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### Nuclear Leadership

#### Massive nuclear expansion now – mainly in developing, nuclear-free nations

**Handley 13** [“Emerging Nations To Power Nuclear Energy Expansion Over Next Decade”, Meg Handley, March 25, 2013, US News & World]

Despite a slew of developed nations putting the brakes on nuclear programs in the wake of Japan's Fukushima disaster, global nuclear energy generation is expected to increase significantly, climbing 30 percent by the end of the decade, according to recent research.¶ But it isn't going to be the usual suspects fueling the increase in nuclear adoption — an influx of nuclear-free nations pursuing programs will drive growth, according to research and consulting firm GlobalData.¶ Rapidly increasing demand for electricity coupled with surging fossil fuel prices is making nuclear power an increasingly attractive option for many countries, especially in those where large-scale alternative-energy generation—such as wind and solar—is impractical. Around 45 current nuclear-free nations including the United Arab Emirates, Turkey, Poland and Bangladesh are looking at adding the controversial power source to their energy portfolio, the GlobalData report noted.¶ "In these countries, there's very rapidly increasing electricity demand," says Jonathan Lane, GlobalData's Head of Consulting for Power and Utilities. "It's not a question of them managing that [demand] with a single technology — it's going to have to be a mix of technology and nuclear is an important part of that."¶ In more mature economies, declining or flat power demand has somewhat dampened the sense of urgency when it comes to considering nuclear power, especially in the United States, where massive discoveries of natural gas have ushered in a new perspective when it comes to the nation's energy outlook.¶ With the abundance of natural gas and the resulting low prices, nuclear power is too expensive to pursue in the United States, Lane says, and private investment in the sector has suffered. Although five reactors are currently under construction, further expansion of nuclear power won't advance until certain policies are changed when it comes to permits and waste disposal, experts say.¶ "There are 16 other reactors the [Nuclear Regulatory Commission] is considering, but they've been put on the back burner because investors want to see what happens with things like nuclear waste disposal and whether the five being built are on time and on budget," says Jack Spencer, senior research fellow on nuclear energy policy at The Heritage Foundation.¶ But in other places such as China, India, and South Korea, nuclear power generation is looking increasingly attractive, especially given the technological advances that aim to make nuclear power more economical and manageable when it comes to spent fuel. According to Lane, new nuclear reactors produce much less waste than older generation models and countries looking at adopting the technology have the benefit of being able to plan for challenges associated with waste disposal.¶ "It ultimately comes down to economics," Spencer says. "It looks like the South Koreans are really close to figuring out how to build reactors on time and on budget. If they're able to export that capacity, it's going to introduce a new reference point in the marketplace that others will have to compete with. More competition will yield better products and allow those countries who want to build nuclear to build nuclear."

#### The plan solves – provides an economic incentive to forego ENR

**Stanford 10** [IFR FaD context – the need for U.S. implementation of the IFR, 18 February 2010 by Barry Brook, This is a context statement for the IFR FaD series, written by Dr. George S. Stanford. George is a nuclear reactor physicist, part of the team that developed the Integral Fast Reactor. He is now retired from Argonne National Laboratory after a career of experimental work pertaining to power-reactor safety. He is the co-author of Nuclear Shadowboxing: Contemporary Threats from Cold War Weaponry. He is a founding member of the Science Council for Global Initiatives, Brave New Climate]

Background info on proliferation (of nuclear weapons). Please follow the reasoning carefully.¶ – Atomic bombs can be made with highly enriched uranium (90% U-235) or with good-quality plutonium (bomb designers want plutonium that is ~93% Pu-239).¶ – For fuel for an LWR, the uranium only has to be enriched to 3 or 4% U-235.¶ – To make a uranium bomb you don’t need a reactor — but you do need access to an enrichment facility or some other source of highly enriched uranium…¶ – Any kind of nuclear reactor can be used to make weapons-quality plutonium from uranium-238, but the uranium has to have been irradiated for only a very short period. In other words, nobody would try to make a plutonium weapon from ordinary spent fuel, because there are easier ways to get plutonium of much better quality.¶ – Plutonium for a weapon not only has to have good isotopic quality, it also has to be chemically uncontaminated. Thus the lightly irradiated fuel has to be processed to extract the plutonium in a chemically pure form. But mere possession of a reactor is not sufficient for a weapons capability — a facility using a chemical process called PUREX is also needed.¶ – Regardless of how many reactors a country has, it cannot have a weapons capability unless it has either the ability to enrich uranium or to do PUREX-type fuel reprocessing.¶ – Therefore, the spread of weapons capability will be strongly inhibited if the only enrichment and reprocessing facilities are in countries that already have a nuclear arsenal.¶ – But that can only happen if countries with reactors (and soon that will be most of the nations of the world) have absolutely ironclad guarantees that they can get the fuel they need even if they can’t make their own, regardless of how obnoxious their political actions might be.¶ – Such guarantees will have to be backed up by some sort of international arrangement, and that can only come to pass if there is effective leadership for the laborious international negotiations that will have to take place. (For a relevant discussion, see here)¶ – At present, the only nation that has a realistic potential to be such a leader is the United States.¶ – But a country cannot be such a leader in the political arena unless it is also in the technological forefront.¶ – The United States used to be the reactor-technology leader, but it abandoned that role in 1994 when it terminated the development of the IFR.¶ – Since then, other nations — China, India, Japan, South Korea, Russia, France — have proceeded to work on their own fast-reactor versions, which necessarily will involve instituting a fuel-processing capability.¶ – Thus the United States is being left behind, and is rapidly losing its ability to help assure that the global evolution of the technology of nuclear energy proceeds in a safe and orderly manner.¶ – But maybe it’s not too late yet. After all, the IFR is the fast-reactor technology with the post promise (for a variety of reasons), and is ready for a commercial-scale demonstration to settle some uncertainties about how to scale up the pyroprocess as needed, to establish better limits on the expected cost of production units, and to develop an appropriate, expeditious licensing process.

