA Langley Research Center, Hampton, Virginia, USA J.-P. Pommereau LATMOS, CNRS, INSU, Université de Versailles Saint Quentin, Université de Paris 6, Guyancourt, France A. Bourassa Institute of Space and Atmospheric Studies, University of Saskatchewan, Saskatoon, Saskatchewan, Canada J. Pelon, A. Garnier, and A. Hauchecorne LATMOS, CNRS, INSU, Université de Versailles Saint Quentin, Université de Paris 6, Guyancourt, France L. Blanot LATMOS, CNRS, INSU, Université de Versailles Saint Quentin, Université de Paris 6, Guyancourt, France ACRI-ST, Sophia-Antipolis, France C. Trepte NASA Langley Research Center, Hampton, Virginia, USA Doug Degenstein Institute of Space and Atmospheric Studies, University of Saskatchewan, Saskatoon, Saskatchewan, Canada F. Vargas Institute for Research and Development, Paraiba Valley University, São José dos Campos, Brazil, “Major influence of tropical volcanic eruptions on the stratospheric aerosol layer during the last decade,” GEOPHYSICAL RESEARCH LETTERS, VOL. 38, L12807, 8 PP., 2011, AM)

The variability of stratospheric aerosol loading between 1985 and 2010 is explored with measurements from SAGE II, CALIPSO, GOMOS/ENVISAT, and OSIRIS/Odin space-based instruments. We find that, following the 1991 eruption of Mount Pinatubo, stratospheric aerosol levels increased by as much as two orders of magnitude and only reached “background levels” between 1998 and 2002. From 2002 onwards, a systematic increase has been reported by a number of investigators. Recently, the trend, based on ground-based lidar measurements, has been tentatively attributed to an increase of SO2 entering the stratosphere associated with coal burning in Southeast Asia. However, we demonstrate with these satellite measurements that the observed trend is mainly driven by a series of moderate but increasingly intense volcanic eruptions primarily at tropical latitudes. These events injected sulfur directly to altitudes between 18 and 20 km. The resulting aerosol particles are slowly lofted into the middle stratosphere by the Brewer-Dobson circulation and are eventually transported to higher latitudes.

## T—Procurement

#### We meet

Webb 93 – lecturer in the Faculty of Law at the University of Ottawa (Kernaghan, “Thumbs, Fingers, and Pushing on String: Legal Accountability in the Use of Federal Financial Incentives”, 31 Alta. L. Rev. 501 (1993) Hein Online)

In this paper, "financial incentives" are taken to mean disbursements 18 of public funds or contingent commitments to individuals and organizations, intended to encourage, support or induce certain behaviours in accordance with express public policy objectives. They take the form of grants, contributions, repayable contributions, loans, loan guarantees and insurance, subsidies, procurement contracts and tax expenditures.19 Needless to say, the ability of government to achieve desired behaviour may vary with the type of incentive in use: up-front disbursements of funds (such as with contributions and procurement contracts) may put government in a better position to dictate the terms upon which assistance is provided than contingent disbursements such as loan guarantees and insurance. In some cases, the incentive aspects of the funding come from the conditions attached to use of the monies.20 In others, the mere existence of a program providing financial assistance for a particular activity (eg. low interest loans for a nuclear power plant, or a pulp mill) may be taken as government approval of that activity, and in that sense, an incentive to encourage that type of activity has been created.21 Given the wide variety of incentive types, it will not be possible in a paper of this length to provide anything more than a cursory discussion of some of the main incentives used.22 And, needless to say, the comments made herein concerning accountability apply to differing degrees depending upon the type of incentive under consideration.

By limiting the definition of financial incentives to initiatives where *public funds are either disbursed or contingently committed*, a large number of regulatory programs with incentive *effects* which exist, but in which no money is forthcoming,23 are excluded from direct examination in this paper. Such programs might be referred to as *indirect* incentives. Through elimination of indirect incentives from the scope of discussion, thedefinition of the incentive instrument becomes both more manageable and more particular. Nevertheless, it is possible that much of the approach taken here may be usefully applied to these types of indirect incentives as well.24 Also excluded from discussion here are social assistance programs such as welfare and *ad hoc* industry bailout initiatives because such programs are not designed primarily to *encourage* behaviours in furtherance of specific public policy objectives. In effect, these programs are assistance, but they are not incentives.

#### C/I—financial incentives are a transfer of economic resources or market creation

EIA 1 (Renewable Energy 2000: Issues and Trends, Report prepared by the US Energy Information Administration, “Incentives, Mandates, and Government Programs for Promoting Renewable Energy”, http://tonto.eia.doe.gov/ftproot/renewables/06282000.pdf)

Over the years, incentives and mandates for renewable energy have been used to advance different energy policies, such as ensuring energy security or promoting environmentally benign energy sources. Renewable energy has beneficial attributes, such as low emissions and replenishable energy supply, that are not fully reflected in the market price. Accordingly, governments have used a variety of programs to promote renewable energy resources, technologies, and renewable-based transportation fuels.1 This paper discusses: (1) financial incentives and regulatory mandates used by Federal and State governments and Federal research and develop- ment (R&D),2, 3 and (2) their effectiveness in promoting renewables. A financial incentive is defined in this report as providing one or more of the following benefits: • A **transfer of economic resources** by the Government to the buyer or seller of a good or service that has the effect of reducing the price paid, or, increasing the price received, respectively; • Reducing the cost of production of the good or service; or, • **Creating or expanding a market for producers**. The intended effect of a financial incentive is to increase the production or consumption of the good or service over what it otherwise would have been without the incentive. Examples of financial incentives are: tax credits, production payments, trust funds, and low-cost loans. Research and development is included as a support program because its effect is to decrease cost, thus enhancing the commercial viability of the good(s) provided.4

#### DOE agrees

Waxman 98 – Solicitor General of the US (Seth, Brief for the United States in Opposition for the US Supreme Court case HARBERT/LUMMUS AGRIFUELS PROJECTS, ET AL., PETITIONERS v. UNITED STATES OF AMERICA, http://www.justice.gov/osg/briefs/1998/0responses/98-0697.resp.opp.pdf)

2 On November 15, 1986, Keefe was delegated “the authority, with respect to actions valued at $50 million or less, to approve, execute, enter into, modify, administer, closeout, terminate and take any other necessary and appropriate action (collectively, ‘Actions’) with respect to Financial Incentive awards.” Pet. App. 68, 111-112. Citing DOE Order No. 5700.5 (Jan. 12, 1981), the delegation defines “Financial Incentives” as the authorized financial incentive programs of DOE, “including direct loans, loan guarantees, purchase agreements, price supports, guaranteed market agreements and any others which may evolve.” The delegation proceeds to state, “[h]owever, a separate prior written approval of any such action must be given by or concurred in by Keefe to accompany the action.” The delegation also states that its exercise “shall be governed by the rules and regulations of [DOE] and policies and procedures prescribed by the Secretary or his delegate(s).” Pet. App. 111-113.

## Biofuels

#### Military PPAs now

ELP, Electric Light & Power Editors, 1/28/13, U.S. Army renewable energy initiative advances, www.elp.com/articles/2013/01/u-s--army-renewable-energy-initiative-advances.html

With plans to issue solicitations for three renewable energy projects before the end of the year, after recently releasing requests for proposals (RFPs) for two others, the U.S. Army has taken a step toward its goal to produce 1 GW of renewable energy at its installations by 2025. At the same time, the Energy Initiatives Task Force — the Army's one-stop office for implementing large-scale projects at its installations — and the Army Corps of Engineers are evaluating industry responses to the multi-award task order contract (MATOC) RFP issued last year. The Army intends to rely on the MATOC to procure $7 billion worth of renewable energy — using solar, wind, geothermal and biomass technologies — through power purchase agreements lasting up to 30 years. The Army this week said it plans to announce awards under that procurement before the end of the second quarter of fiscal 2013, with all awards completed by the end of the calendar year, according to the office of the assistant secretary for installations, energy and environment. Meanwhile, the task force plans to carry out RFPs or enhanced use leases for projects at Fort Bliss, Texas, Fort Irwin, Calif., and Schofield Barracks, Hawaii, in 2013. At Fort Bliss, officials are planning a 20 MW solar photovoltaic project that will be carried out in partnership with El Paso Electric utility. Initially the system will provide peak off-grid power; plans, however, call for it to be integrated with a microgrid and offer the post complete energy security. In October, the Army and the Hawaiian Electric Company signed a memorandum of understanding for the utility to lease Army land to build and operate a 52-megawatt, biodiesel-fired power plant on Oahu intended to increase energy security for the Army.

#### Biofuels specifically cut

Voegele 3/18/13

Erin, Biomass magazine, “Toomey amendments would reallocate military funding for biofuels,” http://www.biomassmagazine.com/articles/8742/toomey-amendments-would-reallocate-military-funding-for-biofuels

On March 14, Sen. Pat Toomey, R-Pa., filed two amendments that aim to strip biofuel spending from H.R. 933, a military appropriations bill. The bill, titled the “Department of Defense, Military Construction and Veterans Affairs, and Full-Year Continuing Appropriations Act, 2013,” is being considered by the Senate. According to a statement posted to the U.S. Senate Democrats website, the Senate was unable to reach an agreement to vote in relation to the Toomey amendments last week. Additional action on the bill is expected to be taken today. One amendment offered by Toomey would transfer $60 million in funding currently allocated for the U.S. Department of Defense’s biofuel program under the heading for advanced drop-in biofuel production, and reassign it to support military operation and maintenance expenses of the DOD in connection with programs, projects and activities in the continental United States. The second amendment would reduce the amount of funding allocated to the military’s alternative energy research by a total of $114 million. The funding would also be reallocated for operation and maintenance expenses. Of the $114 million, $37 would be stripped from allocations to the Army, $40 million from allocations made to the Navy, and $37 from allocations for the Air Force.

#### Budget already mis-aligned and new platforms thump the link

Maren Leed, CSIS senior adviser, Harold Brown Chair in Defense Policy Studies and Ground Forces Dialogue, 1/25/13, A Defense Strategy We Can Afford, csis.org/publication/critical-questions-2013-defense-and-security#a

The coming of the new year has left the specter of sequestration still hanging over the Department of Defense (DoD), making it nearly impossible to look beyond the immediate budget challenges. But 2013 will be a difficult year for the Pentagon for many other, and in some cases even more fundamental, reasons. Once a new secretary of defense is confirmed, he or she will be faced with an unpleasant reality that may be difficult to acknowledge: DoD’s current strategy can’t be fully executed. Today’s strategy has two principal and related vectors: assuring access to the “global commons,” especially the sea, space and cyber lanes that support trade and commerce, and a greater relative emphasis on the Pacific (followed by the Middle East). Unfortunately, the current plans to support these strategic ends are unaffordable. As presently envisioned, DoD is planning major investments in extremely expensive air and maritime platforms that cannot realistically fit within planned resources, **let alone when further reductions of still undetermined magnitude are taken**. These challenges are only further exacerbated by a **sclerotic acquisition** system, and a major knowledge gap between government customers and private sector suppliers. Compound these problems with the politically vexing but inevitable battles over the balance between active and reserve forces and between the military services competing for missions and resources, and it becomes clearer why the ends, ways, and means for supporting our strategic aims are already misaligned.

#### Cost inflation

Clark Murdock, CSIS Senior Adviser, Defense and National Security Group, 1/25/13, Living within Our Means: Redefining Defense Priorities for an Era of Limited Resources, csis.org/publication/critical-questions-2013-defense-and-security#b

This is because DoD will be faced not only with declining defense dollars but also weakening defense dollars in terms of **purchasing power**. As DoD’s January 2012 white paper, Defense Budget Priorities and Choices, noted, “Within the base budget alone…personnel costs increased by nearly 90 percent or about 30 percent above inflation [since 2001], while the number of military personnel has increased by only about 3 percent.” Inflation within the operations and maintenance (O&M) account is similarly rampant. And in the absence of heroic reform efforts, the aggregate inflation within these accounts will place increasingly acute pressure on modernization (procurement and research, development, test, and evaluation [RDT&E]), in turn impacting the nation’s ability to adhere to its current set of defense strategies and priorities.

