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## Contention One is Warming

#### It’s happening and is anthropogenic---reject negative evidence

**Prothero 12** [Donald R. Prothero, Professor of Geology at Occidental College and Lecturer in Geobiology at the California Institute of Technology, 3-1-2012, "How We Know Global Warming is Real and Human Caused," Skeptic, 17.2, EBSCO]

How do we know that global warming is real and primarily human caused? There are numerous lines of evidence that converge toward this conclusion. 1. Carbon Dioxide Increase Carbon dioxide in our atmosphere has increased at an unprecedented rate in the past 200 years. Not one data set collected over a long enough span of time shows otherwise. Mann et al. (1999) compiled the past 900 years' worth of temperature data from tree rings, ice cores, corals, and direct measurements in the past few centuries, and the sudden increase of temperature of the past century stands out like a sore thumb. This famous graph is now known as the "hockey stick" because it is long and straight through most of its length, then bends sharply upward at the end like the blade of a hockey stick. Other graphs show that climate was very stable within a narrow range of variation through the past 1000, 2000, or even 10,000 years since the end of the last Ice Age. There were minor warming events during the Climatic Optimum about 7000 years ago, the Medieval Warm Period, and the slight cooling of the Litde Ice Age in the 1700s and 1800s. But the magnitude and rapidity of the warming represented by the last 200 years is simply unmatched in all of human history. More revealing, the timing of this warming coincides with the Industrial Revolution, when humans first began massive deforestation and released carbon dioxide into the atmosphere by burning an unprecedented amount of coal, gas, and oil. 2. Melting Polar Ice Caps The polar icecaps are thinning and breaking up at an alarming rate. In 2000, my former graduate advisor Malcolm McKenna was one of the first humans to fly over the North Pole in summer time and see no ice, just open water. The Arctic ice cap has been frozen solid for at least the past 3 million years (and maybe longer),[ 4] but now the entire ice sheet is breaking up so fast that by 2030 (and possibly sooner) less than half of the Arctic will be ice covered in the summer.[ 5] As one can see from watching the news, this is an ecological disaster for everything that lives up there, from the polar bears to the seals and walruses to the animals they feed upon, to the 4 million people whose world is melting beneath their feet. The Antarctic is thawing even faster. In February-March 2002, the Larsen B ice shelf -- over 3000 square km (the size of Rhode Island) and 220 m (700 feet) thick -- broke up in just a few months, a story -typical of nearly all the ice shelves in Antarctica. The Larsen B shelf had survived all the previous ice ages and interglacial warming episodes over the past 3 million years, and even the warmest periods of the last 10,000 years -- yet it and nearly all the other thick ice sheets on the Arctic, Greenland, and Antarctic are vanishing at a rate never before seen in geologic history. 3. Melting Glaciers Glaciers are all retreating at the highest rates ever documented. Many of those glaciers, along with snow melt, especially in the Himalayas, Andes, Alps, and Sierras, provide most of the freshwater that the populations below the mountains depend upon -- yet this fresh water supply is vanishing. Just think about the percentage of world's population in southern Asia (especially India) that depend on Himalayan snowmelt for their fresh water. The implications are staggering. The permafrost that once remained solidly frozen even in the summer has now thawed, damaging the Inuit villages on the Arctic coast and threatening all our pipelines to the North Slope of Alaska. This is catastrophic not only for life on the permafrost, but as it thaws, the permafrost releases huge amounts of greenhouse gases which are one of the major contributors to global warming. Not only is the ice vanishing, but we have seen record heat waves over and over again, killing thousands of people, as each year joins the list of the hottest years on record. (2010 just topped that list as the hottest year, surpassing the previous record in 2009, and we shall know about 2011 soon enough). Natural animal and plant populations are being devastated all over the globe as their environments change.[ 6] Many animals respond by moving their ranges to formerly cold climates, so now places that once did not have to worry about disease-bearing mosquitoes are infested as the climate warms and allows them to breed further north. 4. Sea Level Rise All that melted ice eventually ends up in the ocean, causing sea levels to rise, as it has many times in the geologic past. At present, the sea level is rising about 3-4 mm per year, more than ten times the rate of 0.1-0.2 mm/year that has occurred over the past 3000 years. Geological data show that the sea level was virtually unchanged over the past 10,000 years since the present interglacial began. A few mm here or there doesn't impress people, until you consider that the rate is accelerating and that most scientists predict sea levels will rise 80-130 cm in just the next century. A sea level rise of 1.3 m (almost 4 feet) would drown many of the world's low-elevation cities, such as Venice and New Orleans, and low-lying countries such as the Netherlands or Bangladesh. A number of tiny island nations such as Vanuatu and the Maldives, which barely poke out above the ocean now, are already vanishing beneath the waves. Eventually their entire population will have to move someplace else.[ 7] Even a small sea level rise might not drown all these areas, but they are much more vulnerable to the large waves of a storm surge (as happened with Hurricane Katrina), which could do much more damage than sea level rise alone. If sea level rose by 6 m (20 feet), most of the world's coastal plains and low-lying areas (such as the Louisiana bayous, Florida, and most of the world's river deltas) would be drowned. Most of the world's population lives in low-elevation coastal cities such as New York, Boston, Philadelphia, Baltimore, Washington, D.C., Miami, and Shanghai. All of those cities would be partially or completely under water with such a sea level rise. If all the glacial ice caps melted completely (as they have several times before during past greenhouse episodes in the geologic past), sea level would rise by 65 m (215 feet)! The entire Mississippi Valley would flood, so you could dock an ocean liner in Cairo, Illinois. Such a sea level rise would drown nearly every coastal region under hundreds of feet of water, and inundate New York City, London and Paris. All that would remain would be the tall landmarks such as the Empire State Building, Big Ben, and the Eiffel Tower. You could tie your boats to these pinnacles, but the rest of these drowned cities would lie deep underwater. Climate Change Critic's Arguments and Scientists' Rebuttals Despite the overwhelming evidence there are many people who remain skeptical. One reason is that they have been fed distortions and misstatements by the global warming denialists who cloud or confuse the issue. Let's examine some of these claims in detail: \* "It's just natural climatic variability." No, it is not. As I detailed in my 2009 book, Greenhouse of the Dinosaurs, geologists and paleoclimatologists know a lot about past greenhouse worlds, and the icehouse planet that has existed for the past 33 million years. We have a good understanding of how and why the Antarctic ice sheet first appeared at that time, and how the Arctic froze over about 3.5 million years ago, beginning the 24 glacial and interglacial episodes of the "Ice Ages" that have occurred since then. We know how variations in the earth's orbit (the Milankovitch cycles) controls the amount of solar radiation the earth receives, triggering the shifts between glacial and interglacial periods. Our current warm interglacial has already lasted 10,000 years, the duration of most previous interglacials, so if it were not for global warming, we would be headed into the next glacial in the next 1000 years or so. Instead, our pumping greenhouse gases into our atmosphere after they were long trapped in the earth's crust has pushed the planet into a "super-interglacial," already warmer than any previous warming period. We can see the "big picture" of climate variability most clearly in ice cores from the EPICA (European Project for Ice Coring in Antarctica), which show the details of the last 650,000 years of glacial-inters glacial cycles (Fig. 2). At no time during any previous interglacial did the carbon dioxide levels exceed 300 ppm, even at their very warmest. Our atmospheric carbon dioxide levels are already close to 400 ppm today. The atmosphere is headed to 600 ppm within a few decades, even if we stopped releasing greenhouse gases immediately. This is decidedly not within the normal range of "climatic variability," but clearly unprecedented in human history. Anyone who says this is "normal variability" has never seen the huge amount of paleoclimatic data that show otherwise. \* "It's just another warming episode, like the Medieval Warm Period, or the Holocene Climatic Optimum or the end of the Little Ice Age." Untrue. There were numerous small fluctuations of warming and cooling over the last 10,000 years of the Holocene. But in the case of the Medieval Warm Period (about 950-1250 A.D.), the temperatures increased only 1°C, much less than we have seen in the current episode of global warming (Fig. 1). This episode was also only a local warming in the North Atlantic and northern Europe. Global temperatures over this interval did not warm at all, and actually cooled by more than 1°C. Likewise, the warmest period of the last 10,000 years was the Holocene Climatic Optimum ( 5,000-9,000 B.C.E.) when warmer and wetter conditions in Eurasia contributed to the rise of the first great civilizations in Egypt, Mesopotamia, the Indus Valley, and China. This was largely a Northern Hemisphere-Eurasian phenomenon, with 2-3°C warming in the Arctic and northern Europe. But there was almost no warming in the tropics, and cooling or no change in the Southern Hemisphere.[ 8] From a Eurocentric viewpoint, these warming events seemed important, but on a global scale the effect was negligible. In addition, neither of these warming episodes is related to increasing greenhouse gases. The Holocene Climatic Optimum, in fact, is predicted by the Milankovitch cycles, since at that time the axial tilt of the earth was 24°, its steepest value, meaning the Northern Hemisphere got more solar radiation than normal -- but the Southern Hemisphere less, so the two balanced. By contrast, not only is the warming observed in the last 200 years much greater than during these previous episodes, but it is also global and bipolar, so it is not a purely local effect. The warming that ended the Little Ice Age (from the mid-1700s to the late 1800s) was due to increased solar radiation prior to 1940. Since 1940, however, the amount of solar radiation has been dropping, so the only candidate remaining for the post-1940 warming is carbon dioxide.[ 9] "It's just the sun, or cosmic rays, or volcanic activity or methane." Nope, sorry. The amount of heat that the sun provides has been decreasing since 1940,[ 10] just the opposite of the critics' claims (Fig. 3). There is no evidence of an increase in cosmic ray particles during the past century.[ 11] Nor is there any clear evidence that large-scale volcanic events (such as the 1815 eruption of Tambora in Indonesia, which changed global climate for about a year) have any long-term effects that would explain 200 years of warming and carbon dioxide increase. Volcanoes erupt only 0.3 billion tonnes of carbon dioxide each year, but humans emit over 29 billion tonnes a year,[ 12] roughly 100 times as much. Clearly, we have a bigger effect. Methane is a more powerful greenhouse gas, but there is 200 times more carbon dioxide than methane, so carbon dioxide is still the most important agent.[ 13] Every other alternative has been looked at and can be ruled out. The only clear-cut relationship is between human-caused carbon dioxide increase and global warming. \* "The climate records since 1995 (or 1998) show cooling." That's simply untrue. The only way to support this argument is to cherry-pick the data.[ 14] Over the short term, there was a slight cooling trend from 1998-2000, but only because 1998 was a record-breaking El Nino year, so the next few years look cooler by comparison (Fig. 4). But since 2002, the overall long-term trend of warming is unequivocal. All of the 16 hottest years ever recorded on a global scale have occurred in the last 20 years. They are (in order of hottest first): 2010, 2009, 1998, 2005, 2003, 2002, 2004, 2006, 2007, 2001, 1997, 2008, 1995, 1999, 1990, and 2000.[ 15] In other words, every year since 2000 has been on the Top Ten hottest years list. The rest of the top 16 include 1995, 1997, 1998, 1999, and 2000. Only 1996 failed to make the list (because of the short-term cooling mentioned already). \* "We had record snows in the winter of 2009-2010, and also in 2010-2011." So what? This is nothing more than the difference between weather (short-term seasonal changes) and climate (the long-term average of weather over decades and centuries and longer). Our local weather tells us nothing about another continent, or the global average; it is only a local effect, determined by short-term atmospheric and oceano-graphic conditions.[ 16] In fact, warmer global temperatures mean more moisture in the atmosphere, which increases the intensity of normal winter snowstorms. In this particular case, the climate change critics forget that the early winter of November-December 2009 was actually very mild and warm, and then only later in January and February did it get cold and snow heavily. That warm spell in early winter helped bring more moisture into the system, so that when cold weather occurred, the snows were worse. In addition, the snows were unusually heavy only in North America; the rest of the world had different weather, and the global climate was warmer than average. Also, the summer of 2010 was the hottest on record, breaking the previous record set in 2009. \* "Carbon dioxide is good for plants, so the world will be better off." Who do they think they're kidding? The Competitive Enterprise Institute (funded by oil and coal companies and conservative foundations[ 17]) has run a series of shockingly stupid ads concluding with the tag line "Carbon dioxide: they call it pollution, we call it life." Anyone who knows the basic science of earth's atmosphere can spot the gross inaccuracies in this ad.[ 18] True, plants take in carbon dioxide that animals exhale, as they have for millions of years. But the whole point of the global warming evidence (as shown from ice cores) is that the delicate natural balance of carbon dioxide has been thrown off balance by our production of too much of it, way in excess of what plants or the oceans can handle. As a consequence, the oceans are warming[ 19, 20] and absorbing excess carbon dioxide making them more acidic. Already we are seeing a shocking decline in coral reefs ("bleaching") and extinctions in many marine ecosystems that can't handle too much of a good thing. Meanwhile, humans are busy cutting down huge areas of temperate and tropical forests, which not only means there are fewer plants to absorb the gas, but the slash and burn practices are releasing more carbon dioxide than plants can keep up with. There is much debate as to whether increased carbon dioxide might help agriculture in some parts of the world, but that has to be measured against the fact that other traditional "breadbasket" regions (such as the American Great Plains) are expected to get too hot to be as productive as they are today. The latest research[ 21] actually shows that increased carbon dioxide inhibits the absorption of nitrogen into plants, so plants (at least those that we depend upon today) are not going to flourish in a greenhouse world. It is difficult to know if those who tell the public otherwise are ignorant of basic atmospheric science and global geochemistry, or if they are being cynically disingenuous. \* "I agree that climate is changing, but I'm skeptical that humans are the main cause, so we shouldn't do anything." This is just fence sitting. A lot of reasonable skeptics deplore the right wing's rejection of the reality of climate change, but still want to be skeptical about the cause. If they want proof, they can examine the huge array of data that points directly to human caused global warming.[ 22] We can directly measure the amount of carbon dioxide humans are producing, and it tracks exactly with the amount of increase in atmospheric carbon dioxide. Through carbon isotope analysis, we can show that this carbon dioxide in the atmosphere is coming directly from our burning of fossil fuels, not from natural sources. We can also measure the drop in oxygen as it combines with the increased carbon levels to produce carbon dioxide. We have satellites in space that are measuring the heat released from the planet and can actually see the atmosphere getting warmer. The most crucial evidence emerged only within the past few years: climate models of the greenhouse effect predict that there should be cooling in the stratosphere (the upper layer of the atmosphere above 10 km or 6 miles in elevation), but warming in the troposphere (the bottom layer below 10 km or 6 miles), and that's exactly what our space probes have measured. Finally, we can rule out any other suspects (see above): solar heat is decreasing since 1940, not increasing, and there are no measurable increases in cosmic rays, methane, volcanic gases, or any other potential cause. Face it -- it's our problem. Why Do People Continue to Question the Reality of Climate Change? Thanks to all the noise and confusion over climate change, the general public has only a vague idea of what the debate is really about, and only about half of Americans think global warming is real or that we are to blame.[ 23] As in the evolution/creationism debate, the scientific community is virtually unanimous on what the data demonstrate about anthropogenic global warming. This has been true for over a decade. When science historian Naomi Oreskes[ 24] surveyed all peer-reviewed papers on climate change published between 1993 and 2003 in the world's leading scientific journal, Science, she found that there were 980 supporting the idea of human-induced global warming and none opposing it. In 2009, Doran and Kendall Zimmerman[ 25] surveyed all the climate scientists who were familiar with the data. They found that 95-99% agreed that global warming is real and human caused. In 2010, the prestigious Proceedings of the National Academy of Sciences published a study that showed that 98% of the scientists who actually do research in climate change are in agreement over anthropogenic global warming.[ 26] Every major scientific organization in the world has endorsed the conclusion of anthropogenic climate change as well. This is a rare degree of agreement within such an independent and cantankerous group as the world's top scientists. This is the same degree of scientific consensus that scientists have achieved over most major ideas, including gravity, evolution, and relativity. These and only a few other topics in science can claim this degree of agreement among nearly all the world's leading scientists, especially among everyone who is close to the scientific data and knows the problem intimately. If it were not such a controversial topic politically, there would be almost no interest in debating it since the evidence is so clear-cut. If the climate science community speaks with one voice (as in the 2007 IPCC report, and every report since then), why is there still any debate at all? The answer has been revealed by a number of investigations by diligent reporters who got past the PR machinery denying global warming, and uncovered the money trail. Originally, there were no real "dissenters" to the idea of global warming by scientists who are actually involved with climate research. Instead, the forces with vested interests in denying global climate change (the energy companies, and the "free-market" advocates) followed the strategy of tobacco companies: create a smokescreen of confusion and prevent the American public from recognizing scientific consensus. As the famous memo[ 27] from the tobacco lobbyists said "Doubt is our product." The denialists generated an anti-science movement entirely out of thin air and PR. The evidence for this PR conspiracy has been well documented in numerous sources. For example, Oreskes and Conway revealed from memos leaked to the press that in April 1998 the right-wing Marshall Institute, SEPP (Fred Seitz's lobby that aids tobacco companies and polluters), and ExxonMobil, met in secret at the American Petroleum Institute's headquarters in Washington, D.C. There they planned a $20 million campaign to get "respected scientists" to cast doubt on climate change, get major PR efforts going, and lobby Congress that global warming isn't real and is not a threat. The right-wing institutes and the energy lobby beat the bushes to find scientists -- any scientists -- who might disagree with the scientific consensus. As investigative journalists and scientists have documented over and over again,[ 28] the denialist conspiracy essentially paid for the testimony of anyone who could be useful to them. The day that the 2007 IPCC report was released (Feb. 2, 2007), the British newspaper The Guardian reported that the conservative American Enterprise Institute (funded largely by oil companies and conservative think tanks) had offered $10,000 plus travel expenses to scientists who would write negatively about the IPCC report.[ 29] In February 2012, leaks of documents from the denialist Heartland Institute revealed that they were trying to influence science education, suppress the work of scientists, and had paid off many prominent climate deniers, such as Anthony Watts, all in an effort to circumvent the scientific consensus by doing an "end run" of PR and political pressure. Other leaks have shown 9 out of 10 major climate deniers are paid by ExxonMobil.[ 30] We are accustomed to hired-gun "experts" paid by lawyers to muddy up the evidence in the case they are fighting, but this is extraordinary -- buying scientists outright to act as shills for organizations trying to deny scientific reality. With this kind of money, however, you can always find a fringe scientist or crank or someone with no relevant credentials who will do what they're paid to do. Fishing around to find anyone with some science background who will agree with you and dispute a scientific consensus is a tactic employed by the creationists to sound "scientific". The NCSE created a satirical "Project Steve,"[ 31] which demonstrated that there were more scientists who accept evolution named "Steve" than the total number of "scientists who dispute evolution". It may generate lots of PR and a smokescreen to confuse the public, but it doesn't change the fact that scientists who actually do research in climate change are unanimous in their insistence that anthropogenic global warming is a real threat. Most scientists I know and respect work very hard for little pay, yet they still cannot be paid to endorse some scientific idea they know to be false. The climate deniers have a lot of other things in common with creationists and other anti-science movements. They too like to quote someone out of context ("quote mining"), finding a short phrase in the work of legitimate scientists that seems to support their position. But when you read the full quote in context, it is obvious that they have used the quote inappropriately. The original author meant something that does not support their goals. The "Climategate scandal" is a classic case of this. It started with a few stolen emails from the Climate Research Unit of the University of East Anglia. If you read the complete text of the actual emails[ 32] and comprehend the scientific shorthand of climate scientists who are talking casually to each other, it is clear that there was no great "conspiracy" or that they were faking data. All six subsequent investigations have cleared Philip Jones and the other scientists of the University of East Anglia of any wrongdoing or conspiracy.[ 33] Even if there had been some conspiracy on the part of these few scientists, there is no reason to believe that the entire climate science community is secretly working together to generate false information and mislead the public. If there's one thing that is clear about science, it's about competition and criticism, not conspiracy and collusion. Most labs are competing with each other, not conspiring together. If one lab publishes a result that is not clearly defensible, other labs will quickly correct it. As James Lawrence Powell wrote: Scientists…show no evidence of being more interested in politics or ideology than the average American. Does it make sense to believe that tens of thousands of scientists would be so deeply and secretly committed to bringing down capitalism and the American way of life that they would spend years beyond their undergraduate degrees working to receive master's and Ph.D. degrees, then go to work in a government laboratory or university, plying the deep oceans, forbidding deserts, icy poles, and torrid jungles, all for far less money than they could have made in industry, all the while biding their time like a Russian sleeper agent in an old spy novel? Scientists tend to be independent and resist authority. That is why you are apt to find them in the laboratory or in the field, as far as possible from the prying eyes of a supervisor. Anyone who believes he could organize thousands of scientists into a conspiracy has never attended a single faculty meeting.[ 34] There are many more traits that the climate deniers share with the creationists and Holocaust deniers and others who distort the truth. They pick on small disagreements between different labs as if scientists can't get their story straight, when in reality there is always a fair amount of give and take between competing labs as they try to get the answer right before the other lab can do so. The key point here is that when all these competing labs around the world have reached a consensus and get the same answer, there is no longer any reason to doubt their common conclusion. The anti-scientists of climate denialism will also point to small errors by individuals in an effort to argue that the entire enterprise cannot be trusted. It is true that scientists are human, and do make mistakes, but the great power of the scientific method is that peer review weeds these out, so that when scientists speak with consensus, there is no doubt that their data are checked carefully Finally, a powerful line of evidence that this is a purely political controversy, rather than a scientific debate, is that the membership lists of the creationists and the climate deniers are highly overlapping. Both anti-scientific dogmas are fed to their overlapping audiences through right-wing media such as Fox News, Glenn Beck, and Rush Limbaugh. Just take a look at the "intelligent-design" cre-ationism website for the Discovery Institute. Most of the daily news items lately have nothing to do with creationism at all, but are focused on climate denial and other right-wing causes.[ 35] If the data about global climate change are indeed valid and robust, any qualified scientist should be able to look at them and see if the prevailing scientific interpretation holds up. Indeed, such a test took place. Starting in 2010, a group led by U.C. Berkeley physicist Richard Muller re-examined all the temperature data from the NOAA, East Anglia Hadley Climate Research Unit, and the Goddard Institute of Space Science sources. Even though Muller started out as a skeptic of the temperature data, and was funded by the Koch brothers and other oil company sources, he carefully checked and re-checked the research himself. When the GOP leaders called him to testify before the House Science and Technology Committee in spring 2011, they were expecting him to discredit the temperature data. Instead, Muller shocked his GOP sponsors by demonstrating his scientific integrity and telling the truth: the temperature increase is real, and the scientists who have demonstrated that the climate is changing are right (Fig. 5). In the fall of 2011, his study was published, and the conclusions were clear: global warming is real, even to a right-wing skeptical scientist. Unlike the hired-gun scientists who play political games, Muller did what a true scientist should do: if the data go against your biases and preconceptions, then do the right thing and admit it -- even if you've been paid by sponsors who want to discredit global warming. Muller is a shining example of a scientist whose integrity and honesty came first, and did not sell out to the highest bidder.[ 36] \* Science and Anti-Science The conclusion is clear: there's science, and then there's the anti-science of global warming denial. As we have seen, there is a nearly unanimous consensus among climate scientists that anthropogenic global warming is real and that we must do something about it. Yet the smokescreen, bluster and lies of the deniers has created enough doubt so that only half of the American public is convinced the problem requires action. Ironically, the U.S. is almost alone in questioning its scientific reality. International polls taken of 33,000 people in 33 nations in 2006 and 2007 show that 90% of their citizens regard climate change as a serious problem[ 37] and 80% realize that humans are the cause of it.[ 38] Just as in the case of creationism, the U.S. is out of step with much of the rest of the world in accepting scientific reality. It is not just the liberals and environmentalists who are taking climate change seriously. Historically conservative institutions (big corporations such as General Electric and many others such as insurance companies and the military) are already planning on how to deal with global warming. Many of my friends high in the oil companies tell me of the efforts by those companies to get into other forms of energy, because they know that cheap oil will be running out soon and that the effects of burning oil will make their business less popular. BP officially stands for "British Petroleum," but in one of their ad campaigns about 5 years ago, it stood for "Beyond Petroleum."[ 39] Although they still spend relatively little of their total budgets on alternative forms of energy, the oil companies still see the handwriting on the wall about the eventual exhaustion of oil -- and they are acting like any company that wants to survive by getting into a new business when the old one is dying. The Pentagon (normally not a left-wing institution) is also making contingency plans for how to fight wars in an era of global climate change, and analyzing what kinds of strategic threats might occur when climate change alters the kinds of enemies we might be fighting, and water becomes a scarce commodity. The New York Times reported[ 40] that in December 2008, the National Defense University outlined plans for military strategy in a greenhouse world. To the Pentagon, the big issue is global chaos and the potential of even nuclear conflict. The world must "prepare for the inevitable effects of abrupt climate change -- which will likely come [the only question is when] regardless of human activity." Insurance companies have no political axe to grind. If anything, they tend to be on the conservative side. They are simply in the business of assessing risk in a realistic fashion so they can accurately gauge their future insurance policies and what to charge for them. Yet they are all investing heavily in research on the disasters and risks posed by climatic change. In 2005, a study commissioned by the re-insurer Swiss Re said, "Climate change will significantly affect the health of humans and ecosystems and these impacts will have economic consequences."[ 41] Some people may still try to deny scientific reality, but big businesses like oil and insurance and conservative institutions like the military cannot afford to be blinded or deluded by ideology. They must plan for the real world that we will be seeing in the next few decades. They do not want to be caught unprepared and harmed by global climatic change when it threatens their survival. Neither can we as a society.