#### Resurrecting commercial leadership solves safe global non-prolif regime

**Banks 13** [“The Decline of America’s Civil Nuclear Industry and its Impact on Our National Security”, February 9, 2013, Dave Banks, a policy advisor to Heartland and the Director of D.C. Operations for the Alliance of Wise Energy Decisions]

In reality, America’s nuclear energy industry is in rapid decline relative to its foreign competitors. With the aging of our civil nuclear fleet and the lack of new builds, America’s nuclear program has sharply contracted over the last few decades. In the 1980s, for example, 100 percent of equipment for U.S. nuclear plants was manufactured in America, compared to less than 25 percent today. Moreover, the U.S. share of global nuclear exports decreased significantly between 1994 and 2008, according to a U.S. government report. Specifically, the U.S. share of sensitive nuclear material exports declined from roughly 30 to 10 percent, and the country’s share of exports of nuclear reactors, major components, and equipment dropped from 11 to 7 percent.¶ There are a number of reasons for the demise of the sector, but chief among them are financing hurdles and cheaper forms of electricity generation, as well as the failure to find a permanent repository for high-level nuclear waste. More recently, cheap shale gas has become a threat to the continued operation of existing reactors – not just a deterrent to new construction. Duke Energy’s recent decision to shut down its nuclear plant in Florida, instead of repairing it was largely due to the economic benefits of fuel switching to natural gas. And late last year, Dominion announced its intention to shut down its nuclear plant in Wisconsin – a move that was also blamed on the abundance of shale gas.¶ Although energy market observers understand why our civil nuclear program is suffering, most of them do not appreciate its impact on U.S. national security, specifically on our ability to shape the global non-proliferation regime. And likewise, many nuclear proliferation experts do not appreciate the fact that U.S. influence in managing proliferation issues is largely dependent on the health of our civil nuclear sector. Certainly, most fail to recognize the primary reason why America possessed the power to define the nuclear proliferation agenda in the first place – the dominant role held by U.S. companies in providing civil nuclear energy technology and services throughout the world.¶ Some free market leaders would argue that the American consumer would be better off buying foreign made nuclear technologies if those goods were developed reliably at a lower cost. However, nuclear technology is not the average widget or gadget on sale at Target or Best Buy. The production of fissile material, which can be used to make weapons, is inherently linked to civil nuclear energy programs because it is a by-product that cannot be avoided with light water reactors.¶ Unfortunately, many of our elected and senior officials mistakenly assume that America will always have a significant diplomatic ability to shape global non-proliferation issues. However, Washington’s power to ensure that other governments follow non-proliferation guidelines will fall rapidly if we become an insignificant player in providing related technology and services.¶ Even now, countries that are looking to build their own nuclear programs are turning less and less to Washington for guidance. Instead, they are engaging our foreign competitors, who benefit from extensive state subsidies and can offer turn-key services and fuel take-back programs. And if nuclear-armed countries wish to help others build bombs, they can take advantage of loopholes in the Non-Proliferation Treaty (NPT) by exporting nuclear technologies and services that allow a country to develop the capacity to do so.

#### Proliferation likely now – Iran, North Korea, and expiration of Russian arms control set the stage for the tipping point – risks Israel strikes

**Chalmers 13** [Royal United Services Institute, independent think-tank founded in 1831 by the Duke of Wellington, “The Nuclear Agenda for 2013: New Solutions to Old Problems”, RUSI Analysis, 10 Jan 2013, Hugh Chalmers, Research Analyst, Nuclear Analysis, formerly had consulting position at the Verification Research, Training and Information Centre, previously held positions at IHS Jane's and the King's College Centre for Science and Security Studies, MA in Science and Security from the King's College Department of War Studies]

After a year characterised by leadership transitions in the US, Russia, China, Japan, and South Korea, political paralysis has pushed many old nuclear problems into 2013. And through the momentum this has afforded them, they will almost certainly colour the coming year.¶ Continuing Crises¶ Chief among these old problems is the Iranian nuclear crisis. Despite increasingly bellicose rhetoric from Israel and the implementation of further sanctions, Iran's stockpile of 20%-enriched uranium almost tripled in 2012 - increasing the threat to what fragile stability exists in the Middle East. The International Atomic Energy Agency (IAEA) can neither confirm nor deny whether Iran's nuclear programme has a military dimension, and the P5+1 group of nations has yet to negotiate a satisfactory conclusion to this crisis.¶ This was in part due to the US Presidential elections in November. The lingering presence of the crisis in US election debates meant that few risks were taken by the US, and consequently the P5+1, to compromise with Iran in the latter half of 2012. And while the IAEA ended the year with a small step towards resolving its dispute with Iran, the US and its partners in the P5+1 start 2013 no closer to their goal than they were a year ago. Unless Iran dramatically reduces its production of 20%-enriched uranium (or significantly increases the conversion of enriched uranium to less-sensitive forms) its stockpile will probably cross Israel's hazy red line of 240kg before mid-2013. If this occurs, the Israeli airstrikes that were narrowly avoided in 2012 may yet haunt 2013.¶ Elections in South Korea and Japan were also coloured by North Korea's successful launch of the Unha-3 rocket in December, which also cast a shadow over the newly-formed Politburo Standing Committee in China. While the timing of the launch ostensibly commemorated the first anniversary of Kim Jong-Il's death, it served equally well as a reminder that North Korea is still prepared to use provocative displays of power to influence regional debates. The launch was rightly met by familiar condemnation from the international community, including an important call from China to abide by UN Security Council Resolutions. However, the Security Council itself has yet to add its voice to this chorus - something it did within four days of North Korea's failed rocket launch in April 2012.¶ While it is too early to judge the impact of the launch, if North Korea feels that provocation has proven productive (and that it may dodge an assertive response from the UN), it may be tempted to consider further provocation. Satellite imagery analysis suggests that North Korea has maintained a readiness to test a nuclear warhead within two week's notice. And if North Korea does indeed hope to eventually mount a nuclear warhead on a modified Unha-3 rocket, it will have to test a reliable, small-scale warhead.¶ Decaying Relations¶ Finally, since Vladimir Putin's controversial return to the Kremlin in March of 2012, a distinct chill has come over US-Russia relations. While the 'reset' in relations between the two powers successfully secured modest reductions in the strategic nuclear arsenals of the two states, it has since stumbled over the deployment of US ballistic missile defence systems in Europe, and fallen over Russia's tit-for-tat response to the blacklisting of select Russian individuals by the US Magnitsky act at the end of 2012.¶ Two important symptoms of this deteriorating relationship will manifest themselves this year. The Nunn-Lugar Cooperative Threat Reduction Program, which safeguarded and dismantled weapons of mass destruction in the former Soviet Union, and the Megatons to Megawatts Program, which converted Russian weapons-origin fissile material into fuel for US reactors, will be dropped by Russia before 2013 is out. Without a thaw in relations between the US and Russia, and the reinvigoration of bilateral nuclear arms control between the two powers, 2013 may leave the global nuclear disarmament movement in a worse state than it found it.