## Adv CP

#### SMRs solve inevitable water wars

Palley ‘11

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

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

#### That solves indo-pak water wars that go nuclear.

Zahoor ‘11

(Musharaf, is researcher at Department of Nuclear Politics, National Defence University, Islamabad, “Water crisis can trigger nuclear war in South Asia,” <http://www.siasat.pk/forum/showthread.php?77008-Water-Crisis-can-Trigger-Nuclear-War-in-South-Asia>, AM)

South Asia is among one of those regions where water needs are growing disproportionately to its availability. The high increase in population besides large-scale cultivation has turned South Asia into a water scarce region. The two nuclear neighbors Pakistan and India share the waters of Indus Basin. All the major rivers stem from the Himalyan region and pass through Kashmir down to the planes of Punjab and Sindh empty into Arabic ocean. It is pertinent that the strategic importance of Kashmir, a source of all major rivers, for Pakistan and symbolic importance of Kashmir for India are maximum list positions. Both the countries have fought two major wars in 1948, 1965 and a limited war in Kargil specifically on the Kashmir dispute. Among other issues, the newly born states fell into water sharing dispute right after their partition. Initially under an agreed formula, Pakistan paid for the river waters to India, which is an upper riparian state. After a decade long negotiations, both the states signed Indus Water Treaty in 1960. Under the treaty, India was given an exclusive right of three eastern rivers Sutlej, Bias and Ravi while Pakistan was given the right of three Western Rivers, Indus, Chenab and Jhelum. The tributaries of these rivers are also considered their part under the treaty. It was assumed that the treaty had permanently resolved the water issue, which proved a nightmare in the latter course. India by exploiting the provisions of IWT started wanton construction of dams on Pakistani rivers thus scaling down the water availability to Pakistan (a lower riparian state). The treaty only allows run of the river hydropower projects and does not permit to construct such water reservoirs on Pakistani rivers, which may affect the water flow to the low lying areas. According to the statistics of Hydel power Development Corporation of Indian Occupied Kashmir, India has a plan to construct 310 small, medium and large dams in the territory. India has already started work on 62 dams in the first phase. The cumulative dead and live storage of these dams will be so great that India can easily manipulate the water of Pakistani rivers. India has set up a department called the Chenab Valley Power Projects to construct power plants on the Chenab River in occupied Kashmir. India is also constructing three major hydro-power projects on Indus River which include Nimoo Bazgo power project, Dumkhar project and Chutak project. On the other hand, it has started Kishan Ganga hydropower project by diverting the waters of Neelum River, a tributary of the Jhelum, in sheer violation of the IWT. The gratuitous construction of dams by India has created serious water shortages in Pakistan. The construction of Kishan Ganga dam will turn the Neelum valley, which is located in Azad Kashmir into a barren land. The water shortage will not only affect the cultivation but it has serious social, political and economic ramifications for Pakistan. The farmer associations have already started protests in Southern Punjab and Sindh against the non-availability of water. These protests are so far limited and under control. The reports of international organizations suggest that the water availability in Pakistan will reduce further in the coming years. If the situation remains unchanged, the violent mobs of villagers across the country will be a major law and order challenge for the government. The water shortage has also created mistrust among the federative units, which is evident from the fact that the President and the Prime Minister had to intervene for convincing Sindh and Punjab provinces on water sharing formula. The Indus River System Authority (IRSA) is responsible for distribution of water among the provinces but in the current situation it has also lost its credibility. The provinces often accuse each other of water theft. In the given circumstances, Pakistan desperately wants to talk on water issue with India. The meetings between Indus Water Commissioners of Pakistan and India have so far yielded no tangible results. The recent meeting in Lahore has also ended without concrete results. India is continuously using delaying tactics to under pressure Pakistan. The Indus Water Commissioners are supposed to resolve the issues bilaterally through talks. The success of their meetings can be measured from the fact that Pakistan has to knock at international court of arbitration for the settlement of Kishan Ganga hydropower project. The recently held foreign minister level talks between both the countries ended inconclusively in Islamabad, which only resulted in heightening the mistrust and suspicions. The water stress in Pakistan is increasing day by day. The construction of dams will not only cause damage to the agriculture sector but India can manipulate the river water to create inundations in Pakistan. The rivers in Pakistan are also vital for defense during wartime. The control over the water will provide an edge to India during war with Pakistan. The failure of diplomacy, manipulation of IWT provisions by India and growing water scarcity in Pakistan and its social, political and economic repercussions for the country can lead both the countries toward a war. The existent A-symmetry between the conventional forces of both the countries will compel the weaker side to use nuclear weapons to prevent the opponent from taking any advantage of the situation. Pakistan's nuclear programme is aimed at to create minimum credible deterrence. India has a declared nuclear doctrine which intends to retaliate massively in case of first strike by its' enemy. In 2003, India expanded the operational parameters for its nuclear doctrine. Under the new parameters, it will not only use nuclear weapons against a nuclear strike but will also use nuclear weapons against a nuclear strike on Indian forces anywhere. Pakistan has a draft nuclear doctrine, which consists on the statements of high ups. Describing the nuclear thresh-hold in January 2002, General Khalid Kidwai, the head of Pakistan's Strategic Plans Division, in an interview to Landau Network, said that Pakistan will use nuclear weapons in case India occupies large parts of its territory, economic strangling by India, political disruption and if India destroys Pakistan's forces. The analysis of the ambitious nuclear doctrines of both the countries clearly points out that any military confrontation in the region can result in a nuclear catastrophe. The rivers flowing from Kashmir are Pakistan's lifeline, which are essential for the livelihood of 170 million people of the country and the cohesion of federative units. The failure of dialogue will leave no option but to achieve the ends through military means.

#### Biochar doesn’t solve warming

**GAO 11** (Government Accountability Office, “Climate Engineering: Technical Status, Future Directions, and Potential Responses,” Technology Assessment July 2011)

We rated the maturity of biochar and biomass at TRL 2. Ongoing and published research is available on the sustainability of biochar to mitigate global climate change (Woolf et al. 2010). While its proof of concept has been demonstrated in published modeling and experimental results, we found uncertainties in experimental data demonstrating the efficacy of biochar as a net carbon sink. For example, how long the captured CO2 in biochar will remain sequestered is uncertain. Similar to BECS, biochar production by pyrolysis is considered to be a carbon-negative process. Reports show its benefits to soil, but **the current immaturity of biochar sequestration technology precludes it from being practiced on a scale large enough to affect the climate**. Its maximum sustainable potential for reducing net CO2, CH4, and N2O emissions has been estimated at 1–2 gigatons of CO2–C equivalent per year, compared to annual anthropogenic emissions of these greenhouse gases of 15 gigatons of CO2–C equivalent (Laird et al. 2009; Woolf et al. 2010).32 Lehmann and colleagues (2006) quoted a higher future potential of biochar as a carbon sink of 5.5–9.5 gigatons of carbon per year by 2100. The Royal Society views biochar as low in effectiveness because its maximum anticipated reduction in atmospheric CO2 concentration would be only 10–50 ppm by the end of this century compared to a projected atmospheric CO2 concentration of 500 ppm in 2100 (Royal Society 2009). Therefore, **biochar could be viewed as a small-scale contributor to a climate engineering** approach to enhancing the global terrestrial carbon sink (Royal Society 2009). Although producing biochar and storing it in soil have been suggested as a way to abate climate change, provide energy, and increase crop yields, scientists have expressed uncertainty about its global effect and sustainability (Woolf et al. 2010). Its emission balance is **highly variable** and largely depends on the feedstock available, the existing soil fertility, and the local energy needs (Woolf et al. 2010). While biochar and biomass sequestration methods currently represent a trivial carbon sink, experts are researching them as a means of abating climate change and improving soil fertility.

#### Reflectivity doesn’t solve warming

**GAO 11** (Government Accountability Office, “Climate Engineering: Technical Status, Future Directions, and Potential Responses,” Technology Assessment July 2011)

Increasing Earth’s surface reflectivity in deserts, flora, and settled areas has been proposed. Gaskill would double the reflectivity of deserts by covering them with white polyethylene, estimating that up to 12 trillion square meters of Earth’s deserts (about 2 percent of Earth’s surface) would be suitable for reflectivity enhancement (Gaskill 2004; Gaskill n.d.). Similarly, Ridgwell and colleagues proposed increasing the reflectivity of crops by selecting varieties that are glossy or have reflective shapes and structure (Ridgwell et al. 2009). Hamwey proposed to increase the reflectivity of open shrubland, grasslands, and savannah and to double the reflectivity of all human settlements, excluding agricultural land (Hamwey 2007). Akbari, Menon, and Rosenfeld (2009) proposed to increase the reflectivity of urban roofs and pavement. 3.2.4.2 Maturity and potential effectiveness We assessed increased reflectivity of desert technology at TRL 2. Basic principles have been reported and a system concept has been proposed, allowing at least TRL 1, but demonstration of proof of concept has not been reported (Gaskill 2004; Gaskill n.d.), ruling out TRL 3. Having a system concept does not automatically qualify this technology for TRL 2 but it cannot be ruled out given the information available in Gaskill (2004) and Gaskill (n.d.). We assessed technologies for increasing the reflectivity of flora and settled areas at TRL 1 because only basic principles have been reported; the absence of system concepts precluded a rating of TRL 2 (Ridgwell et al. 2009; Hamwey 2007). Technologies for increasing the reflectivity of deserts could potentially be more than 57 percent effective in compensating for global warming from doubled preindustrial CO2. Gaskill proposed to increase reflectivity from 36 to 80 percent over 10 trillion square meters of the 12 trillion square meters of desert areas that he deemed suitable (Gaskill 2004; Gaskill n.d.). The Royal Society’s (2009) and Lenton and Vaughan’s (2009) interpretation of Gaskill corresponded to an effectiveness of 74 percent. Lenton and Vaughan’s refinement of Gaskill’s proposal corresponded to 57 percent effectiveness, accounting for lower average intensity of solar radiation over land and absorption in the atmosphere. However, they also stated that deserts have higher-than-average solar radiation because they are generally in the lower latitudes, so that increased reflectivity would be somewhat more effective (Lenton and Vaughan 2009). Sustaining reflective deserts would require maintenance. Increasing the reflectivity of flora could be up to about 25 percent effective. Ridgwell and colleagues investigated the effect of increasing the reflectivity of crops with a fully coupled climate model (Ridgwell et al. 2009). They focused on an increase of 20 percent, asserting that an increase of 35 percent observed after coating plants with a white chalky suspension provided a first-order guide as to the possible upper limit of reflectivity increase. They found a global average cooling of only 0.11 degrees Celsius. Hamwey investigated increasing the reflectivity of open shrubland, grasslands, and savannah with a static two-dimensional radiative transfer model (Hamwey 2007). His preliminary estimate was that an increase in reflectance of 25 percent corresponded to about 16 percent effectiveness. Lenton and Vaughan interpreted these results with energy balance analyses (Lenton and Vaughan 2009). Following Ridgwell and colleagues, their estimate—using a larger area estimate and a 40 percent increase in reflectance—corresponded to an upper limit of about 9 percent effectiveness. Their interpretation of Hamwey’s data corresponded to essentially the same effectiveness as Hamwey’s—about 16 percent. **Thus the total effectiveness of reflective flora—cropland, open shrubland, grasslands, and savannah combined**, using Lenton and Vaughan’s reinterpretations based on energy balance—**would be up to about 25 percent.**

#### Islanding capability is irrelevant if inputs are intermittent—baseload nuclear power key

Energy Collective, 5/10/12, Replacing nuclear with wind power: Could it be done?, theenergycollective.com/node/84553