#### Reducing emissions now prevents extinction---it’s not too late to solve

Nuccitelli 12 – Dana, environmental scientist at a private environmental consulting firm in Sacramento and has a Bachelor's Degree in astrophysics from the University of California at Berkeley, and a Master's Degree in physics from the University of California at Davis, 2012, “Realistically What Might The Future Climate Look Like?”, http://thinkprogress.org/climate/2012/09/01/784931/realistically-what-might-the-future-climate-look-like/

This is Why Reducing Emissions is Critical¶ We’re not yet committed to surpassing 2°C global warming, but as Watson noted, we are quickly running out of time to realistically give ourselves a chance to stay below that ‘danger limit’. However, 2°C is not a do-or-die threshold. Every bit of CO2 emissions we can reduce means that much avoided future warming, which means that much avoided climate change impacts. As Lonnie Thompson noted, the more global warming we manage to mitigate, the less adaption and suffering we will be forced to cope with in the future.¶ Realistically, based on the current political climate (which we will explore in another post next week), limiting global warming to 2°C is probably the best we can do. However, there is a big difference between 2°C and 3°C, between 3°C and 4°C, and anything greater than 4°C can probably accurately be described as catastrophic, since various tipping points are expected to be triggered at this level. Right now, we are on track for the catastrophic consequences (widespread coral mortality, mass extinctions, hundreds of millions of people adversely impacted by droughts, floods, heat waves, etc.). But we’re not stuck on that track just yet, and we need to move ourselves as far off of it as possible by reducing our greenhouse gas emissions as soon and as much as possible.¶ There are of course many people who believe that the planet will not warm as much, or that the impacts of the associated climate change will be as bad as the body of scientific evidence suggests. That is certainly a possiblity, and we very much hope that their optimistic view is correct. However, what we have presented here is the best summary of scientific evidence available, and it paints a very bleak picture if we fail to rapidly reduce our greenhouse gas emissions.¶ If we continue forward on our current path, catastrophe is not just a possible outcome, it is the most probable outcome. And an intelligent risk management approach would involve taking steps to prevent a catastrophic scenario if it were a mere possibility, let alone the most probable outcome. This is especially true since the most important component of the solution – carbon pricing – can be implemented at a relatively low cost, and a far lower cost than trying to adapt to the climate change consequences we have discussed here (Figure 4).¶ Climate contrarians will often mock ‘CAGW’ (catastrophic anthropogenic global warming), but the sad reality is that CAGW is looking more and more likely every day. But it’s critical that we don’t give up, that we keep doing everything we can do to reduce our emissions as much as possible in order to avoid as many catastrophic consequences as possible, for the sake of future generations and all species on Earth. The future climate will probably be much more challenging for life on Earth than today’s, but we still can and must limit the damage.

#### Scientific consensus proves warming is real, anthropogenic, and causes extinction – SPS solves

Flournoy 12 –Dan Flournoy, PhD and MA from the University of Texas, Former Dean of the University College at Ohio University, Former Associate Dean at State University of New York and Case Institute of Technology, Project Manager for University/Industry Experiments for the NASA ACTS Satellite, Currently Professor of Telecommunications at Scripps College of Communications @ Ohio University, January 2012, "Solar Power Satellites," Springer Briefs in Space Development

In the Online Journal of Space Communication , Dr. Feng Hsu, a NASA scientist at Goddard Space Flight Center, a research center in the forefront of science of space and Earth, writes, “The **evidence of global warming is alarming**,” noting the potential for a catastrophic planetary climate change is real and troubling (Hsu 2010 ) . Hsu and his NASA colleagues were engaged in monitoring and analyzing climate changes on a global scale, through which they received first-hand scientific information and data relating to global warming issues, including the dynamics of polar ice cap melting. After discussing this research with colleagues who were world experts on the subject, he wrote: I now have no doubt global temperatures are rising, and that global warming is a serious problem confronting all of humanity. No matter whether these trends are due to human interference or to the cosmic cycling of our solar system, there are two basic facts that are crystal clear: (a) there is overwhelming scientific evidence showing **positive correlations between the level of CO2 concentrations** in Earth’s atmosphere **with respect to** the historical **fluctuations of global temperature** changes; and (b) the overwhelming majority of the world’s scientific community is in agreement about the risks of a potential catastrophic global climate change. That is, if we humans continue to ignore this problem and do nothing, if we continue dumping huge quantities of greenhouse gases into Earth’s biosphere, humanity will be at dire risk (Hsu 2010 ) . As a technology risk assessment expert, Hsu says he can show with some confidence that the planet will face more risk doing nothing to curb its fossil-based energy addictions than it will in making a fundamental shift in its energy supply. “This,” he writes, “is because the risks of a catastrophic anthropogenic climate change can be potentially the **extinction of human species**, a risk that is simply too high for us to take any chances” (Hsu 2010 ) . It was this NASA scientist’s conclusion that humankind must now embark on the next era of “sustainable energy consumption and re-supply, the most obvious source of which is the mighty energy resource of our Sun” (Hsu 2010 ) (Fig . 2.1 ).

#### CO2 emissions will destroy the ocean - causes extinction

Sify, Citing Professors @ University of Queensland and North Carolina, 10 (Sify News, Citing Ove Hoegh-Gulberg, Professor @ University of Queensland and Director of the Global Change Institute AND Citing John Bruno, Associate Professor of Marine Science @ UNC, “Could unbridled climate changes lead to human extinction?,” June 19th, <http://www.sify.com/news/could-unbridled-climate-changes-lead-to-human-extinction-news-international-kgtrOhdaahc.html>)

Sydney: Scientists have sounded alarm bells about how **growing concentrations of greenhouse gases are driving irreversible and dramatic changes in the** way the **oceans** function, **providing evidence that humankind could well be on the way to** the next great **extinction**. **The findings** of the comprehensive report: 'The impact of climate change on the world's marine ecosystems' **emerged from a synthesis of recent research** on the world's oceans, **carried out by** two of **the world's leading marine scientists.**  One of the authors of the report is Ove Hoegh-Guldberg, professor at The University of Queensland and the director of its Global Change Institute (GCI). '**We may see sudden, unexpected changes that have serious ramifications for** the overall well-being of humans, including **the capacity of the planet to support people**. This is further evidence that **we are well on the way to the next great extinction event**,' says Hoegh-Guldberg. 'The findings have enormous implications for mankind, particularly **if the trend continues**. The earth's ocean, which produces half of the oxygen we breathe and absorbs 30 per cent of human-generated carbon dioxide, is equivalent to its heart and lungs. This study shows worrying signs of ill-health. It's as if the earth has been smoking two packs of cigarettes a day!,' he added. 'We are entering a period in which **the ocean services upon which humanity depends are** undergoing massive change and in some cases **beginning to fail**', he added.

#### Warming magnifies all impacts and makes global conflicts inevitable

Ginsborg et al. 12 – Mikkel Funder, Signe Marie Cold-Ravnkilde and Ida Peters Ginsborg - in collaboration with Nanna Callisen Bang, Denmark Institute for International Studies, 2012, "ADDRESSING CLIMATE CHANGE AND CONFLICT IN DEVELOPMENT COOPERATION EXPERIENCES FROM NATURAL RESOURCE MANAGEMENT" www.diis.dk/graphics/Publications/Reports2012/RP2012-04-Addressing-climate-change\_web.jpg.pdf

2.2 Climate change as a conﬂict multiplier¶ Climate change is therefore best seen as a conﬂict multiplier, rather than as a major direct cause of conﬂict in itself. **Climate change may aggravate and extend the scope of existing conﬂicts, or trigger underlying and latent conﬂicts to break out into the open**. ¶ Previous studies have identiﬁed a number of areas in which **climate change may contribute to a worsening of conﬂicts** (Brown & Crawford 2009). These include:¶ • Land and water access. Access and use rights to land are a key feature in most situations where climate change has contributed to natural resource conﬂicts so far. Climate change can **intensify existing conﬂicts over land**, as land becomes less fertile or is ﬂooded, or if existing resource sharing arrangements between diﬀerent users and land use practices are disrupted. **In some parts of Africa, climate change may lead to a decline in available water resources of some 10–20% by the end of the century** (op cit.). This may **intensify existing competition** for access to water at intra-state and/or subnational levels. ¶ • Food security. Reduced rainfall and rising sea levels may lead to a decline in agricultural production and a substantial loss of arable land in some parts of Africa. Reduced yields for own consumption and increasing domestic food prices may in some cases lead to **civil unrest, and competition over access to land may intensify**.¶ • Migration and displacement. In some cases, increased scarcity of and competition over access to water and arable land may contribute to internal or regional migration, and disasters such as ﬂoods may lead to temporary or long-term local displacement. This may in turn **strengthen conﬂicts between host societies/communities and migrants** looking for access to new land and resources. ¶ • Increasing inequality and injustice. Through processes such as the above, some population groups may be particularly hard hit, leading to increased inequality and a sense of injustice. This may **intensify existing grievances and disputes** between natural resource users and/or between resource users and outside actors such as governments – thereby increasing the risk and intensity of conﬂict.

#### Warming causes African instability

Fuerth 8 – Fuerth, Research Professor of International Affairs at George Washington University, former National Security Advisor to VP Al Gore, 2008, Leon, Severe Climate Change over the Next Thirty Years, In Climatic Cataclysm, p. 142

In sub-Saharan Africa, hundreds of millions of already vulnerable persons will be exposed to intensified threat of death by disease, malnutrition, and strife. Natural causes such as long-term drought will play a major role, but political factors either will exacerbate these disasters or may even precipitate them as the result of a mix of mismanagement and miscalculated policy. Such was the case in Ethiopia during the rule of Colonel Mengistu Haile Mariam. The ongoing genocide in Darfur may have begun as a consequence of water scarcity, as noted elsewhere in this report.¶ Under conditions of severe global climate change environmental factors will push already failed states deeper into the abyss, **while driving other states toward the brink**. The stronger regional states, such as South Africa, will be affected not only by internal social and economic stress related to changing climatic patterns but also by southward flows of refugees hoping for rescue and safety.¶ Contemporary Africa aspires to be a unified system but falls far short. Severe climate change would, in a grim way, provide for the first time the missing element of connectivity. **From one end of the African continent to the other**, severe climate change will become the common denominator of turbulence and destruction.

#### Great power nuclear war

Glick 7 Caroline Glick 7, deputy managing editor of The Jerusalem Post, Senior Fellow for Middle East Affairs of the Center for Security Policy, “Condi's African holiday”, December 11, http://www.rightsidenews.com/20071211309/editorial/us-opinion-and-editorial/our-world-condis-african-holiday.html

The Horn of Africa is a dangerous and strategically vital place. Small wars, which rage continuously, can easily escalate into big wars. Local conflicts have regional and global aspects. All of the conflicts in this tinderbox, which controls shipping lanes from the Indian Ocean into the Red Sea, can potentially give rise to regional, and indeed global conflagrations between competing regional actors and global powers.

#### SPS facilitates a complete transition away from conventional energy

Flournoy 12 – Don Flournoy, PhD and MA from the University of Texas, Former Dean of the University College at Ohio University, Former Associate Dean at State University of New York and Case Institute of Technology, Project Manager for University/Industry Experiments for the NASA ACTS Satellite, Currently Professor of Telecommunications at Scripps College of Communications at Ohio University, "Solar Power Satellites," January, Springer Briefs in Space Development, Book

One of the obvious opportunities for solar power satellites is to become an **on-demand source of electric power for terrestrial utilities.** Once Sunsat providers can demonstrate the capability to direct continuous radio or light frequency power beams to production sites, the owners of coal-fired generation stations will quickly discover the value of this service. The same will also be true of **nuclear, gas-fired, biomass** and other such plants. With electrical power production ratings of 1 gw or more, solar satellite systems can be designed to meet the short- and long-term **needs of the terrestrial power plants at their** existing locations, at first to complement but eventually to replace their current fuel feedstocks. An attractive feature of this approach for space solar power investors is that the utilities have a predictable need for energy in great quantities. Since the power utilities are already connected to an electrical power grid, often covering regions larger than a single state or nation, the Sunsat people won’t have to also be in the terrestrial distribution business. Whether producing power from coal, nuclear, gas, biomass or other sources, **power utilities can be expected to step forward as early users** of this new space asset to begin reducing their mining and transportation costs. The use of scrubbers and filters will be greatly reduced, if needed at all. Problems related to spent fuel disposal and toxic waste management should be fewer. But mainly the utilities will become clients (and possibly investors) in the Sunsat business to guarantee a **sustainable night-and-day fuel source.**

#### SPS overcomes the flaws of other energy sources – terrestrial alternatives fail

Flournoy 12 – Don Flournoy, PhD and MA from the University of Texas, Former Dean of the University College at Ohio University, Former Associate Dean at State University of New York and Case Institute of Technology, Project Manager for University/Industry Experiments for the NASA ACTS Satellite, Currently Professor of Telecommunications at Scripps College of Communications at Ohio University, "Solar Power Satellites," January, Springer Briefs in Space Development, Book

Alternative terrestrial energy is not the complete answer, either. According to Woodcock, the limitation of Earth-based renewable energy sources is that they are not “demand” sources; that is, **they are only intermittently available.** Terrestrial solar power works when the Sun shines. Terrestrial wind power works when the wind blows. Terrestrial hydroelectric power is a way of storing water energy until users demand it. This process can include hydroelectric pumped storage, which is the lifting of water uphill where it is held until released to create electricity as it flows through turbines. But there is little capacity remaining on the planet for hydroelectric installations. Geothermal energy is also way to tap stored energy in the Earth itself. Batteries, water electrolysis and hydrogen storage in fuel cells are other ways to provide storage. But to run a **modern power grid** exclusively (or even largely) on terrestrial renewable energy, he says, would **require enormous amounts of storage**, and **storage is expensive**. Woodcock concludes that [SPS] solar power satellites are a potential solution because they can be positioned in space over a particular location to which they can stream continuous sunlight. Supplying power around the clock, such an energy system can serve as a demand source with very little storage required. He also suggests, given constant solar pointing, the photovoltaic area could probably be reduced by a factor of 10–100 by using concentrators. Land designated for receiving sites might also serve dual or multiple purposes. The National Space Society (NSS) hosts annual conferences that include sessions on space solar power. The organization’s website includes one of the most complete archives on space solar research. It also has taken positions of advocacy, stating that “all viable energy options should be pursued with vigor, [but that] Sun/ Sat power (**SSP) has a number of** substantial advantages over other energy sources.” The NSS lists several of these advantages: • Unlike oil, gas, ethanol and coal, SSP does not emit greenhouse gases. • Unlike nuclear power plants, SSP does not **produce hazardous waste** that needs to be stored and guarded for hundreds of years. • **Unlike terrestrial solar and wind** power plants, **SSP can be available in huge quantities 24-hours-a-day, 7 days a week. It produces regardless of cloud cover, daylight, or wind speed.** • Unlike coal and nuclear fuels, SSP does not require environmentally problematic mining operations. • Unlike nuclear power plants, SSP doesnot **provide** potential **targets for terrorists** (National Space Society 2008 ).

#### The US is key---US action sends a signal that revitalizes international cooperation on warming even before the energy created

Ritter 11-24 – Karl Ritter, reporter for the Huffington Post, November 24th, 2012, "U.N. Climate Talks: Will U.S. Take More Central Role After Bout Of Extreme Weather?" [www.huffingtonpost.com/2012/11/24/un-climate-un-qatar-united-states\_n\_2184357.html?view=print&comm\_ref=false](http://www.huffingtonpost.com/2012/11/24/un-climate-un-qatar-united-states_n_2184357.html?view=print&comm_ref=false)

"I think there will be expectations from countries to hear a new voice from the United States," said Jennifer Morgan, director of the climate and energy program at the World Resources Institute in Washington.¶ The climate officials and environment ministers meeting in the Qatari capital of Doha will not come up with an answer to the global temperature rise that is already melting Arctic sea ice and permafrost, raising and acidifying the seas, and shifting rainfall patterns, which has an impact on floods and droughts.¶ They will focus on side issues, like extending the Kyoto protocol – an expiring emissions pact with a dwindling number of members – and ramping up climate financing for poor nations.¶ **They will also try to structure the talks for a new global climate deal that is supposed to be adopted in 2015, a process in which American leadership is considered crucial**.¶ Many were disappointed that Obama didn't put more emphasis on climate change during his first term. He took some steps to rein in emissions of heat-trapping gases, such as sharply increasing fuel efficiency standards for cars and trucks. But a climate bill that would have capped U.S. emissions stalled in the Senate.¶ "We need the U.S. to engage even more," European Union Climate Commissioner Connie Hedegaard told The Associated Press. "Because that can change the dynamic of the talks."¶ The world tried to move forward without the U.S. after the Bush Administration abandoned the Kyoto Protocol, a 1997 pact limiting greenhouse emissions from industrialized nations. As that agreement expires this year, the climate curves are still pointing in the wrong direction.¶ The concentration of heat-trapping gases like carbon dioxide has jumped 20 percent since 2000, primarily from the burning of fossil fuels like coal and oil, according to a U.N. report released this week. And each year, the gap between what researchers say must be done to reverse this trend, and what's actually being done, gets wider.¶ Bridging that gap, through clean technology and renewable energy, is not just up to the U.S., but to countries like India and China, whose carbon emissions are growing the fastest as their economies expand.¶ But Obama raised hopes of a more robust U.S. role in the talks when he called for a national "conversation" on climate change after winning re-election. The issue had been virtually absent in the presidential campaigning until Hurricane Sandy slammed into the East Coast.¶ **The president still faces domestic political constraints**, and there's little hope of the U.S. increasing its voluntary pledge in the U.N. talks of cutting emissions by 17 percent by 2020, compared to 2005 levels.¶ Still, just a signal that Washington has faith in the international process would go a long way, analysts said.¶ "**The** perception **of many negotiators and countries is that the U.S. is not really interested in increasing action on climate change** in general," said Bill Hare, senior scientist at Climate Analytics, a non-profit organization based in Berlin.

#### SPS solves for global emissions

Kammen 7 – Professor of Public Policy @ UC Berkeley (Daniel, "Green Jobs Created by Global Warming Initiative," September 25th, http://www.unep.org/civil\_society/GCSF9/pdfs/karmen-senate.pdf)

In addition to supporting domestic job creation, clean energy is an important and fastest growing international sector, and one where overseas policy can be used to support poor developing regions – such as Africa (Jacobsen and Kammen, 2007) and Central America – as well as regaining market share in solar, fuel cell and wind technologies, where European nations and Japan have invested heavily and are reaping the benefits of month to year backlogs in clean energy orders. Some of those orders are for U. S. installations, but many more could be if we choose to make clean and green energy a national priority for both domestic installation and overseas export. Technology exports have impacts well beyond domestic job creation. In fact, if properly managed, the development of a thriving ‘cleantech’ sector can address a vital global issues, namely the emissions trajectories of major developing nations. China and India are often singled out for attention as major, emerging global emitters. China, in fact, will become the world’s largest greenhouse emitter in the near future, if it has not already. This fact, is often used – mistakenly in my view – to argue against unilateral climate protection efforts by nations such as the United States.  This view is shortsighted in two vital respects. First, China is demonstrably already suffering from the impacts of fossil fuel use. Crop yields in many parts of China are significantly lower than they would be without the significant sulfur and particulate burden that results from domestic coal combustion. (In fact, coal combustions emissions from China have significant air quality impacts on Japan, and can be measured in the U. S. as well.) Crop losses of over 20% have been reported in part of China, with the decrease unambiguously linked to air pollution. China also experiences significant human health impacts from this pollution burden as well. Second, China has committed, on paper, to a ‘circular economy’ where waste is reduced and overall productivity is enhanced. If the United States were to become a major exporter, or even a partner, in the production of low-emissions technologies – from truly carbon-capture coal-fired power plants, to increased numbers of solar, wind, and biofuel technologies – China would be an eager trading partner, so that they could install increasing numbers of low-emissions technologies. This would directly help the Chinese economy and their environmental and public health situation**.** On both of these grounds, U. S. domestic expansion of the clean energy sector will likely positively impact the ability and the actions of a number of emerging economies to ‘go green’.

#### Fossil fuel dependence is unsustainable – only SPS-ALPHA solves world energy needs and can be exported globally

Dvorsky 11-28 – George Dvorsky, writer for Io9, a daily science and technology publication, November 28th, 2012, "How space-based solar power will solve all our energy needs" io9.com/5963955/how-space+based-solar-power-will-solve-all-our-energy-needs

Humanity's demand for energy is growing at an astonishing rate. Combine this with an ever-dwindling supply of fossil fuels, and it becomes painfully clear that something innovative and powerful is required. There's one high-tech proposal that holds tremendous promise — an idea that has been around since the late 1960s. Here's how space-based solar power will **eventually** solve all our energy needs.¶ Humans needs more power¶ Assuming that economic progress and globalization continues at its current pace, **we'll need to produce twice the amount of energy that's consumed today by the 2030s — what will reach a monumental 220 trillion kiloWatt hours per year. And by the end of the century, we'll need four times the current rate of consumption.**¶ **Just as importantly, we're also going to have to kick the fossil fuel habit — and not only because** it'll eventually run out**. Rising CO2 emissions are wreaking havoc on the Earth's atmosphere, what's creating environmentally deleterious side-effects at a rate faster than expected.**¶ Moreover, if greenhouse gases are to be brought under control over the course of the next several decades, we'll need to get upwards of 90% of all our energy from either renewable or nuclear sources.¶ While there are a number of proposals on the table for how we might be able to meet these challenges, **none** really **appear to be truly viable**.¶ Except for solar powered satellites.¶ Obvious benefits¶ A closer look at a space-based solution yields a lengthy list of advantages.¶ Solar powered satellites **don't produce any greenhouse gases**, nor do they take up valuable real estate on Earth. Once the initial costs are met, they would be relatively cheap to maintain; the solar modules used for generating solar energy have a long service life, not to mention the astounding ROI that would come from a virtually unlimited energy source.¶ Additionally, they're not constrained by night/day cycles, the weather, or the changing seasons. And indeed, they would be much more efficient than any kind of ground-based station. The collection of solar energy in space is seven times greater per unit area than on the surface of the planet. Moreover, **the amount of solar energy available up there is staggering — on the order of** billions **of times greater than what we draw today; the Earth receives only one part in 2.3 billion of the Sun's output**. The potential for scalability is enormous, to say the least.¶ Solar powered satellites won't be prone to terrorist attacks and they'll **reduce geopolitical pressure for oil.** According to futurist Keith Henson, space-based solar could be used to power vehicles, like electric cars, or by enabling the production of synthetic fuels — which at a penny per kiloWatt hour would result in gasoline that costs one dollar a gallon.¶ At the same time, space-based solar would provide true energy independence for those nations who choose to implement it. And on top of that, the energy could be exported to virtually anywhere in the world; it would be especially valuable for isolated areas of the globe, including Africa and India.¶ Lastly, **space-based solar power would also yield** tremendous benefits to human and robotic space exploration**, including the powering of off-planet colonies on the Moon, Mars, and space stations.** It could also serve as the first seed in the development of a Dyson Sphere — a massive array of solar collectors that would completely envelope the sun at a distance of about 1 AU.¶ How it's going to work¶ Back in the late 1960s, Peter Glaser proposed the idea of solar powered satellites (SPS), what he envisioned as space-based photovoltaics that could transfer energy wirelessly back down to Earth. His design called for a large platform positioned in space in a high Earth orbit that would continuously collect and convert solar energy into electricity. In turn, that power would be used to drive a wireless power transmission (WPT) that beams the solar energy to receiving stations on Earth — what would be comprised of massive receiving dishes.¶ A number of visionaries have updated Glaser's vision to include the use of a microwave wireless power transmitter. This would involve large discrete structures (like a solar array and transmitter) that would have to be assembled in space. SPS systems could also include a modular electric/diode array laser WPT concept, involving self-assembling solar power-laser-thermal modules. Other designs call for an extremely modular microwave WPT SPS "sandwich structure" concept, requiring a significant number of small solar power-microwave-thermal modules that would be robotically assembled on orbit.¶ But to make it happen, we'll need to develop low-cost, environmentally-friendly launch vehicles. Eventually we'll send the materials up in a space elevator, but until then we'll have to come up with something more efficient. Thankfully, SpaceX and other private firms are already working on more efficient launch solutions.¶ Additionally, we'll require large scale construction and operations stations in orbit — space-based workplaces that would be more complex, larger, and more energy-demanding than the ISS. They would allow for the production of large, simple panels, that are easy to assemble and consist of many identical parts. Eventually, it may be possible to construct an entire flotilla of these solar collectors using materials extracted from asteroids.¶ Design proposals¶ As word gets out about the potential for SPS, and as the technology catches up to the idea, a number of design proposals have been put forth; this isn't just idle speculation anymore — it's something that's just about ready for prime-time.¶ For example, there's SPS-ALPHA (Solar Power Satellite via Arbitrarily Large PHased Array) which is being developed by NASA's John Mankins. Using a "biomimetic" approach, the project calls for huge platforms constructed from tens of thousands of small elements that could deliver tens to thousands of megawatts via wireless power transmission.¶ It would do this by using a large array of individually controlled thin-film mirrors outfitted on the curved surface of a satellite. These adjustable mirrors would intercept and redirect incoming sunlight toward photovoltaic cells affixed to the backside of the solar power satellite's large array. The Earth-pointing side of the array would be tiled with a collection of microwave-power transmission panels that generate the coherent, low-intensity beam of radio frequency energy and transmits that energy to Earth.¶ And what's particularly cool about this concept is that **it would enable the construction of a solar-power satellite that can be assembled entirely from individual system elements that weigh no more than 110 to 440 pounds (**50 **to 200** kilograms**), allowing all pieces to be** mass produced at low cost.

## Contention Two is UAVs

#### SPS is key to UAV effectiveness

Johnson et al. 9 – W. Neil Johnson, Naval Research Laboratory, High-energy Space Environment Branch, Space Science Division, AND\*\*\* Keith Atkins, James Armstrong, Kwok Cheung, Glen Henshaw, Steven Huynh, Paul Jaffe, Matthew Long, Michael Mook, Michael Osborn, Robert Skalitzky, and Frederick Tasker, Spacecraft Engineering Department, AND\*\*\* Jill Dahlburg and Michael N. Lovelette, Space Science Division, AND\*\*\* Robert Bartolo and Keith Williams, optical sciences division, AND\*\*\* Mark Dorsey, radar division, AND\*\*\* Donald Gubser, Materials Science and Technology Division, October 23rd, 2009, "Space-based Solar Power: Possible Defense Applications and Opportunities for NRL Contributions" [www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA513123](http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA513123)

Current long-duration solar-powered UAV systems, while demonstrated to be feasible, are **payload limited because a significant** fraction of total vehicle **mass must be dedicated to energy storage**, usually in the form of batteries. Those batteries are essential to provide power during nighttime flight as well as to augment available solar power when the aircraft flies in attitudes or circumstances not favorable to solar energy collection. While significant advances in lightweight battery technology have been made in recent years, energy storage still comprises anywhere from 20% to 50% of total vehicle mass in flight-proven UAVs. Significant augmentation of overall UAV system capabilities is possible if a large fraction of that battery mass can be made available to the payload. ¶ SBSP, provided in concert with local insolation at the UAV, can result in far less battery mass being required on the aircraft. In addition to providing additional power during daylight operations, a network of SBSP satellites can provide nearly continuous power to the UAV during local night. In fact, at typical UAV cruise power requirements of 75 to 100 W and typical wing areas of 1.2 to 2 m 2 , all the flight power for the bird could conceivably be provided by RF or light transmission from SBSP without exceeding the 100 W/m 2 controlled area limit of exposure currently accepted as human-safe.