#### Israel strike causes great power war

José Miguel Alonso Trabanco 2009; researcher for Global Research, “The Middle Eastern Powder Keg Can Explode at Anytime,” globalresearch.ca/index.php?context=va&aid=11762

In case of an Israeli and/or American attack against Iran, Ahmadinejad's government will certainly respond. A possible countermeasure would be to fire Persian ballistic missiles against Israel and maybe even against American military bases in the regions. Teheran will unquestionably resort to its proxies like Hamas or Hezbollah (or even some of its Shiite allies it has in Lebanon or Saudi Arabia) to carry out attacks against Israel, America and their allies, effectively setting in flames a large portion of the Middle East. The ultimate weapon at Iranian disposal is to block the Strait of Hormuz. If such chokepoint is indeed asphyxiated, that would dramatically increase the price of oil, this a very threatening retaliation because it will bring intense financial and economic havoc upon the West, which is already facing significant trouble in those respects. In short, the necessary conditions for a major war in the Middle East are given. Such conflict could rapidly spiral out of control and thus a relatively minor clash could quickly and dangerously escalate by engulfing the whole region and perhaps even beyond. There are many key players: the Israelis, the Palestinians, the Arabs, the Persians and their respective allies and some great powers could become involved in one way or another (America, Russia, Europe, China). Therefore, any miscalculation by any of the main protagonists can trigger something no one can stop. Taking into consideration that the stakes are too high, perhaps it is not wise to be playing with fire right in the middle of a powder keg.

#### New proliferation causes global nuclear war

Cimbala, ‘8

[Stephen, Distinguished Prof. Pol. Sci. – Penn. State Brandywine, Comparative Strategy, “Anticipatory Attacks: Nuclear Crisis Stability in Future Asia”, 27, InformaWorld]

If the possibility existed of a mistaken preemption during and immediately after the Cold War, between the experienced nuclear forces and command systems of America and Russia, then it may be a matter of even more concern with regard to states with newer and more opaque forces and command systems. In addition, the Americans and Soviets (and then Russians) had a great deal of experience getting to know one another’s military operational proclivities and doctrinal idiosyncrasies, including those that might influence the decision for or against war. Another consideration, relative to nuclear stability in the present century, is that the Americans and their NATO allies shared with the Soviets and Russians a commonality of culture and historical experience. Future threats to American or Russian security from weapons of mass destruction may be presented by states or nonstate actors motivated by cultural and social predispositions not easily understood by those in the West nor subject to favorable manipulation during a crisis. The spread of nuclear weapons in Asia presents a complicated mosaic of possibilities in this regard. States with nuclear forces of variable force structure, operational experience, and command-control systems will be thrown into a matrix of complex political, social, and cultural crosscurrents contributory to the possibility of war. In addition to the existing nuclear powers in Asia, others may seek nuclear weapons if they feel threatened by regional rivals or hostile alliances. Containment of nuclear proliferation in Asia is a desirable political objective for all of the obvious reasons. Nevertheless, the present century is unlikely to see the nuclear hesitancy or risk aversion that marked the Cold War, in part, because the military and political discipline imposed by the Cold War superpowers no longer exists, but also because states in Asia have new aspirations for regional or global respect.12 The spread of ballistic missiles and other nuclear-capable delivery systems in Asia, or in the Middle East with reach into Asia, is especially dangerous because plausible adversaries live close together and are already engaged in ongoing disputes about territory or other issues.13 The Cold War Americans and Soviets required missiles and airborne delivery systems of intercontinental range to strike at one another’s vitals. But short-range ballistic missiles or fighter-bombers suffice for India and Pakistan to launch attacks at one another with potentially “strategic” effects. China shares borders with Russia, North Korea, India, and Pakistan; Russia, with China and NorthKorea; India, with Pakistan and China; Pakistan, with India and China; and so on. The short flight times of ballistic missiles between the cities or military forces of contiguous states means that very little time will be available for warning and attack assessment by the defender. Conventionally armed missiles could easily be mistaken for a tactical nuclear first use. Fighter-bombers appearing over the horizon could just as easily be carrying nuclear weapons as conventional ordnance. In addition to the challenges posed by shorter flight times and uncertain weapons loads, potential victims of nuclear attack in Asia may also have first strike–vulnerable forces and command-control systems that increase decision pressures for rapid, and possibly mistaken, retaliation. This potpourri of possibilities challenges conventional wisdom about nuclear deterrence and proliferation on the part of policymakers and academic theorists. For policymakers in the United States and NATO, spreading nuclear and other weapons of mass destruction in Asia could profoundly shift the geopolitics of mass destruction from a European center of gravity (in the twentieth century) to an Asian and/or Middle Eastern center of gravity (in the present century).14 This would profoundly shake up prognostications to the effect that wars of mass destruction are now passe, on account of the emergence of the “Revolution in Military Affairs” and its encouragement of information-based warfare.15 Together with this, there has emerged the argument that large-scale war between states or coalitions of states, as opposed to varieties of unconventional warfare and failed states, are exceptional and potentially obsolete.16 The spread of WMD and ballistic missiles in Asia could overturn these expectations for the obsolescence or marginalization of major interstate warfare.