Many people would like it to be theoretically possible to replace nuclear power with wind power, since the wind is a free resource. The way that I would like to approach the topic is to not discuss the source of power, but to discuss this question from the perspective of “intermittency.” Stating the question another way: Can an intermittent source replace a baseload power source for producing electricity? This question has nothing to do with how the electricity is generated, but everything to do with when the electricity is generated. The production of electricity involves understanding concepts such as capacity, capacity factor, and generation. These three concepts are often misunderstood and misused when comparing the generation of intermittent electricity with baseload generated electricity. It is sometimes useful to use a familiar analogy when explaining complicated topics. I will, therefore, use the automobile for this analogy, since many of us own a car and everyone is familiar with them. Capacity Here is the analogy: Suppose there is a car on the market that is very environmentally friendly. Its mileage is phenomenal! I call it a “super-green” car. This super-green car has the same horsepower as a conventional car. It will handle steep hills as well as a conventional car. It has the same 0 to 60 mph performance. The only difference is that when you try to start it in the morning, it will only start 25 percent of the time, and you can never predict on which day it will start. It runs, randomly, 25 percent of the time. Would you replace your conventional car with a super-green car to get you to work every day? To keep the analogy simple, let us assume that if the car starts on a particular day, it will also take you home at the end of the workday. If it doesn’t start on a particular day, however, it won’t start that day no matter how often you turn the starter key. To most people, the answer is obvious. Most of us would not hold on to a job very long if we randomly showed up at work only 25 percent of the time. So the answer is no, the super-green car cannot replace the conventional car. Horsepower is the equivalent of capacity in this analogy. An intermittent electrical power source with a capacity (or power capability when it is working) to generate 1000MW cannot replace a conventional power plant with a capacity of 1000MW. Even though the capacities are the same, the power plants are not equivalent. Yet capacity comparisons are made all the time, as if this somehow makes the power plants equivalent. They are not equivalent. Capacity factor Others would say that since the capacity factor is 25 percent (the car works 25 percent of the time), you would just need four cars to reliably get you to work every day. This is also not true, however. There is a chance that none of the cars will work on a particular day. As a matter of fact, this probability can be computed, if the probability of each car not working is independent of the other cars not working. It is 0.75 x 0.75 x 0.75 x 0.75 or (0.75)^4, which is equal to 32 percent. So if you owned four super-green cars, the probability of none of them working on a particular day is 32 percent. So, with four super-green cars, you get to work 68 percent of the time, which is better than 25 percent of the time, but it is still a long way from 100 percent of the time. Another problem with using capacity factor as an equalizing parameter is that there are times when more than one car will start. The extra cars, however, are of no value to you as far as getting to work is concerned. The extra working cars do not average out with the demand to get to work on time each day. They are working at the wrong time. Note that in the case of a wind farm, the probability of each turbine not working is not independent. If the wind doesn’t blow in a particular area, it will affect all wind turbines. The probabilities are not randomly independent. Therefore, wind farms must be in separate weather patterns, in order to significantly reduce the unavailable time. Generation A better equalizing parameter is generation. When the super-green car works, it generates highly economical miles. That parameter has its problems as well, however. The generation of economical miles can be increased simply by taking the long route to work. Those extra economical miles are of no value as far as getting to work is concerned. In the same way, generated electricity has no value unless there is a demand for it at the time that it is generated. This is because electricity has zero shelf-life. It must be consumed when it is generated. So, when generation cost comparisons are made between intermittent and baseload power sources, this presumes that the resulting electricity value is the same. This is actually not the case, because electricity generated when the demand for it is not certain does not have the same value as electricity that is generated when there is demand for it. There is no perfect equalization parameter when making comparisons between intermittent and baseload generated electricity. Capacity is by far the worst, next comes capacity factor, and the best is generation, but it is not perfect. Conclusion So, the conclusion is that intermittently generated electricity cannot replace baseload generation. Just like there is a chance that none of the super-green cars are working on a particular day, there is also a chance that no electricity is generated by an intermittent source. Hence, all the conventional power sources are still needed. Intermittent power sources can be of value, however, because they do save fuel in conventional power plants. But the economics are usually not very good at today’s fuel prices. In the car analogy, I compute that my 20-mile round-trip commute to work would save me about two gallons of gas a month if the super-green car gets double the mileage of my conventional car. At $4 per gallon, that is $8 per month saving. It is obvious that, from an economic point of view, this saving is nowhere near the hundreds of dollars required per month to own an extra car. Similarly, I wrote an article explaining that wind farms cannot be justified on an economic basis, except in Hawaii, where expensive oil is used to generate electricity. But perhaps using intermittent power plants can be justified environmentally. Perhaps not burning fossil fuels is worth the environmental benefit of not releasing as much greenhouse gases. Also, the fossil resource can be saved for other uses such as plastics. That argument breaks down, however, when the baseload generator is nuclear. Nuclear power does not generate greenhouse gases during operation. Saving the uranium for other uses is not applicable, because uranium has no other commercial uses. What exactly would we be saving it for? So, to answer the general question, can wind power replace nuclear? The answer is clearly no. No technology is perfect, and there is always some impact in everything we do. Nuclear has the capability to meet the electrical needs for humanity for a millennia. That is a very compelling reason to use it, versus using a technology that only works intermittently and requires keeping all the conventional generators that we already have.

## 2AC Thorium PIC

#### The DOE agrees—

[Jeff McMahon](http://blogs.forbes.com/jeffmcmahon/), 5/23/2012. Forbes green-tech contributor. “Small Modular Nuclear Reactors By 2022 -- But No Market For Them,” Forbes, http://www.forbes.com/sites/jeffmcmahon/2012/05/23/small-modular-reactors-by-2022-but-no-market-for-them/.

DOE **defines reactors as SMRs if they generate less than 300 megawatts of power**, sometimes as little as 25 MW, compared to conventional reactors which may produce more than 1,000 MW. Small modular reactors can be constructed in factories and installed underground, which improves containment and security but may hinder emergency access.

#### Permutation—do both—

Only LWRs get commercialized—thorium won’t happen

Shellenberger 12

(Michael, founder of the Breakthrough Institute, graduate of Earlham College and holds a masters degree in cultural anthropology from the University of California, Santa Cruz, "New Nukes: Why We Need Radical Innovation to Make New Nuclear Energy Cheap", September 11, http://thebreakthrough.org/index.php/programs/energy-and-climate/new-nukes/)

Arguably, the biggest impact of Fukushima on the nuclear debate, ironically, has been to force a growing number of pro-nuclear environmentalists out of the closet, including us. The reaction to the accident by anti-nuclear campaigners and many Western publics put a fine point on the gross misperception of risk that informs so much anti-nuclear fear. Nuclear remains the only proven technology capable of reliably generating zero-carbon energy at a scale that can have any impact on global warming. Climate change -- and, for that matter, the enormous present-day health risks associated with burning coal, oil, and gas -- simply dwarf any legitimate risk associated with the operation of nuclear power plants. About 100,000 people die every year due to exposure to air pollutants from the burning of coal. By contrast, about 4,000 people have died from nuclear energy -- ever -- almost entirely due to Chernobyl. But rather than simply lecturing our fellow environmentalists about their misplaced priorities, and how profoundly inadequate present-day renewables are as substitutes for fossil energy, we would do better to take seriously the real obstacles standing in the way of a serious nuclear renaissance. Many of these obstacles have nothing to do with the fear-mongering of the anti-nuclear movement or, for that matter, the regulatory hurdles imposed by the U.S. Nuclear Regulatory Commission and similar agencies around the world. As long as nuclear technology is characterized by enormous upfront capital costs, it is likely to remain just a hedge against overdependence on lower-cost coal and gas, not the wholesale replacement it needs to be to make a serious dent in climate change. Developing countries need large plants capable of bringing large amounts of new power to their fast-growing economies. But they also need power to be cheap. So long as coal remains the cheapest source of electricity in the developing world, it is likely to remain king. The most worrying threat to the future of nuclear isn't the political fallout from Fukushima -- it's economic reality. Even as new nuclear plants are built in the developing world, old plants are being retired in the developed world. For example, Germany's plan to phase-out nuclear simply relies on allowing existing plants to be shut down when they reach the ends of their lifetime. Given the size and cost of new conventional plants today, those plants are unlikely to be replaced with new ones. As such, the combined political and economic constraints associated with current nuclear energy technologies mean that nuclear energy's share of global energy generation is unlikely to grow in the coming decades, as global energy demand is likely to increase faster than new plants can be deployed. To move the needle on nuclear energy to the point that it might actually be capable of displacing fossil fuels, we'll need new nuclear technologies that are cheaper and smaller. Today, there are a range of nascent, smaller nuclear power plant designs, some of them modifications of the current light-water reactor technologies used on submarines, and others, like thorium fuel and fast breeder reactors, which are based on entirely different nuclear fission technologies. Smaller, modular reactors can be built much faster and cheaper than traditional large-scale nuclear power plants. Next-generation nuclear reactors are designed to be incapable of melting down, produce drastically less radioactive waste, make it very difficult or impossible to produce weapons grade material, use less water, and require less maintenance. Most of these designs still face substantial technical hurdles before they will be ready for commercial demonstration. That means a great deal of research and innovation will be necessary to make these next generation plants viable and capable of displacing coal and gas. The United States could be a leader on developing these technologies, but unfortunately U.S. nuclear policy remains mostly stuck in the past. Rather than creating new solutions, efforts to restart the U.S. nuclear industry have mostly focused on encouraging utilities to build the next generation of large, light-water reactors with loan guarantees and various other subsidies and regulatory fixes. With a few exceptions, this is largely true elsewhere around the world as well. Nuclear has enjoyed bipartisan support in Congress for more than 60 years, but the enthusiasm is running out. The Obama administration deserves credit for authorizing funding for two small modular reactors, which will be built at the Savannah River site in South Carolina. But a much more sweeping reform of U.S. nuclear energy policy is required. At present, the Nuclear Regulatory Commission has little institutional knowledge of anything other than light-water reactors and virtually no capability to review or regulate alternative designs. This affects nuclear innovation in other countries as well, since the NRC remains, despite its many critics, the global gold standard for thorough regulation of nuclear energy y. Most other countries follow the NRC's lead when it comes to establishing new technical and operational standards for the design, construction, and operation of nuclear plants. What's needed now is a new national commitment to the development, testing, demonstration, and early stage commercialization of a broad range of new nuclear technologies -- from much smaller light-water reactors to next generation ones -- in search of a few designs that can be mass produced and deployed at a significantly lower cost than current designs. This will require both greater public support for nuclear innovation and an entirely different regulatory framework to review and approve new commercial designs. In the meantime, developing countries will continue to build traditional, large nuclear power plants. But time is of the essence. With the lion's share of future carbon emissions coming from those emerging economic powerhouses, the need to develop smaller and cheaper designs that can scale faster is all the more important. A true nuclear renaissance can't happen overnight. And it won't happen so long as large and expensive light-water reactors remain our only option. But in the end, there is no credible path to mitigating climate change without a massive global expansion of nuclear energy. If you care about climate change, nothing is more important than developing the nuclear technologies we will need to get that job done.

#### Thorium reactors take 30 years

Tickell 12

Oliver Tickell, As a student of physics at St John's College, Oxford, Tickell holds a masters degree from Oxford University. He is a founding partner of Oxford Climate Associates and a member of the Oxford Geoengineering Institute, April/May 2012, "Thorium: Not ‘green’, not ‘viable’, and not likely", http://www.jonathonporritt.com/sites/default/files/users/Thorium%20briefing%20FINAL%203.7.12.pdf

Despite the resurgence of interest in the MSR / LFTR technology, there are no concrete plans to build even a single such reactor. China currently appears most likely to provide the funding necessary to develop LFTR technology due to that country's relatively large nuclear programme and the government's willingness to invest in new energy generation technologies. But even there any production-scale LFTR is unlikely to materialise for 20-30 years.