#### Now is key – the next generation of UAVs is coming to deal with growing threats

Reed 12 – John Reed graduated from the University of New Hampshire with a dual degree in international affairs and history. Reed is a national security reporter for Foreign Policy. He comes to FP after editing Military.com’s publication Defense Tech and working as the associate editor of DoDBuzz. Between 2007 and 2010, he covered major trends in military aviation and the defense industry around the world for Defense News and Inside the Air Force. July 31st, 2012, "The Next Generation of UAVs" blog.foreignpolicy.com/posts/2012/07/31/the\_next\_generation\_of\_uavs

In an example of how the next-generation of stealthy UAV will be here within the decade, Lockheed Martin has just revealed the Sea Ghost, an unmanned Naval strike jet.¶ While the vast majority of the world's current fleet of combat UAVs aren't much more survivable against modern air defenses than a World War I bi-plane, **drone technology is set to take a** giant leap forward in the next decade **if all goes according to the U.S. Navy's plan to field a fighter-sized, stealthy, long-range combat drone by 2018.**¶ The Navy's Unmanned Carrier-Launched Surveillance and Strike (UCLASS) program calls for a fleet of jet-powered stealth drones that can do everything from refuel other planes to spy on the enemy and even drop bombs on them, all while flying autonomously. This means they are supervised by humans aboard aircraft carriers or shore installations, but the planes will execute the details of their missions -- including the incredibly difficult task of landing on an aircraft carrier in pitching seas -- on their own. Current UAVs are flown by pilots sitting in trailers, which is why the U.S. Air Force officially calls them Remotely Piloted Vehicles. (Click here to see how UCLASS will fly autonomously and land itself on carriers.)¶ **How is the Navy going to field a brand new class of jet so quickly? It's going to base the jets off of existing technology that's been developed and proven via programs such as Northrop Grumman's X-47B Unmanned Combat Air Vehicle**. (The X-47B is actually being used to prove that it is possible to operate a stealthy, fighter-sized UAV from an aircraft carrier.)¶ To that end, Lockheed Martin is developing Sea Ghost as its proposal for the UCLASS effort. The jet, shown above, will draw on the Bethesda-Md.-based company's experiences fielding the mysterious RQ-170 Sentinel stealth UAV (made famous for spying on Osama bin Laden as well as crashing inside Iran in 2011) and the F-35 Joint Strike Fighter, according to a company statement.¶ Other than that, Lockheed is pretty mum about the new jet.¶ We do know that in addition to being stealthy, autonomous and able to quickly swap out payloads of weapons, sensors and even air-to-air refueling kits, the Sea Ghost will need to be toughened to withstand the strain of catapult launches, arrested landings and corrosive, salty ocean air. It would also seem likely that this will be a flying wing, judging from the image above and the fact that this plane will draw on Lockheed's experience with the RQ-170, which is a stealthy, jet-powered flying wing.¶ The UCLASS concept fits nicely into several post-Iraq/Afghanistan constructs that the military is focusing on.¶ First off, this jet is well suited, in theory anyway, to the Pentagon's focus on fielding new weapons capable of traveling long distances and penetrating 21st century air defenses.¶ This is **because** nations such as Iran and China have figured out how to defend against the U.S. military that awed the world in the 1990s **during campaigns in the Balkans and Middle East.** Potential enemies will try to keep U.S. aircraft and warships at bay by firing masses of guided missiles capable of hitting American air bases the region - and in China's case, aircraft carriers - and by fielding advanced Russian-designed air defense systems that are able to shoot down all but the stealthiest of aircraft. ¶ UCLASS is stealthy - so that, with the help of electronic warfare gear, it has a chance of getting past enemy radars - and it can be refueled in flight, giving it fairly unlimited range and it's unmanned so that if one is shot down, a U.S. pilot won't be endangered.¶ The jet also fits into Chief of Naval Operations Adm. Jonathan Greenert's call for the sea service to buy relatively inexpensive, easy to develop, "trucks" that can be adapted to perform a variety of missions instead of complex and expensive weapons systems that are designed to perform a narrow set of missions. (20th Century examples of the type of truck Greenert has in mind are the B-52 bomber and the U-2 spy plane, both of which have outlasted aircraft built to replace them by decades due to their ability to be adapted to perform a wide variety of missions over the last fifty years.)

#### UAVs in Pakistan are inevitable and key to quelling the insurgency

Bergen & Tiedemann 11 – Peter Bergen, Director of the National Security Studies Program at the New America Foundation AND\*\*\* Katherine Tiedemann, research fellow at the New America Foundation, July/August 2011, “Washington’s Phantom War,” Foreign Affairs, http://www.foreignaffairs.com/articles/67939/peter-bergen-and-katherine-tiedemann/washingtons-phantom-war?page=show

Despite the drone program’s shortcomings, it is likely to continue-put simply, Washington has no better military options for combating the anti-Western militants who have made their home in Pakistan’s tribal areas. Pakistan’s army has proved itself unwilling or unable to clear out the Taliban and other insurgent groups from North Waziristan, where around 90 percent of last year’s drone strikes took place. Although the Pakistani armed forces have in recent years undertaken operations in the six other agencies of fata, the military’s high command remains resistant to attacking North Waziristan, a base of the Haqqani network, al Qaeda and other foreign fighters, and local Taliban militants, some of whom Pakistan views as a hedge against Indian influence in the region. Pakistan’s ambassador to United States, Husain Haqqani, has argued that Pakistan is not in a position to begin an offensive in North Waziristan because its military is already stretched thin by its work on reconstruction efforts necessitated by the country’s devastating floods in the summer of 2010. And Pakistan’s powerful army chief, General Ashfaq Parvez Kayani, has resisted the efforts of countless U.S. officials to convince him to attack the insurgents based in North Waziristan. Kayani, it seems, is concerned not only with overcommitting his already overstretched forces but also with retaining the loyalty of the Haqqani network, which has long been an asset of Pakistani military intelligence, according to U.S. officials. The military alternatives to drone strikes in the tribal areas-U.S. Special Forces operations using ground troops, for example, or conventional nato-led air strikes-are not supported by Pakistani officials and would be met with strong resistance. In September 2008, U.S. commandos carried out a raid against alleged al Qaeda and Taliban militants just over the border from Afghanistan in South Waziristan, angering Kayani, who said that Pakistan’s sovereignty would be defended “at all cost.” Two years later, when nato helicopters flew into Pakistani airspace in the Kurram Agency, Pakistan’s reaction was even harsher-officials closed the Torkham border crossing, a key link in nato’s supply lines to Afghanistan. Last December, when a report in The New York Times suggested that Washington might be interested in expanding U.S. special operations raids into Pakistani territory, Ambassador Haqqani immediately registered his disapproval and noted that no foreign forces would be allowed to operate inside Pakistan. And the operation that killed bin Laden was met with outcries from Pakistani offi- cials concerned about violations of the country’s sovereignty. Behind the scenes, many Pakistani officials-including President Asif Ali Zardari and Prime Minister Yousaf Raza Gilani-have supported the drone strikes, despite their occasional public protests. In a State Department cable from August 2008, just when Washington was ramping up the drone program, Gilani said, “I don’t care if they [the Americans] do it as long as they get the right people. We’ll protest in the National Assembly and then ignore it.” A few months later, Zardari gave his blessing to the program with the brusque comment, “Kill the seniors. Collateral damage worries you Americans. It does not worry me.” And of course, the greatest proof of Islamabad’s cooperation is the fact that the program has continued; for the strikes to be even minimally successful, they require some coordination with Pakistan’s military and intelligence services. As one U.S. official commented, “You need guys on the ground to tell you who they [militant targets] are, and that isn’t coming from some white guy running around the fata.” Although Pakistani officials have recently resumed their public criticism of the strikes, Islamabad has some strong reasons to cooperate. The strikes routinely kill enemies of the Pakistani state, such as Mehsud, who targeted police officers, soldiers, and civilians across the country with suicide bombings. Anecdotal evidence suggests that **the strikes are** also **having an effect on the insurgents’ morale and operational practices.** Low-level **militants** have grown to **fear the drones**, which some have dubbed machay, or “wasps,” for the buzzing sound they make as they hover for hours before or after attacks. David Rohde, the New York Times reporter who was held by the Haqqani network for over seven months in North and South Waziristan in 2008 and 2009, wrote later that “the drones [were] a terrifying presence that … unnerved and angered the guards.” Today, Haqqani fighters set up camp in groups no larger than ten men to avoid attracting the attention of the Predators and Reapers patrolling the skies above them. Some militants in North Waziristan have reportedly gone so far as to take up living in underground tunnels. Finally, it is important to remember that Pakistan’s tribal areas are a major source of human and material support for attacks against U.S. and nato forces in Afghanistan, according to the United Nations. Washington is therefore loath to abandon, or even slow down, a program that may have any kind of positive effects in taming this troublesome region. Lacking other military alternatives and facing a persistent threat from the tribal areas, the U.S. program of drone strikes is not likely to end in the near future. As Leon Panetta, the outgoing cia director, once said, **the drone program is “the only game in town.”**

#### Insurgency in Pakistan causes global nuclear war

Pitt 9 – William Rivers Pitt, Political Activist Specializing on the War on Terror and New York Times and Internationally Bestselling Author of “War on Iraq: What Team Bush Doesn’t Want You to Know,” and “The Greatest Sedition is Silence” “Unstable Pakistan threatens the world,” May 8th, 2009, http://www.arabamericannews.com/news/index.php?mod=article&cat=commentary&article=2183

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But a suicide bomber in Pakistan rammed a car packed with explosives into a jeep filled with troops today, killing five and wounding as many as 21, including several children who were waiting for a ride to school. Residents of the region where the attack took place are fleeing in terror as gunfire rings out around them, and government forces have been unable to quell the violence. Two regional government officials were beheaded by militants in retaliation for the killing of other militants by government forces. As familiar as this sounds, it did not take place where we have come to expect such terrible events. This, unfortunately, is a whole new ballgame. It is part of another conflict that is brewing, one which puts what is happening in Iraq and Afghanistan in deep shade, and which represents a grave and growing threat to us all. Pakistan is now trembling on the edge of violent chaos, and is doing so with nuclear weapons in its hip pocket, right in the middle of one of the most dangerous neighborhoods in the world. The situation in brief: Pakistan for years has been a nation in turmoil, run by a shaky government supported by a corrupted system, dominated by a blatantly criminal security service, and threatened by a large fundamentalist Islamic population with deep ties to the Taliban in Afghanistan. All this is piled atop an ongoing standoff with neighboring India that has been the center of political gravity in the region for more than half a century. **The fact that Pakistan**, and **India**, and **Russia, and China all possess nuclear weapons and share the same space means any** ongoing or escalating **violence** over there **has the real potential to crack open the** very **gates of Hell itself.** Recently, the Taliban made a military push into the northwest Pakistani region around the Swat Valley. According to a recent Reuters report: The (Pakistani) army deployed troops in Swat in October 2007 and use d artillery and gunship helicopters to reassert control. But insecurity mounted after a civilian government came to power last year and tried to reach a negotiated settlement. A peace accord fell apart in May 2008. After that, hundreds — including soldiers, militants and civilians — died in battles. Militants unleashed a reign of terror, killing and beheading politicians, singers, soldiers and opponents. They banned female education and destroyed nearly 200 girls' schools. About 1,200 people were killed since late 2007 and 250,000 to 500,000 fled, leaving the militants in virtual control. Pakistan offered on February 16 to introduce Islamic law in the Swat valley and neighboring areas in a bid to take the steam out of the insurgency. The militants announced an indefinite cease-fire after the army said it was halting operations in the region. President Asif Ali Zardari signed a regulation imposing sharia in the area last month. But the Taliban refused to give up their guns and pushed into Buner and another district adjacent to Swat, intent on spreading their rule. The United States, already embroiled in a war against Taliban forces in Afghanistan, must now face the possibility that Pakistan could collapse under the mounting threat of Taliban forcesthere. Military and diplomatic advisers to President Obama, uncertain how best to proceed, now face one of the great nightmare scenarios of our time. "Recent militant gains in Pakistan," reported The New York Times on Monday, "have so alarmed the White House that the national security adviser, Gen. James L. Jones, described the situation as 'one of the very most serious problems we face.'" "Security was deteriorating rapidly," reported The Washington Post on Monday, "particularly in the mountains along the Afghan border that harbor al-Qaeda and the Taliban, intelligence chiefs reported, and there were signs that those groups were working with indigenous extremists in Pakistan's populous Punjabi heartland. The Pakistani government was mired in political bickering. The army, still fixated on its historical adversary India, remained ill-equipped and unwilling to throw its full weight into the counterinsurgency fight. But despite the threat the intelligence conveyed, Obama has only limited options for dealing with it. Anti-American feeling in Pakistan is high, and a U.S. combat presence is prohibited. The United States is fighting Pakistan-based extremists by proxy, through an army over which it has little control, in alliance with a government in which it has little confidence." It is believed Pakistan is currently in possession of between 60 and 100 nuclear weapons. Because Pakistan's stability is threatened by the wide swath of its population that shares ethnic, cultural and religious connections to the fundamentalist Islamic populace of Afghanistan, fears over what could happen to those nuclear weapons if the Pakistani government collapses are very real. "As the insurgency of the Taliban and Al Qaeda spreads in Pakistan," reported the Times last week, "**senior American officials** say they **are increasingly concerned about** new vulnerabilities for **Pakistan's nuclear arsenal,** including the potential for militants to snatch a weapon in transport or to insert sympathizers into laboratories or fuel-production facilities. In public, the administration has only hinted at those concerns, repeating the formulation that the Bush administration used: that it has faith in the Pakistani Army. But that cooperation, according to officials who would not speak for attribution because of the sensitivity surrounding the exchanges between Washington and Islamabad, has been sharply limited when the subject has turned to the vulnerabilities in the Pakistani nuclear infrastructure." "The prospect of turmoil in Pakistan sends shivers up the spines of those U.S. officials charged with keeping tabs on foreign nuclear weapons," reported Time Magazine last month. "Pakistan is thought to possess about 100 — the U.S. isn't sure of the total, and may not know where all of them are. Still, if Pakistan collapses, the U.S. military is primed to enter the country and secure as many of those weapons as it can, according to U.S. officials. Pakistani officials insist their personnel safeguards are stringent, but a sleeper cell could cause big trouble, U.S. officials say." In other words, a shaky Pakistan spells trouble for everyone, especially if America loses the footrace to secure those weapons in the event of the worst-case scenario. **If** Pakistani militants **ever succeed in toppling the government,** several very dangerous events could happen at once. **Nuclear-armed India could be galvanized into military action** of some kind, **as could** nuclear-armed **China or** nuclear-armed **Russia.** If the Pakistani government does fall, and all those Pakistani nukes are not immediately accounted for and secured, the specter (or reality) of **loose nukes** falling into the hands of terrorist organizations could **place the entire world on a collision course with unimaginable disaster.** We have all been paying a great deal of attention to Iraq and Afghanistan, and rightly so. The developing situation in Pakistan, however, needs to be placed immediately on the front burner. The Obama administration appears to be gravely serious about addressing the situation. So should we all.

#### UAVs are key to Alaskan air power

Anderson 12 – Ben Anderson, writer for the Alaska Dispatch, February 13th, 2012, "Unmanned aerial drones the future of Arctic reconnaissance?" [www.alaskadispatch.com/article/unmanned-aerial-drones-future-arctic-reconnaissance?page=full](http://www.alaskadispatch.com/article/unmanned-aerial-drones-future-arctic-reconnaissance?page=full)

But there's a softer, friendlier side to UAVs -- they're not all the terrifying, death-from-above variety popularized in media. UAVs, thanks to their small size and ability to be controlled remotely, have been finding their niche doing jobs that are too messy, dangerous, or downright impossible for manned aircraft to perform.¶ Alaska's big role in domestic drone programs¶ Now, a new, long-term Federal Aviation Administration bill aims to increase the number of UAVs in American airspace over the next four years, designating specific airspace for UAV flight and testing, similar to the restricted airspace utilized by military installations.¶ H.R. 658, the FAA reauthorization bill, mandates that the FAA must designate six UAV test ranges in U.S. airspace within about six months. But a special clause, and the one most important to Alaska, will designate portions of airspace from the Aleutian Islands to the North Slope for 24-hour UAV use "for research and commercial purposes."¶ The amendment was written by Alaska Sen. Mark Begich, with the University of Alaska Unmanned Aircraft Program in mind. That program, based at the University of Alaska Fairbanks Geophysical Institute, **has been on the cutting-edge of UAV technology, thanks to Alaska's myriad uses for the science**.¶ Researchers with the program have been getting around the state, too: last year, the program performed tests in the Aleutians and Prince William Sound. In November, the program took a trip to Prudhoe Bay, where a UAV observed the maintenance needs of fire-breathing gas flare stations.¶ In January, program manager Greg Walker was on hand in Nome, Alaska, as a Russian fuel tanker prepared to offload more than a million gallons of fuel. Walker and a small Aeryon scout UAV surveyed ice conditions in advance of the ship's arrival and **prepared to assist with surveillance in the case of a spill**.¶ Walker said that Alaska's unique need for UAV technology -- particularly in far-flung Arctic regions -- played a big role in the bill's Arctic language.

#### Alaskan air power prevents Arctic conflict escalation

Schanz 8 – Mark V. Schanz, Associate Editor of Airforce Magazine, 2008, “Strategic Alaska,” http://www.airforce-magazine.com/MagazineArchive/Pages/2008/November%202008/1108alaska.aspx

**More than ever before, the Air Force is paying close attention to its force structure in Alaska.** Indeed, a major rush of events in the High North has propelled the 49th state up to the top ranks of service thinking.¶ A resurgent Russia has ramped up its long-range bomber flights nearby. A changing Arctic climate has uncorked a flurry of activity in the region as once inaccessible resources now seem ready for exploitation. Alaska’s strategic Arctic location is viewed as useful for missile defense, air defense, and force deployments to locations ranging from Europe to East Asia and beyond. And **the military training space available to USAF there is huge and varied.**¶ For these and other reasons, the Air Force has started beefing up its forces in the state. A visitor there sees that the service has been sending its newest and most advanced equipment for Alaskan service, including brand-new F-22 fighters and C-17 transports.¶ C-17s are surrounded by low clouds on the runway at Elmendorf AFB, Alaska. (USAF photo by SrA. Garrett Hothan)¶ "From an airman’s perspective, [it’s] probably the most strategic location," said Lt. Gen. Dana T. Atkins, commander of Alaskan Command and Alaskan NORAD region. **The state’s geographic location "makes it** hugely of strategic import to the United States **and** really important in a global context**."**¶ From Alaskan bases, the Air Force can gain quick access both to the Pacific and European Theaters. Transiting across the Arctic, forces could arrive in Europe faster than if flying from the East Coast of the US, Atkins pointed out. This responsive location has helped to **push Alaska to the forefront of USAF’s investment queue**.¶ The reinvigoration of Russian **bomber patrols over Arctic waters in August 2007 was an opening push of that country’s increasingly** assertive power projection efforts**. NORAD’s US and Canadian fighters have** repeatedly intercepted Russian flights skirting Alaskan airspace**.**¶ New F-22s at Elmendorf Air Force Base took center stage last fall when Raptors stepped in to fill the role of the temporarily grounded F-15 fleet to intercept Russian Tu-95 Bear bombers.¶ The Air Sovereignty Mission¶ Many of the Raptor pilots leveraged their F-15 backgrounds, and the scrambles led to the development of a new training plan for the air sovereignty mission, said Lt. Col. Orlando Sanchez, director of operations for the 525th Fighter Squadron at Elmendorf. While F-22s are no longer on alert, they may perform intercepts in the future.¶ The commander of Russia’s Air Force, Col. Gen. Alexander Zelin, said in April the country will increase its strategic patrols to as many as 30 a month.¶ "It’s been interesting in the last few years," said Gen. Carrol H. Chandler, chief of Pacific Air Forces, in September. "When I was ... Alaskan Command commander, we had one intercept in the time that I was there. The Russians have continued to put emphasis on long-range aviation; they’ve continued to put emphasis on presence in the Arctic. ... Those numbers have picked up considerably over the last three to four years."¶ Chandler suspects that a "competition for resources" will continue, and perhaps intensify, in the Arctic.¶ Last year, Russia publicized a submarine trip to the bottom of the seabed at the North Pole—where the crew deposited a titanium Russian flag, symbolically marking territory.¶ The Canadians derided the expedition as a "stunt," with Prime Minister Stephen Harper making a trip to Canada’s Arctic region to unveil several major military investments, and following with a new defense strategy, outlining new capabilities in the North**.**¶ **Russia’s focus on Arctic operations is a part of the country’s push to assert its own interests over Siberia’s extended continental shelf**—the largest and least explored so far of the world’s continental shelves, according to senior Russian military officials. Geologists believe major oil and gas deposits could potentially become available as the polar ice cap slowly recedes with warming temperatures—a fact that is the focus of increasing attention to the nations claiming Arctic waters.¶ "I don’t see that abating anytime in the near future, and **the Russians certainly have the resources at this point" to continue to push into the region**, said Chandler.¶ A Resurgent Russia¶ While Russia’s Arctic bellicosity has been on the rise, commanders in the region say the moves have to be kept in perspective.

#### Arctic conflict causes nuclear war

Wallace & Staples 10 – Michael Wallace is Professor Emeritus at the University of British Columbia; Steven Staples is President of the Rideau Institute in Ottawa, March 2010, “Ridding the Arctic of Nuclear Weapons A Task Long Overdue”, http://www.arcticsecurity.org/docs/arctic-nuclear-report-web.pdf

The fact is, the Arctic is becoming a zone of increased military competition. Russian President Medvedev has announced the creation of a special military force to defend Arctic claims. Last year Russian General Vladimir Shamanov declared that Russian troops would step up training for Arctic combat, and that Russia’s submarine fleet would increase its “operational radius.” Recently, two Russian attack submarines were spotted off the U.S. east coast for the first time in 15 years. ¶ In January 2009, on the eve of Obama’s inauguration, President Bush issued a National Security Presidential Directive on Arctic Regional Policy. It affirmed as a priority the preservation of U.S. military vessel and aircraft mobility and transit throughout the Arctic, including the Northwest Passage, and foresaw greater capabilities to protect U.S. borders in the Arctic. ¶ The Bush administration’s disastrous eight years in office, particularly its decision to withdraw from the ABM treaty and deploy missile defence interceptors and a radar station in Eastern Europe, have greatly contributed to the instability we are seeing today, even though the Obama administration has scaled back the planned deployments. **The Arctic has figured in this renewed interest in Cold War weapons systems**, particularly the upgrading of the Thule Ballistic Missile Early Warning System radar in Northern Greenland for ballistic missile defence. ¶ **The Canadian government, as well, has put forward new military capabilities to protect Canadian sovereignty claims in the Arctic**, including proposed ice-capable ships, a northern military training base and a deep-water port. Earlier this year Denmark released an all-party defence position paper that suggests the country should create a dedicated Arctic military contingent that draws on army, navy and air force assets with shipbased helicopters able to drop troops anywhere. Danish fighter planes would be tasked to patrol Greenlandic airspace. ¶ Last year Norway chose to buy 48 Lockheed Martin F-35 fighter jets, partly because of their suitability for Arctic patrols. In March, that country held a major Arctic military practice involving 7,000 soldiers from 13 countries in which a fictional country called Northland seized offshore oil rigs. ¶ The manoeuvres prompted a protest from Russia – which objected again in June after Sweden held its largest northern military exercise since the end of the Second World War. About **12,000 troops, 50 aircraft and several warships were involved**. ¶ Jayantha Dhanapala, President of Pugwash and former UN under-secretary for disarmament affairs, summarized the situation bluntly: “From those in the international peace and security sector, deep concerns are being expressed over the fact that two nuclear weapon states – the United States and the Russian Federation, which together own 95 per cent of the nuclear weapons in the world – converge on the Arctic and have competing claims. These claims, together with those of other allied NATO countries – Canada, Denmark, Iceland, and Norway – could, if unresolved, lead to conflict escalating into the threat or use of nuclear weapons.” Many will no doubt argue that this is excessively alarmist, but **no circumstance in which nuclear powers find themselves in military confrontation can be taken lightly.** ¶ The current geo-political threat level is nebulous and low – for now, according to Rob Huebert of the University of Calgary, “[**the] issue is the uncertainty** as Arctic states and non-Arctic states begin to recognize the geo-political/economic significance of the Arctic because of climate change.”

#### Alaskan UAVs solve environmental problems and oil spills in the Arctic

Anderson 12 – Ben Anderson, writer for the Alaska Dispatch, February 13th, 2012, "Unmanned aerial drones the future of Arctic reconnaissance?" [www.alaskadispatch.com/article/unmanned-aerial-drones-future-arctic-reconnaissance?page=full](http://www.alaskadispatch.com/article/unmanned-aerial-drones-future-arctic-reconnaissance?page=full)

Walker said that **Alaska's unique need for UAV technology -- particularly in far-flung Arctic regions -- played a big role** in the bill's Arctic language.¶ "The Arctic is the canary in the mine for climate change," Walker said. "The Arctic has lots of need, it's very understudied, and it's hard to get there to study it. It's a job to study a river flooding in Tennessee. It's really a job to study a river flooding on the North Slope."¶ In addition to **environmental uses like performing wildlife counts on easily-spooked animal populations or surveying forest fires** where the smoke would be too thick for manned aircraft to fly, the UAVs being tested by the program have commercial purposes as well.¶ The trip to Prince William Sound last summer was to test capability of the Aeryon Scout -- a 2-1/2 pound, four-propellered, hovering UAV -- in examining shorelines in the event of an oil spill. The BP-owned Scout could have been used for a similar purpose in the sea ice off of Nome, had a spill occurred there.¶ **Possibility of an** Arctic oil spill **is chief among lingering questions of offshore oil development in the Arctic -**- and Walker has also worked with Royal Dutch Shell, the oil supermajor looking at oil prospects in the Chukchi Sea off Alaska's northwest coastline. In advance of that development, in response to environmental concerns, Shell is interested in conducting wildlife surveys in the area, and UAVs offer an ideal way to do that.¶ "We see **drones** potentially p**laying a key role not only** monitoring **any possible impact the offshore** oil industry **activity might have on marine mammals (whales, seals, walrus and polar bears**)," Shell spokesman Curtis Smith said in an email, "but also limiting the exposure of our biologists who have typically gathered this kind of information while seated in aircraft flying over extremely remote ocean locations."¶ The small, quieter **UAVs, featuring a video camera streaming information back to the pilot, provide a much less invasive method to count species when compared to buzzing overhead in a plane or helicopter.** Smith said there are also other advantages to using UAVs in such a remote location.¶ "UAVs can be launched and recovered from a marine vessel the size of a standard fishing boat," he said. "They have a 10-foot wing span and weigh about 40 pounds. They are modular and can be stored in an 11-foot-long suitcase. They can fly for 20 hours on 1-1/2 gallons of gas. They are able to fly in poor weather conditions, which would ground manned aircraft."