#### Extinction

Krieger, ‘9

[David, Pres. Nuclear Age Peace Foundation and Councilor – World Future Council, “Still Loving the Bomb After All These Years”, 9-4, https://www.wagingpeace.org/articles/2009/09/04\_krieger\_newsweek\_response.php?krieger]

Jonathan Tepperman’s article in the September 7, 2009 issue of Newsweek, “Why Obama Should Learn to Love the Bomb,” provides a novel but frivolous argument that nuclear weapons “may not, in fact, make the world more dangerous….” Rather, in Tepperman’s world, “The bomb may actually make us safer.” Tepperman shares this world with Kenneth Waltz, a University of California professor emeritus of political science, who Tepperman describes as “the leading ‘nuclear optimist.’” Waltz expresses his optimism in this way: “We’ve now had 64 years of experience since Hiroshima. It’s striking and against all historical precedent that for that substantial period, there has not been any war among nuclear states.” Actually, there were a number of proxy wars between nuclear weapons states, such as those in Korea, Vietnam and Afghanistan, and some near disasters, the most notable being the 1962 Cuban Missile Crisis. Waltz’s logic is akin to observing a man falling from a high rise building, and noting that he had already fallen for 64 floors without anything bad happening to him, and concluding that so far it looked so good that others should try it. Dangerous logic! Tepperman builds upon Waltz’s logic, and concludes “that all states are rational,” even though their leaders may have a lot of bad qualities, including being “stupid, petty, venal, even evil….” He asks us to trust that rationality will always prevail when there is a risk of nuclear retaliation, because these weapons make “the costs of war obvious, inevitable, and unacceptable.” Actually, he is asking us to do more than trust in the rationality of leaders; he is asking us to gamble the future on this proposition. “The iron logic of deterrence and mutually assured destruction is so compelling,” Tepperman argues, “it’s led to what’s known as the nuclear peace….” But if this is a peace worthy of the name, which it isn’t, it certainly is not one on which to risk the future of civilization. One irrational leader with control over a nuclear arsenal could start a nuclear conflagration, resulting in a global Hiroshima. Tepperman celebrates “the iron logic of deterrence,” but deterrence is a theory that is far from rooted in “iron logic.” It is a theory based upon threats that must be effectively communicated and believed. Leaders of Country A with nuclear weapons must communicate to other countries (B, C, etc.) the conditions under which A will retaliate with nuclear weapons. The leaders of the other countries must understand and believe the threat from Country A will, in fact, be carried out. The longer that nuclear weapons are not used, the more other countries may come to believe that they can challenge Country A with impunity from nuclear retaliation. The more that Country A bullies other countries, the greater the incentive for these countries to develop their own nuclear arsenals. Deterrence is unstable and therefore precarious. Most of the countries in the world reject the argument, made most prominently by Kenneth Waltz, that the spread of nuclear weapons makes the world safer. These countries joined together in the Nuclear Non-Proliferation Treaty (NPT) to prevent the spread of nuclear weapons, but they never agreed to maintain indefinitely a system of nuclear apartheid in which some states possess nuclear weapons and others are prohibited from doing so. The principal bargain of the NPT requires the five NPT nuclear weapons states (US, Russia, UK, France and China) to engage in good faith negotiations for nuclear disarmament, and the International Court of Justice interpreted this to mean complete nuclear disarmament in all its aspects. Tepperman seems to be arguing that seeking to prevent the proliferation of nuclear weapons is bad policy, and that nuclear weapons, because of their threat, make efforts at non-proliferation unnecessary and even unwise. If some additional states, including Iran, developed nuclear arsenals, he concludes that wouldn’t be so bad “given the way that bombs tend to mellow behavior.” Those who oppose Tepperman’s favorable disposition toward the bomb, he refers to as “nuclear pessimists.” These would be the people, and I would certainly be one of them, who see nuclear weapons as presenting an urgent danger to our security, our species and our future. Tepperman finds that when viewed from his “nuclear optimist” perspective, “nuclear weapons start to seem a lot less frightening.” “Nuclear peace,” he tells us, “rests on a scary bargain: you accept a small chance that something extremely bad will happen in exchange for a much bigger chance that something very bad – conventional war – won’t happen.” But the “extremely bad” thing he asks us to accept is the end of the human species. Yes, that would be serious. He also doesn’t make the case that in a world without nuclear weapons, the prospects of conventional war would increase dramatically. After all, it is only an unproven supposition that nuclear weapons have prevented wars, or would do so in the future. We have certainly come far too close to the precipice of catastrophic nuclear war. As an ultimate celebration of the faulty logic of deterrence, Tepperman calls for providing any nuclear weapons state with a “survivable second strike option.” Thus, he not only favors nuclear weapons, but finds the security of these weapons to trump human security. Presumably he would have President Obama providing new and secure nuclear weapons to North Korea, Pakistan and any other nuclear weapons states that come along so that they will feel secure enough not to use their weapons in a first-strike attack. Do we really want to bet the human future that Kim Jong-Il and his successors are more rational than Mr. Tepperman?