#### It still requires uranium

Tickell 12

Oliver Tickell, As a student of physics at St John's College, Oxford, Tickell holds a masters degree from Oxford University. He is a founding partner of Oxford Climate Associates and a member of the Oxford Geoengineering Institute, April/May 2012, "Thorium: Not ‘green’, not ‘viable’, and not likely", http://www.jonathonporritt.com/sites/default/files/users/Thorium%20briefing%20FINAL%203.7.12.pdf

3.1 Abundance of thorium relative to uranium Claim: Thorium is several times more abundant in the Earth's crust than uranium. Response: Thorium (232Th) is indeed more abundant than uranium, by a factor of three to four. But whereas 0.7% of uranium occurs as fissile 235U, none of the thorium is fissile. The world already possesses an estimated 1.2 million tonnes of depleted uranium (mainly 238U), like thorium a fertile but non-fissile material. So the greater abundance of thorium than uranium confers no advantage, other than a very marginal advantage in energy security to those countries in which it is abundant.

## Kazahk uranium DA

No escalation

Collins, prof poli sci – Notre Dame, and Wohlforth, prof govt – Dartmouth, ‘4

(Kathleen and William, <http://www.dartmouth.edu/~govt/docs/15-Central%20Asia-press.pdf>)

While cautious realism must remain the watchword concerning an impoverished and potentially unstable region comprised of fragile and authoritarian states, our analysis yields at least conditional and relative optimism. Given the confluence of their chief strategic interests, the major powers are in a better position to serve as a stabilizing force than analogies to the Great Game or the Cold War would suggest. It is important to stress that the region’s response to the profoundly destabilizing shock of coordinated terror attacks was increased cooperation between local governments and China and Russia, and—multipolar rhetoric notwithstanding—between both of them and the United States. If this trend is nurtured and if the initial signals about potential SCO-CSTO-NATO cooperation are pursued, another destabilizing shock might generate more rather than less cooperation among the major powers.

Uzbekistan, Kyrgyzstan, Tajikistan, and Kazakhstan are clearly on a trajectory that portends longer-term cooperation with each of the great powers. As military and economic security interests become more entwined, there are sound reasons to conclude that “great game” politics will not shape Central Asia’s future in the same competitive and destabilizing way as they have controlled its past. To the contrary, mutual interests in Central Asia may reinforce the broader positive developments in the great powers’ relations that have taken place since September 11, as well as reinforce regional and domestic stability in Central Asia.

#### No stability and the economy’s not key

David Britain, London School of Economics, Feb 2012, Kazakhstan: The Myth of Stability, blogs.lse.ac.uk/ideas/2012/02/kazakhstan-the-myth-of-stability/

The 16th of December was meant to be a jubilant day in Kazakhstan. Parallel to the unveiling of a Paris-style triumphal arch in Astana, all major cities celebrated the 20th anniversary of Kazakhstan’s independence. But in Zhanaozen, a small town in the oil-rich Western province of Mangystau, the festivities turned into tragedy. An unresolved conflict about higher wages between the state-owned oil company KazMunayGas and striking oil workers escalated – police forces opened fire on the protesters in the central square, leaving 17 dead and dozens injured. K+, an independent Kazakh TV station broadcasting from Kyrgyzstan, presented video footage of retreating demonstrators being relentlessly attacked by armed police. President Nazarbayev, autocratic ruler of the country for 20 years, immediately imposed a state of emergency on the Western region prohibiting internet access and mobile phone contact to the outside world. The brutal police crackdown marks the darkest hour in the former Soviet republic’s young history. Kazakhstan’s image as Central Asia’s oasis of stability is starting to crumble. And so is the legitimacy of the President. The leitmotif of Nazarbayev’s faux-democratic reign is his alleged concern for stability and prosperity. But Zhanaozen poses a crucial question: Can an authoritarian regime actually provide social stability? Or does authoritarian governance imperil stability in the long term? Indeed, Zhanaozen is not Cairo. And the people who took to the streets in Zhanaozen had no intention of regime change. Neither are they starving, or even unemployed. They merely demanded better pay and more labour rights. But an autocratic regime that proved to be incapable even of handling union strikes seems an incapable guarantor for social stability in the future.

Economy already diversified

Sergei Gretsky is a Professorial Lecturer in International Affairs, The Elliott School of International Affairs, George Washington University, 3/4/13 [“Kazakhstan seeks wider horizons,” Asia Times, 2013, http://www.atimes.com/atimes/Central\_Asia/CEN-01-040313.html]

Kazakhstan is well known for the successful transformation of its economy following independence more than 20 years ago, and the leadership has consistently set ambitious goals to solidify the gains and **diversify the economy** to meet the challenges of the 21st century.¶ The year 2012 ended on a high note - the 2012-2013 Global Competitiveness Report by the World Economic Forum placed the country in 51st place in the overall rating, while the World Bank (WB)/International Finance Corporation (IFC) Doing Business 2013 report ranked Kazakhstan 49th out of 185 countries surveyed.¶ Following these successes, the first two months of 2013 have seen a series of high-level meetings involving President Nursultan Nazarbayev, Prime Minister Serik Ahmetov, the Cabinet of Ministers and Kazakhstani entrepreneurs to review economic policy and set new goals for the economic development of the country.¶ The focal point of the discussions has been "Strategy-2050," whose objective is to turn Kazakhstan into one of the 30 most developed countries in the world. What sets Strategy-2050 apart from the previous development programs and strategies is the principle of "economic pragmatism" in decision-making and economic planning to build up the competitiveness of Kazakhstan's economy.¶ This principle entails a departure from an earlier focus on achieving higher macroeconomic indicators in favor of economic decision-making based on calculating the internal rate of return (IRR) of all projects, which measures and compares the profitability of investments.¶ Another important aspect of the January-February 2013 meetings and discussions was their sober and critical assessment of the shortcomings in the country's economic performance and decision-making, along with a search for ways to overcome them.¶ Thus, while Kazakhstan considers innovative industrialization as the primary vehicle to join the ranks of the 30 most developed countries in the world, there is a clear understanding that success ultimately depends on the quality of human capital and effective institutions (competent government, sound corporate governance, adoption of international business standards, etc).¶ To increase the effectiveness of Kazakh institutions, a number of concrete steps have been announced. A new Ministry of Regional Development has been established to carry out governmental economic policies more efficiently, support the development of small- and medium-sized businesses in all regions of the country, and eliminate regional imbalances in economic development and social welfare.¶ Another important task of the ministry is to shepherd the implementation of the law on decentralization of power and regional and local self-governance, which is expected to begin in the summer of 2013. The primacy of the new regional approach in economic development of Kazakhstan has been underscored by the simultaneous appointment of Regional Development Minister Bakytzhan Sagintayev as the first deputy prime minister of the country.¶ Another institution - the National Development Agency - was created to support the new region-based strategy of economic development. Its task is to channel government investments directly into the regions through the provision of long-term credits to local economic entities and entrepreneurs. The creation of this agency is meant to rectify the lack of long-term credits in Kazakhstan's economy since the overwhelming majority of credits issued by Kazakhstani private banks are short-term.¶ Along with launching new agencies, Kazakhstan is taking steps to avoid creating a bloated government. Samruk-Kazyna - Kazakhstan's National Welfare Fund - has already eliminated 1,173 jobs in 2012, with a further 2,356 to be eliminated in 2013. Other government agencies are expected to follow suit.¶ **Improving the efficiency of the governmental bureaucracy and developing human capital** is of particular concern for the country. According to a recent study commissioned by the Ministry of Labor and Social Protection, Kazakhstan's labor force will grow to 9.5 million in 2017, compared to 8.54 million in 2012.¶ At the same time, Kazakhstan, like much of the rest of the world, experiences a shortage of highly qualified managers, engineers and specialists, which globally by 2020 will number around forty million specialists. To solve the country's immediate need for such specialists, President Nazarbayev suggested attracting the most talented foreign cadres.¶ Umirzak Shukeev, the chairman of the Samruk-Kazyna fund, has already announced that the Fund is looking to recruit foreign experts in such fields as sustainable development, risk management, human resources, financial control and reporting.¶ The Kazakhstani government also understands that economic development and diversification cannot be achieved without **attracting foreign investment**. One of the January government meetings was dedicated to adopting measures that would improve this Central Asian republic's standing in the World Bank's Doing Business index.¶ Despite its 49th overall place, Kazakhstan's standing in "Obtaining permission for construction" and "Foreign trade" indicators is 155th and 182nd, respectively. Minister of Economy and Budget Planning Erbolat Dosayev announced that a single "e-window" would be launched in 2013 to facilitate export-import transactions. A pilot system of electronic customs declarations of goods will be tested as well. Such measures, if successfully implemented, should open Kazakhstan up to **larger volumes of foreign trade.**¶ Another decision announced by President Nazarbayev will undoubtedly generate interest among foreign investors. In January, he lifted the ban on new subsoil exploration and drilling. He tasked the government to change, if necessary, the laws and regulations to facilitate access to explore new mineral resource fields for foreign investors.¶ In Nazarbayev's opinion, the country is lagging significantly behind the rest of the world in the exploration of its mineral riches. He cited the figure of $20 per kilometer a year spent in Kazakhstan on new exploration compared to $45 in China, $167 in Australia and $203 in Canada, criticizing a number of ministries for inadequate work in this direction. Lifting the ban is another example of rethinking the strategy of economic development, in this case away from an earlier policy of resource nationalism, which should attract even more foreign direct investment (FDI) into the country.¶ Though the main thrust of the January-February meetings and discussions has been streamlining government management of the economy and devising steps to eliminate existing economic bottlenecks and inefficiencies, their participants have clearly had one eye on the country's future.¶ The most ambitious of the plans announced by President Nazarbayev on January 23 is turning Astana into a fully "green" city. The first stage will be the building of a pilot "green" district in the Kazakhstani capital. Another step will be powering the Astana 2017 Expo exclusively with alternative sources of energy. Should the experiment prove successful, Astana may well become the first "green" city in the world.

Prices low—

Uranium prices just plummeted – no recovery in sight – Japan’s demand most important

Bloomberg 3/12 [Ben Sharples, “Uranium Rally Falters on Japanese Nuclear Delays: Energy Markets,” 2013, http://www.bloomberg.com/news/2013-03-12/uranium-rally-falters-on-japanese-nuclear-delays-energy-markets.html]