#### Oil spills kill Arctic biodiversity

O’Rourke 12 – Ronal O’Rourke, specialist in naval affairs, June 15th, 2012, “Changes in the Arctic: Background and Issues for Congress” http://www.fas.org/sgp/crs/misc/R41153.pdf

No oil spill is entirely benign. **Even a** relatively minor spill**, depending on the timing and location, can cause significant harm to individual organisms and entire populations**. Regarding aquatic spills, marine mammals, birds, bottom-dwelling and intertidal species, and organisms in early developmental stages—eggs or larvae—are especially vulnerable. However, the effects of oil spills can vary greatly. Oil spills can cause impacts over a range of time scales, from only a few days to several years, or even decades in some cases. Conditions in the Arctic may have implications for toxicological effects that are not yet understood. For example, **oil spills on permafrost may persist in an ecosystem for relatively long periods of time, potentially harming plant life through their root systems**. Moreover, little is known about the effects of oil spills on species that are unique to the Arctic, particularly, species’ abilities to thrive in a cold environment and the effect temperature has on toxicity.94 The effects of oil spills in high latitude, cold ocean environments **may last longer and cause greater damage** than expected. Some recent studies have found that oil spills in lower latitudes have persisted for longer than initially expected, thus raising the concern that the persistence of oil in the Arctic may be understated. In terms of wildlife, population recovery may take longer in the Arctic because many of the species have longer life spans and reproduce at a slower rate.95

#### ****Collapse of Arctic biodiversity causes extinction****

CAFF 98– Biodiversity Working group of the Arctic Council, Conservation of Arctic Flora and Fauna, September 1998, “Strategic Plan for the Conservation of Arctic Biological Diversity” http://arcticportal.org/uploads/RX/zN/RXzNc4KU8QKfhN\_KDw\_oQQ/The-StrategicPlanforTheConservofArcticBiolDiv.pdf

The **species of the Arctic are important** for their own sake and for their value, directly or indirectly, **to other parts of their ecosystems,** including humans. Of particular concern for conservation are **rare and endangered species**. CAFF’s inventories have identified 39 species and subspecies of rare and endangered birds and mammals and 96 species of rare endemic vascular plants (i.e., those with root systems) in the Arctic. In addition, several shared species, such as murres (guillemots) and eiders, have been targeted for co-operative action as species of common conservation concern. While these species may not be considered rare or endangered at a global level, **some populations may be seriously threatened at the local level in parts of the Arctic**. Out of the approximately 360 bird species that breed regularly in the Arctic region as defined by CAFF, 279 migrate out of the region and spend the winter in a non-Arctic country. In addition, **many Arctic plant species** are also found elsewhere, which may affect **their** overall genetic diversity**.** The conservation of these species may require co-operative efforts with non-Arctic countries.

#### SPS is key to micro-UAVs

Leet et al. 12 – Kevin Gu, James Leet, Amit Alon, Manpreet Singh, engineering department at CalTech, June 7th, 2012, "E/ME 103 Final Report" [www.pickar.caltech.edu/e103/papers/Micro%20UAVs.pdf](http://www.pickar.caltech.edu/e103/papers/Micro%20UAVs.pdf)

We believe that **the key technological breakthrough for micro-UAV’s** **will be** the development of a suitable high energy-density power source. Through our secondary research, we found that the single most pressing issue facing micro-UAV’s is flight time and range, a conclusion that has been validated by our primary research. However, suffice it to say that we anticipate our technology will become viable for military applications within the next 5-10 years, even without this breakthrough of high energydensity power sources. For instance, as early as 2007, Horizon Fuel Cell Technologies and the NASA Dryden Flight Research Center demonstrated a micro-UAV, called the Pterosoar, with a range of 500 km being powered by hydrogen fuel [7]. Based on the trend of development we observed through our primary research, current technology is expected to mature sufficiently, such that **micro-UAV’s will become viable for a number of applications that require moderate energy density.** The development of a high energy density power source will then enable significantly more complex and power-intensive vehicles (such as devices capable of vertical take-off and landing), which will **dramatically increase the role of micro-UAV’s in both military and commercial applications.**

#### Micro-UAVs are key to air power

Abatti 5 – James M. Abatti, USAF Major, the Center for Strategy and Technology, Air War College, Air University, November 2005, "Small Power: The Role of Micro and Small UAVs in the Future" [www.au.af.mil/au/awc/awcgate/cst/bugs\_ch06.pdf](http://www.au.af.mil/au/awc/awcgate/cst/bugs_ch06.pdf)

No longer are micro and small UAVs of limited utility for military operations. Technological advances and new operational concepts are eliminating the barriers that restricted their use on the battlefield. Advances in miniaturization, computer technology, and nanotechnology are broadening the capabilities of micro and small UAVs, making them an economically feasible means of augmenting the USAF’s manned and unmanned fleet. Current advances in miniaturization and microfabrication have succeeded in reducing some UAV payloads by a factor of fifteen 113 and will continue to do so at an accelerating rate in the future. In addition, the exponential growth of computing power is expanding small UAV capabilities by providing more capable and intelligent systems in smaller and smaller packages. Scientists predict that **lower costs and technology advances will enhance the degree of autonomous capability and create a paradigm shift from reliance on a few LDHD platforms to a robust network of small UAVs working together.** 114¶ The synergistic capabilities of these agents working together in a MAS will enable the USAF to employ less capable low cost UAVs to perform complex missions. Moreover, a robust network of smaller UAVs provides commanders innate flexibility to accomplish a wide spectrum of missions regardless of the level of threat. **From ISR to strike missions, micro and small UAVs will be** critical force enhancers in future conflicts. The traditional small UAV role of basic ISR will expand to include NBC detection and monitoring, battle damage assessment, urban ISR, and large area ISR coverage utilizing numerous cooperative UAVs. **Due to their inherently low signatures and low cost, these small vehicles will play a** major role defeating future adversaries**.** Whether they are deployable UAV jammers or UAV antiradiation missiles, micro and small UAVs will be an integral part of the USAF’s arsenal.

#### Perception of credible air power de-escalates conflict – the alternative is global instability and miscalculation

Eaglen & Birkey 12 – Mackenzie Eaglen is a resident fellow at the American Enterprise Institute, AND\*\*\* Douglas A. Birkey is the director for government relations at the Air Force Association, March 21st, 2012, "Nearing coffin corner: US air power on the edge" aei.org/outlook/foreign-and-defense-policy/defense/nearing-coffin-corner-us-air-power-on-the-edge/

Air power presents many opportunities for cultivating these associations. **Whether conducting training exercises, promoting regional stability through joint operations, or supporting disaster recovery and humanitarian relief efforts, American and allied airmen are uniquely situated to project smart, effective, and positive power**. This requires putting work into building enduring relationships over time, not scrambling in a crisis to create them overnight. ¶ Considering that air power can be deployed and sustained through minimal forward troop presence, such cooperative engagement has the advantage of focusing on desired regional effects without many of the liabilities associated with occupation by land forces. Also, given the scale and scope of the Asia-Pacific region, air power’s range and speed enables a discrete number of assets to engage across the theater on a sustained basis. However, these alliances will be successful only if they are built on robust policies underwritten by well-equipped forces**.** Allies’ commitment **to the United States and its interests** depends directly on their perceptions **regarding American presence,** staying power, and resolve.¶ When cooperation is not possible, US leaders must have the capability and capacity to discourage and ultimately deter potential adversaries from threatening American interests. Whether alone or in concert with allied partners, American air power affords many policy options through its daily missions:¶ Airlift and aerial refueling ensure regional and global mobility.¶ Intelligence, surveillance, and reconnaissance assets provide critical data to inform the decision-making process.¶ **Air superiority ensures** access throughout the global commonsfor all US forces. ¶ The ability to strike anywhere around the globe at will holds targets at risk.¶ Nuclear forces provide an umbrella of protection for allied states and US forces.¶ However, **efforts to change the calculus or behavior of potential adversaries are effective** only if they are credible. **Securing interests through peaceful influence demands robust capability and capacity, including adequate quantity of forces**. Failing to make such investments encourages regional instability that may lead to miscalculation and ultimately conflict.

#### Airpower prevents nuclear war and bioweapons in Asia

Khalilzad & Lesser 98 – Zalmay Khalilzad, Counselor at CSIS, President of Khalilzad Associates, and Former US Ambassador to the UN AND\*\*\* Ian Lesser, PhD Senior Transatlantic Fellow @ the German Marshall Fund, 1998, "Sources of Conflict in the 21st Century," p.164-165

The first key implication derived from the analysis of trends in Asia suggests that American air and space power will continue to remain critical for conventional and unconventional deterrence in Asia. This argument is justified by the fact that several sub-regions of the continent still harbor the potential for **full-scale** conventional war. This potential is most conspicuously on the Korean peninsula and to a lesser degree, in South Asia, the Persian Gulf, and the South China Sea. In some of these areas such as Korea and the Persian Gulf, the United States has clear treaty obligations and therefore has pre-planned the use of air power should contingencies arise. U.S. Air Force assets could also be called upon for operations in some of these other areas. In almost all these cases, US **airpower would be at the forefront of an American** politico-military **response** because (a) of the vast distances on the Asian continent; (b) the diverse range of operational platforms available to the U.S. Air Force, a capability unmatched by any other country or service, (c) the possible unavailability of naval assets in close proximity, particularly in the context of surprise contingencies; and (d) the heavy payload that can be carried by U.S. Air Force platforms. These platforms can exploit speed, reach, and high operating tempos to sustain continual operations until the political objectives are secured. The entire range of warfighting capability—fighters, bombers, electronic warfare (EW), suppression of enemy air defense (SEAD), combat support platforms such as AWACS and J-STARS and tankers—are relevant in the Asia-Pacific region, because many of the regional contingencies will involve large, fairly modern, conventional forces, most of which are built around large land armies, as is the case in Korea, China-Taiwan, India-Pakistan and the Persian Gulf. In addition to conventional combat, the demands of unconventional deterrence will increasingly confront the U.S. Air Force in Asia. The Korean peninsula, China, and the Indian subcontinent are already arenas of WMD proliferation. While emergent nuclear capabilities continue to receive the most public attention, chemical and biological warfare threats will progressively become future problems. The delivery systems in the region are increasing in range and diversity. China already targets the continental United States with ballistic missiles. North Korea can threaten northeast Asia with existing Scud-class theater ballistic missiles. India will acquire the capability to produce ICBM-class delivery vehicles, and both China and India will acquire long-range cruise missiles during the time frames examined in this report. The second key implication derived from the analysis of trends in Asia suggests that airand space power **will function as a** vital rapid reaction force **in a breaking crisis**. Current guidance tasks the Air Force to prepare for two major regional conflicts that could break out in the Persian Gulf and on the Korean peninsula. In other areas of Asia, however, such as the Indian subcontinent, the South China Sea, Southeast Asia, and Myanmar, the United States has no treaty obligations requiring it to commit the use of its military forces. But as past experience has shown, American policymakers have regularly displayed the disconcerting habit of discovering strategic interests in parts of the world previously neglected after conflicts have already broken out. Mindful of this trend, it would behoove U.S. Air Force planners to prudently plan for regional contingencies in nontraditional areas of interest, because naval and air power will of necessity be the primary instruments constituting the American response.

#### Bioweapons cause extinction

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

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

## Contention Three is Solvency

#### The DOD is interested in SPS – procurement rapidly accelerates commercial development

Lemonick 9 – Michael D. Lemonick is the senior writer at Climate Central, a nonpartisan organization whose mission is to communicate climate science to the public. Prior to joining Climate Central, he was a senior writer at Time magazine, where he covered science and the environment for more than 20 years. He has also written four books on astronomical topics and has taught science journalism at Princeton University for the past decade. August 31st, 2009, "Solar Power from Space: Moving Beyond Science Fiction" e360.yale.edu/feature/solar\_power\_from\_space\_moving\_beyond\_science\_fiction/2184/

But the military’s interest in SBSP could give a major boost to the technology. According to Marine Corps Lt. Col. Paul Damphousse, Chief of Advanced Concepts for the National Security Space Office, the military is interested in SBSP for two main reasons.¶ The first, he said, is that “we’re **obviously interested in energy security**, and we’re also **interested in weaning ourselves off fossil fuels** because climate change could pose national security risks.” By being an early customer, the government can rapidly accelerate development of the technology. But there would also be a **tactical advantage to space-based solar**, Damphousse noted. When the military is operating in remote regions of countries like Iraq or Afghanistan, it uses diesel generators to supply forward bases with power.¶ “We have a significant footprint getting energy in,” says Damphousse, noting the need for frequent convoys of oil tankers, the soldiers to protect them, and air support — all of which is expensive and dangerous.¶ **Being able to tap into power beamed directly down from space would clearly have a lot of appea**l, says Damphousse, even if it were relatively costly. And **it’s not just useful for the battlefield, he says, but also for areas affected by natural disasters**, such as Hurricane Katrina.¶ For those reasons, Damphousse supports the idea of coordinated studies by the Pentagon and other agencies — such as NASA and the Department of Energy — that would have a stake in space-based power.

#### Procurement makes SPS economically feasible and catalyzes investment

NSSO 7 – National Security Space Office, Report to the Director, October 10, 2007, “Space-Based Solar Power As an Opportunity for Strategic Security; Phase 0 Architecture Feasibility Study” http://www.nss.org/settlement/ssp/library/final-sbsp-interim-assessment-release-01.pdf

FINDING:The SBSP Study Group found that industry has stated that the #1 driver and requirement for generating industry interest and investment in developing the initial operational SBSP systems is acquiring an anchor tenant customer, or customers, that are willing to sign contracts for high‐value SBSP services. Industry is particularly interested in the possibility that the DoD might be willing to pay for SBSP services delivered to the warfighter in forward bases in amounts of 5‐50 MWe continuous, **at a price of $1** or more per kilowatt‐hour. o Recommendation: The SBSP Study Group recommends that the DoD should immediately conduct a requirements analysis of underlying long‐term DoD demand for secure, reliable, and mobile energy delivery to the war‐fighter, what the DoD might be willing to pay for a SBSP service delivered to the warfighter and under what terms and conditions, and evaluate the appropriateness and effectiveness of various approaches to signing up as an anchor tenant customer of a commercially‐delivered service, such as the NextView acquisition approach pioneered by the National GeoSpatial‐imaging Agency. FINDING: The SBSP Study Group found that even with the DoD as an anchor tenant customer at a price of $1‐2 per kilowatt hour for 5‐50 megawatts continuous power for the warfighter, when considering the risks of implementing a new unproven space technology and other major business risks, the business case for SBSP still does not appear to close in 2007 with current capabilities (primarily launch costs). This study did not have the resources to adequately assess the economic viability of SBSP given current or projected capabilities, and this must be part of any future agenda to further develop this concept. Past investigations of the SBSP concept have indicated that the costs are dominated by costs of installation, which depend on the cost of launch (dollars per kilogram) and assembly and on how light the components can be made (kilograms per kilowatt). Existing launch infrastructure cannot close the business case, and any assessment made based upon new launch vehicles and formats are speculative. Greater clarity and resolution is required to set proper targets for technology development and private capital engagement. Ideally SBSP would want to be cost‐competitive with other baseload suppliers in developing markets which cannot afford to spend a huge portion of their GDP on energy (4c/kWh), and these requirements are extremely stringent, but other niche export markets may provide more relaxed criteria (35c/kWh), and **some customers, such as DoD, appear to be** spend**ing more than $1/kWh in forward deployed locations**. It would be helpful to develop a series of curves which examine technology targets for various markets, in addition to the sensitivities and opportunities for development. Some work by the European Space Agency (ESA) has suggested that in an “apples‐to‐apples” comparison, **SBSP may already be competitive with large‐scale terrestrial solar baseload power**. A great range of opinions were expressed during the study regarding the near‐term profitability. It is instructive to note that that there are American companies that have or are actively marketed SBSP at home and abroad, while another group feels the technology is sufficiently mature to create a dedicated public‐private partnership based upon the COMSAT model and has authored draft legislation to that effect. • **The business case is much more likely to close in the near future if the U.S. Government agrees to: o** Sign up as an anchor tenant customer, and o Make appropriate technology investment and risk‐reduction efforts by the U.S. Government, and o Provide appropriate financial incentives to the SBSP industry that are similar to the significant incentives that Federal and State Governments are providing for private industry investments in other clean and renewable power sources. • The business case may close in the near future with appropriate technology investment and risk‐reduction efforts by the U.S. Government, and with appropriate financial incentives to industry. Federal and State Governments are providing significant financial incentives for private industry investments in other clean and renewable power sources. o Recommendation: The SBSP Study Group recommends that in order to reduce risk and to promote development of SBSP, the U.S. Government should increase and accelerate its investments in the development and demonstration of key component, subsystem, and system level technologies that will be required for the creation of operational and scalable SBSP systems. Finding: The SBSP Study Group found that **a small amount of entry capital by the US Government is likely to** catalyze substantially more investment by the private sector**.** This opinion was expressed many times over from energy and aerospace companies alike. Indeed, there is anecdotal evidence that even the activity of this intermim study has already provoked significant activity by at least three major aerospace companies. Should the United States put some dollars in for a study or demonstration, it is likely to catalyze significant amounts of internal research and development. Study leaders likewise heard that the DoD could have a catalytic role by sponsoring prizes or signaling its willingness to become the anchor customer for the product.

#### **SPS-Alpha can be up and running in a few years with only a few billion dollars – new tech ensures feasibility and low costs**

Mankins 12 – John C. Mankins, President of Artemis Innovation Management Solutions LLC is an internationally recognized leader in space systems and technology innovation, spent 25 years at NASA and CalTech's Jet Propulsion Laboratory. He holds undergraduate (Harvey Mudd College) and graduate (UCLA) degrees in Physics and an MBA in Public Policy Analysis (The Drucker School at Claremont Graduate University). Mr. Mankins is a member of the International Academy of Astronautics (IAA) and Chair of the Academy Commission III (Space Systems and Technology Development); and a member of the International Astronautical Federation (IAF), the American Institute of Aeronautics and Astronautics (AIAA), and the Sigma Xi Research Society. Editor/Authors are :Brian Wang, Director of Research. Sander Olson, Interviews and other articles Phil Wolff, Communications and social technologist. Alvin Wang. Computer, technology, social networking, and social media expert. June 7th, 2012, "A New Paradigm for Space-Based Solar Power," nextbigfuture.com/2012/06/new-paradigm-for-space-based-solar.html

Question: How exactly has the technology evolved since the 1970s? ¶ There have been a number of improvements. The **efficiency of solar photovoltaics has improved** from less than 10% efficiency to more than 30% efficiency now. I'm confident that within the next decade, solar photovoltaics could achieve efficiencies of up to 50%. There have also been **substantial improvements in key electronic components**, such as solid-state power amplifiers. The efficiencies have gone from 15% in the 1970s to **70% now**. With focused investments, we should be able to get devices with efficiencies approaching 80% by 2020. This will further increase the viability of space-based solar power. A wide range of other technologies have also improved dramatically, including **light-weight and high-strength materials, robotics, in-space propulsion and others.** ¶ Question: You are the chief architect behind the SPS-ALPHA design. What are the central aspects of this new paradigm? ¶ The SPS-ALPHA concept facilitates the design and development of a very large solar power satellite out of a large number of very small pieces. Each piece weighs perhaps 25-100 kilograms, but there are tens of thousands of pieces in the final product. **The beauty of this system is that all of the parts of the design can be manufactured readily in a standard factory – resulting in very low costs for the system hardware.** ¶ Question: So the power satellite would be composed of vast numbers of identical modules? ¶ Yes, the modules would be stackable – like pizza boxes – for ease of transportation to space, and then unstacked and assembled once they reach the operational orbit for the satellite. There might be about 6 or 8 different types of modular elements, and each type would be mass produced with from hundreds to tens of thousands of copies. They would initially be launched into a low Earth orbit, and from there transferred to a higher orbit for integration into the SPS platform. We are looking at using robotic systems to assemble the panels. ¶ Question: So your plan employs robots for most of the construction? ¶ Yes. The SPS-ALPHA architecture would only employ people on the ground to supervise the robots operating in space. The goal would be to assume the intervention of astronauts only in the event of a problem that could not be resolved using robots. As a rule of thumb, we expect that it may cost from 100-times to 1000-times more to have a suited astronaut perform a task in a high Earth orbit than to have a remotely-supervised robot do it. This field of technology has advanced rapidly in the past decade, and so we plan to employ robots extensively. ¶ Question: How long would it take to get a prototype system up and running? ¶ With sufficient funding, we could have a ground based, rudimentary prototype up and running by 2014. **An early prototype in orbit could be** built by 2017-2018. And in about a decade, a larger pilot plant could be in geosynchronous Earth orbit, generating 10 megawatts. The total cost for this roadmap could be several billion dollars, with most of the cost coming in the last few years. As a point of comparison, the pilot plant would be approximately the same size as the International Space Station, which cost $100 billion to manufacture, launch into space and assemble. **The cost savings would result from using standard, mass-produced pieces, standard launch systems and robotic assembly in space.**

#### Recent studies prove that SPS tech exists now – terrestrial solar fails

Garretson 12 – Lt Col Peter Garretson is an airpower strategist currently serving on the CSAF’s Strategic Studies Group (HAF/CK). His previous assignment was at the Institute for Defence Studies and Analyses in New Delhi as an Air Force Fellow examining Indo–US long-term space collaboration under the sponsorship of the Council on Foreign Relations. Prior to that he was the chief of future science and technology exploration for the HQ USAF Directorate of Strategic Planning (AF/A8XC), Spring 2012, "Solar Power in Space?" Strategic Studies Quarterly Spring, <http://www.au.af.mil/au/ssq/2012/spring/garretson.pdf>

As of 2010, the fundamental research to achieve technical feasibility for the SPS [solar-power satellites] was already accomplished. Whether it requires 5–10 years or 20–30 years to mature the technologies for economically viable SPS now depends more on the development of appropriate platform systems concepts and the availability of adequate budgets. —International Academy of Astronautics (IAA), 2011 The world needs a constant supply of uninterrupted electrical power to enable and sustain economic growth; power its cities, factories, and vehicles; and provide energy for heating, cooling, lighting, cooking, and desalination. Long term, it is desirable to transition from an energy system based on fossil fuels—an exhaustible resource which alters the composition of our atmosphere with unknown long-term effects on our climate— to a system based upon renewable sources. Many see solar power as the answer, because the resource is so vast and available. However, traditional solar power has limitations that make it less than a perfect match for our society. It is highly intermittent (only a 20-percent duty cycle) due to weather effects (clouds, rain, dust), and its low density requires vast tracks of land. Worst of all, it is not available at night, requiring vast storage or nonrenewable backup systems. Space-based solar is an innovation designed to retain[s] the advantages of traditional solar power while sidestepping the disadvantages. The basics of the idea are quite simple. Rather than cope with the unpredictability and intermittency of solar power on the ground, go where the sun always shines. In geostationary orbit (GEO), the sun shines constantly and is 36 percent stronger, allowing a solar array to collect almost 10 times the amount of energy as the same array installed at mid latitude on the ground (see fig.1). Power can then be transferred (beamed) directly to where it is needed. The technologies to do this are not magic or unfamiliar—they are the same elements used every day to emplace, power, and communicate with every existing satellite. Building the SBSP system would rely on the same familiar solar cells, radio transceivers, and rockets to propel them to GEO, only assembled on a grand different scale. In a mature system-of-systems, multiple solar-power satellites would reside in geostationary orbit, each collecting vast amounts of power and transmitting it through active electronic beam steering, like routers in a vast orbiting power internet. While appearing to hover above a particular location, each SPS could service multiple markets, providing power on demand to urban centers or remote locations. For example, a single satellite south of Baja California could service markets across most of North and South America; a satellite over the Indian Ocean could service markets as far apart as Africa and Indonesia, and from Diego Garcia to as far north as Russia. 1 Power in this system-of-systems would be transmitted using a technique called retrodirective phased array, where an encrypted pilot signal from the ground handshakes with the satellite’s active electronic beam-steering system to link transmitter and receiver. The beam itself would be in the ISM band (typically 2.45 or 5.8 GHz), so that it passes nearly full strength through the atmosphere, clouds, and rain. Because of low atmospheric losses (<2 percent), extremely efficient reconversion (>80 percent), and most of all, constant illumination, the beam can be safely kept at an amazingly low intensity (only one-sixth the intensity of sunlight) and yet be significantly more energy productive than a comparably sized terrestrial solar plant. The location and diameter of the beam are predictable and well confined. Unlike communications satellites—which, because of their small-aperture antennas, cast continent-sized footprints and must be separated by degrees (and thousands of miles) on orbit to deconflict signals—SPSs have very large apertures and therefore can send very narrow beams, allowing them to be spaced much closer together. The beam itself terminates on a receiver called a rectenna, with peak intensity in its center and tapering to nearly nothing at the periphery. The rectenna, about the size of a municipal airport, is a mesh of dipole antennas that capture all the incident energy from the beam. It is nevertheless 80 percent transparent to sunlight, allowing the land beneath to remain available for agricultural uses.