#### The only impediment to escalating terror is access to spent fuel

NTI, 12 [Nuclear Threat Initiative, August 1st,“Why Is Highly Enriched Uranium a Threat?”, <http://www.nti.org/analysis/reports/civilian-heu-reduction-and-elimination/>]

Why Is Highly Enriched Uranium a Threat? The most difficult challenge for a terrorist organization seeking to build a nuclear weapon or [improvised nuclear device](http://www.nti.org/glossary/improvised-nuclear-device-ind/) is obtaining [fissile material](http://www.nti.org/glossary/fissile-material/), either [plutonium](http://www.nti.org/glossary/plutonium-pu/) or [highly enriched uranium (HEU)](http://www.nti.org/glossary/highly-enriched-uranium-heu/). HEU, [uranium](http://www.nti.org/glossary/uranium/) that has been processed to increase the proportion of the U-235 [isotope](http://www.nti.org/glossary/isotope/) to over 20%, is required for the construction of a [gun-type nuclear device](http://www.nti.org/glossary/gun-type-nuclear-weapon/), the simplest type of nuclear weapon. The greater the proportion of U-235 (i.e. the higher the [enrichment](http://www.nti.org/glossary/enriched-uranium/) level), the less material is needed for a nuclear explosive device. [Weapons-grade uranium](http://www.nti.org/glossary/weapons-grade-material/) generally refers to uranium enriched to at least 90%, but material of far lower enrichment levels, found in both fresh and [spent nuclear fuel](http://www.nti.org/glossary/spent-nuclear-fuel/), can be used to create a nuclear explosive device. In 2002, the U.S. National Research Council warned that "crude HEU weapons could be fabricated without state assistance," noting that "the primary impediment that prevents countries or technically competent terrorist groups from developing nuclear weapons is the availability of [nuclear material], especially HEU."[1] Creating a nuclear weapon from HEU is technically easier than building a [plutonium](http://www.nti.org/glossary/plutonium-pu/) weapon. Moreover, current technology is unlikely to detect a shielded nuclear device on a truck or boat. Therefore, securing and eliminating stocks of HEU is the surest way to decrease the risk that terrorist groups could use this material to create a nuclear explosion. Where Is Civilian HEU Located? Experts estimate that approximately 70 tons of HEU are used in civilian applications worldwide. [2] As little as 25 kilograms (kg) of U-235 (which amounts to about 28kg of HEU enriched to 90%) is needed to produce a nuclear weapon; about 40-60kg is needed for a cruder nuclear device. [3] Bomb-grade material can be obtained from HEU that is fresh (unirradiated), and [irradiated](http://www.nti.org/glossary/irradiate/) (also referred to as spent). Fresh and lightly irradiated fuel (such as fuel used in critical assemblies and pulse reactors) is not significantly [radioactive](http://www.nti.org/glossary/radioactivity/), and is therefore relatively safe to handle. Although using nuclear fuel in high-powered reactors initially makes it highly radioactive and thus very difficult to handle safely (often this fuel is referred to as "self-protecting"), [spent fuel](http://www.nti.org/glossary/spent-nuclear-fuel/) loses its radioactivity over time, making it easier to handle and potentially more attractive to terrorists. HEU is currently used in the civilian sphere to fuel [research reactors](http://www.nti.org/glossary/research-reactor/), critical assemblies, pulsed reactors, and a few fast reactors. According to the [International Atomic Energy Agency (IAEA)](http://www.nti.org/glossary/international-atomic-energy-agency/), 244 research reactors are in operation or temporarily shut down across 56 countries. A further 441 reactors have been shut down or decommissioned, while eight are planned or under construction. [4] Many of the research reactors that have been shut down, but not decommissioned, have spent HEU fuel on-site. The IAEA database notes that over 20,000 spent fuel assemblies from research reactors are enriched to levels above 20 percent. Nearly half of these stored fuel assemblies are enriched to levels at or above 90 percent.[5] That said, there is no current comprehensive, authoritative inventory of civil HEU globally, which is a major obstacle to progress in this area. According to the Government Accountability Office, even the [United States](http://www.nti.org/country-profiles/united-states/) has failed to maintain an accurate inventory of the HEU that it has exported over the years as attempts to balance the books could only account for 10 percent of the material. [6] The United States and the [Soviet Union](http://www.nti.org/country-profiles/russia/) supplied much of the HEU fuel used in research reactors world-wide. Other producers include [China](http://www.nti.org/country-profiles/china/) (which sent HEU fuel for research reactors to Nigeria, Ghana, [Iran](http://www.nti.org/country-profiles/iran/), [Pakistan](http://www.nti.org/country-profiles/pakistan/), and [Syria](http://www.nti.org/country-profiles/syria/), as well as enriched uranium to [South Africa](http://www.nti.org/country-profiles/south-africa/), and [Argentina](http://www.nti.org/country-profiles/argentina/)); [France](http://www.nti.org/country-profiles/france/) (to Chile and [India](http://www.nti.org/country-profiles/india/)); the [United Kingdom](http://www.nti.org/country-profiles/united-kingdom/) (to [Australia](http://www.nti.org/country-profiles/australia/), India, and [Japan](http://www.nti.org/country-profiles/japan/)); and South Africa (which did not export this fuel).[7] Before 1978, when Washington and Moscow became concerned about the implications of their exports of highly enriched fuels, most of the fuel supplied by the United States (the bulk of which went to North American and the Asia-Pacific), was of very high enrichment levels (90% and above). The Soviet-supplied fuel, chiefly sent to Eastern Europe, was typically 80% enriched. Under several U.S.-led initiatives, many countries have returned HEU fuel, both fresh and spent, to its country of origin in order to reduce the risk of theft. HEU is also used in targets in reactors that produce [medical isotopes](http://www.nti.org/glossary/medical-isotopes/). HEU is used for this purpose annually in reactors in Belgium, Canada, France, the Netherlands, and Russia.