Uranium’s rally from a three-year low is stalling amid signs Japan, once the world’s third-biggest nuclear power producer, will keep all but a handful of its reactors offline this year.¶ ¶ The atomic fuel has slipped 6.8 percent to $42.40 a pound since the Liberal Democratic Party won Dec. 16 elections, erasing most of the 12 percent gain in the six weeks before the vote. While the LDP pledged to review the previous administration’s zero-nuclear policy, regulators probably won’t allow any more plants to start in 2013, a survey of power companies by Kyodo News showed. Uranium will average less than $48 a pound in the six months ending June, the lowest for this time of year since 2010, according to Credit Suisse Group AG.¶ Enlarge image Uranium Rally Falters on Japanese Nuclear Delays¶ ¶ The No. 4, from left, No. 3, No. 2 and No. 1 reactor buildings stand at Kansai Electric Power Co.'s Ohi nuclear power station in Ohi Town, Fukui Prefecture. All Japan’s reactors may be shut before the end of the year when the only two currently running, at Kansai's Ohi plant, close for scheduled maintenance. Photographer: Tomohiro Ohsumi/Bloomberg¶ Audio Download: Blue Phoenix's Licata on Uranium, Crude Oil Prices, Jan. 9¶ ¶ A delay in the resumption of nuclear plants would be a blow for uranium producers from Australia to Namibia, while boosting natural gas exporters such as Qatar, which helped plug Japan’s power deficit after the March 2011 meltdown at Tokyo Electric Power Co.’s Fukushima Dai-Ichi plant. The disaster sent uranium tumbling as countries from Germany to China said they would phase out atomic power or slow project approvals. All but two of Japan’s 50 reactors are still shut and must meet stricter safety standards before they can restart.¶ ¶ “There is much uncertainty around the entire nuclear program in Japan,” Jonathan Hinze, a senior vice president at Roswell, Georgia-based Ux Consulting who forecasts prices won’t exceed $50 before the end of the year, said in an e-mailed response to questions. “Due to Japanese reactor outages as well as smaller reductions in demand from Germany and elsewhere, there continues to be an ample supply of uranium for near-term delivery. **We do not expect a rapid price run-up is likely.**”¶ Price Low¶ ¶ Uranium for immediate delivery slid to $40.65 a pound on Nov. 5, the lowest since March 2010, before rebounding to $45.50 on Dec. 13, according to Ux, which provides research on the nuclear industry. The price climbed as high as $152 in June 2007. It will average $45 this quarter and $47.50 in the three months ended June, the median of five analyst estimates this year by banks including Credit Suisse and Toronto-Dominion Bank compiled by Bloomberg shows.¶ ¶ Japan generated 280 billion kilowatt-hours of electricity from atomic plants in 2010, behind only the U.S. at 807 billion and France at 410 billion, according to the World Nuclear Association. That dropped to 156 billion kilowatt-hours in 2011. The nation’s estimated uranium requirement was 4,636 metric tons in 2012, down from 8,003 tons in 2010, the WNA data show.¶ ¶ The country’s 10 largest power producers generated or purchased 2.1 percent of their electricity from nuclear plants in January, down from 27 percent in February 2011.¶ Gas Purchases¶ ¶ The LDP said in its election campaign that the country needs nuclear reactors to reduce the cost of importing fuel for thermal plants. The nation paid 6 trillion yen ($63 billion) for a record 87.3 million tons of liquefied natural gas in 2012, customs data show. The fuel cost an average $16.70 per million British thermal units, or almost six times as much as the $2.83 average price of U.S. gas traded on the New York Mercantile Exchange last year.¶ ¶ Japan will restart atomic power plants once their safety is assured, while the government will still seek to reduce its nuclear dependence through energy-saving efforts and a shift to renewable sources, Prime Minister Shinzo Abe said in a Feb. 28 speech, two months after the election.¶ Reactor Restarts¶ ¶ The Nuclear Regulation Authority in January approved safety standards for reactors idled after the Fukushima disaster, which caused the evacuation of 160,000 people. Plants must meet the new rules before they can resume. The regulations, to be implemented in July, mean restarts are unlikely in 2013, Kyodo News reported March 4, citing a survey of Japan’s 10 biggest power companies.¶ ¶ “If true, **that bodes very negatively for uranium prices this year**,” said Joel Crane, the vice president of research at Morgan Stanley in Melbourne. Prices may average $46.75 a pound this year, he said.¶ ¶ All Japan’s reactors may be shut before the end of the year when the only two currently running, at Kansai Electric Power Co.s Ohi plant, close for scheduled maintenance. The company is required to idle the No. 3 unit on Sept. 2 and the No. 4 unit on Sept. 15, Takahiro Senoh, the company’s spokesman, said Jan. 28.

#### Supply-side factors outweigh the plan

Melissa Pistilli, Market Analyst, 3/14 [“Uranium’s Comeback Year Hasn’t Jumped the Track Yet,” 2013, http://uraniuminvestingnews.com/13909/uranium-comeback-rob-chang-jeb-handwerger-outlook-2013-japan-china-nuclear-reactors-mergers-acquisitions.html]

Supply drives the market There’s no doubt that the demand side of uranium’s long-term fundamentals will remain stable in the years to come; rather, it’s the “supply side that’s the drive of the equation,” said Chang. The close of the US-Russian HEU Agreement at the end of this year will take up to 24 million pounds of annual uranium supply — **about one-fifth of total global supply** — out of the market. That factor, along with key mine closures, shelved expansion projects and deferred production due to low uranium prices, is leading to a **projected supply deficit**.

## immigration

US-Indian relations low but will never collapse

**Padukone 12** (Neil Padukone is the Felow for geopolitics at the Takshashila Institution, 6/19/2012, "Natural Allies?", pragati.nationalinterest.in/2012/06/natural-allies/)

In the late 1990s, the United States and India embarked on a partnership based largely on three strategic issues: markets, counter-terrorism, and balancing China. With the opening of India’s economy in 1991, the United States saw India’s billion-strong population as a massive market for its businesses. In the wake of 9/11, Washington came to see India’s travails against Islamist militants in Kashmir and Afghanistan through the lens of its War on Terror and increased counter-terrorism cooperation with New Delhi. And as India’s and China’s strategic spaces began to overlap, managing China’s rise became a common concern for both New Delhi and Washington. With that in mind, the United States and India reversed decades of enmity and, through the 2006 nuclear deal, embarked upon a symbolic commitment to what heads of state of both countries have called a “natural alliance.” Yet with all the fanfare- particularly after U.S. President Barack Obama voiced his support for a permanent Indian seat on the UN Security Council in his 2010 Lok Sabha speech- bilateral ties have recently been marked by considerable drift: India has not fallen in line on the issue of Iran, Washington is only slowly coming around on Pakistani militancy, the countries’ UN voting records do not mesh, and trade disagreements abound. Questions have been raised over why U.S.-India relations have cooled, or whether they were over hyped in the first place. The U.S. Department of Defense’s “strategic pivot” toward Asia is one way to shore up relations and realign the Indo-U.S. partnership. India’s geostrategic location at the centre of the Indian Ocean- along with its naval expansion toward the southern Indian Ocean and its Port Blair naval base at the Andaman Islands- enable New Delhi to manage China’s presence in the region. Indeed, India and America’s navies have been more coordinated than any other bureaucracy since 2000. But the implications of this shared Beijing-centric orientation will only come about in the medium-term. One dimension of these ties, the sale of defence technologies, is another place where India has not yet delivered: the recent Medium Multi-Role Combat Aircraft (MMRCA) competition failed to award contracts to American companies. And in the middle of a global recession in which all countries are hunkering down, and domestic inflation and unemployment- not to mention concerns over doing business in India, such as retroactive taxation and tax avoidance measures- have grown, economic reforms that would further open India’s markets have slowed. U.S. Secretary of State Hillary Clinton’s recent visit to Kolkata was largely an effort to encourage India to increase the speed of its market liberalisation, particularly in the retail sector. This may be a prospect for the future, but is doubtful today given India’s economic slowdown and the attendant drop in employment. Yet perhaps the main reason for this strategic drift is that America’s key concern in South Asia these days is Afghanistan. President Obama delivered on his campaign promise to refocus efforts on the war in that country, and from 2009, his administration’s “AfPak” strategy took a regional perspective that originally sought to bring India into the equation. The thinking behind this, as Amitai Etzioni writes, is that “for Pakistanis, conflict (with India) poses an ominous existential challenge that drives their behaviour on all things,” including “their approach to the West and the war in Afghanistan… If the India-Pakistan confrontation could be settled, chances for progress on other fronts would be greatly enhanced.” The implication was that Washington ought to hyphenate India and Pakistan, to see the two as part of the same regional tussle, and try to settle the Kashmir dispute in order to make progress in Afghanistan. This was something New Delhi vehemently opposed and in fact, it sought de-hyphenation from Pakistan – engagement with New Delhi and Islamabad on separate and unconnected tracks. So when the office of the late US Special Adviser on Pakistan and Afghanistan Richard Holbrooke sought to include India and Kashmir in its purview, New Delhi successfully lobbied against it. This effort served one of India’s aims, insofar as it keeps Kashmir out of America’s area of direct intervention. Yet it also takes India, its assets, and its clout out of the broader Afghan resolution. Among these assets is the Indian-constructed Chabahar Road that connects Iran’s eastern Chabahar Port on the Gulf of Oman to western Afghanistan. The road ends Pakistan’s monopoly on seaborne trade to Afghanistan, which has long allowed Islamabad’s pernicious dominance of Kabul’s economic and political life. In light of America’s confrontation with Iran and efforts to sanction the latter’s energy sector, however, Washington opposes India’s use of Chabahar, particularly to import Iranian oil and natural gas. Indeed another goal of Secretary Clinton’s visit was to try to shore up India’s support for sanctions against Iran- to which end India is reducing its dependence on Iranian energy as it awaits an exemption on sanctions from the US State Department. But when New Delhi recently used its Chabahar road to send 100,000 tons of wheat to Kabul, its full potential vis-à-vis Afghanistan became evident. And this food aid was on top of India’s additional commitments to Afghanistan: constructing the Zaranj-Delaram highway in western Afghanistan that connects Chabahar to the Afghan ring road, the development of the Ayni Air base in Tajikistan (originally designed to treat wounded Afghan soldiers), building Afghanistan’s parliament building, exploring the Hajigak iron mine, and even commitments to train the Afghan National Police and Army- all of which amount to pledges of over $1 billion since 2001. Washington has been wary of encouraging India’s presence in Afghanistan citing Islamabad’s fear of encirclement. But, even without American attention, a refutation of Pakistan’s “India Threat” narrative is already underway. In order to remain focused on strategic horizons beyond South Asia, India is reorienting its defence apparatus away from Pakistan and towards China and the southern Indian Ocean; even the Ayni Base and Chabahar Road can be seen as elements of this strategic shift beyond the subcontinent. Together with Pakistan’s focus on the Durand Line and events within its own borders, political breathing space between Islamabad and New Delhi has opened up. India-Pakistan talks have already produced a number of important breakthroughs that portend better bilateral days to come: the granting of Most-Favoured Nation status, enhanced trade measures, as well as discussions on the specific parameters of a Kashmir peace based on economic integration. Specifically regarding the Indo-Pak dynamic in Afghanistan, things are less zero-sum than they appear. Important as the Chabahar route is, the combination of road, sea, and even rail links still comes with massive transport costs for India-Afghanistan trade. As S Verma, chairman of Steel Authority of India and the head of a consortium of Indian industries engaged in Afghanistan’s Hajigak iron mine, put it, “over the longer term,” transporting Afghan minerals over Pakistani territory “will be a productive investment. Not just for us, but others in the region including Pakistan. There are license fees, logistics, and so forth.” Meanwhile, Kaustav Chakrabarti of the Observer Research Foundation has suggested “deploying joint Indo-Pak nation building teams” in Afghanistan that include advisors, military trainers, bureaucrats, developments experts, medical crews and NGOs. These teams would “provide additional resources, bridge political polarities, foster cooperation between India and Pakistan and devise means to verify each other’s role, and ultimately, present a long-term mechanism,” guaranteed by India and Pakistan’s geographic proximity, “to ensure Afghanistan’s neutrality.” He cites as a precedent the collaboration between Indian and Pakistani armed forces in “UN peacekeeping missions in hot spots like Somalia.” Full realisation of any Indo-Pak promise will require more space, and time, between the two countries. The interim period, meanwhile, may indeed take a cooling period between the United States and India, who are unlikely to become allies in the fullest sense due to differing tactical approaches. But the strategic fundamentals of the Indo-American rapport- balancing China, expanding trade, and stabilising South Asia- remain intact.

#### Obama losing immigration still results in high-skill reform

Matthew Yglesias, Slate, 1/15/13, How the GOP Can Roll Obama on Immigration, www.slate.com/blogs/moneybox/2013/01/15/immigration\_reform\_will\_obama\_get\_rolled.html

Of the major policy issues under discussion in Washington, "immigration reform" stands out for having unusually undefined content. For the major immigration-advocacy groups, the goal is clear, a comprehensive bill that includes a path to citizenship for the overwhelming majority of unauthorized migrants already living in the United States. But many other aspects of immigration law are in the mix as part of a proposed deal, and it seems to me that there's a fair chance that a nimble Republican Party could essentially roll the Democratic coalition and pass an "immigration reform" bill that doesn't offer the path Latino advocacy groups are looking for.