#### SPS is resilient, cost-effective, and efficient

Reed & Willenberg 4 – Head of the Welsom Space Consortium, and Harvey, PhD, Independent Review Team Leader for Space Power Research for NASA, Former Chief Scientist of the ISS (Kevin and Harvey, , "Early commercial demonstration of space solar power using ultra-lightweight arrays,” Acta Astronautica, Volume 65, Issues 9-10, accessed on Science Direct)

Future systems will be even more sensitive to specific power. A number of conceptual design architecture studies have been performed that offer promise for terrestrial electrical power generation by [SSP] space solar power, i.e. a constellation of large Earth-orbiting spacecraft that collect solar power, convert it to laser or microwave beams, and beam that power to terrestrial collectors that, in turn, convert that power to electricity.[1-3] To make this concept economically attractive, they must compete with current large power plants by economically generating Gigawatts (GW) of power. At 100 W/kg, such a power station must weigh 2-5 ∙ 107 kg or more – a tall order for launch vehicles that currently place no more than 2-3 ∙ 103 kg into geosynchronous orbit. Recent technology advances in the area of thin film photovoltaic arrays offer a solution to the mass limitations of high power arrays. Thin film arrays, while the efficiency is only around 9-12%, are so lightweight that they offer specific powers in excess of 1,000 W/kg - a factor of ten or more above the current state of the art. Since these arrays are deployable, they can be packaged with minimum mass and volume, and readily deployed in space with **near-term demonstrable technologies**. This section provides an introduction to this possibility. The next section will discuss the specific advantages of lightweight arrays. Section 3 will describe near-term applications in the 50-500 kWe power range, both in space and in the high altitude atmosphere, as well as future directions for space power satellites and high-power electric thrusters. Section 4 discusses recent and ongoing plans for prototype testing of thin-film arrays in civil and military applications as well as commercial "NewSpace" applications. In Section 5, we discuss some key process steps required for commercial development of space solar power and wireless power transmission, with specific focus on the development pathway for these solar arrays. A development Roadmap is described in Section 6. A short summary is presented in Section 7, followed by references. 2. ADVANTAGES OF ULTRALIGHTWEIGHT ARRAYS Since the beginning of Earth-orbiting satellites, solar array technology has gone through two or three generations, and is on the verge of a new generation. Most early satellites were powered with crystalline silicon arrays, with power levels generally below about 6 kilowatts (kWe). These silicon arrays were heavy and operated at low efficiency, i.e. the amount of power produced per unit area of solar array started around 10-12% at beginning of life. These crystalline silicon arrays also degraded rapidly, dropping to 8-10% efficiencies after several years in space, as a result of radiation-induced degradation of the photovoltaic silicon and atomic oxygen-induced discoloration of the cover glass which protects the silicon from these environmental factors. In the 1990s, the technology for many, if not most, satellite solar arrays converted from these original silicon arrays to compound semiconductors, which generally used gallium arsenide plus a second or third semiconductor to capture a greater share of the solar spectrum and convert it to electricity. These compound dual-junction and triple-junction semiconductors are much more resistant to radiation and more efficient, with efficiencies of 20-24%. More recently, the ability to separate different wavelengths of the solar spectrum and tailor the incident light onto a stretched lens of selected semiconductors (separating red, yellow, green, and blue wavelengths) has shown indications of efficiencies as high as 40-50%.[4-5] Yet even at this nearly theoretical limit of efficiency, the power density level will reach only 300 W/kg. Until recently, the focus of most solar array technology development has been toward more efficient, more radiation-resistant arrays. This focus has been driven primarily by the challenge of deployment of large arrays. This challenge has limited the total array area that can be launched into space, and therefore the way to higher power arrays has been higher efficiencies. These rigid, higher efficiency solar arrays come at the cost, however, of relatively high mass - with the best rigid arrays able to produce about 80-100 Watts per kilogram (W/kg) at 30% efficiency, and the stretched lens arrays promising about 150 W/kg but limited to a total of around 10 kW by deployment considerations. Two dominant performance metrics in the selection of solar array technologies are this power/mass ratio (i.e. the amount of power that can be produced for each kilogram of total mass) and the volume of the stowed array as it is launched. These are important because of the mass and volume limitations on the launch vehicle that places the array into space, and the high cost of launching this limited mass and volume. Using launch vehicles available today, these limit the total power available to satellites in geostationary orbit to about 18 kWe. Higher powers will be highly desirable as the user demands for communications services continue to increase. Recent advances in the ability to place photovoltaic materials on very thin film substrates have produced a new generation of solar arrays. These advances allow arrays to be stowed in the launch vehicle in very compact configurations, and easily deployed to much larger arrays than have heretofore been achievable. These new, thin film arrays are much lighter - around 1200 W/kg, including the deployment systems. Laboratory test cells have been produced by Institut de Microtechnique at the University of Neuchatel, Switzerland using LaRCTM-CP1 thin-film substrates produced by SRS Technologies in Huntsville, AL that have the highest power/mass ratio on record - 4300 W/kg![6] These thin film arrays can be stowed in a rolled or folded configuration in the launch vehicle and deployed in space by simple boom extension or roller mechanisms. A well-designed 50 kW space solar array and deployment system using rolled mechanisms with this specific power would weigh 32 kg with a payload volume the size of a suitcase. This low mass and payload volume, combined with high power density, can provide 50 kW+ space solar arrays at 25% of the cost of current rigid solar arrays. There are two approaches to thin film arrays: amorphous silicon (a-Si:H) and polycrystalline Cu(Ga,In)Se2 (CIGS). The Neuchatel partners have developed an array configuration that deposits amorphous silicon on SRS 6 µm-thick CP1TM polymer films, referred to as CP1/a-Si:H arrays. CIGS cells are generally deposited on 30 µm-thick metal foil substrates, a fact that assures that CIGS cells will be heavier than CP1/a-Si:H cells. Some basic comparisons between these solar arrays are summarized in Table 1. Using deployable thin-film arrays with specific powers in excess of 1,000 W/kg opens opportunities for large power levels in space. With current launch vehicles, this means that communications satellites can have 200 kWe or more in geosynchronous orbit, or that commercial platforms such as manufacturing sites or tourist destinations, can approach a MWe. With such possibilities, **this technology might drive the economics of [SSP] space solar power satellites into the profitable arena**, thereby contributing greatly to a non-petroleum-based worldwide electrical power grid. 3. APPLICATIONS Deployable thin-film arrays would have immediate applications with communications satellites and with high altitude aircraft. A 60 kWe array which can be rolled out in 20 kWe segments would greatly extend the useful lifetime of communications satellites – essentially tripling the array lifetime by rolling out 20 kWe of beginning-of-life (BOL) arrays at the end of the array's useful lifetime. An alternative application would be for much higher-power communications satellites, from 50 to 200 kWe, for higher data rates or power. A unique application may also be realized for recharging mobile batteries. Such an orbiting power platform may provide a source of electrical power for very distributed demands, such as for cellular phones and laptop computers. A 200 kWe solar array would have a mass of less than 200 kg. This would make a thin-film array attractive for still higher-power commercial applications, such as orbiting hotels – with expected demands in the 250 kWe to 1 MWe – and manufacturing sites. The latter would be either for sites for in-space construction of larger platforms, or for processing of materials in the microgravity environment of space. As the technology matures to the megawatt range, additional applications appear promising. For example, electric thrusters in the megawatt range would be attractive for human transportation to Mars and its moons. This technology can be developed in stages, perhaps using high altitude airships as platforms to demonstrate megawatt arrays. As the technology for high power thin film arrays matures, the logical next step would be solar power satellites. With a launch vehicle capable of placing 50,000 kg to geosynchronous orbit, 50 MWe platforms can be considered as building blocks for the GWe stations that would be required to provide a primary source of power for the electrical power grid. 4. DEVELOPMENT OF ULTRALIGHTWEIGHT ARRAYS Recent advances in the ability to place photovoltaic materials on very thin film substrates have produced a new generation of solar arrays. These advances allow arrays to be stowed in the launch vehicle in very compact configurations and easily deployed to much larger arrays than have heretofore been achievable. These new, thin film arrays are much lighter - around 1200 W/kg, including the deployment systems. Problematic to most thin-film solar arrays are radiation and atomic oxygen erosion. Test solar cells are made on CP1TM polyimide that is space-rated for 10 years in Geosynchronous Earth Orbit ( GEO), or SRS CORIN which is the only transparent uncoated commercial polyimide that will not erode in LEO. These flexible, 6 micron thick, thin film arrays, can be rolled or folded into a very low stowed volume in the launch vehicle configuration, and then deployed in space by simple boom extension or roller mechanisms. Such a typical 50 kW space solar array and deployment system would weigh 32 kg with a payload volume the size of a suitcase. This low mass and payload volume, combined with high power density, can provide 50 kW+ space solar arrays at 25% of the cost of current rigid solar arrays. The key technologies are ultra-thin, deployable arrays that generate power at acceptable efficiencies with high power density, and are resistant to atomic oxygen and radiation in the operational space environment.

## Plan

#### The Department of Defense should obtain electricity from space solar power for energy production in the United States.

### Disasters

#### **SPS is key to disaster response**

Wood 12 – Leet W.Wood is a PhD student in political science at George Mason University in Fairfax, Virginia, Bulletin of the Atomic Scientists, February 15th, 2012, ““Projecting power: The security implications of space-based solar power,” Ebscohost

The ability of the system to direct power on short notice to most points on the globe also has significance for international aid and disaster relief. In the wake of a **natural or humanitarian disaster**, power from space could be used to **keep hospitals and refugee camps operational, as well as providing electricity for water desalination** and other critical but energy-intensive processes. Operating in this mode, spacebased solar power could become a powerful tool of diplomacy rather than one of force projection in the traditional sense.

#### Inadequate response to disasters results in disease outbreak

Aljunid et al 12 Syed, Professor of Health Economics and Senior Research Fellow at UNU International Institute for Global Health, Kouadio Koffi Isidore, Postdoctoral Fellow at United Nations University International Institute for Global Health, Taro Kamigaki, Assistant Professor, at the Department of Virology of Tohoku University Graduate School of Medicine, Karen Hammad, Australian emergency nurse and Lecturer at the School of Nursing and Midwifery, Flinders University and Hitoshi Oshitani, Professor of Virology at Tohoku University Graduate School of Medicine, "Preventing and controlling infectious diseases after natural disasters", March 13, United Nations University, unu.edu/publications/articles/preventing-and-controlling-infectious-diseases-after-natural-disasters.html#info

Beyond damaging and destroying physical infrastructure, natural disasters can lead to outbreaks of infectious disease. In this article, two UNU-IIGH researchers and colleagues review risk factors and potential infectious diseases resulting from the secondary effects of major natural disasters that occurred from 2000 to 2011, classify possible diseases, and give recommendations on prevention, control measures and primary healthcare delivery improvements.¶ Over the past few decades, the incidence and magnitude of natural disasters has grown, resulting in substantial economic damages and affecting or killing millions of people. Recent disasters have shown that even the most developed countries are vulnerable to natural disasters, such as Hurricane Katrina in the United States in 2005 and the Great Eastern Japan Earthquake and tsunami in 2011. Global population growth, poverty, land shortages and urbanization in many countries have increased the number of people living in areas prone to natural disasters and multiplied the public health impacts.¶ Natural disasters can be split in three categories: hydro-meteorological disasters, geophysical disasters and geomorphologic disasters.¶ Hydro-meteorological disasters, like floods, are the most common (40 percent) natural disasters worldwide and are widely documented. The public health consequences of flooding are disease outbreaks mostly resulting from the displacement of people into overcrowded camps and cross-contamination of water sources with faecal material and toxic chemicals. Flooding also is usually followed by the proliferation of mosquitoes, resulting in an upsurgence of mosquito-borne diseases such as malaria. Documentation of disease outbreaks and the public health after-effects of tropical cyclones (hurricanes and typhoons) and tornadoes, however, is lacking.¶ Geophysical disasters are the second-most reported type of natural disaster, and earthquakes are the majority of disasters in this category. Outbreaks of infectious diseases may be reported when earthquake disasters result in substantial population displacement into unplanned and overcrowded shelters, with limited access to food and safe water. Disease outbreaks may also result from the destruction of water/sanitation systems and the degradation of sanitary conditions directly caused by the earthquake. Tsunamis are commonly associated with earthquakes, but can also be caused by powerful volcanic eruptions or underwater landslides. Although classified as geophysical disasters, they have a similar clinical and threat profile (water-related consequences) to that of tropical cyclones (e.g., typhoon or hurricane).¶ Geomorphologic disasters, such as avalanches and landslides, also are associated with infectious disease transmissions and outbreaks, but documentation is generally lacking.¶ After a natural disaster¶ The overwhelming majority of deaths immediately after a natural disaster are directly associated with blunt trauma, crush-related injuries and burn injuries. The risk of infectious disease outbreaks in the aftermath of natural disasters has usually been overemphasized by health officials and the media, leading to panic, confusion and sometimes to unnecessary public health activities.¶ The prolonged health impact of natural disasters on a community may be the consequence of the collapse of health facilities and healthcare systems, the disruption of surveillance and health programmes (immunization and vector control programmes), the limitation or destruction of farming activities (scarcity of food/food insecurity), or the interruption of ongoing treatments and use of unprescribed medications.¶ The risk factors for increased infectious diseases transmission and outbreaks are mainly associated with the after-effects of the disasters rather than to the primary disaster itself or to the corpses of those killed. These after-effects include displacement of populations (internally displaced persons and refugees), environmental changes and increased vector breeding sites. Unplanned and overcrowded shelters, poor water and sanitation conditions, poor nutritional status or insufficient personal hygiene are often the case. Consequently, there are low levels of immunity to vaccine-preventable diseases, or insufficient vaccination coverage and limited access to health care services.¶ Phases of outbreak and classification of infectious disease¶ Infectious disease transmission or outbreaks may be seen days, weeks or even months after the onset of the disaster. Three clinical phases of natural disasters summarize the chronological public health effects on injured people and survivors:¶ Phase (1), the impact phase (lasting up to to 4 days), is usually the period when victims are extricated and initial treatment of disaster-related injuries is provided.¶ Phase (2), the post-impact phase (4 days to 4 weeks), is the period when the first waves of infectious diseases (air-borne, food-borne, and/or water-borne infections) might emerge.¶ Phase (3), the recovery phase (after 4 weeks), is the period when symptoms of victims who have contracted infections with long incubation periods or those with latent-type infections may become clinically apparent. During this period, infectious diseases that are already endemic in the area, as well as newly imported ones among the affected community, may grow into an epidemic.¶ It is common to see the international community, NGOs, volunteers, experts and the media leaving a disaster-affected zone usually within three months, when in reality basic sanitation facilities and access to basic hygiene may still be unavailable or worsen due to the economic burden of the disasters.¶ Although it is not possible to predict with accuracy which diseases will occur following certain types of disasters, diseases can be distinguished as either water-borne, air-borne/droplet or vector-borne diseases, and contamination from wounded injuries.¶ Diarrhoeal diseases¶ The most documented and commonly occurring diseases are water-borne diseases (diarrhoeal diseases and Leptospirosis). Diarrhoeal diseases cause over 40 percent of the deaths in disaster and refugee camp settings. Epidemics among victims are commonly related to polluted water sources (faecal contamination), or contamination of water during transportation and storage. Outbreaks have also been related to shared water containers and cooking pots, scarcity of soap and contaminated food, as well as pre-existing poor sanitary infrastructures, water supply and sewerage systems.

#### Disease causes extinction---no burnout

**Torrey and Yolken 5** E. Fuller and Robert H, Directors Stanley Medical Research Institute, 2005, Beasts of the Earth: Animals, Humans and Disease, pp. 5-6

The outcome of this marriage, however, is not as clearly defined as it was once thought to be. For many years, it was believed that microbes and human slowly learn to live with each other as microbes evolve toward a benign coexistence wit their hosts. Thus, the bacterium that causes syphilis was thought to be extremely virulent when it initially spread among humans in the sixteenth century, then to have slowly become less virulent over the following three centuries. This reassuring view of microbial history has recently been challenged by Paul Ewald and others, who have questioned whether microbes do necessarily evolve toward long-term accommodation with their hosts. Under certain circumstances, Ewald argues, “Natural selection may…favor the evolution of extreme harmfulness if the exploitation that damages the host [i.e. disease] enhances the ability of the harmful variant to compete with a more benign pathogen.” The outcome of such a “marriage” may thus be the murder of one spouse by the other. In eschatological terms, this view argues that a microbe such as HIV or SARS virus may be truly capable of **eradicating the human race**.

# 2AC

## Warming

#### Global warming will engulf the Middle East in conflict

Duchene 2008 research assistant at Penn State [Lisa, “Probing Question: Are water wars in our future?” http://www.physorg.com/news131901803.html]

With rapid population growth, wasteful practices, and impending climate change, the situation is likely to get worse. Water resources in semi-arid regions are expected to be especially hard-hit, warned the Intergovernmental Panel on Climate Change in its 2007 summary report. By some estimates, two-thirds of the world's population will be water-stressed by 2025. During a year when many states across the U.S. are suffering some of the worst droughts ever, water is a topic on people's minds. Will the prospect of a diminishing water supply result in serious geopolitical conflict? "Freshwater resources are unevenly distributed around the globe," says Robert B. Packer, lecturer in political science at Penn State, who studies international political economy and the causes of war. "While freshwater is relatively abundant in Europe and much of North America, other regions of the globe, such as the Middle East, Central Asia, and parts of West and Eastern Africa, face increasingly severe shortages." According to the BBC, the number of 'water-scarce' countries in the Middle East grew from three in 1955 to eight in 1990, with another seven expected to be added within 20 years. "Of particular concern," said Packer, "are certain riparian basins that could explode into conflict as sources of freshwater diminish. Conflict is more likely to occur where water can be seized and controlled in addition to being scarce." Among Middle East countries, where every major river crosses at least one international border, up to 50 percent of water needs of any specific state finds its source in another state, Packer noted. "Hydro-politics already play a central role among states in riparian basins, such as the Tigris-Euphrates, the Nile, the Jordan, as well as those sharing the underground aquifers of the West Bank." Conflicts are likely to emerge as competition intensifies to control river waters for hydroelectricity, agricultural use, and human consumption, he added. "Farms and cities downstream are vulnerable to the actions and decisions of upstream countries that they have little control over. This is exemplified in the tensions over the Tigris-Euphrates, where Turkey commenced construction of a system of hydroelectric dams. Iraq and Syria have protested, citing the project would reduce the rivers' flow downstream. Turkey's response to the Arab states has been 'we don't control their oil, they don't control our water.'" To the west, the Nile has been the lifeline for Egyptian civilization dating back to antiquity. Nearly all of Egypt's 80 million people live on the three percent of Egyptian territory that is the river's valley and delta. "For Egypt the Nile is life, and its government has voiced to upstream countries that any reduction of Nile waters would be taken as national security threat that could trigger a military response," says Packer. "Nearly all freshwater in the Israeli-occupied West Bank comes from underground aquifers," he added. "Water access has become a major issue between Israelis and Palestinians." "Perhaps the greatest of all modern Middle East conflicts, the Six Day War of 1967, began as a dispute over water access," Packer noted. Israel built a National Water Carrier to transport freshwater from the Jordan and the Sea of Galilee to the country's farming and urban centers. (The Carrier now supplies half the drinking water in Israel.) In 1965, Israeli forces attacked a Syrian water diversion project that would have cut the Carrier's supply, and prolonged violence led to war. "For Israelis, control of the Golan Heights is important strategically in terms of controlling the headwaters of the Jordan River," Packer noted. The effects of global warming and desertification also have impacted hydro-politics around the world. In West Africa, rainfall has declined 30 percent over the last four decades and the Sahara is advancing more than one mile per year. Senegal and Mauritania engaged in militarized conflict in 1989 across the Senegal River that divides them, in part over changing access to arable land.

## Topicality

#### We meet

Diehl 7 – Junior Staff Member, Journal of Land, Resources & Environmental Law; J.D candidate (Rustin P., “NOTE: Transitioning to a Clean Renewable Energy Network in the West”, 27 J. Land Resources & Envtl. L. 345, Lexis Law)

Many studies have considered the benefits and achieved results of the available renewable energy financial incentives. While studies agree that these incentives are effectively promoting business integration of renewable energies, it is questionable whether the incentives encourage private adoption of renewable energy technology.n55 The incentives for implementing clean renewable power generation fall into two main categories: financial incentives and policy [\*354] incentives. These incentives can be provided at federal, state, and municipal levels. A laundry list of financial incentives include: corporate equipment rebates, energy efficient mortgages, accelerated corporate depreciation schedules, corporate tax credits, corporate production incentives, corporate and personal tax exemptions, personal tax credits, federal grant programs, USDA renewable energy systems and energy efficiency improvements loan programs, green power purchasing or aggregation, corporate tax incentive, industry recruitment incentives, property tax incentives, state public benefit funds, and state sales tax incentives. n56 Some of the policy incentives encouraging the use of renewable energies include: construction and design policies, contractor licensing, equipment certifications, generation disclosure rules, net metering rules, renewables portfolio set asides, required utility green power option, and solar and wind access laws. n57 In addition to these policy incentives, many states have adopted portfolio mandates or portfolio standards, which require certain percentages of energy come from renewable sources.n58

#### Counter-interpretation – financial incentives are public funds to induce behaviors – 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 casess, 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.

#### Precision – the DOE supports our definition

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.

## QER CP

#### **Should is not mandatory**

Atlas Collaboration 99

Use of shall, should, may can,” <http://rd13doc.cern.ch/Atlas/DaqSoft/sde/inspect/shall.html> ¶ In the expression of the requirements, shall describes something that is mandatory ; should is weaker. It describes something that might not be satisfied in the final product, but that is desirable enough that any non−compliance shall be explicitly justified ; may grants permission to do something, and makes only a weak statement.

#### Resolved is not part of the resolution

Webster’s Guide to Grammar and Writing 2k [http://ccc.commnet.edu/grammar/marks/colon.htm]

Use of a colon before a list or an explanation that is preceded by a clause that can stand by itself. Think of the colon as a gate, inviting one to go on… If the introductory phrase preceding the colon is very brief and the clause following the colon represents the real business of the sentence, begin the clause after the colon with a capital letter.

#### Resolved can be an opinion not necessarily a determination

Webster’s 98 – Webster’s Revised Unabridged Dictionary, 1998 [dictionary.com]

**Resolved:**¶5. To express, as an opinion or determination, by resolution and vote; to declare or decide by a formal vote; -- followed by a clause; as, the house resolved (or, it was resolved by the house) that no money should be apropriated (or, to appropriate no money).

#### QERs already get submitted every year

Marburger 10 – Lindsey Marburger, 11/30/10, manages the Earth Systems Program, overseeing Federation of American Scientists' work in building technologies, energy efficiency and energy technology training and safety, and systems resource analysis, “PCAST Federal Energy Policy Report Released”, <http://www.fas.org/blog/nutshell/2010/11/pcast-federal-energy-policy-report-released/>

The QER is not a new idea. Rather, it is a timescale change. The Section 7321 of US Code (Title 42, 84, VIII, 7321) already legally obligates the President to produce and submit to Congress a biennial National Energy Policy Plan. The comprehensive plan is to be developed with the participation of “consumers, small businesses, and a wide range of other interests, including those of individual citizens who have no financial interest in the energy industry.” The last plan produced was the Bush Administration’s controversial 2001 report, Reliable, Affordable, and Environmentally Sound Energy for America’s Future.

#### Counterplan links to politics – it requires Congressional approval

Marburger 10 – Lindsey Marburger, 11/30/10, manages the Earth Systems Program, overseeing Federation of American Scientists' work in building technologies, energy efficiency and energy technology training and safety, and systems resource analysis, “PCAST Federal Energy Policy Report Released”, <http://www.fas.org/blog/nutshell/2010/11/pcast-federal-energy-policy-report-released/>

While changing the timescale from two years to four years will decrease the time burden on the DOE and the OOP, it will not fundamentally change the fact that the energy review process will still depend upon annual Congressional appropriations for funding as well as continued OOP compliance. In order to ensure the success of the QER, the relevant legislation must both fund the entire four year process outright and include provisions compelling Congress and of Executive branch to act upon the results and recommendations of the QER.

#### No solvency

Koonan 11 – Steven E. Koonan, 11/15/11, Undersecretary for Science at the Department of Energy, “HEARING

BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE, <http://www.gpo.gov/fdsys/pkg/CHRG-112shrg72188/pdf/CHRG-112shrg72188.pdf>

However, as you think about the broader QER, I would urge some caution. One of the reasons the QTR turned out as well as it did was that we thought through the goals, the framing and the process before beginning execution. A QER dealing with technology and policy will be far more complex with many possible goals and many more participants.¶ I don’t believe that we know how to do it right at the moment, and, because it needs to be done right, it should not be done in haste. Structuring and organizing the interagency effort will require flexibility the first time through, and no doubt there will be a lot of learning going on. So please bear in mind as you think about legislation.

## States CP

#### Perm do both – shields the link to politics

Overby 3 – A. Brooke, Professor of Law, Tulane University School of Law, “Our New Commercial Law Federalism.” Temple University of the Commonwealth System of Higher Education Temple Law Review, Summer, 2003 76 Temp. L. Rev. 297 Lexis

We held in New York that Congress cannot compel the States to enact or enforce a federal regulatory program. Today we hold that Congress cannot circumvent that prohibition by conscripting the States' officers directly. The Federal Government may neither issue directives requiring the States to address particular problems, nor command the States' officers, or those of their political subdivisions, to administer or enforce a federal regulatory program. It matters not whether policymaking is involved, and no case-by-case weighing of the burdens or benefits is necessary; such commands are fundamentally incompatible with our constitutional system of dual sovereignty.n65 The concerns articulated in New York and echoed again in Printz addressed the erosion of the lines of political accountability that could result from federal commandeering.n66 Federal authority to compel implementation of a national legislative agenda through the state legislatures or officers would blur or launder the federal provenance of the legislation and shift political consequences and costs thereof to the state legislators. Left unchecked, Congress could foist upon the states **expensive or** unpopular programs yet shield itself from accountability to citizens**.** While drawing the line between constitutionally permissible optional implementation and impermissible mandatory implementation does not erase these concerns with accountability, it does ameliorate them slightly.