[8] Other countries, including Australia and [Indonesia](http://www.nti.org/country-profiles/indonesia/), have begun producing these isotopes with [LEU](http://www.nti.org/glossary/low-enriched-uranium-leu/) targets, and still other countries, such as [Egypt](http://www.nti.org/country-profiles/egypt/), are currently developing and implementing their LEU target-based production process. [9] In particular, South Africa—a major exporter—converted its Safari-1 reactor to rely on both LEU targets and fuel for the production of [medical isotopes](http://www.nti.org/glossary/radioisotope/). Most of the other major producers of medical isotopes, including Canada, the Netherlands, and France, utilize LEU fuels in their reactors, but continue to rely on HEU targets. However, a number of these countries, particularly in Western Europe, have pledged to convert to LEU targets. Progress towards fuller use of LEU is not universal, however. A Russian project, for example, aims to produce enough molybdenum-99 using HEU fuel and targets to satisfy 20 percent of global demand by 2015. [10] In addition to use in research and test reactors and for medical isotope production, HEU is used in naval propulsion and space propulsion research. The material is also used for testing fast reactor core designs using [mixed oxide (MOX) fuel](http://www.nti.org/glossary/mixed-oxide-mox-fuel/). For further information on HEU in civilian applications, see [Civilian Uses of HEU](http://www.nti.org/analysis/articles/civilian-uses-heu/). Security of Civilian HEU Many civilian facilities with HEU on-site do not have adequate security. The IAEA reported that during one of its missions, it discovered a research reactor with HEU that "was observed to have essentially no physical protection." [11] The IAEA assisted the facility with enhancing its security, but reported that overall, "deficiencies remain in the legal, administrative, and technical arrangements for controlling and protecting nuclear materials ... in many countries." [12] The U.S. Department of Energy has been assisting with physical protection upgrades for 22 foreign research reactors through the Global Research Reactor Program. A September 2009 GAO report found that while most sites that have received upgrades generally met IAEA security guidelines, in some cases, critical security weaknesses remained. [23] It is not a simple matter to upgrade security measures; the majority of the world's research reactors are located in universities or other publicly accessible research centers. While security concerns have dramatically increased since 9/11, it is difficult to reconfigure a site that was not built with physical protection in mind. Storage of spent fuel stocks is generally even less secure than fresh fuel stocks, as until a few years ago spent nuclear fuel was considered "self-protecting" and few facilities wanted to spend money securing a material that was no longer of economic value. It is far more effective to remove this material from vulnerable locations than to attempt to increase security on-site. Programs to Reduce and Eliminate HEU There have been efforts to reduce the amount of HEU at civilian facilities since 1978, when Washington initiated the [Reduced Enrichment for Research and Test Reactors (RERTR) Program](http://www.nti.org/glossary/rertr-program/). Moscow also began its own program to reduce enrichment at Soviet-built research reactors outside of the Soviet Union, and changed its HEU export policies, supplying these reactors with 36% HEU in lieu of 80% HEU. In the past 25 years, many countries have cooperated with the RERTR program or initiated their own, similar programs. In May 2004, the U.S. Department of Energy launched the [Global Threat Reduction Initiative (GTRI](http://www.nti.org/glossary/global-threat-reduction-initiative/)), which the IAEA, Russia, and others have since joined. Among its goals, the GTRI seeks to "minimize and eventually eliminate any reliance on HEU in the civilian fuel cycle, including conversion of research and test reactors worldwide from the use of HEU to the use of LEU fuel and targets." As of early 2012, U.S.-led efforts have converted to LEU or verified the shut down of 88 HEU-fueled facilities.[14] The RERTR program is also working on the conversion of a handful of medical isotope producers that use HEU targets in their reactors. The program includes some of the largest producers of medical isotopes, located in Europe. To date, the RERTR program has helped to successfully convert isotope-producing reactors in Argentina and South Africa. At present, there are no longer any technical barriers to conversion to LEU and only political and financial issues remain. [15] Besides converting facilities to use LEU fuel and targets, there have also been efforts to consolidate fresh and spent HEU fuel at a smaller number of relatively secure locations. This has involved removing the fuel, mostly to the United States and Russia, from other countries, as well as consolidating the fuel within countries. U.S. programs in this area (the Russian Research Reactor Fuel Return program to repatriate fuel to Russia, and the Foreign Research Reactor Spent Nuclear Fuel Acceptance Program to repatriate U.S.-origin fuel), have all been subsumed under the 2004 GTRI initiative. Together, the two programs have returned over 2,735kg of spent and fresh HEU fuel to the United States and Russia as of 2012. [16] According to the IAEA's definition of the quantity of HEU necessary to construct a nuclear explosive device, the amount of repatriated HEU is equivalent to up to 80 weapons. [17] Despite the progress of these efforts, many HEU sites remain worldwide, with a significant portion of them located in Russia. [26] A related program, the Material Consolidation and Conversion (MCC) project, established in 1999, reduces this excess Russian civilian HEU by blending it down into LEU. As of the end of 2011, approximately 13.5 of an estimated 17 tons of U-235 in excess Russian civilian HEU had been blended down. [18] Both the United States and Russia also have large quantities of excess HEU from their defense programs. In Russia, excess HEU from weapons is blended down to LEU within the framework of the Megatons to Megawatts program (also known as the [HEU-LEU program](http://www.nti.org/glossary/heu-deal/)). The resulting LEU is then released for civilian use. The program will end in 2013, at which point 500 tons of HEU will have been downblended. [19] The United States initially declared some 174 metric tons of HEU as excess to military needs, designating this material as civilian. [20] An additional 200 metric tons were officially removed from the U.S. weapons stockpile in November 2005. [21]