Elise Foley has the key line from her briefing on the administration's thinking about immigration, namely that a piecemeal approach "could result in passage of the less politically complicated pieces, such as an enforcement mechanism and high-skilled worker visas, while leaving out more contentious items such as a pathway to citizenship for undocumented immigrants."

And indeed it could. But how can they stop it? The last House GOP effort to split the high-tech visas question from the path to citizenship question was an absurd partisan ploy. If Republicans want to get serious about it they should be able to make it work. The centerpiece would be something on increased immigration of skilled workers. That's something the tech industry wants very much, it's a great idea on the merits, and few influential people have any real beef with it. High tech visas will easily generate revenue to pay for some stepped-up enforcement. Then instead of adding on a poison pill so Democrats will block the bill, you need to add a sweetener. Not the broad path to citizenship, but something small like the DREAM Act. Now you've got a package that falls massively short of what Latino groups are looking for, but that I think Democrats will have a hard time actually blocking. After all, why would they block it? It packages three things—more skilled immigration, more enforcement, and help for DREAMers—they say they want. Blocking it because it doesn't also do the broad amnesty that liberals want and conservatives hate would require the kind of fanaticism that is the exact opposite of Obama's approach to politics.

#### No link

**Appelbaum 12**

Binyamin, Defense cuts would hurt scientific R&D, experts say, The New York Times, 1-8, <http://hamptonroads.com/2012/01/defense-cuts-would-hurt-scientific-rd-experts-say>

Sarewitz, who studies the government's role in promoting innovation, said the Defense Department had been **more successful** than other federal agencies because it is the **main user of the innovations that it finances**. The Pentagon, which spends billions each year on weapons, equipment and technology, has an **unusually direct stake in the outcome** of its research and development projects.¶ "The central thing that distinguishes them from other agencies is that they are the customer," Sarewitz said. "You can't pull the wool over their eyes."¶ Another factor is the Pentagon's relative insulation from politics, which has allowed it to sustain a long-term research agenda **in controversial areas.** No matter which party is in power, the Pentagon has continued to invest in clean-energy technology, for example, in an effort to find ways to reduce one of its largest budget items, energy costs.

#### guns

Jon Terbush, The Week, 3/28/13, Bully pulpit: Can Obama save gun legislation? , theweek.com/article/index/242083/bully-pulpit-can-obama-save-gun-legislation#

President Barack Obama pushed back Thursday against opponents of tighter gun laws, saying it would be "shame on us" if Washington fails to act after last year's mass shootings, like the one in Newton, Conn., that left 26 dead, 20 of them children. "I haven’t forgotten those kids. Shame on us if we’ve forgotten," he said. "If there is one thing I’ve said consistently since I first ran for this office, nothing is more powerful than millions of voices calling for change." Standing with Vice President Joe Biden and families affected by gun violence, Obama said it was Washington's "best chance in a decade" to strengthen gun laws. However, the president candidly acknowledged that the issue has lost some of its resonance and could be stonewalled into oblivion by considerable opposition. Several recent polls have found a sharp drop in support for new gun laws. A CBS News survey released this week found that less than half of Americans now support such measures, down from the 57 percent who supported them shortly after the Sandy Hook shooting. At the same time, neither chamber of Congress has passed a gun bill this year, and a proposed ban on assault weapons — once a central element of the White House's plan for broader gun legislation — was scrapped by Senate Democrats for lack of support. In his speech, Obama urged Congress to move ahead with other proposals still on the table, such as limits on magazine capacity and expanded background checks. "None of these are controversial," nor will they infringe on the Second Amendment, he insisted. **Yet those proposals are controversial**, **and have drawn considerable opposition** from conservatives and the National Rifle Association. A group of Republican senators has already vowed to filibuster gun bills in that chamber, and bipartisan negotiations over the very proposals Obama touted on Thursday fell apart earlier this month, with Republicans walking away entirely. If legislation ever advances to the Republican-controlled House, it would face an even tougher test there. As for the NRA, they appeared to be flailing in December, but have since bounced back with two straight months of enormous fundraising and an arsenal of slick new ads. "Wayne LaPierre Is Winning," an editorial in The Nation lamented, referring to the NRA's CEO and executive vice president. In once again publicly pressing for new gun laws — as he did immediately after the Newtown massacre and in his State of the Union speech — Obama is hoping to revive support and prevent his opponents from, as he said, "running out the clock." In the speech, which was timed to coincide with a national day of action on gun laws, he called on Americans to keep up the fight by contacting their representatives and pressuring them to act. "We need everybody to remember how we felt 100 days ago and make sure that what we said at that time wasn’t just a bunch of platitudes, that we meant it," he said. He'll take that message on the road next week; he's scheduled to be in Colorado to tout that state's new gun laws.

#### Labor fight kills the bill

Anna Palmer, 3/22/13, Immigration deal in limbo as business, labor clash, dyn.politico.com/printstory.cfm?uuid=1B5B052A-9CA3-4105-8BBE-B24B22287C3E

The Senate’s “Gang of Eight” is preparing to leave town with a deal on immigration reform in limbo, stalled by a fight between Big Labor and Big Business. On Thursday morning, it had appeared that a deal was in hand over the major remaining sticking point: the outlines of a broad new visa program aimed at balancing the need for foreign workers in low-skilled jobs with the desires of American workers competing for those same jobs. So much for optimism. In a closed-door session that stretched late into Thursday night, **things got heated**. Sources said negotiations grew extremely tense after business groups balked. There were more talks on Friday — but no more progress, even though negotiations continued in a rare Friday night session of the Senate. Now, the Gang of Eight faces a quandary. If senators can’t win the endorsement of labor and business, they must soon decide whether to go their own way — absent the support of the U.S. Chamber of Commerce and AFL-CIO — and hope the powerful interest groups stay neutral when a bill eventually emerges. The senators said they would continue to negotiate with the interest groups during their two-week recess, with the goal of narrowing their differences, winning their backing and rolling out a proposal in the second week of April. That would set up a Senate Judiciary Committee vote before the end of the month, with floor votes by early summer. “People have a lot at stake here,” said Sen. John McCain (R-Ariz.). “This is a huge deal. Talking about the lives of 11 million people just to start with, so I understand why passions are high, and sentiments are high." Late Friday night, tensions were still at a boil. Labor officials accused Republicans and business groups of proposing “congressionally sanctioned poverty” for low-skilled workers. And Chamber officials attacked labor groups for preventing a deal from taking shape. “The unions have jeopardized the entire immigration reform effort, which would provide a pathway to legalization and citizenship for the 10-11 million undocumented workers, because of their refusal to take a responsible stance on a small temporary worker program,” Randy Johnson, the Chamber’s senior vice president of Labor, Immigration, and Employee Benefits, said in a late Friday night statement. “These types of programs have always been considered a key part of comprehensive immigration reform.”

#### Obama’s not involved

Julie Pace, Associated press whtie house correspondent, 3/27/13, Obama: Immigration bill could pass by summer, www.timesunion.com/news/politics/article/Obama-back-at-forefront-of-immigration-debate-4389183.php

While overhauling the nation's patchwork immigration laws is a top second term priority for the president, he has ceded the negotiations almost entirely to Congress. He and his advisers have calculated that a bill crafted by Capitol Hill stands a better chance of winning Republican support than one overtly influenced by the president. In his interviews Wednesday, Obama tried to **stay out of the prickly policy issues** that remain unfinished in the Senate talks, though he said a split between business and labor on wages for new low-skilled workers was unlikely to "doom" the legislation.

#### No issue spillover

Judson Berger, 3/4/13, Recurring budget crises could put squeeze on Obama's second-term priorities, www.foxnews.com/politics/2013/03/04/recurring-budget-crises-could-put-squeeze-on-obama-second-term-priorities/

Rep. Luis Gutierrez, D-Ill., a vocal advocate for immigration reform, voiced confidence Monday that the administration and Congress could handle the busy agenda. "The spirit of bipartisan cooperation that is keeping the immigration issue moving forward has not been poisoned by the sequester and budget stalemate, so far," he said in a statement. "The two sets of issues seem to exist in parallel universes where I can disagree with my Republican colleagues strenuously on budget matters, but still work with them effectively to eventually reach an immigration compromise. ... I remain extremely optimistic that immigration reform is going to happen this year." Immigration reform efforts are still marching along despite the budget drama. Obama met last week on the issue with Sens. John McCain, R-Ariz., and Lindsey Graham, R-S.C., who both are part of a bipartisan group crafting legislation.

#### Border security kills

Fawn Johnson, 3/21/13, Border Triggers Could Sink Immigration Deal, www.nationaljournal.com/daily/border-triggers-could-sink-immigration-deal-20130321

Republicans' insistence that border-security benchmarks be met before legalizing 11-12 million illegal immigrants could sink an emerging compromise measure that is expected to be unveiled in a few weeks. The “Gang of Eight” senators negotiating a sweeping immigration bill are on track to unveil draft legislation at the beginning of April, according to congressional aides. Similarly, a bipartisan group of House members is honing its own version. The cornerstone of both measures is a mass probationary legalization of noncriminal undocumented immigrants. Legalization is a significant concession from Republicans, who are reluctant to give breaks to immigrants who violated the law. They acknowledge, however, that mass deportation is not possible and that millions of illegal residents are bad for national security. Conservatives are worried that once a bill passes, legalization will take the pressure off immigration authorities to stop further illegal entry and to find and deport those who manage to make it in without authorization. To keep that from happening, the negotiators are discussing a variety of enforcement-related benchmarks, or “triggers,” that would need to be met before the population of undocumented immigrants can move toward citizenship. But some lawmakers worry that forestalling citizenship in the name of border security may not be enough of an incentive for the authorities. After all, only half of legal immigrants in the country now go to the trouble of becoming U.S. citizens. Once the illegal population is given provisional legal status, they might not be clamoring as hard for government action that would allow them to become full-fledged citizens. Rep. Raul Labrador, R-Idaho, a leading voice for tea-party conservatives on immigration, has suggested that even the probationary legalization of illegal immigrants should wait until some enforcement mechanisms are in place. “We have to have enforcement triggers happen before anyone receives any kind of legal status,” he said Wednesday. “Certain objective triggers that we can measure.” Labrador is walking a tightrope between the tea-party House members who follow his lead on immigration and the immigrant-friendly lawmakers with whom he is trying to strike a deal. The two groups don’t speak the same language. For hardcore conservatives, only tough enforcement benchmarks could give them enough comfort to support the legislation. “We cannot simply legalize 12 million people and enforce the laws later,” Senate Judiciary Committee ranking Republican Chuck Grassley, R-Iowa, said Wednesday. But Labrador’s suggestion is a deal-breaker for immigrant advocates and Democrats. “Whoever’s saying that, they’re trying to kill the bill before it even gets started,” said Alison Reardon, legislative consultant for the Service Employees International Union, which represents thousands of immigrant workers. “We should continue to work to secure our borders, but there’s no way to do that and wait for legalization. Border security is an ongoing thing.” The **Obama** administration **isn’t helping** on this front, because it has been more aggressive than any previous administration in deporting and detaining illegal immigrants. Almost half of those in deportation proceedings have committed no other crimes.