#### State funding relies on bonds – perceived as unreliable

Stevens 11 (Paul, PRESIDENT AND CEO OF INVESTMENT COMPANY INSTITUTE, “OVERSIGHT OF THE MUTUAL FUND INDUSTRY: ENSURING MARKET STABILITY

AND INVESTOR CONFIDENCE”, June 24, BEFORE THE SUBCOMMITTEE ON CAPITAL MARKETS AND GOVERNMENT SPONSORED ENTERPRISES COMMITTEE ON FINANCIAL SERVICES UNITED STATES HOUSE OF REPRESENTATIVES, http://financialservices.house.gov/uploadedfiles/062411stevens.pdf)¶ The tax-exempt municipal securities market provides an important mechanism for the almost 90,000 units of state and local government to access capital primarily for infrastructure needs including schools, streets and highways, bridges, hospitals, public housing, sewer and water systems, power utilities, and various public projects. 145 The tax treatment of municipal securities in Section 103 of the Internal Revenue Code, which states that the interest on municipal bonds is exempt from federal income tax, serves to bolster demand for municipal securities. For many of these small government units, the municipal securities markets are the only way in which they can truly raise needed funding for their operations. Funds are a critical part of this market. At the end of 2010, individual investors held 33 percent of the $2.9 trillion municipal securities market through funds and another 37 percent directly. 146¶ Funds provide an efficient and cost-effective means for individual investors to obtain municipal securities. With approximately 1.2 million active municipal bonds, 147 however, the municipal securities markets are complex. Investors will naturally gravitate toward issues for which they have ready access to the detailed, consistent, and timely disclosure necessary to informed investment decisions. Unfortunately, under the current municipal securities regulatory regime, disclosure too often is limited, non-standardized, and often stale. 148¶ For these reasons, we repeatedly have called for reform of the municipal securities disclosure regime. 149 ICI consistently has supported SEC efforts to enhance the disclosure of information regarding municipal securities by amending Rule 15c2-12 under the Securities Exchange Act of 1934, which establishes requirements on the initial disclosure, periodic disclosure, and secondary market reporting of municipal securities. 151 The Rule requires dealers and underwriters, through contract, to obtain issuer representations that certain disclosures may be made. Since adoption, time has shown that the attenuated nature of this disclosure system is extremely difficult to enforce. 152¶ A better disclosure regime should be devised for this important market. Municipal securities now trade on a nationwide scale; their trading volume has increased substantially; and the market is composed of many complex instruments. Individual investors increasingly must evaluate not only default risk, but also market price and the corresponding value of a bond. The credit environment for municipal securities has become, and likely will continue to be, more challenging in the coming years, primarily in small or unrated issues. ¶ Until 2008, the need for better disclosure was tempered by the fact that most municipal securities were insured. It was presumed that in the absence of publicly available information, a bond insurer had ready access to the municipal issuer’s most recent financial statements and had performed necessary due diligence. Now, however, a smaller segment of the municipal securities market has bond insurance because of the skepticism of investors about the ability of the insurance industry to conduct quality risk assessments following the 2008 financial crisis. Disclosure gaps have been compounded by the adoption of a single global rating scale, which rates corporate and municipal securities on the same scale, and reduces the granularity of available information on municipal securities. Headline risk and the cyclical nature of retail trading further exacerbate the problem. Industry initiatives have made some headway for disclosure improvements in certain categories of municipal securities but these too are limited and voluntary. 153

#### New spending wrecks the California economy

Krol 12 Robert, Professor of economics at California State University Northridge and author of a forthcoming Cato Journal paper on state budget institutions, 2012, “California Needs a Spending Limit”, http://www.cato.org/publications/commentary/california-needs-spending-limit

California's budget is once again in the red. The governor signed a balanced budget in August of last year, but before the ink was dry, a slowing economy, the real estate bust and a spate of unplanned spending resulted in a significant budget crunch. The Legislative Analyst's Office now projects a deficit of about $10 billion over the next 18 months, and Gov. Schwarzenegger says the shortfall may be as high as $14 billion. To be sure, the slowing economy has reduced revenues, but excessive spending remains the root cause ofCalifornia's persistent financial troubles. The governor plans to declare a "fiscal emergency," requiring legislators in Sacramento to correct the deficit. The resulting legislation will likely include spending cuts, fee increases and borrowing. Details aside, Schwarzenegger must insist that any legislation contain an enforceable framework to help prevent future fiscal crises and allow for a voter referendum on a constitutional spending limit. The time is right**.** California's taxes are already high, so the solution is to control spending with a constitutional constraint limiting expenditure growth to inflation plus population growth. Schwarzenegger proposed a spending limit in 2005, but it was poorly designed, and voters had little incentive to support it. Now, the fiscal crunch is much worse. A new proposal should require legislators to get voter approval for any expenditures above the limit, and include a component allowing taxpayers to decide for themselves whether they want higher spending or a tax refund. Such a law would lessen the severity of budget shortfalls in economic downturns. Recent experience provides an example of how this would work. The state's revenues began to rise in the 2004-05 fiscal year. Since that time, pegging spending increases to inflation and population growth would have allowed spending to grow by 15 percent. Instead, expenditures increased by more than twice that much. If spending growth had been limited to 15 percent since 2004-05, we'd be facing a $7 billion surplus rather than a $2 billion deficit for the current fiscal year. Thirty states already have some form of a tax or government spending limit. Most of the limits link the growth of state expenditures to growth in personal income. California overwhelmingly passed a population growth plus inflation spending constraint in 1979, but it was amended by voters in 1990 to limit expenditure growth to increases in population plus growth in personal income. This more generous limit has never effectively constrained state spending. Linking spending growth to increases in population plus inflation is a more effective way to establish fiscal discipline in Sacramento. We know from other states that tax and spending limits can constrain the expansion of government. Research shows that the most effective limits are constitutional, written by voters and limit increases in spending rather than revenues. As an added bonus, financial markets reward states with expenditure limits by demanding lower interest rates on state borrowing. This offers significant savings over time. During economic booms, if revenues increase more than inflation plus population growth, the surplus should be refunded to taxpayers or used to shore up California's rainy-day fund. If state leaders wanted to spend some of the additional revenues, they should put their proposals up for a vote. California has little choice but to get its spending under control. Higher taxes are not an economically viable option. The Tax Foundation in Washington, D.C., ranks California 46th in its 2007 State Business Climate Rankings. Our neighboring states – Arizona, Nevada and Oregon – rank considerably better. Despite healthy revenue growth over the last few years, the California budget has been mismanaged. Schwarzenegger has been unable to make good on his pledge to reform Sacramento and get state lawmakers off of what he called "autopilot" spending. In the 2003 recall election, he ran as a budget reformer, promising he would "tear up the credit cards" and rein in runaway spending. He has failed to live up to his promises. A spending limit would give California some much-needed budget stability, and allow the governor to salvage his legacy. With a new fiscal mess brewing, it's time for him to try again.

#### California is key to the US economy

Williams 9 Juliet, writer for the Huffington Post, June 29, 2009, “California's Ailing Economy Could Prolong US Recession”, http://www.huffingtonpost.com/2009/06/29/californias-ailing-econom\_n\_222616.html

SACRAMENTO, Calif. — California faces a $24 billion budget shortfall, an eye-popping amount that dwarfs many states' entire annual spending plans. Beyond California's borders, why should anyone care that the home of Google and the Walt Disney Co. might stop paying its bills this week? Virtually all states are suffering in the recession, some worse than California. But none has the economic horsepower of the world's eighth-largest economy, home to one in eight Americans. California accounts for 12 percent of the nation's gross domestic product and the largest share of retail sales of any state. It also sends far more in tax revenue to the federal government than it receives giving a dollar for every 80 cents it gets back which means Californians are keeping social programs afloat across the country. While the deficit only affects the state, California's deepening economic malaise could make it harder for the entire nation's economy to recover. When the state stumbles, its sheer size 38.3 million people creates fallout for businesses from Texas to Michigan. "California is the key catalyst for U.S. retail sales, and if California falls further you will see the U.S. economy suffer significantly," said retail consultant Burt P. Flickinger, managing director of Strategic Resource Group. He warned of more bankruptcies of national retail chains and brand suppliers. Even if California lawmakers solve the deficit quickly, there will likely be more government furloughs and layoffs and tens of billions of dollars in spending cuts. That will ripple through the state economy, sowing fear of even more job losses.

#### States can’t fund new energy programs---budget constraints that result in tradeoffs

Berlin et al 12 Ken, senior vice president for policy and planning and general counsel at the Coalition for Green Capital, Reed Hundt is the CEO of the Coalition for Green Capital, Mark Muro is a senior fellow and the director of policy for the Metropolitan Policy Program at Brookings and Devashree Saha is a senior policy analyst and associate fellow at the Brookings Metropolitan Policy Program, "State Clean Energy Finance Banks: New Investment Facilities for Clean Energy Deployment", September, www.brookings.edu/~/media/research/files/papers/2012/9/12%20state%20energy%20investment%20muro/12%20state%20energy%20investment%20muro

State budget constraints are also severe. At the same time, state and local governments are also facing budget problems that will likely preclude efforts to offset the federal pull-back with bold new grant and subsidy programs. For one thing, state discretionary spending remains and is projected to remain depressed given the continued revenue impacts caused by the after-effects of the Great Depression.17 For another, states are also finding it difficult to issue new general obligation bonds. Bond issuance by states and others including cities, schools, hospitals, and other municipal entities fell to a 10-year low in 2011 after reaching a record high in 2010. Even though debt sales by states are up by 74 percent as of May 2012 compared to the same period in 2011, Moody’s notes that heightened fiscal management concerns will result in less new state borrowing, and that much of the increased issuance reflects refunding issues to take advantage of lower long-term interest rates rather than new money issues for new projects. For instance, states like California, Florida, and New Jersey have all reduced borrowing and are funding some capital projects on a pay-as-you-go basis even while contending with their constitutional budget restrictions. 18¶ In addition, federal fiscal austerity is likely to impose further challenges. With the direct federal aid to the states under ARRA now waning states will face increased fiscal stress that will vary depending on their ability to raise revenue and make cuts in other programs. The implication is that state governments that want to encourage continued clean energy investment in their states are now going to have to do it largely without major new grants, bonds, or subsidy programs.

#### State budget cuts destroys bioterror response

Ahlers 11 Mike M, senior producer, transportation and regulation, for CNN, “Bioterror security at risk”, December 20, http://security.blogs.cnn.com/2011/12/20/bioterror-security-at-risk/

Recent and proposed budget cuts at all levels of government are threatening to reverse the significant post-9/11 improvements in the nation's ability to respond to natural diseases and bioterror attacks, according to a report released Tuesday. "We're seeing a decade's worth of progress eroding in front of our eyes," said Jeff Levi, executive director of the Trust for America's Health, which published the report with the Robert Wood Johnson Foundation.

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Budget cuts already have forced state and local health departments to cut thousands of health officials, the report says. Cuts are jeopardizing the jobs of federal investigators who help states hunt down diseases, threatening the capabilities at all 10 "Level 1" state labs that conduct tests for nerve agents or chemical agents such as mustard gas, and may hurt the ability of many cities to rapidly distribute vaccines during emergencies, it says. The "upward trajectory" of preparedness, fueled by more than $7 billion in federal grants to cities and states in the past 10 years, is leveling off, and the gains of the last decade are "at risk," the report says. The 2011 report departs slightly in tone from the nine previous reports prepared by the two health advocacy groups. Earlier reports, while focusing on gaps in the nation's preparedness for pandemics and bioterror attacks, showed a "steady progression of improvement," said Levi. "Our concern this year is that because of the economic crisis... we may not be as prepared today as we were a couple of years ago," he said. Once lost, medical capabilities take time and money to rebuild, the report says. "It would be like trying to hire and train firefighters in the middle of a fire," Levi said. "You don't do that for fire protection, and we shouldn't be doing that for public health protection." There are few expressions of assurance or optimism in the 2011 report. The report says: – In the past year, 40 states and the District of Columbia have cut funds to public health. – Since 2008, state health agencies have lost 14,910 people through layoffs or attrition; local health departments have lost 34,400. – Federal PHEP grants - Public Health Emergency Preparedness grants - were cut 27 percent between fiscal 2005 and 2011, when adjusted for inflation. – Some 51 cities are at risk for elimination of Cities Readiness Initiative funds, which support the rapid distribution of vaccinations and medications during emergencies. "Two steps forward, three steps back," said Dr. F. Douglas Scutchfield of the University of Kentucky College of Public Health, in an essay accompanying the study. "As certain as the sun will rise in the east, we will experience another event that will demonstrate our inability to cope, as the resources for public health are scarce, and it will prompt the cycle of build-up, neglect, event, build-up, etc." Federal aid to state and local governments for health preparedness peeked in 2002 at about $1.7 billion, and fell to $1.3 billion in fiscal 2012, Levi said. But the impact of cuts were masked when Congress allocated more than $8 billion in emergency funds to fight the H1N1 flu in 2009, Levi said. "Now that money is gone. And so we're seeing the real impact of these cuts," he said. The TFAH report comes just two months after another report concluded that the United States is largely unprepared for a large-scale bioterror attack or deadly disease outbreak.

#### Bioweapons cause extinction

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

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

#### Federal support for SPS is key to revitalize the aerospace sector

Mankins, President of SPA and Former NASA Scientist, 9 (John, Preeminent Global Expert on SSP, SPA = Space Power Association, President of ARTEMIS Innovation Management Solutions, Worked @ NASA for 25 Years, “To boldly go: the urgent need for a revitalized investment in space technology,” 5-18, <http://www.thespacereview.com/article/1377/1>)

Unfortunately, the US investment in advanced research and technology for space exploration and development has been reduced to historically low levels, and concurrently has been focused more narrowly than ever before on immediate system designs and development projects. In many respects, the current budget is little more than an “advanced development” program with minimal opportunity for innovation and essentially no possibility that an invention arising from civil space research and technology programs could influence system design decisions, inform budget estimates or inspire new, more ambitious space program goals. The challenge today Space has never been more important to our national security than it is today. The opportunities for truly profound scientific discoveries through space exploration have never been greater. And the pace of international development of new capabilities for space operations has never been faster. Federal budgets for advanced research and technology to enable future space exploration and development have been reduced in scope and focused on near-term system developments to the point that US preeminence in space activities is in question. NASA’s advanced space research and technology budget was over $2 billion in fiscal year (FY) 2005, with a focus on objectives five to ten years in the future and with the purpose of informing program and design decisions, while retiring both technical and budget risks of those future programs. The President’s FY 2007 budget for NASA exploration technology declined to less than $700 million, and of that only a small fraction (perhaps less than $200 million) still addressed longer-term objectives. The corresponding budgets in 2008 and 2009 were further reduced. Little to none of the remaining investment deals with enabling fundamentally new goals or objectives, or dramatically reducing expected costs. With these funding levels and program goals, it is unlikely that the US will maintain leadership in space exploration beyond the current generation of projects—all of which are founded on the “seed corn” harvested from past investments in innovative new space capabilities. Further, declining support for space research and technology is creating an innovation vacuum in the US as small business opportunities evaporate, and funding for universities and students vanishes. This trend jeopardizes America’s long-term leadership in space exploration and development, and damages our ability to achieve important national security goals. History Since the conclusion of the Apollo program in the early 1970s, the US space program has experienced varying levels of support from national leaders in the White House and the US Congress. Moreover, during most of that time human exploration beyond low Earth orbit has been “off the agenda”, with the exception of the short-lived Space Exploration Initiative (SEI) of 1989–1993. During the same period, US robotic exploration has had a number of tremendous successes, primarily involving the outer planets (e.g., Voyager spacecraft, Galileo, and more recently, Cassini), but also the inner solar system (e.g., Viking on Mars, Magellan at Venus), and the recent series of Mars missions (e.g., Pathfinder/Sojourner, Mars Observer, Spirit and Opportunity). However, these programs have tended to reflect one-of-a-kind successes with a minimal number of spacecraft and missions using common systems or technologies, resulting in continuing very high costs. Various attempts to create a foundation of common technologies and modular spacecraft have failed. Similarly, attempts to bridge the gap between robotic mission systems technologies and human space flight technologies (e.g., “Platform Z” from the early Space Station Freedom program) have failed. The most notable successes in this vein arose from the in-space assembly and spacecraft servicing capabilities of the Space Shuttle, first in the early 1980s with the Solar Max servicing mission, then with the series of hugely successful Hubble Space Telescope servicing missions, and finally with the assembly of the International Space Station. However, these achievements were far more the exception than the rule. For the most part human and robotic exploration systems and technologies became increasingly isolated beginning in the 1970s. More recently Following the Columbia tragedy in 2003, the direction of the US space program was again the subject of intense discussion (led by the White House) and including various agencies and organizations. The result, announced in January 2004, was the “Vision for Space Exploration” (VSE). The VSE as formulated originally was much more than a new justification for human space flight. Rather, the Vision addressed the full range of human and robotic exploration, as well as a revitalization of advanced space research and technology with far-reaching implications. The original VSE strategy placed strong emphasis on studies, research, and technology developments that would in time inform decisions regarding architectures and systems for (1) a Space Shuttle replacement; (2) annual robotic technology missions to the Moon; (3) a human return to the Moon to establish a permanent presence; (4) new space observatories to explore the universe beyond our solar system; (5) a campaign of robotic missions to Mars and beyond; and more. With current funding levels and program goals, it is unlikely that the US will maintain leadership in space exploration beyond the current generation of projects—all of which are founded on the “seed corn” harvested from past investments in innovative new space capabilities. However, in 2005 NASA shifted to a dramatically different approach to exploration and related technology developments with the results of the Exploration Systems Architecture Study. ESAS results placed exclusive emphasis on a US human lunar return and in an attempt to accelerate the first operational capability for the “crew exploration vehicle”—a capsule-based Space Shuttle replacement. To achieve this focus, numerous strategic changes were necessary. References to other aspects of space science and exploration were dropped, as was integrated planning of human and robotic exploration missions. For example, the initially planned annual campaign of robotic technology missions to the Moon was reduced to a single orbiter and one lunar lander mission, and these retained little or no role in guiding design decisions for human lunar systems. Also, to avoid technology-related risks, a range of lifecycle cost-related architectural options were eliminated from consideration, including in-space assembly of lunar transportation systems, in-space fueling and servicing, reusable lunar transportation systems, and others. The result was a family of systems for low Earth orbit access and a return to the Moon that involved a re-sized, Apollo-like architectural approach, with a heavy-lift launch vehicle and expendable transportation system elements. Significant shifts in agency budgets followed these new strategic directions, including drastic reductions in advanced space research and technology development, and a redefinition of remaining investments as “technology development”, focused on already-made design decisions. This shift in strategy was epitomized by NASA’s elimination of the NASA Institute of Advanced Concepts (NIAC) on the grounds of budget constraints, despite that fact that NIAC represented less than one third of one percent of the agency’s annual budget. The real point was that NIAC no longer had a legitimate role given NASA’s new approach to innovation: low engineering risk designs, and modest technology developments focused on those designs. Unfortunately, the elimination of design-to-cost and investments in longer-term innovation have come with a price. By recent estimates, the transportation-related cost of a single human mission to the Moon using the present, low-technology design solution will exceed $5 billion; transportation for two crewed lunar missions per year would require approximately 60% of NASA’s annual budget. Moreover, in-house agency subject matter expertise has been severely affected, as has the Agency’s contribution to US space technology leadership. Overall, the ambitious goals that were articulated by the White House in 2004 have been pushed into the indefinite future. A permanent human outpost of the Moon, development of lunar resources, deployment of large space observatories, and ambitious missions to the outer planets: all of these have been pushed out into the future by 20 years or more. Moreover, it is difficult to envision how such goals could ever be achieved using current systems concepts and concomitant prohibitively high costs. Only new systems concepts, enabled by focused space research and technology developments, can change this assessment. At the same time, real progress continues to be made by the international space community, grounded in steady investments in new technologies and systems—and resulting in regular accomplishments in space systems. The international flotilla of robotic space missions to the Moon illustrates this point: the US contribution of a single orbiter and a future lander are largely indistinguishable from the missions of other countries. Without an adequate strategy for, and more robust investment in, advanced space research and technology, long-term US preeminence in space exploration and development is doubtful. The Office of Naval Research (ONR) of the US Department of Defense (DOD) provides a useful example for how long-term but focused government research and technology advancement may be pursued. In particular, the ONR uses four complementary program strategies: a foundation of in-house subject matter expertise, sustained basic research and technology investments, development and demonstration of prototypes, and a focus on future capabilities. The concept of “Future Naval Capabilities” (FNCs) is used by the ONR to focus advanced research and technology (R&T) efforts around novel systems and concepts of operations. FNCs allow a range of R&T investments to be coordinated around specific new capabilities—even though the details of those systems designs have not yet been finalized, nor development programs approved. Also, the ONR uses the concept of “Innovative Naval Prototypes” (INPs) to orchestrate a range of ongoing R&T and draw the results of those efforts into nearer-term demonstrations of working prototypes and test-beds. INPs are characterized by ambitious technical objectives, and their potential to truly transform future naval operations. In addition, the ONR has preserved for over 60 years a commitment to long lead, discipline-oriented research and technology development. These investments have been responsible for advances in areas as diverse as materials, electronics, communications, power, and others—but all leading toward naval preeminence. And finally, DOD investments have maintained a foundation of in-house subject matter expertise at the Naval Research Laboratory (NRL) and other installations. Over the years, these in-house experts have enabled more effective technology investment decisions and, working with civilian and uniformed leaders better system acquisition decisions. Novel technologies and systems concepts must be matured and validated before decisions are made regarding the detailed designs of future space systems. There are a variety of business models that might be considered for space research and technology development. However, the strategies used by the ONR for its investments seem especially appropriate to the long-term character of the challenge of space exploration and development. For civil space exploration and development, these would be: (1) maintenance of in-house NASA subject matter expertise in relevant technologies; (2) sustained, discipline-oriented investment in basic research and technology at NASA centers, universities, and small businesses; (3) development and demonstration of transformational systems prototypes in partnerships involving NASA, major industry and others; and (4) a sustained focus on future space capabilities. And the results of these investments must be harvested before designs are finalized and system acquisition programs started. Assessment It is hardly consistent with the aspirations of Americans to “go where everyone has been before…” However, it is fantasy to suppose that the civil space program can affordably accomplish ambitious goals and objectives in space using systems concepts and technologies of the last century. Novel technologies and systems concepts must be matured and validated before decisions are made regarding the detailed designs of future space systems. In fact, numerous reports over a period of decades have established the criticality of a robust and focused investment in advanced research and technology, including the findings of several National Commissions, committees of the National Academy of Sciences, and others. Stable, robust, long-term federal investments in advanced research and technology for future civil space capabilities—funded at a level sufficient to assure US preeminence in space science, exploration, and utilization—are critical if we are to meet the challenges of this century: achieving ambitious goals in science and exploration, delivering on the promise of space to contribute to a strong national economy, maintaining a skilled aerospace workforce,

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and providing the foundations for future national security. It is time for the Congress and the White House—recognizing the challenges facing this nation’s space sector—to articulate and implement a strategy to revitalize advanced space research and technology and to make a sustained commitment to the implementation of that strategy. The recently chartered national study on the future of human space exploration, chaired by Norm Augustine, should take up this task. What should be done? The following actions are needed now: The federal government should revitalize its investment to invent and develop innovative new technologies for space science, exploration, and development, consistent with assuring US preeminence in space activities and industry’s ability to adopt these innovations for application in future space missions and markets. A balanced distribution should be created in the allocation of revitalized advanced space research and technology funding among more basic research efforts, technology maturation, and demonstrations of new technologies. These investments should be guided by the goal of creating ambitious new “future space capabilities”—well-enough defined to inform technology investments, but flexible enough to allow the results of those investments to influence designs, reduce costs, and enable new and more ambitious science goals. In establishing these investments, NASA must seek and embrace inputs from outside the agency (including other agencies, industry, academia) to develop, review, and recommend NASA advanced space research and technology plans, programs, and strategies. NASA in-house space research and technology (performed by engineers and technical specialists) should be restored, in balance with increased external research (by industry and academia). Funding for university research should also be targeted toward producing graduates with advanced degrees to support the follow-on work that will be undertaken by industry. We need to reconsider what makes an ambitious space program worth a substantial investment of public dollars—and consider again the historical and future importance of advancing space technology and developing truly new and valuable space capabilities for the public, the nation, and the world. To achieve the purposes for which it was created, NASA must maintain the excellence of its workforce and their expertise in a wide array of cutting-edge new technologies. As they enter the workforce, it will be impossible to attract the “best and the brightest” to federal service without a foundation of cutting-edge research and technology program opportunities. Moreover, a healthy NASA workforce, armed with appropriate skills and secure in its future, will provide better oversight for technical system procurement and program management. This competence will result in better performing systems, better ability to meet schedule, more productive interactions with other stakeholders in the aerospace enterprise, and more efficient use of taxpayer dollars. Although NASA must accommodate changing priorities and budgets, it must also ensure that it does not lose the important skills and knowledge currently possessed by its workers. NASA also must continue to ensure that the NASA workforce gains the new competencies needed in the aerospace industry of the future. In order accelerate the transition of novel technologies into transformational future space capabilities NASA must invest in demonstrations of innovative space prototypes on the ground and in space. Innovative space prototypes should be implemented in coordination with the DoD, academia, and industry; and wherever possible with co-funding with the private sector in order to speed the application of these new capabilities in creating new space industries. To implement these recommendations effectively, focused and timely near term action is essential: The National Academy of Sciences (National Research Council) should be chartered to conduct an independent, visionary study to identify 6–12 transformational “future space capabilities” that would—if developed—enable a wide range of new, ambitious, and affordable space exploration and development. These future space capabilities would in turn drive planning for government and industry research and technology investments. The Administration should develop—in consultation with the US Congress, and using NASA as its executive agent—a strategic research and technology development roadmap that establishes a baseline for achieving these goals, including objectives, schedules, milestones and budgets. This roadmap should be used to provide the basis for future US investments in advanced space research and technology development and demonstrations. The US space program needs more than a national discussion of what human exploration should do next: International Space Station research versus lunar outposts versus asteroid sorties versus human Mars missions, and so on. These are important questions. Even more, however, weneed to set in place basic policies that can endure from one administration to the next. We need to reconsider what makes an ambitious space program worth a substantial investment of public dollars—and consider again the historical and future importance of advancing space technology and developing truly new and valuable space capabilities for the public, the nation, and the world.

#### Aerospace solves cyberterrorism

Deloitte 12 | (Deloitte is a consulting and financial advisory service, Report Commissioned by the Aerospace Industries Association, " The Aerospace and Defense Industry in the U.S. A financial and economic impact study," March, http://www.aia-aerospace.org/assets/deloitte\_study\_2012.pdf)

The world continues to demonstrate how dangerous it is and how our civilization and way of life can be put in jeopardy quickly. The surprise attacks on Pearl Harbor and the tragic events surrounding the terrorist attacks of 9/11 have shown our nation how vulnerable it can be. Technology innovations and products developed in the aerospace and defense industry have made our nation safer, from sophisticated sensors that can “see” nefarious activities of our adversaries, to the bomb and metal detectors that have become ubiquitous at airports around the world, the industry continues to innovate to produce the necessary defenses used to increase our national security. Recent advances to counter the next generation national security threats include for example, sophisticated software to trace bank transactions of terrorists, advanced listening sensors to eavesdrop on communications of known terrorists, and sophisticated sensors to help discover threats at our airports, borders, and seaports. Of course, the unmanned aerial vehicle (UAV) has been extraordinarily successful in helping to see, then attack if necessary, our adversaries. Lastly, the specter of a potential cyber-attack on our nation’s water, power, transportation or communications infrastructure is cause for alarm, and the industry continues to develop the next generation technologies to address these and future threats.