#### Securing spent fuel key to the nuclear taboo – solves nuclear war

Bin ‘9(5-22-09 About the Authors Prof. Li Bin is a leading Chinese expert on arms control and is currently the director of Arms Control Program at the Institute of International Studies, Tsinghua University. He received his Bachelor and Master Degrees in Physics from Peking University before joining China Academy of Engineering Physics (CAEP) to pursue a doctorate in the technical aspects of arms control. He served as a part-time assistant on arms control for the Committee of Science, Technology and Industry for National Defense (COSTIND).Upon graduation Dr. Li entered the Institute of Applied Physics and Computational Mathematics (IAPCM) as a research fellow and joined the COSTIND technical group supporting Chinese negotiation team on Comprehensive Test Ban Treaty (CTBT). He attended the final round of CTBT negotiations as a technical advisor to the Chinese negotiating team. Nie Hongyi is an officer in the People’s Liberation Army with an MA from China’s National Defense University and a Ph.D. in International Studies from Tsinghua University, which he completed in 2009 under Prof. Li Bin. )

The nuclear taboo is a kind of international norm and this type of norm is supported by the promotion of the norm through international social exchange. But at present the increased **threat of nuclear terrorism has lowered people’s confidence that nuclear weapons will not be used**. China and the United States have a broad common interest in combating nuclear terrorism. **Using technical and institutional measures to break the foundation of nuclear terrorism and lessen the possibility of a nuclear terrorist attack can** not only weaken the danger of nuclear terrorism itself but also **strengthen people’s confidence in the nuclear taboo**, and in this way preserve an international environment beneficial to both China and the United States. In this way **even if there is crisis** in China-U.S. relations caused by conflict, **the nuclear taboo can** also help both countries **reduce suspicions** about the nuclear weapons problem, **avoid miscalculation and thereby reduce the danger of a nuclear war.**

#### Terrorism causes extinction – retal

**Ayson 10** (Robert, Professor of Strategic Studies, Director of Strategic Studies: New Zealand, Senior Research Associate with Oxford’s Centre for International Studies. “After a Terrorist Nuclear Attack: Envisaging Catalytic Effects. Studies in Conflict and Terrorism, Volume 33, Issue 7, July 2010, pages 571-593)

Washington's early response to a terrorist nuclear attack on its own soil might also raise the possibility of an unwanted (and nuclear aided) confrontation with Russia and/or China. For example, in the noise and confusion during the immediate aftermath of the terrorist nuclear attack, the U.S. president might be expected to place the country's armed forces, including its nuclear arsenal, on a higher stage of alert. In such a tense environment, when careful planning runs up against the friction of reality, it is just possible that Moscow and/or China might mistakenly read this as a sign of U.S. intentions to use force (and possibly nuclear force) against them. In that situation, the temptations to preempt such actions might grow, although it must be admitted that any preemption would probably still meet with a devastating response. As part of its initial response to the act of nuclear terrorism (as discussed earlier) Washington might decide to order a significant conventional (or nuclear) retaliatory or disarming attack against the leadership of the terrorist group and/or states seen to support that group. Depending on the identity and especially the location of these targets, Russia and/or China might interpret such action as being far too close for their comfort, and potentially as an infringement on their spheres of influence and even on their sovereignty. One far-fetched but perhaps not impossible scenario might stem from a judgment in Washington that some of the main aiders and abetters of the terrorist action resided somewhere such as Chechnya, perhaps in connection with what Allison claims is the “Chechen insurgents' … long-standing interest in all things nuclear.”42 American pressure on that part of the world would almost certainly raise alarms in Moscow that …might require a degree of advanced consultation from Washington that the latter found itself unable or unwilling to provide.

### Warming

#### Warming is real and anthropogenic – CO2 is key

Rahmstorf 12 [Stefan Rahmstorf is a German oceanographer and climatologist. Since 2000, he has been a Professor of Physics of the Oceans at Potsdam University. He received his Ph.D. in oceanography from Victoria University of Wellington.Comparing climate projections to observations up to 2011, Stefan Rahmstorf et al 2012 Environ Res. Lett. 7 044035 [doi:10.1088/1748-9326/7/4/044035](http://dx.doi.org/10.1088/1748-9326/7/4/044035) © 2012 IOP Publishing Ltd Received 19 July 2012, accepted for publication 9 November 2012 Published 27 November 2012. <http://iopscience.iop.org/1748-9326/7/4/044035/article>]