# 1AR

# Warming

## Feedbacks are positive

#### Feedbacks are positive

**Mandia 11**

(Scott A. Mandia, Professor of Physical Sciences at Suffolk College, 1/22/2011, "Global Warming: Man or Myth?", www2.sunysuffolk.edu/mandias/global\_warming/greenhouse\_gases.html#stratospheric\_cooling)

A climate forcing mechanism such as CO2 is one that will cause a change in climate. A feedback mechanism is one in which the forced change is either amplified (positive feedback) or dampened (negative feedback). A review of the literature by Bony et al. (2006) shows that there are four major climate change feedbacks. These are listed below along with the estimates of their radiative feedback in parentheses: Water Vapor (1.80 ± 0.18 W/m2/K): Water vapor is a very important positive feedback mechanism. When the air gets warmer, the saturation vapor pressure of water increases. That means that more water vapor can be present in warmer air. Because the average relative humidity of the climate is conserved, a warmer climate means that there will be more water vapor in the air. In turn, this causes a greater greenhouse effect which amplifies the initial warming caused by increasing industrial greenhouse gases. This water vapor feedback essentially doubles the warming caused by greenhouse gas forcing. (Note: Water vapor molecules typically spend about 10 days in the atmosphere {while elevated CO2 concentrations can remain for hundreds to thousands of years} so water vapor cannot be a climate change forcing mechanism like CO2.) See: A Matter of Humidity by Dessler and Sherwood (2009) for more information. Lapse Rate (-0.84 ± 0.26 W/m2/K): The tropospheric lapse rate (rate of change of temperature with height) affects the emission of LW radiation to space. If the troposphere warms uniformly, there is no radiative feedback whereas if there is a larger decrease in temperature with height there will be a greater greenhouse effect. An atmosphere that warms more in the lower troposphere will produce a larger positive feedback whereas an atmosphere that warms faster at higher altitudes will produce a negative feedback. Clouds (0.69 ± 0.38 W/m2/K): Cloud feedbacks are the most uncertain but progress has been made in recent years to understand the magnitude of the cloud feedback. Clouds are effective at absorbing and emitting LW radiation and are also affective at reflecting SW radiation. The feedback from clouds is influenced by cloud amount, cloud height and vertical profile, optical depth, liquid and ice water contents, and particle sizes. (Stephens, 2005) For some climate models, cloud feedback is positive and comparable in strength to the combined “water vapor plus lapse rate” feedback while for other models, cloud feedback is close to neutral. (Soden and Held, 2006) Surface Albedo (0.26 ± 0.08 W/m2/K): Albedo is defined as the percentage of incoming SW radiation from the sun that is reflected. In a warmer climate, highly reflective snow and ice melt away and leave less reflective surfaces such as water and land exposed below. These lower albedo surfaces will absorb more incoming radiation than the snow and ice that were above resulting in a positive feedback. Despite the large uncertainty in the magnitude of cloud feedbacks, the overall picture of feedbacks in a warmer world is one that is positive - meaning that greenhouse gas warming will be enhanced by these mechanisms. A superb tutorial on forcing and feedbacks can be read at Chris Colose's: Re-visiting climate forcing/feedback concepts

# Space

## 1AR no impact

Diplomacy solves escalation

Lambakis 01

Steven Lambakis (senior defense analyst at the National Institute for Public Policy), Policy Review, 2001, 105, “Space Weapons: Refuting the Critics”, <http://www.hoover.org/publications/policy-review/article/6612>

Those who believe we run extraordinary risks stemming from clouded perceptions and misunderstandings in an age of computerized space warfare might want to take a look at some real-world situations of high volatility in which potentially provocative actions took place. Take, for example, the tragedies involving the USS Stark and USS Vincennes. In May 1987, an Iraqi F-1 Mirage jet fighter attacked the Stark on patrol to protect neutral shipping in the Persian Gulf, killing 37 sailors. Iraq, a "near-ally" of the United States at the time, had never before attacked a U.S. ship. Analysts concluded that misperception and faulty assumptions led to Iraq’s errant attack. The memory of the USS Stark no doubt preoccupied the crew of the USS Vincennes, which little over a year later, in July 1988, was also on patrol in hostile Persian Gulf waters. The Vincennes crew was involved in a "half war" against Iran, and at the time was fending off surface attacks from small Iranian gunboats. Operating sophisticated technical systems under high stress and rules of engagement that allowed for anticipatory self-defense, the advanced Aegis cruiser fired anti-aircraft missiles at what it believed to be an Iranian military aircraft set on an attack course. The aircraft turned out to be a commercial Iran Air flight, and 290 people perished owing to mistakes in identification and communications. To these examples we may add a long list of tactical blunders growing out of ambiguous circumstances and faulty intelligence, including the U.S. bombing in 1999 of the Chinese Embassy in Belgrade during Kosovo operations. Yet though these tragic actions occurred in near-war or tinderbox situations, **they did not escalate** or exacerbate local instability. The world also survived U.S.-Soviet "near encounters" during the 1948 Berlin crisis, the 1961 Cuban missile crisis, and the 1967 and 1973 Arab-Israeli wars. Guarded diplomacy won the day in all cases. **Why would** disputes affecting **space be any different?**

## 1AR No link

Plan can’t solve political obstacles

Downey, Lt Col – USAFR, Forestier, Wg Cdr – RAAF, and Miller, Lt Col – USAF, April ‘4

(James, Anthony, and David, “Flying Reactors: The Political Feasibility of Nuclear Power in Space,” A Research Report Submitted to Air Force Fellows, CADRE/AR In Partial Fulfillment of the Graduation Requirements)

For a period of more than 50 years the United States has been exploring the potential of

nuclear power reactors for use in a variety of space based applications. From the earliest days

there have been numerous challenges―some technical, many political―that have impeded

progress in every program that has been considered. The issues surrounding space nuclear

power (SNP) are complex and multifaceted. For the United States, the development of SNP lies

at the intersection of program cost benefit and the social perception of risk. The actual decision

to employ SNP is finally political, encompassing political, judgment will and acceptance of risk.

But if the current climate surrounding all things nuclear remains manifest, the future for SNP

looks politically challenging.

Empirics are overwhelming

Downey, Lt Col – USAFR, Forestier, Wg Cdr – RAAF, and Miller, Lt Col – USAF, April ‘4

(James, Anthony, and David, “Flying Reactors: The Political Feasibility of Nuclear Power in Space,” A Research Report Submitted to Air Force Fellows, CADRE/AR In Partial Fulfillment of the Graduation Requirements)

The United States has had a public policy interest in the development of SNP since the late 1950s. Over the years, **there have been several attempts to build space** nuclear **reactors** for these purposes. Despite this extended effort, no operational SNP system has ever been deployed by either NASA or DOD. It is now approaching 50 years since SNP was initially proposed. It is difficult to think of another scientific development program that has been stalled for so long by political concerns. Therefore, in order to contemplate a modern public policy-maker’s decision as to whether to deploy SNP, we must understand both the scientific history of SNP and the politics that has delayed the deployment of reactors in space for so long. This section will highlight the key points that can be deduced from the history. A more detailed review of SNP past programs is presented in Appendix 1.^

DOD doesn’t avoid political pressure

Downey, Lt Col – USAFR, Forestier, Wg Cdr – RAAF, and Miller, Lt Col – USAF, April ‘4

(James, Anthony, and David, “Flying Reactors: The Political Feasibility of Nuclear Power in Space,” A Research Report Submitted to Air Force Fellows, CADRE/AR In Partial Fulfillment of the Graduation Requirements)

From the perspective of the Department of Defense (DoD), perhaps in the decade 2010-

2020 the United States and its allies may take comfort in the fact that, although terrorism has not

been eliminated, a constellation of large, long lived SNP satellites with their hyper-spectral

sensors have made the problem of global intelligence, surveillance and reconnaissance (ISR)

much more manageable. Terrorists and proliferators of nuclear weapons and associated delivery

systems will find fewer opportunities to act and places to hide.

So is SNP an environmental menace or a feasible enabling technology? The argument is

polarized in the United States, the epicenter of the debate as the world’s most capable space

faring and democratic nation. Valid arguments can be made either way. Each side of the debate

has its active proponents, supported by allies and ad hoc coalitions of stakeholders. Yet between

the interlocutors in the debate there is the vast, unaligned, and politically passive or inactive

majority. The public is interested in space science but is also sensitive to the costs and risks.

Politically aligned and activated, even a small part of that majority would pose pressure that

policy-makers in the government could not ignore, and such pressure may determine the

feasibility of SNP systems' going forward.

# WW

#### Water scarcity causes Middle East war

Nitish Priyadarshi 12, lecturer in the department of environment and water management at Ranchi University in India, “War for water is not a far cry”, June 16, <http://www.cleangangaportal.org/node/44>

The crisis over water in the Middle East is escalating. Despite existing agreements, dwindling resources – increasingly affected by pollution, agricultural/industrial initiatives and population growth – have elevated the strategic importance of water in the region. For Middle Eastern nations, many already treading the razor’s edge of conflict, water is becoming a catalyst for confrontation – an issue of national security and foreign policy as well as domestic stability. Given water’s growing ability to redefine interstate relations, the success of future efforts to address water sharing and distribution will hinge upon political and strategic approaches to this diminishing natural resource. In the Middle East, water resources are plummeting. While representing 5% of the total world population, the Middle East & North Africa (MENA) region contains only 0.9% of global water resources.1 The number of water-scarce countries in the Middle East and North Africa has risen from 3 in 1955 (Bahrain, Jordan and Kuwait) to 11 by 1990 (with the inclusion of Algeria, Israel and the Occupied Territories, Qatar, Saudi Arabia, Somalia, Tunisia, the United Arab Emirates and Yemen). Another 7 are anticipated to join the list by 2025 (Egypt, Ethiopia, Iran, Libya, Morocco, Oman and Syria). In addition to its scarcity, much of Middle Eastern water stems from three major waterways: the Tigris-Euphrates, Nile and Jordan River systems. Mutual reliance on these resources has made water a catalyst for conflict, spurring confrontations such as the 1967 War (fomented by Syria’s attempts to divert water from Israel) and the Iran-Iraq War (which erupted from disputes over water claims and availability). Recognition of water’s role as an obstacle in interstate relations has spurred numerous attempts at resolution, including diplomatic efforts (most notably the 1953-1955 U.S.-brokered Johnston negotiations) and bilateral and multilateral treaty efforts, ranging from the 1959 Agreement for the Full Utilization of Nile Waters to the 1994 Israeli-Jordanian Treaty. Along the Tigris and Euphrates Rivers, Turkey and Syria are currently approaching a massive confrontation over water resources. Relations between the two countries, strained at best, have been exacerbated since the 1980s by growing tensions over water, which have brought them to the brink of war several times. The Jordan River Basin has also emerged as a flashpoint for conflict over water. Resources in the area, suffering serious overuse as a result of pollution and population growth, have increasingly impacted interstate relations. Between Jordan and Israel, water resource issues are reaching a fever pitch. Despite the 1994 Israeli-Jordanian Treaty – which established comprehensive guidelines regulating the distribution, preservation and availability of water from the Jordan and Yarmouk Rivers – conflicts over water have risen to the forefront of relations between the two countries. Jordan, fed only by underground sources and the Jordan River, has experienced an escalating water deficit – one that is expected to reach 250 million cubic meters (nearly 1/3rd of current annual consumption) by 2010. At the same time, Israel – currently utilizing almost all available water from its National Water System (consisting of the West Bank Mountain Aquifer, the Coastal Aquifer and the Lake Kinneret Basin) – has been forced to resort to overexploitation of available resources for expanding agricultural and industrial ventures. As a result, water has become a critical bone of contention between the two countries. The historically troubled relations between Israel and the Palestinians have also been magnified by water. Mutual reliance on the West Bank Mountain Aquifer, which rests atop the demarcating border of the disputed West Bank territory (and currently provides 1/3rd of Israel’s water supply and 80% of Palestinian consumption), has created friction between the State of Israel and the Palestinian Authority.