#### Great power nuclear war

Fritz 9 | Researcher for International Commission on Nuclear Nonproliferation and Disarmament [Jason, researcher for International Commission on Nuclear Nonproliferation and Disarmament, former Army officer and consultant, and has a master of international relations at Bond University, “Hacking Nuclear Command and Control,” July, <http://www.icnnd.org/latest/research/Jason_Fritz_Hacking_NC2.pdf>]

This paper will analyse the threat of cyber terrorism in regard to nuclear weapons. Specifically, this research will use open source knowledge to identify the structure of nuclear command and control centres, how those structures might be compromised through computer network operations, and how doing so would fit within established cyber terrorists’ capabilities, strategies, and tactics. If access to command and control centres is obtained, terrorists could fake or actually cause one nuclear-armed state to attack another, thus provoking a nuclear response from another nuclear power. This may be an easier alternative for terrorist groups than building or acquiring a nuclear weapon or dirty bomb themselves. This would also act as a force equaliser, and provide terrorists with the asymmetric benefits of high speed, removal of geographical distance, and a relatively low cost. Continuing difficulties in developing computer tracking technologies which could trace the identity of intruders, and difficulties in establishing an internationally agreed upon legal framework to guide responses to computer network operations, point towards an inherent weakness in using computer networks to manage nuclear weaponry. This is particularly relevant to reducing the hair trigger posture of existing nuclear arsenals. All computers which are connected to the internet are susceptible to infiltration and remote control. Computers which operate on a closed network may also be compromised by various hacker methods, such as privilege escalation, roaming notebooks, wireless access points, embedded exploits in software and hardware, and maintenance entry points. For example, e-mail spoofing targeted at individuals who have access to a closed network, could lead to the installation of a virus on an open network. This virus could then be carelessly transported on removable data storage between the open and closed network. Information found on the internet may also reveal how to access these closed networks directly. Efforts by militaries to place increasing reliance on computer networks, including experimental technology such as autonomous systems, and their desire to have multiple launch options, such as nuclear triad capability, enables multiple entry points for terrorists. For example, if a terrestrial command centre is impenetrable, perhaps isolating one nuclear armed submarine would prove an easier task. There is evidence to suggest multiple attempts have been made by hackers to compromise the extremely low radio frequency once used by the US Navy to send nuclear launch approval to submerged submarines. Additionally, the alleged Soviet system known as Perimetr was designed to automatically launch nuclear weapons if it was unable to establish communications with Soviet leadership. This was intended as a retaliatory response in the event that nuclear weapons had decapitated Soviet leadership; however it did not account for the possibility of cyber terrorists blocking communications through computer network operations in an attempt to engage the system. Should a warhead be launched, damage could be further enhanced through additional computer network operations. By using proxies, multi-layered attacks could be engineered. Terrorists could remotely commandeer computers in China and use them to launch a US nuclear attack against Russia. Thus Russia would believe it was under attack from the US and the US would believe China was responsible. Further, emergency response communications could be disrupted, transportation could be shut down, and disinformation, such as misdirection, could be planted, thereby hindering the disaster relief effort and maximizing destruction. Disruptions in communication and the use of disinformation could also be used to provoke uninformed responses. For example, a nuclear strike between India and Pakistan could be coordinated with Distributed Denial of Service attacks against key networks, so they would have further difficulty in identifying what happened and be forced to respond quickly. Terrorists could also knock out communications between these states so they cannot discuss the situation. Alternatively, amidst the confusion of a traditional large-scale terrorist attack, claims of responsibility and declarations of war could be falsified in an attempt to instigate a hasty military response. These false claims could be posted directly on Presidential, military, and government websites. E-mails could also be sent to the media and foreign governments using the IP addresses and e-mail accounts of government officials. A sophisticated and all encompassing combination of traditional terrorism and cyber terrorism could be enough to launch nuclear weapons on its own, without the need for compromising command and control centres directly.

## Space Debris

#### **SPS is key to soft power**

Wood 12 – Leet W.Wood is a PhD student in political science at George Mason University in Fairfax, Virginia, Bulletin of the Atomic Scientists, February 15th, 2012, ““Projecting power: The security implications of space-based solar power,” Ebscohost

The ability of the system to direct power on short notice to most points on the globe also has significance for international aid and disaster relief. In the wake of a **natural or humanitarian disaster**, power from space could be used to **keep hospitals and refugee camps operational, as well as providing electricity for water desalination** and other critical but energy-intensive processes. Operating in this mode, spacebased solar power could become a powerful tool of diplomacy rather than one of force projection in the traditional sense.

#### Soft power prevents extinction

Stanley 7—Elizabeth Stanley, Ph.D. is an Assistant Professor of Security Studies in the Edmund A. Walsh School of Foreign Service and the Department of Government, 7 “International Perceptions of US Nuclear Policy” Sandia Report,<http://www.prod.sandia.gov/cgi-bin/techlib/access-control.pl/2007/070903.pdf>

How important is soft power, anyway?  Given its vast conventional military power, does  the United States even need soft power?  Some analysts argue that US military predominance is both possible and desirable over the long term, and thus soft power is not important.  But a growing consensus disagrees.  These analysts argue that soft power is critical for four reasons.   First, soft power is invaluable for keeping potential adversaries from gaining international  support, for “winning the peace” in Afghanistan and Iraq, and for convincing moderates to  refrain from supporting extremist terrorist groups.  Second, soft power helps influence neutral  and developing states to support US global leadership.  Third, soft power is also important for  convincing allies and partners to share the international security burden.14  Finally, and perhaps  most importantly, given the increasing interdependence and globalization of the world system,  soft power is critical for addressing most security threats the United States faces today.  Most  global security threats are impossible to be countered by a single state alone.  Terrorism,  weapons of mass destruction (WMD) proliferation, failed and failing states, conflicts over access  to resources, are not confined to any one state.  In addition, disease, demographic shifts,  environmental degradation and global warming will have negative security implications as  well.15  All of these potential threats share four traits: (1) they are best addressed proactively,  rather than after they develop into full-blown crises; (2) they require multi-lateral approaches,  often under the umbrella of an international institution; (3) they are not candidates for a quick  fix, but rather require multi-year, or multi-decade solutions; and, (4) they are “wicked” problems.   Given these four traits, soft power is critical for helping to secure the international, multi-lateral  cooperation that will be necessary to address such threats effectively.

#### Cleanup solves

Selding10Peter, Space News Writer, “NASA May Move Orbital Debris Mitigation Off Back Burner,” July 23, <http://www.spacenews.com/civil/100723-nasa-orbital-debris-mitigation.html>

BREMEN, Germany — NASA’s Orbital Debris Program Office expects to begin active work on how to remove debris in orbit on the strength of the new U.S. National Space Policy, according to the office’s chief scientist. Nicholas L. Johnson said the office, which assembles data from the U.S. Air Force-run Space Surveillance Network, has been working on these issues for years, but only on an informal basis, with few resources and no formal mandate. That changed on June 28, when President Barack Obama issued an updated space policy that specifically orders NASA and the U.S. Defense Department to “pursue research and development of technologies and techniques … to mitigate and remove on-orbit debris.” Attending the 38th Congress of the Committee on Space Research (Cospar) here July 18-25, Johnson said it is too early to tell exactly how the new policy will be transformed into programs and budgets. But the specificity of the wording, he said, gives reason to conclude that NASA will be able to increase its efforts. In addition to asking NASA and the Defense Department to research debris mitigation — making satellites and rockets less likely to break up in orbit, and removing satellites from the orbital highways upon retirement — the policy’s inclusion of orbital debris removal may take the NASA office in a new direction.

#### **Russia solves now**

Atkinson 10 – Nancy Professor at North Alabama and Maryland, department of history [http://www.universetoday.com/80643/russia-wants-to-build-sweeper-to-clean-up-space-debris/ November 29, 2010 Russia is using sweepers and sweeper pods to push debris out of orbit

Energia Russia is looking to build a $2 billion orbital “pod” that would sweep up satellite debris from space around the Earth. According to a post on the Russian Federal Space Agency, Roscosmos’ Facebook site, (which seems to confirm an earlier article by the Interfax news agency) the cleaning satellite would work on nuclear power and be operational for about 15 years. The Russian rocket company, Energia proposes that they would complete the cleaning satellite assembly by 2020 and test the device no later than in 2023. “The corporation promises to clean up the space in 10 years by collecting about 600 defunct satellites on the same geosynchronous orbit and sinking them into the oceans subsequently,” Victor Sinyavsky from the company was quoted as saying.

#### No impact to debris – your evidence is exaggerated

Hackett 7(James, Washington Post Writer, “ Much ado about space debris,” April 25, Lexis

China's deliberate destruction of one of its own satellites in a January test of an anti-satellite (ASAT) weapon has led to much hand-wringing about the creation of space debris, reinvigorating the opponents of weapons in space. Orbiting debris is dangerous, but the danger has been greatly exaggerated and is no reason for new unenforceable arms control agreements. When the space age began 50 years ago there were no man-made objects in space. Since then, Space Command has tracked more than 25,000 objects of baseball size or larger. More than 10,000 have fallen into the atmosphere and disintegrated or landed, but in 50 years not one person anywhere on Earth has been killed or injured by falling debris. Space debris is only slightly more likely to strike one of the 850 active spacecraft. Most are in low Earth orbit below about 800 miles. These operational spacecraft are only 6 percent of the objects tracked. The rest is space junk that includes inactive satellites, spent rockets, debris from exploding rockets and just plain trash. Space Command monitors debris to identify threats and alerts operators of satellites to move out of the way if they appear to be in danger. Some 80 percent of debris orbits between 500 and 600 miles altitude. The Chinese test, at 527 miles, created more debris right where traffic is heaviest. Air Force Space Command is tracking more than 1,000 pieces of debris from the Chinese test, plus 14,000 that were there before. So far, none has hit an active spacecraft. In fact, over the last 50 years there have been only three documented debris impacts with operational spacecraft, and none have been destroyed. A Space Command Web site describing the Space Surveillance Network that tracks debris notes there is only a small amount in the low orbits of the space shuttle and space station, and gives a worst-case estimate of 1 chance in 10,000 years of a piece of debris of baseball size or larger hitting either one. Even in the debris-heavy area around 500 miles altitude, Space Command says normally there are only three or four objects orbiting in an area equivalent to the airspace over the continental United States up to an altitude of 30,000 feet. Thus, it states, the likelihood of a collision is very small. Now there are reports U.S. intelligence agencies knew about and monitored Chinese preparations for the ASAT test, but senior administration officials decided to say nothing to deter Beijing in orderto protect intelligence methods. That shows that despite the anguish about space debris the creation of more was not considered a serious danger. Most debris eventually migrates down and burns up in the atmosphere. The main efforts are to avoid existing debris, design spacecraft and rockets that will not explode in space, limit the release of debris on orbit, and at the end of their mission de-orbit satellites or move them to parking orbits where there is little traffic. The Inter-Agency Space Debris Coordination Committee (IADC) is an international governmental group that promotes good conduct in space. Most space-faring nations are members, including the United States, Russia, China and the European Space Agency, which together have created some 95 percent of space junk. The IADC was supposed to meet in Beijing in late April, but after creating a new debris field, China postponed the meeting until November. Now an earlier meeting at a new location is under consideration. It will be interesting to see if China explains its anti-satellite test. By conducting the test without advance notice to anyone, Beijing ignored the concerns of governments and commercial satellite operators alike, and violated a cardinal rule of the IADC by creating a lot of long-lived debris at a relatively high altitude. Though the danger is not as great as many believe, China's action has led to renewed calls for a ban on tests in space that might cause debris. That would be a mistake. Banning weapons or tests in space could adversely affect our ability to protect our armed forces on land and sea from satellite reconnaissance and targeting.

#### Debris won't affect SPS

Grey 2k

Jerry, Director of AIAA, Federal News Service, Congressional Testimony, 9-7-2000, Lexis

(2) Orbital Debris. Although the SSP configurations are large, their diaphanous nature and location in geostationary or geosynchronous halo orbits imply low susceptibility to serious damage by either natural or anthropogenic orbital debris. Moreover, since all the proposed concepts employ robotic inspection and maintenance, repairs of any such damage should be able to be accomplished.

## Sequestration

#### Hegemony isn’t key to peace

Fettweis 11 Christopher J. Fettweis, Department of Political Science, Tulane University, 9/26/11, Free Riding or Restraint? Examining European Grand Strategy, Comparative Strategy, 30:316–332, EBSCO

It is perhaps worth noting that there is no evidence to support a direct relationship between the relative level of U.S. activism and international stability. In fact, the limited data we do have suggest the opposite may be true. During the 1990s, the United States cut back on its defense spending fairly substantially. By 1998, the United States was spending $100 billion less on defense in real terms than it had in 1990.51 To internationalists, defense hawks and believers in hegemonic stability, this irresponsible “peace dividend” endangered both national and global security. “No serious analyst of American military capabilities,” argued Kristol and Kagan, “doubts that the defense budget has been cut much too far to meet America’s responsibilities to itself and to world peace.”52 On the other hand, if the pacific trends were not based upon U.S. hegemony but a strengthening norm against interstate war, one would not have expected an increase in global instability and violence. The verdict from the past two decades is fairly plain: The world grew more peaceful while the U**nited** S**tates** cut its forces.

**mark**

No state seemed to believe that its security was endangered by a less-capable United States military, or at least none took any action that would suggest such a belief. No militaries were enhanced to address power vacuums, no security dilemmas drove insecurity or arms races, and no regional balancing occurred once the stabilizing presence of the U.S. military was diminished. The rest of the world acted as if the threat of international war was not a pressing concern, despite the reduction in U.S. capabilities. Most of all, the United States and its allies were no less safe. The incidence and magnitude of global conflict declined while the United States cut its military spending under President Clinton, and kept declining as the Bush Administration ramped the spending back up. No complex statistical analysis should be necessary to reach the conclusion that the two are unrelated. Military spending figures by themselves are insufficient to disprove a connection between overall U.S. actions and international stability. Once again, one could presumably argue that spending is not the only or even the best indication of hegemony, and that it is instead U.S. foreign political and security commitments that maintain stability. Since neither was significantly altered during this period, instability should not have been expected. Alternately, advocates of hegemonic stability could believe that relative rather than absolute spending is decisive in bringing peace. Although the United States cut back on its spending during the 1990s, its relative advantage never wavered. However, even if it is true that either U.S. commitments or relative spending account for global pacific trends, then at the very least stability can evidently be maintained at drastically lower levels of both. In other words, even if one can be allowed to argue in the alternative for a moment and suppose that there is in fact a level of engagement below which the United States cannot drop without increasing international disorder, a rational grand strategist would still recommend cutting back on engagement and spending until that level is determined. Grand strategic decisions are never final; continual adjustments can and must be made as time goes on. Basic logic suggests that the United States ought to spend the minimum amount of its blood and treasure while seeking the maximum return on its investment. And if the current era of stability is as stable as many believe it to be, no increase in conflict would ever occur irrespective of U.S. spending, which would save untold trillions for an increasingly debt-ridden nation. It is also perhaps worth noting that if opposite trends had unfolded, if other states had reacted to news of cuts in U.S. defense spending with more aggressive or insecure behavior, then internationalists would surely argue that their expectations had been fulfilled. If increases in conflict would have been interpreted as proof of the wisdom of internationalist strategies, then logical consistency demands that the lack thereof should at least pose a problem. As it stands, the only evidence we have regarding the likely systemic reaction to a more restrained United States suggests that the current peaceful trends are unrelated to U.S. military spending. Evidently the rest of the world can operate quite effectively without the presence of a global policeman. Those who think otherwise base their view on faith alone.

#### No Middle East impact

Cook 7**—**CFR senior fellow for Mid East Studies. BA in international studies from Vassar College, an MA in international relations from the Johns Hopkins School of Advanced International Studies, and both an MA and PhD in political science from the University of Pennsylvania(Steven, Ray Takeyh, CFR fellow, and Suzanne Maloney, Brookings fellow, 6 /28, Why the Iraq war won't engulf the Mideast, http://www.iht.com/bin/print.php?id=6383265, AG)

Underlying this anxiety was a scenario in which Iraq's sectarian and ethnic violence spills over into neighboring countries, producing conflicts between the major Arab states and Iran as well as Turkey and the Kurdistan Regional Government. These wars then destabilize the entire region well beyond the current conflict zone, involving heavyweights like Egypt. This is scary stuff indeed, but with the exception of the conflict between Turkey and the Kurds, the scenario is far from an accurate reflection of the way Middle Eastern leaders view the situation in Iraq and calculate their interests there. It is abundantly clear that major outside powers like Saudi Arabia, Iran and Turkey are heavily involved in Iraq. These countries have so much at stake in the future of Iraq that it is natural they would seek to influence political developments in the country. Yet, the Saudis, Iranians, Jordanians, Syrians, and others are very unlikely to go to war either to protect their own sect or ethnic group or to prevent one country from gaining the upper hand in Iraq. The reasons are fairly straightforward. First, Middle Eastern leaders, like politicians everywhere, are primarily interested in one thing: self-preservation. Committing forces to Iraq is an inherently risky proposition, which, if the conflict went badly, could threaten domestic political stability. Moreover, most Arab armies are geared toward regime protection rather than projecting power and thus have little capability for sending troops to Iraq. Second, there is cause for concern about the so-called blowback scenario in which jihadis returning from Iraq destabilize their home countries, plunging the region into conflict. Middle Eastern leaders are preparing for this possibility. Unlike in the 1990s, when Arab fighters in the Afghan jihad against the Soviet Union returned to Algeria, Egypt and Saudi Arabia and became a source of instability, Arab security services are being vigilant about who is coming in and going from their countries. In the last month, the Saudi government has arrested approximately 200 people suspected of ties with militants. Riyadh is also building a 700 kilometer wall along part of its frontier with Iraq in order to keep militants out of the kingdom. Finally, there is no precedent for Arab leaders to commit forces to conflicts in which they are not directly involved. The Iraqis and the Saudis did send small contingents to fight the Israelis in 1948 and 1967, but they were either ineffective or never made it. In the 1970s and 1980s, Arab countries other than Syria, which had a compelling interest in establishing its hegemony over Lebanon, never committed forces either to protect the Lebanese from the Israelis or from other Lebanese. The civil war in Lebanon was regarded as someone else's fight. Indeed, this is the way many leaders view the current situation in Iraq. To Cairo, Amman and Riyadh, the situation in Iraq is worrisome, but in the end it is an Iraqi and American fight. As far as Iranian mullahs are concerned, they have long preferred to press their interests through proxies as opposed to direct engagement. At a time when Tehran has access and influence over powerful Shiite militias, a massive cross-border incursion is both unlikely and unnecessary. So Iraqis will remain locked in a sectarian and ethnic struggle that outside powers may abet, but will remain within the borders of Iraq. The Middle East is a region both prone and accustomed to civil wars. But given its experience with ambiguous conflicts, **the region has** also **developed an intuitive ability to contain its civil strife and prevent local conflicts from enveloping the entire Middle East.**

#### Won’t pass---no compromise on cuts and taxes

Klein 1/2—senior editorial writer for The Washington Examiner. (Phillip, Past the 'cliff,' debt ceiling promises a more brutal fight, http://washingtonexaminer.com/phillip-klein-past-the-cliff-debt-ceiling-promises-a-more-brutal-fight/article/2517384#.UOV43m9ZUUM)

As a weary Washington assesses the "fiscal cliff" deal, a debt-ceiling showdown looms on the horizon. There are a number of reasons to believe that the standoff -- expected sometime in February or March -- will be even more difficult to resolve than the last debt-ceiling impasse in the summer of 2011.¶ In the 2011 showdown, House Speaker John Boehner established the principle that every dollar increase in the debt limit would have to be accompanied by a dollar cut in government spending. The final deal allowed for at least $2.1 trillion in debt-limit increases offset by promised spending cuts and did not raise taxes.¶ This time, however, it will be more difficult for Republicans to get Democrats to agree to spending cuts. In the summer of 2011, both parties were essentially placing bets on the outcome of the 2012 election. With Obama re-elected and Democrats still controlling the Senate, Democrats believe they are in a stronger position.¶ The 2011 debt-limit deal reduced projected spending by about $917 billion. There isn't much desire among victorious Democrats to cut discretionary spending further, and there is deep resistance to cutting mandatory spending by reforming the big entitlement programs -- Medicare, Medicaid and Social Security.¶ Congress is also running out of gimmicks. Scrambling to come up with further spending cuts during the 2011 debt-limit fight, lawmakers created a bipartisan, bicameral 12-member "super committee" tasked with finding at least $1.2 trillion in deficit reduction. In theory, the members would be motivated to act, or else face automatic cuts to defense and nondefense spending at the start of 2013. They failed to come up with a solution, but this week's fiscal cliff deal delayed the automatic cuts -- or sequester -- for another two months.¶ Not only will it be hard for Congress to get away with another tactic like this, but the continued desire to replace the sequester with different deficit reduction means that Boehner goes into the debt-limit debate $1.2 trillion in the hole. Any spending cuts Democrats would conceivably agree to as a substitute to the sequester would only pay for the 2011 debt-ceiling increase. To be consistent with Boehner's dollar-for-dollar principle and replace the sequester, Republicans would have to get Obama and Senate Democrats to agree to spending cuts above and beyond the $1.2 trillion.¶ For his part, Obama has insisted that he won't negotiate over the debt limit this time around. This is unlikely to hold, given the potential consequences to the federal government, financial markets and the economy if it is never raised. And the fact that he made the debt ceiling a part of ultimately fruitless fiscal cliff talks with Boehner means he's already negotiated over it.¶ In his comments following the passage of the fiscal cliff deal, Obama emphasized that the agreement enshrined the principle of a "balanced" approach in which spending cuts are exchanged for tax increases. So, even if Obama did negotiate over the debt limit, he is unlikely to agree to any spending cuts -- let alone trillions in cuts and fundamental entitlement reform -- without additional tax increases.¶ And from the Republican perspective, the tax debate is now closed. Income taxes have gone up by $617 billion, and the rich are now paying their "fair share." The final fiscal cliff deal was a bitter pill for Republicans to swallow, but they were able to do so only because of the unique circumstances in which tax rates were expiring anyway, so that inaction meant $4.5 trillion in tax hikes on nearly everyone. Absent that automatic expiration issue -- which ultimately forced even anti-tax crusader Grover Norquist to give Republicans a pass -- there is no reason Republicans would agree to a penny more in higher taxes.

#### Hagel pounds the disad---requires all Obama’s PC

Politico 1-6 – “Chuck Hagel takes fire from Capitol Hill,” 1/6/13, http://dyn.politico.com/printstory.cfm?uuid=F3C2EA30-9671-40B6-A668-0BDDCDC603FB

Senate Democrats and Republicans are far from sold on President Barack Obama’s expected nomination of Chuck Hagel as secretary of defense.¶ In fact, Obama’s decision to tap the Vietnam veteran and outspoken former Republican senator is likely to spark another nasty fight with Congress right on the heels of the fiscal cliff showdown and just before another likely battle royal over the debt ceiling.¶ Republicans on Sunday unleashed a fresh barrage of attacks amid reports Obama would nominate Hagel on Monday for the top job at the Pentagon. ¶ The new Senate minority whip, Texas Republican John Cornyn, said he’s firmly against Hagel’s nomination. Sen. Lindsey Graham (R-S.C.), an Air Force reservist who serves on the Armed Services Committee that will consider the nod, said Hagel would hold the “most antagonistic” views toward Israel of any defense secretary in U.S. history.¶ And despite heaping praise on Hagel when he retired from the Senate after the 2008 elections, Minority Leader Mitch McConnell (R-Ky.) on Sunday failed to extend an olive branch to the Nebraska Republican, instead suggesting there would be “tough questions” ahead. ¶ Even Senate Democrats are privately signaling they‘re not yet on board with the Hagel pick, and that the White House has a lot of work to do to get him across the finish line. ¶ The nomination comes at a tricky time for the administration — just as the fights over raising the debt ceiling and government appropriations are set to begin. And it could put a number of at-risk or pro-Israel Democrats in tough political spots — especially if the nomination fight grows even more contentious.¶ Democrats are also scratching their heads over why Obama appears willing to go to the mat for Hagel, while abandoning his push for a close friend and member of his inner circle, U.N. Ambassador Susan Rice, to become secretary of state. Rice, an unabashed Democrat, abandoned her bid after withering GOP criticism over the deadly attacks on the U.S. Consulate in Libya. ¶ Though different in substance, the controversy over Rice’s remarks is not unlike the current pushback over Hagel’s past foreign policy positions and controversial remarks. But Hagel lacks a natural constituency in the Senate, given that he’s grown alienated from the GOP, yet Democrats are suspicious of his record. ¶ “It is a strange signal for the White House to send that they are willing to fight for Hagel but not Rice,” one Senate Democratic aide said Sunday. “Democrats are not currently unified behind Hagel, and it will take some real work by the administration to get them there, if it’s even possible.” ¶ Senior Republicans agreed, noting that after Hagel infuriated Republicans and Democrats alike over the years, there isn’t a natural base for him. ¶ “I can’t imagine why [Obama] would choose to burn his political capital on this nomination. For what? There is no constituency for Chuck Hagel,” one senior GOP aide said. “Obama will expend every ounce of political capital he has to get him across the finish line. Dems will hate this.”

#### **PC fails and is low**

McGregor 1-3 – Richard McGregor, CNN writer, January 3rd, 2013, "Fiscal fights threaten US policy goals" [www.cnn.com/2013/01/03/business/us-fiscal-fight/](http://www.cnn.com/2013/01/03/business/us-fiscal-fight/)

"I find it remarkable that the president apparently continues to believe that he will not have to deal with people that he does not agree with," said Mr Galston. "A president who is not disdainful of the art of legislating can get things done."¶ Forging a consensus on issues such as gun control and climate change, if the White House does take them on, will require Mr Obama to do more than just persuade some Republicans to support him.¶ **Many Democrats are wary of such reforms or oppose them outright**, and a second-term president with declining political capital will face an uphill battle to shift their views.

#### Debt deal pounds the link --- negotiations will occur simultaneously

John T. Bennett 1-3, Marine Corps Times, “Obama signs sequestration delay, defense bill”, http://www.marinecorpstimes.com/news/2013/01/dn-obama-signs-sequestration-defense-010313

A vacationing President Obama has signed the controversial measure that delays pending cuts to projected Pentagon spending and the 2013 military policy bill, the White House said.¶ From Hawaii, Obama reviewed the American Taxpayer Relief Act of 2012, which extends tax breaks for most Americans and raises rates on high earners while delaying big cuts to planned domestic and defense spending.¶ He ordered his signature be placed via the autopen on that bill, which steers the nation around the fiscal cliff.¶ The fiscal cliff bill’s two-month sequestration delay sets a new March 1 deadline for passage of at least $1.2 trillion in deficit-reduction measures, the amount needed to turn off the defense and domestic sequestration cuts. If Congress and Obama again fail to do so, sequestration would take effect March 27, according to the law.¶ Efforts to cobble together those deficit-cutting components will take place at the same time Obama and lawmakers are engaged in what is expected to be a bitter fight over raising the nation’s borrowing limit.

#### No impact---most qualified expert

Korb 9/9 Lawrence Korb is a former assistant secretary of defense in the Reagan administration and is a senior fellow at the Center for American Progress. “Cuts Would Not Affect Security,” 2012, NYT, http://www.nytimes.com/roomfordebate/2012/09/09/how-big-should-the-defense-budget-be/cuts-would-not-affect-security

But the United States can afford defense cuts, without undermining national security, for four reasons:¶ First, the United States has just gone through an enormous defense buildup. The budget increased, in real terms, for an unprecedented 13 straight years between 1998 and 2012. Even during the Reagan buildup, defense spending grew for only four years before dropping back to more sustainable levels.¶ Second, the cuts being discussed are smaller than they seem. The first $500 billion come from projected growth, so the budget will fall by just $6 billion next year and then grow at about the same pace as inflation. Even with sequestration, defense spending would be brought back only to its 2006 level in real terms -- more than we spent on average under Presidents Ronald Reagan and George H. W. Bush.¶ Third, ending this indiscriminate growth will force the Pentagon to manage its funds more carefully. Over the past decade, the Pentagon squandered $46 billion on weapons it later canceled, and let half its procurement programs balloon beyond their original budgets.¶ Finally, we face a world with relatively few major threats. And even with sequestration-size cuts, we would still account for more than 40 percent of the world’s defense spending, and our allies would account for about half of the rest.

#### Congressional support for SPS

Morring 7 – Frank Morring, expert at Aviation Week & Space Technology, August 20th, 2007, “Space Solar Power: Climate, Economy, National Security Drive Another Look At SSP; Experts see warming, economic concerns and energy security as reasons to build SSP” Proquest Search

Another factor that might build support in Congress and the Executive Branch is the effect building an SSP system would have on competitiveness. "Here in the U.S. **we continue to be concerned about competitiveness**, particularly in light of the migration of many high-tech industries overseas, and how [to] provide long-term economic and science and technology strength in the U.S. [It's] an ongoing challenge," Mankins says.

#### The DOD supports SPS and shields it

Hurst 8 – executive editor and writer for ecopolitology and Cleantechnica (Timothy B. December 21, 2008, Red Green & Blue, “Will Obama Champion Space-Based Solar Power?” <http://redgreenandblue.org/2008/12/21/will-obama-champion-space-based-solar-power/>)

But there has also been some discussion that Obama could make cuts at NASA, if for no other reason than something has got to be cut somewhere. Although funding NASA may not be a top priority for Obama, a strong argument could be made that investment in SSP research program would sync with his focus on building a clean energy economy. It also helps that the idea has been supported by Defense Department officials who see SSP applications in the transmission of electricity to remote locations to support military actions. I’m not suggesting that Obama will use the cover of the Defense Departmen**t to expand solar research**, but used as part of a strategy that promotes economic growth and environmental health, it may be a strategic choice that has some political legs. Whatever political method the Obama administration uses to hammer on the clean energy agenda, it is clear that Obama’s will be a science-based administration. And as recently as yesterday, Obama reiterated that his administration would not stifle hard-to-swallow science, but nurture it. Obama said in his weekly address: “Today more than ever before science holds the key to our survival as a planet and the security and prosperity as a nation. It’s time once again that we put science at the top of our agenda and restore America’s place as the world leader in science and technology.” If that includes a robust Space-Based Solar Program, we’ll have to wait and see.

#### The DOD shields the plan from politics

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.

#### **Congress is gridlocked---5 reasons---debt ceiling, other issues, speaker vote, primaries, and cabinet fights**

Sullivan & Blake 1-4 – Sean Sullivan AND\*\*\* Aaron Blake, writers for the Washington Post, January 4th, 2013, "5 reasons gridlock will seize Congress again" [www.washingtonpost.com/blogs/the-fix/wp/2013/01/04/5-reasons-gridlock-will-seize-congress-again/](http://www.washingtonpost.com/blogs/the-fix/wp/2013/01/04/5-reasons-gridlock-will-seize-congress-again/)

Below are five reasons the 113th Congress could be as deadlocked and disappointing as the preceding one:¶ 1. The debt ceiling battle: There is no honeymoon ahead. Republicans who were long adamant about not raising tax rates eventually caved during the fiscal cliff negotiations, handing President Obama a political win and fulfillment of his campaign promise to raise taxes on the wealthy while holding middle-class rates steady. Republicans believe the concession handed them new leverage in the debt debate to demand the spending cuts they want (and were punted away during the “fiscal cliff” debate) in exchange for increasing in the federal borrowing limit. On the other side stand Democrats, led by Obama, who has warned that he will not negotiate with Republicans over the $16.4 trillion limit. It’s not difficult to see the **emerging game of political chicken** that could well end with leaders finding themselves in the familiar position of hastily slapping together a deal as a deadline nears. And that deadline is just two months away.¶ 2. Other tough votes in the pipeline: Obama has identified immigration reform and new gun control measures as the early legislative priorities of his second term. But **Congress hasn’t passed immigration or gun control bills in years for a reason.** Even Republicans have been talking up the urgent need to reform immigration laws, and a recent Washington Post-ABC News poll showed a strong majority of Americans support a path to citizenship for illegal immigrants. But a similar majority in a separate poll stood in favor of raising taxes on the wealthy during the fiscal cliff debate, and that didn’t stop the issue from holding up a deal. When it comes to gun control, a recent Gallup poll illustrates why passing new regulations could be difficult and divisive, even in the wake of the mass shooting at a Newtown, Conn., school. While a significant majority of Americans say they support new gun measures, those same people can’t seem to come to an agreement about specific laws — beyond further background checks.¶ 3. Thursday’s speaker vote: House Speaker John Boehner (R-Ohio) was reelected on Thursday, but he also came closer to failing to secure a win on the first ballot than any speaker since an embattled Newt Gingrich in 1997. Twelve Republicans voted against Boehner, just a couple of weeks after the Ohio Republican failed to win sufficient support from his conference for his “Plan B” proposal on the “fiscal cliff.” **As both instances showed, there isn’t a shortage of House Republicans willing to adopt a stern posture and make a statement. And that’s bad news for compromise.**¶ 4. Threat of primaries looms large: Over 85 percent of the 113th Congress won with better than 55 percent of the vote in 2012, and majorities of winners in both parties claimed between 60 and 70 percent of the vote. Not to sound like a broken record here, but **that’s not an ingredient for compromise**. For the members who won comfortably, the threat of attracting a formidable opponent from the same party is much more serious than losing in the general election. The most common way for incumbents to stave off intra-party challenges is to adhere to conservative or liberal voting patterns that prevent potential opponents from questioning their credentials with the party base.¶ 5. Cabinet fights: Senate Republicans haven’t been shy about expressing their displeasure with prospective Obama Administration cabinet nominees they don’t care for. The resistance United Nations Ambassador Susan Rice faced in meetings with Republican lawmakers prompted her to remove her name from consideration for secretary of state. And the prospect of former Nebraska Republican senator Chuck Hagel becoming the next secretary of defense triggered pushback from some Senate Republicans saying he’d have a tough time getting confirmed. Rest assured: **More spats over cabinet confirmations will only fuel partisan divisions.**

# 1AR

## 1AR---T

#### We meet – rectennas would be in the US

Snead 8 – James Michael Snead, senior member of the American Institute of Aeronautics and Astronautics, past chair of the Space Logistics Technical Committee, published in Aerospace America, the Air Force Air and Space Power Journal, the International Society of Logistics’ Logistics Spectrum magazine, the Journal of AstroPolitics, and the online Space Review, graduate of the Air Force Institute of Technology with Master's Degrees in Aerospace Engineering, November 19th, 2008, “The End of Easy Energy and What to Do About It,” National Space Society, <http://mikesnead.net/resources/spacefaring/white_paper_the_end_of_easy_energy_and_what_to_do_about_it.pdf>

Possible rectenna locations in the United States 2.45/5.8 GHz SSP During the initial SSP studies, Rice University conducted a preliminary assessment of the continental United States to determine where the rectennas could be located. The initial assessment concluded that about 40% of the continental United States could be used to locate rectennas.

**MARKED**

Fifteen exclusion variables were used: inland waters, metropolitan areas, other populated areas, marshlands, perennially flooded lands, military reservations, waterways, designated habitats of endangered species, topography unacceptable, atomic energy commission lands, and lands excluded by three dimensions of electromagnetic compatibility problems. Further refinement of these criteria reduced the initial 40% estimate to about 17% or about 530,000 sq. mi.209 Noting that a rectangular area enclosing the elliptical rectenna and safety zone comprises about 100 sq. mi.,210 the suitable land in the United States could, therefore, support over **5,000 rectennas,** substantially greater than the approximately 250 SSP platforms that would likely be used.211

#### Counter-interpretation – energy production is conversion to electricity and this must be in the United States – justifies because haven’t read till the block

PNL 78, Report Commissioned by the DOE Pacific Northwestern Laboratories "An Analysis of Federal Incentives Used to Stimulate Energy Production" March 1978 www.osti.gov/bridge/servlets/purl/7059750-iKeQE4/7059750.pdf

Energy production is defined as the transformation of natural resources into commonly used forms of energy such as heat, light, and electricity. By this definition, the shining of the sun or the running of a river are not examples of energy production, but the installation of solar panels or the construction of a hydroelectric dam are. Energy consumption is defined as the use of one of these common, "manufactured" forms of energy. Under this definition sunbathing is not energy consumption, but heating water by means of a solar panel is. In both definitions, the crucial ingredient is the application of technology and resources to change a natural resource into a useful energy form.

## 1AR---CP

#### High risk of bioterror

Maginnis 9 (Robert, retired Army lieutenant colonel, and a national security and foreign affairs analyst for radio and television, “Al-Qaeda and The Plague,” <http://www.humanevents.com/article.php?id=30382>)

The report that some forty al-Qaeda terrorists died after the bubonic plague swept through their Algerian training camp has been treated with some glee in the media. But that schadenfreude may be misplaced. One question being investigated is whether the North African fanatics fell victim to the naturally-occurring pathogen or the possibility the group mistakenly released the killer bug while brewing it for terror attacks. This incident provides the Obama administration the impetus to assess whether our nation is prepared for a bioterrorist attack. The Algerian terrorist franchise, al-Qaeda in the land of the Islamic Maghreb (AQIM), is the largest al-Qaeda group outside the Middle East. AQIM has a deadly terrorism record and a declared intention to attack American targets which makes the potential bioterrorism threat credible but not a surprise for American experts. Last year, Dr. Jeffrey Runge, chief medical officer at the US Department of Homeland Security, told Congress that the risk of a large-scale biological attack on the nation is significant and the US knows its terrorist enemies have sought biological weapons. Runge said al-Qaeda is the most significant threat. Al-Qaeda leader Osama bin Laden has long shown an active interest in biological weapons. In the late 1990s, bin Laden set-up 19 chemical and biological weapons laboratories in Afghanistan stocking them with deadly pathogens: anthrax, plague, and botulinum toxins. He hired Ukrainian and Russian experts to train his people and, according to then-CIA director George Tenet, bin Laden trained his operatives “…to conduct attacks with toxic chemicals or biological toxins.” The group’s biological weapons expert, Midhat Mursi al-Sayid Umar, who was reportedly killed by a US missile in 2008, published a 5,000-page encyclopedia of jihad devoted to chemical biological warfare (CBW). Al-Sayid’s manual, which is available in print and on the Internet, provides instructions on how to manufacture rudimentary biological weapons. The availability of al-Sayid’s CBW cookbook makes it possible for independent jihadist cells like the AQIM to attempt to manufacture rudimentary biological weapons. That’s why it shouldn’t be a surprise when there are attempts to manufacture agents by franchise groups such as the 2003 incident in London where six Algerians were charged with plotting to produce the poison ricin and the 2005 French government claim that al-Qaeda cells in the Pankisi Gorge region of Georgia are producing anthrax bacteria, ricin, and botulinum toxin. Any bioterror attack on America will likely come from suicidal jihadists armed with small containers of toxins made in remote sites like AQIM’s training camps rather than pathogen-filled bombs launched from rockets, because weaponizing biological agents is very difficult. It requires the manufacturer to isolate the virulent strain, convert it into a weaponized form and then integrate it with a weapon system that can evenly distribute the agent in lethal doses to the intended targets. A bioterrorist attack would go something like the following. A lone suicidal bioterrorist could cause significant suffering by spreading killer agents in a public place -- dumping a vile of anthrax spores in a ventilation system or subway -- or even more sinister, contaminate himself with the bubonic plague and then cough and sneeze the deadly plague in a closed area like an airplane or office building. It could be 36 hours after a terrorist spreads anthrax or up to a week after someone is exposed to bubonic plague before victims become ill with classical symptoms. That’s why health care providers must be alert to identify the threat and notify public officials. Quick action will save many lives, but the cost could be high. The US Centers for Disease Control and Prevention estimates that an intentional release of anthrax by a bioterrorist in a major city could result in an economic impact of up to $26 billion per 100,000 persons exposed. The AQIM incident came to light when Algerian security forces found the bubonic plague-riddled body of a known terrorist by a roadside. Reportedly, AQIM chiefs fear the highly contagious plague has spread to other terror cells because some of the nearly 1,000 Algerian insurgents abandoned the contaminated camp for others in Morocco, Tunisia and Nigeria. The Sun, a British newspaper, broke the AQIM story on January 19th. The paper reported that the epidemic began in AQIM’s camp 90 miles east of the capital Algiers. The group turned the camp’s shelters into mass graves and fled, reported the Sun. The plague, also known as “black death,” is believed to have killed an estimated 75-200 million people in the 14th century. Today, the World Health Organization reports several thousand cases a year, mainly in southern Asia, Africa and Central America. The killer bug is caused by a bacterial agent, yersinia pestis, which infects rodents, producing blood poisoning. Fleas that feed on the dying rodents carry the toxic bacteria to humans. This may explain how AQIM terrorists contracted the pathogen if not from a terror weapon mishap. Left untreated by antibiotics, the plague’s symptoms begin with a headache, then chills and fever which lead to exhaustion. The condition may include nausea, vomiting, back pain, soreness in the arms and legs. Swellings, called buboes, which give the bubonic plague its name, appear around the lymph nodes -- the neck, arms and inner thighs. They are hard knobs that turn black, split open to ooze pus and blood. The survival rate among the untreated is small. Both offensive and defensive programs must be in place to reduce the likelihood of a successful bioterrorist attack launched by groups like AQIM or homegrown radicals. The best offensive effort is to shutdown bioterrorists at the source. That’s why the possibility that AQIM is working on deadly pathogens matters. Our special operation forces working with allies and friendly governments must eliminate threats before they mature.

## 1AR---Politics

#### No military impact

Barno 11/7— retired Lieutenant General of the United States Army. Master’s in National Security and Strategic Studies from Georgetown University—Dr. Nora Bensahel is Deputy Director of Studies and a Senior Fellow at the Center for a New American Security—AND Joel Smith and Jacob Stokes; Research Assistants at the Center for a New American Security (Brace Yourself, [www.foreignpolicy.com/articles/2012/11/07/brace\_yourself?page=full](http://www.foreignpolicy.com/articles/2012/11/07/brace_yourself?page=full))

If we do go off the fiscal cliff, all is not lost for the Pentagon. The exact effects of allowing sequestration to take effect still remain unclear, but they are likely to occur more gradually than generally understood. Sequestration mandates a $52.3 billion reduction of DOD spending in Fiscal Year (FY) 2013, which amounts to a 9.4 percent cut of budget authority from nonexempt accounts during the nine remaining months of FY 2013.¶ Focusing on the $52.3 billion cut to defense budget authority distorts how sequestration would affect defense spending for the rest of the fiscal year. Budget authority is often spread across multiple years and therefore is an improper metric for examining the immediate impacts of cuts in economic terms. Instead, outlays -- money actually spent -- provide a better measure.¶ Some of the key ways that sequestration could affect defense during the rest of FY 2013 include:¶ The DOD civilian workforce. As spending on civilian personnel is largely consumed in the first outlay year, the civilian workforce potentially faces significant layoffs or furloughs. Unlike uniformed personnel, civilian personnel are not exempt from sequestration. Expert analysts have estimated that if sequestration goes into effect, DOD would need to reduce its civilian workforce by as much as 13.7 percent during the remainder of the fiscal year.¶ Military health care. Military health care services are subject to sequestration since they are primarily funded through nonexempt operations and maintenance accounts. This could result in delayed payments to providers and possible denial of services.¶ Program cancellations. Despite widespread concern, most procurement programs will not be affected right away. Sequestration does not affect prior-year funding obligations, so already authorized and planned purchases will go ahead as scheduled. Sequestration allows already planned programs to continue, but over time it would reduce quantities bought, delay deliveries, and increase unit prices.¶ Military end strength. Since President Obama exercised his authority to shield military personnel accounts from sequestration, pay and benefits would remain intact and end strength would not be cut beyond already-planned levels for FY 2013.¶ The Pentagon would likely try to mitigate some of these effects by asking Congress for liberal reprogramming authority, in order to shift money from one account to another. If Congress grants this authority, DOD would be able to allocate any defense cuts strategically rather than being forced to cut each plan, program and activity would equally during FY 2013. It would likely shift funds away from lower-priority base budget operations and maintenance accounts to fund higher priorities, such as the Overseas Contingency Operations budget that supports deployed troops.¶ The Defense Department might also mitigate these effects by deferring any cuts until the fourth quarter of FY 2013. Under such a plan, the department would continue operating at planned FY 2013 spending levels as specified in the continuing resolution until a decision is made by Congress and signed by the president to undo the cuts. This would allow the Pentagon to continue resourcing ongoing operations and maintain readiness at existing levels for the near term. Of course, this would be a very high-stakes gamble: if Congress did not reverse sequestration or increase the DOD budget for the fourth quarter, the effects would be devastating. Going off the fiscal cliff might not be as bad as many analysts have warned -- and it might even have some political benefits -- but that doesn't mean the risks aren't significant.

#### Experts conclude no impact to cuts—their evidence is political hype

John T. Bennett 9/19/12, Senior Congressional Reporter for Defense News, and is a Master's candidate in Global Security Studies at Johns Hopkins University, "Experts: Automatic defense cuts might be manageable," The Great Falls Tribune, www.greatfallstribune.com/article/20120919/NEWS01/309190030/Experts-Automatic-defense-cuts-might-manageable?odyssey=tab|topnews|text|Frontpage

WASHINGTON — Pentagon officials, lawmakers and defense industry executives have described $500 billion in automatic military budget cuts set to kick in Jan. 2 as devastation, catastrophe and disaster. ¶ Yet several nonpartisan Washington think tanks have produced analyses that suggest the process, known as sequestration, might be manageable. ¶ The Bipartisan Policy Center estimates that even if the sequestration cuts stick, the annual Pentagon budget would dip below $500 billion for just one year, return to current levels by 2017 and approach $600 billion by 2020. ¶ And the Center for Strategic and Budgetary Assessments projects the Pentagon likely could avoid canceling any weapon programs and would not be forced to lay off troops or slash benefits. ¶ Spread over 10 years ¶ The $500 billion in cuts will be parceled out at $50 billion annually over 10 years. Yet even if they take place, Washington likely will continue to spend more on its military than the rest of the world combined, experts said. ¶ The reason: The Pentagon’s budget has experienced such dramatic growth in the past decade that taking the fiscal 2013 budget down 10 percent would return it to 2006 levels — when no one claimed an insufficient level of defense spending. ¶ The Bipartisan Policy Center study includes a chart that shows the Defense Department’s base budget would fall from $550 billion to a little less than $500 billion in 2013. From that point, it would begin rising steadily. ¶ By 2015, it would be well above $500 billion again, growing to almost $600 billion by the end of this decade. ¶ 'Slow down' but not stop ¶ The Strategic and Budgetary Assessments study, conducted by Todd Harrison, acknowledges that a sequester “would slow down nearly everything DoD does” and predicts fewer new contract awards and extensions. ¶ But Harrison’s findings suggest the cuts would not trigger “immediate program terminations” because money already committed on contracts would not be affected. Defense insiders have said most major defense contractors likely could ride out a dip in annual Pentagon spending because they are still sitting on money from the final years of the post-9/11 defense buildup. ¶ Buying less of the best ¶ Many defense sources doubt the full $500 billion cut would stick for a decade. Under such a scenario, at worst, the annual defense budget would climb at the rate of inflation. And if Republicans take control of Congress and the White House, it could grow even more. ¶ Gordon Adams, who oversaw defense budgeting for the Clinton administration, said that even if the entire $500 billion planned spending cut sticks, “the American military would still be the biggest, toughest kid on the block. The Pentagon would still be buying the most advanced equipment, just at slightly smaller numbers each year.” ¶ One example: Officials have stated a sequester would force them to do things like buy 25 F-35 fighter jets annually, rather than 29.

#### Hagel drains enough PC to decks the rest of the agenda

Lizza 1/7 Ryan is a politics expert at the New York Times. “WILL HAGEL SPIKE THE G.O.P.’S FEVER?” 2013, http://www.newyorker.com/online/blogs/newsdesk/2013/01/how-much-will-the-nomination-of-chuck-hagel-hurt-obamas-second-term-agenda.html#ixzz2HKGSAz32

President Obama’s nomination of Chuck Hagel for Defense Secretary has added yet another intense political battle with Republicans to an already busy season for the White House. So how does Hagel fit in? During last year’s Presidential campaign, Barack Obama had a metaphor he often used to describe what needed to happen in Washington in order for his agenda to move forward in 2013. The election, he said, had to “break the fever” of the Republicans. The hope, frequently articulated by White House aides, was that once Obama was reëlected, the main incentive for G.O.P. obstructionism—trying to defeat Obama in 2012 and thus pursue a more favorable fiscal deal with Mitt Romney—would be removed. As a White House aide told me last year, “To get anything done in the second term, the President has to convince the Republican Party that obstructionism is a losing strategy.” But Obama’s victory has made almost no difference in changing the psychology or incentives of the members of the G.O.P. who matter most: the House Republicans. The idea that a bloc of conservative, mostly Southern, Republicans would start to coöperate with the President on issues like tax policy and immigration may have rested on a faulty assumption. The past few weeks of fiscal-cliff drama have taught us that “breaking the fever” was the wrong metaphor. There is no one event—even the election of a President—that can change a political party overnight. Congress is a co-equal branch of government, and House Republicans feel that they have as much of a mandate for their policies as Obama does for his. Shouldn’t House Republicans care that their views on Obama’s priorities, like tax cuts for the rich and immigration, helped cost Romney the White House and will make it difficult for their party’s nominee to win in 2016? In the abstract, many do, but that’s not enough to change the voting behavior of the average House Republican, who represents a gerrymandered and very conservative district. A better metaphor for the coming battles with Congress may be what Woody Hayes, the college-football coach, famously called “three yards and a cloud of dust”: a series of grinding plays where small victories are earned only after lots of intense combat. While the fiscal-cliff showdown demonstrated that there’s potential for bipartisan deal-making in the Senate, passing any Obama priority through the House of Representatives is nearly impossible unless the political pressure is extremely intense. The fiscal-cliff bill passed the House only when Speaker John Boehner’s members realized that their only alternative was blowing up the settlement negotiated by Joe Biden and Mitch McConnell—and accepting all the blame and consequences. That episode offers the White House a general template for the coming fights over spending, immigration, and gun control—three issues where there is very little consensus between Obama and most House Republicans. Deals will have to be negotiated in the Senate and gain the imprimatur of some high-profile Republicans. Then a pressure campaign will have to be mounted to convince Boehner to move the legislation to the floor of the House under rules that allow it to pass with mostly Democratic votes. It’s easier to see how this could happen with the coming budgetary issues, which have deadlines that force action, than for the rest of Obama’s agenda, which is more likely than not to simply die in the House. There simply isn’t much common ground between Obama and most House Republicans on the agenda he’s chosen. On every front, Obama is challenging the G.O.P.’s most intransigent interest groups. He’s taking on the anti-tax activists who have controlled Republican economic thinking for decades. He’s taking on the Republicans’ Tea Party base over immigration, an issue that polls (and the Republican Presidential primaries) have shown to be more intense than almost any other for grassroots conservatives. He’s taking on the previously untouchable National Rifle Association with his coming proposals to regulate firearms. And with today’s nomination of Hagel, Obama will open a new front against Republican neoconservatives, who control foreign policy in the G.O.P. It’s doubtful that the votes to defeat Hagel will materialize in the Senate, but a President’s political capital, especially in a second term, depletes quickly after his election. Even if Obama prevails, the Hagel fight will have a cost to the rest of his agenda.

#### The DOD shields the plan from politics

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.

#### AT: Asteroids

#### Plan solves asteroid deflection

**Mahan 7 -**  founder of Citizens for Space Based Solar Power (Rob, SBSP FAQ, based on a Bright Spot Radio interview from December 28th, 2007, http://c-sbsp.org/sbsp-faq/)

Are there other reasons you believe we should be developing [SBSP] space-based solar power? Yes, several very important ones. U.S. manufacturing and technology companies are concerned about being able to hire enough capable employees to replace the experienced workforce, a large percentage of which will be elgible to retire within the next ten years. Our domestic “intellectual feedstock” is very low, which is one of many reasons we haven’t built any new nuclear facilities in the last twenty-five years. Like the Apollo and other U.S. space programs did so many years ago, space-based solar power will inspire new generations of U.S. science and technology graduates. The U.S. domestic manufacturing base is badly eroded, and while some economists say that we are moving towards a service-based economy, common sense tells me that we should regain our independence and self-sufficiency in many areas necessary to support our society. Now that what seems like the majority of our clothing, computers, cars, oil, toys and electronics are imported, space-based solar power will support the development of new domestic manufacturing industries. We will also benefit from spin-offs similar to the original space program (microelectronics, internet, velcro, Tang, etc.) Better earth-based solar power efficiences will be gained. Low cost and reliable access to space will support many new industries. Perhaps a space tourism industry will be the forerunner of space colonization. Manufacturing in zero gravity and the hard vacuum of space will yield new materials and new products. Moon and asteroid based operations, such as the mining of natural resources from the Moon and asteroids will provide a platform for planetary protection from NEO (meteor / asteroid) strikes.

Intervening actors check

Worden 2 - United States Space Command, Peterson Air Force Base (October 24, S.P., “ Military Perspectives on the Near-Earth Object (Neo) Threat. ” NASA Workshop on Scientific Requirements for Mitigation of Hazardous Comets and Asteroids, <http://www.noao.edu/meetings/mitigation/media/arlington.extended.pdf> pg. 101 )

Finally, just about everyone knows of the “dinosaur killer” asteroids. These are objects, a few kilometers across, that strike on time scales of tens of millions of years. While the prospect of such strikes grabs people’s attention and make great catastrophe movies, too much focus on these events has, in my opinion, been counterproductive. Most leaders in the United States or elsewhere believe there are more pressing problems than something that may only happen every 50-100 million years. I advocate we focus our energies on the smaller, more immediate threats. This is not to say we do not worry about the large threats. However, I’m reasonably confidant we will find almost all large objects within a decade or less. If we find any that seem to be on a near-term collision course–which I believe unlikely–we can deal with the problem then.

Jupiter's gravitational pull solves

Murraco, 6/3 [Michael, “Asteroid 2009 DD45 Barely Misses Earth June 1, 2011”, Mount Washington Valley Astronomy, http://mwvastronomy.net/2011/06/asteroid-2009-dd45-barely-misses-earth-june-1-2011/]

What has kept the Earth “safe” at least the past 65 million years, other than blind luck is the massive gravitational field of Jupiter, our cosmic guardian,

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with its stable circular orbit far from the sun, which assures a low number of impacts resulting in mass extinctions by sweeping up and scatters away most of the dangerous Earth-orbit-crossing comets and asteroids.