## 1AR Impact Addon—Disease

#### Palley says desal key to solve disease—Extinction

**Yu ‘9**

(Victoria, Undergraduate at Dartmouth, University publication, “Human Extinction: The Uncertainty of Our Fate,” Dartmouth Undergraduate Journal of Science, 22 May 2009)

**A pandemic will kill off all humans**. In the past, humans have indeed fallen victim to viruses. Perhaps the best-known case was the bubonic plague that killed up to one third of the European population in the mid-14th century (7). While vaccines have been developed for the plague and some other infectious diseases, new viral strains are constantly emerging — a process that maintains the possibility of **a pandemic-facilitated human extinction**. Some surveyed students mentioned AIDS as a potential pandemic-causing virus. It is true that scientists have been unable thus far to find a sustainable cure for AIDS, mainly due to HIV’s rapid and constant evolution. Specifically, two factors account for the virus’s abnormally high mutation rate: 1. HIV’s use of reverse transcriptase, which does not have a proof-reading mechanism, and 2. the lack of an error-correction mechanism in HIV DNA polymerase (8). Luckily, though, there are certain characteristics of HIV that make it a poor candidate for a large-scale global infection: HIV can lie dormant in the human body for years without manifesting itself, and AIDS itself does not kill directly, but rather through the weakening of the immune system. However, for more easily transmitted viruses such as influenza, the evolution of new strains could prove far more consequential. The simultaneous occurrence of antigenic drift (point mutations that lead to new strains) and antigenic shift (the inter-species transfer of disease) in the influenza virus could produce a new version of influenza for which scientists may not immediately find a cure. Since influenza can spread quickly, this lag time could potentially lead to a “global influenza pandemic,” according to the Centers for Disease Control and Prevention (9). The most recent scare of this variety came in 1918 when bird flu managed to kill over 50 million people around the world in what is sometimes referred to as the Spanish flu pandemic. Perhaps even more frightening is the fact that only 25 mutations were required to convert the original viral strain — which could only infect birds — into a human-viable strain (10).

## AR Yes Escalation

#### No diplomacy

Tir ‘10

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

Aside from triggering disputes, climate-induced water stress can lead to the escalation of those disputes over rivers and increase the use of coercive diplomacy. Whereas competing uses of a water source might be manageable politically during normal times, conditions of scarcity can make states less likely to wait for diplomatic options to resolve conflicts. For example, the increased sensitivity to water issues can lead to a more combative response to the damming of a river. Downstream states may use threats or overt military force as a bargaining tactic to coerce upstream states into limiting water diversion. The increased value of the water source to both sides will zone of agreement shrink and increase the attractiveness of coercive bargaining. This expectation has received some empirical support. In a study of competing river claims, Hensel, Mitchell, and Sowers (2006) find that water scarcity increases the likelihood of militarized conflicts between states with an existing riparian dispute. This has been the case with the political and military tensions between Syria and Turkey, due to construction by Turkey of dams on the Euphrates. A similar dynamic has also occurred in the Nile basin, with Egypt opposing diversion attempts by upstream states.

#### Spills over to the entire relationship

Tir ‘10

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

Finally, water stress can increase the risk of conflict through indirect means. Even when conflicts do not occur over the specific issue of water, disputes over a transboundary water source can damage the general relations between states. Poorly managed interdependence can contribute to overall tensions between states (Starr 1997). Disagreements over water may therefore spill-over and set the stage for conflicts over other issues. For example, the slow progress of implementing the water–related provisions of the Israel-Jordan peace agreement damaged overall relations between the two countries (Fischhendler2008a). This expectation finds some support in several empirical studies of the connection between water resources and international conflict (Toset, Gleditsch, and Hegre 2000; Furlong, Gleditsch, and Hegre2006; Gleditsch et al. 2006). These studies all find that dyads sharing river basins are at a higher risk of conflict, although the magnitude of the relationship is relatively small. The risk of conflict is also higher for rivers that cross international boundaries and under conditions of water scarcity (Furlong, Gleditsch,and Hegre 2006). Because they utilize a general measure of international conflict-the Correlates of War Militarized Interstate Dispute (MID) data-these findings are consistent with the expectation that water conflicts can spill over to affect other areas of interstate relations.

# CP

## 1AR Biochar

#### Production ALONE would create more emissions than it solves and releases other GHGs

**Lenton et al 8** (Tim, PhD, Professor in Earth System Science at the School of Environmental Sciences at the University of East Anglia, Martin T. Johnson, a Naomi E. Vaughan, a,b Philip Goodwin, a Colin Goldblatt, a Sonia Roudesli, a School of Environmental Sciences, University of East Anglia, b Tyndall Centre for Climate Change Research, University of East Anglia, “ Why NH3 Is Not a Candidate Reagent for Ambient CO2 Fixation: A Response to ‘‘Alternative Solution to Global Warming Arising from CO2 Emissions—Partial Neutralization of Tropospheric H2CO3 with NH3,’’ July 17, 2008)

To produce ammonia by the Born-Haber cycle, the most efﬁcient industrial plants currently use about 28 GJ ton 21 (28 3 10 9 Joules per metric ton of ammonia) [23] or 28 3 17.03 5 0.5 MJ mol 21 . As a byproduct of molecular hydrogen production they also create approximately 15 g of CO2 per gram of NH3 [23], or 6 moles CO2 per mole of NH3 . Therefore, using current technologies, producing the required amount of NH3 would require 0.5 3 10 6 J mol 21 3 13.3 3 10 15 mol 5 6.7 3 10 21 J or 6700 EJ (exo-joules) of energy and emission of 6 3 13.3 5 80 Pmol or 960 Pg-C (roughly equivalent to **one quarter the total known fossil fuel reserve**). However, Ga´lvez et al. [23] propose a new method of producing ammonia which incurs no CO2 production other than that associated with production of the energy required to make the ammonia (approximately 27 GJ ton 21 ). If we assume that their method will be used throughout, the annual energy cost is 6500 EJ, with no associated CO2 emission (as long as alternative or nuclear energy sources are utilized). This is >10 times the total primary energy consumption of the human race (including electricity, transport, cooking, wood burning, etc), which is currently 470 EJ yr 21 [24]. Therefore, except given the development of cheap and abundant renewable or nuclear energy technology, the necessary ammonia production is unfeasible. However, the majority of the CO2 sink in the above processes is in the production of urea; of a magnitude such that atmospheric CO2 would be depleted to zero in less than 10 years (although a great deal of CO2 would be emitted from the ocean to compensate). What would be the effect of a much smaller application of urea to the land surface such that the ‘‘target’’ CO2 emissions are stored as bicarbonate? This at ﬁrst appears sensible, in terms of chemistry, if not the energetics of urea production: One mole of urea decomposes to form two moles of NH3 and one mole of CO2 . Thus two moles of alkalinity are added to the land surface and have the potential to ﬁx two moles of CO2 as bicarbonate. However, the eventual fate of the majority of reduced nitrogen deposited on the land surface is nitriﬁcation [10], a biologically mediated process which oxidizes ammonia to nitrate, removing two moles of alkalinity for every mole nitriﬁed. Thus the net effect of adding 1 mole of urea is to increase the acidity of the soil by four moles and drive more CO2 into the atmosphere than was originally ﬁxed. Furthermore, both nitriﬁcation and the subsequent process of denitriﬁcation (the reduction of nitrate to molecular nitrogen, which occurs ubiquitously in soils [e.g. 25]) produce the strong greenhouse gas, nitrous oxide (N2O); a further negative effect. Let us neglect the warming and OH-consuming effects of enhanced atmospheric NH3 and assume as a more reasonable alternative to land application: that NH3 is emitted directly to the atmosphere to react. Taking our conservative estimate of 1.1 Pmol NH3 emissions required per year, we calculate that, using current ammonia production technology, 550 EJ of energy will be required and 277 Pg-C would be emitted. Even to neutralize 10% of the CO2 from distributed sources would require 55 EJ (>10% of the human race’s current energy consumption) and lead to the emission of 28 Pg-C as CO2; approximately 60 times that which would be sequestered in the ocean (0.5 Pg-C).

#### Doesn’t solve—pushes ocean’s carbon into the atmosphere

**Lenton et al 8** (Tim, PhD, Professor in Earth System Science at the School of Environmental Sciences at the University of East Anglia, Martin T. Johnson, a Naomi E. Vaughan, a,b Philip Goodwin, a Colin Goldblatt, a Sonia Roudesli, a School of Environmental Sciences, University of East Anglia, b Tyndall Centre for Climate Change Research, University of East Anglia, “ Why NH3 Is Not a Candidate Reagent for Ambient CO2 Fixation: A Response to ‘‘Alternative Solution to Global Warming Arising from CO2 Emissions—Partial Neutralization of Tropospheric H2CO3 with NH3,’’ July 17, 2008)

However, only a small area of the global ocean is substantially N-limited [28], so in most regions other nutrients (particularly P) would rapidly run out and the excess N would most likely be nitriﬁed (releasing N2O in the process). As we saw above, the process of oxidizing ammonia/um to nitrate removes 2 moles of alkalinity for every mole reacted. Therefore, the net effect of adding ammonium bicarbonate to the ocean is to add one mole of DIC, but to remove between 1 and 2 moles of alkalinity, thus driving the deposited carbon back into the atmosphere, along with some DIC which was previously stored stably in the surface ocean. For further information on ammonium deposition, nitriﬁcation and alkalinity effects in the ocean we refer the reader to Doney et al. [29]

#### Doesn’t solve—unfeasible, too large of energy input, and releases methane

**Lenton et al 8** (Tim, PhD, Professor in Earth System Science at the School of Environmental Sciences at the University of East Anglia, Martin T. Johnson, a Naomi E. Vaughan, a,b Philip Goodwin, a Colin Goldblatt, a Sonia Roudesli, a School of Environmental Sciences, University of East Anglia, b Tyndall Centre for Climate Change Research, University of East Anglia, “ Why NH3 Is Not a Candidate Reagent for Ambient CO2 Fixation: A Response to ‘‘Alternative Solution to Global Warming Arising from CO2 Emissions—Partial Neutralization of Tropospheric H2CO3 with NH3,’’ July 17, 2008)

It has been proposed that application of urea, or ammonium sulfate (plus lime) to nonagricultural land to evolve ammonia may provide a ‘‘solution’’ to increasing CO2 concentrations by neutralizing atmospheric carbonic acid to ammonium bicarbonate at ambient concentrations and subsequent storage in the surface ocean (Apak [2007]: Environmental Progress 26, 355–359). We identify a series of major ﬂaws in this hypothesis, which indicate that the approach is unfeasible and would not succeed if attempted at any scale: (i) The phenomenal energy cost associated with breaking the NBN bond and evolving H2 for NH3 production (and associated fossil fuel CO2 emissions under the current energy generation market); (ii) the radiative forcing associated with substantially increasing the concentration of ammonia in the atmosphere, and (iii) a number of unwanted indirect effects, including eutrophication, enhanced N2O emissions, and the inhibition of the oxidation of strong greenhouse gases such as methane in the atmosphere. We strongly urge future efforts to be directed away from this approach and suggest that engagement with the climate, earth-system, and biogeochemistry communities is essential when putting forward ideas for potential geoengineering approaches to mitigate global climate change. 2008 American Institute of Chemical Engineers Environ Prog, 27: 412–417, 2008

## AT methane

#### CO2 outweighs and methane decreasing now

**Cook 10** (John is the Climate Communication Fellow for the Global Change Institute at the University of Queensland. He originally studied physics at the University of Queensland. After graduating, he majored in solar physics in his post-grad honours year. He recently co-authored the book Climate Change Denial: Heads in the Sand., 7/9/2010, "What is methane's contribution to global warming?", www.skepticalscience.com/methane-and-global-warming.htm)

While methane is a more potent greenhouse gas than CO2, there is over 200 times more CO2 in the atmosphere. Hence the amount of warming methane contributes is 28% of the warming CO2 contributes. While methane is a more potent greenhouse gas than CO2, there is over 200 times more CO2 in the atmosphere. Eg - CO2 levels are 380 ppm (parts per million) while methane levels are 1.75ppm. Hence the amount of warming methane contributes is calculated at 28% of the warming CO2 contributes. Here is a graph of the various forcings that influence climate (methane is CH4, right above CO2). This is not to say methane can be ignored - reducing methane levels is definitely a goal to pursue. The good news is since the early 1990's, the trend in increasing methane has slowed down and even leveled off in the last few years (Dlugokencky 2003).