Climate projections like those of the Intergovernmental Panel on Climate Change (IPCC [2001](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib10), [2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib11)) are increasingly used in decision-making. It is important to keep track of how well past projections match the accumulating observational data. Five years ago, it was found that CO2 concentration and global temperature closely followed the central prediction of the third IPCC assessment report during 1990–2006, whilst sea level was tracking along the upper limit of the uncertainty range (Rahmstorf et al [2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib24)). Here we present an update with five additional years of data and using advances in removing short-term noise from global temperature data. Atmospheric carbon dioxide concentration continues to match the prediction: the mean value reached in 2011 was 390.5 ppm (NOAA [2012](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib21)), only about 1.5 ppm higher than the central IPCC projections published in 2001. For historical perspective, in his article 'Are we on the brink of a pronounced global warming?', Broecker ([1975](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib1)) predicted an increase from 322 ppm observed in 1970 to 403 ppm in 2010. A more detailed analysis of anthropogenic climate forcing, which also includes other greenhouse gases, aerosols and surface albedo changes, is beyond the scope of this letter. Here we focus on two prime indicators of climate change: the evolution of global-mean temperature and sea level. 2. Global temperature evolution To compare global temperature data to projections, we need to consider that IPCC projections do not attempt to predict the effect of solar variability, or specific sequences of either volcanic eruptions or El Niño events. Solar and volcanic forcing are routinely included only in 'historic' simulations for the past climate evolution but not for the future, while El Niño–Southern Oscillation (ENSO) is included as a stochastic process where the timing of specific warm or cool phases is random and averages out over the ensemble of projection models. Therefore, model-data comparisons either need to account for the short-term variability due to these natural factors as an added quasi-random uncertainty, or the specific short-term variability needs to be removed from the observational data before comparison. Since the latter approach allows a more stringent comparison it is adopted here. Global temperature data can be adjusted for solar variations, volcanic aerosols and ENSO using multivariate correlation analysis (Foster and Rahmstorf [2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib6), Lean and Rind [2008](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib14), [2009](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib15), Schönwiese et al [2010](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib28)), since independent data series for these factors exist. We here use the data adjusted with the method exactly as described in Foster and Rahmstorf, but using data until the end of 2011. The contributions of all three factors to global temperature were estimated by linear correlation with the multivariate El Niño index for ENSO, aerosol optical thickness data for volcanic activity and total solar irradiance data for solar variability (optical thickness data for the year 2011 were not yet available, but since no major volcanic eruption occurred in 2011 we assumed zero volcanic forcing). These contributions were computed separately for each of the five available global (land and ocean) temperature data series (including both satellite and surface measurements) and subtracted. The five thus adjusted data sets were averaged in order to avoid any discussion of what is 'the best' data set; in any case the differences between the individual series are small (Foster and Rahmstorf [2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib6)). We show this average as a 12-months running mean in figure [1](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig1), together with the unadjusted data (likewise as average over the five available data series). Comparing adjusted with unadjusted data shows how the adjustment largely removes e.g. the cold phase in 1992/1993 following the Pinatubo eruption, the exceptionally high 1998 temperature maximum related to the preceding extreme El Niño event, and La Niña-related cold in 2008 and 2011. Figure 1. Observed annual global temperature, unadjusted (pink) and adjusted for short-term variations due to solar variability, volcanoes and ENSO (red) as in Foster and Rahmstorf ([2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib6)). 12-months running averages are shown as well as linear trend lines, and compared to the scenarios of the IPCC (blue range and lines from the third assessment, green from the fourth assessment report). Projections are aligned in the graph so that they start (in 1990 and 2000, respectively) on the linear trend line of the (adjusted) observational data. [Export PowerPoint slide](http://iopscience.iop.org/1748-9326/7/4/044035/powerpoint/figure/erl439749fig1) [Download figure (96 KB)](http://iopscience.iop.org/1748-9326/7/4/044035/downloadFigure/figure/erl439749fig1) Note that recently a new version of one of those time series has become available: version of 4 the HadCRUT data (Morice et al [2012](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib20)). Since the differences are small and affect only one of five series, the effect of this update on the average shown in figure [1](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig1) is negligible. We chose to include version 3 of the data in this graph since these data are available up to the end of 2011, while version 4 so far is available only up to the end of 2010. The removal of the known short-term variability components reduces the variance of the data without noticeably altering the overall warming trend: it is 0.15 °C/decade in the unadjusted and 0.16 °C/decade in the adjusted data. From 1990–2011 the trends are 0.16 and 0.18 °C/decade and for 1990–2006 they are 0.22 and 0.20 °C/decade respectively. The relatively high trends for the latter period are thus simply due to short-term variability, as discussed in our previous publication (Rahmstorf et al [2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib24)). During the last ten years, warming in the unadjusted data is less, due to recent La Niña conditions (ENSO causes a linear cooling trend of −0.09 °C over the past ten years in the surface data) and the transition from solar maximum to the recent prolonged solar minimum (responsible for a −0.05 °C cooling trend) (Foster and Rahmstorf [2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib6)). Nevertheless, unadjusted observations lie within the spread of individual model projections, which is a different way of showing the consistency of data and projections (Schmidt [2012](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib27)). Figure [1](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig1) shows that the adjusted observed global temperature evolution closely follows the central IPCC projections, while this is harder to judge for the unadjusted data due to their greater short-term variability. The IPCC temperature projections shown as solid lines here are produced using the six standard, illustrative SRES emissions scenarios discussed in the third and fourth IPCC reports, and do not use any observed forcing. The temperature evolution for each, including the uncertainty range, is computed with a simple emulation model, hence the temperature curves are smooth. The temperature ranges for these scenarios are provided in the summary for policy makers of each report, in figure 5 in case of the third assessment and in table SPM.3 in case of the fourth assessment (where the full time evolution is shown in figure 10.26 of the report; Meehl et al [2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib18)). For historic perspective, Broecker in 1975 predicted a global warming from 1980–2010 by 0.68 °C, as compared to 0.48 °C according to the linear trend shown in figure [1](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig1), an overestimate mostly due to his neglect of ocean thermal inertia (Rahmstorf [2010](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib23)). A few years later, Hansen et al ([1981](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib8)) analysed and included the effect of ocean thermal inertia, resulting in lower projections ranging between 0.28 and 0.45 °C warming from 1980–2010. Their upper limit thus corresponds to the observed warming trend. They further correctly predicted that the global warming signal would emerge from the noise of natural variability before the end of the 20th century. 3. Global sea-level rise Turning to sea level, the quasi linear trend measured by satellite altimeters since 1993 has continued essentially unchanged when extending the time series by five additional years. It continues to run near the upper limit of the projected uncertainty range given in the third and fourth IPCC assessment reports (figure [2](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig2)). Here, the sea-level projections provided in figure 5 of the summary for policy makers of the third assessment and in table SPM.3 of the fourth assessment are shown. The satellite-based linear trend 1993–2011 is 3.2 ± 0.5 mm yr−1, which is 60% faster than the best IPCC estimate of 2.0 mm yr−1 for the same interval (blue lines). The two temporary sea-level minima in 2007/2008 and 2010/2011 may be linked to strong La Niña events (Llovel et al [2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib17)). The tide gauges show much greater variability, most likely since their number is too limited to properly sample the global average (Rahmstorf et al [2012](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib25)). For sea level the fourth IPCC report did not publish the model-based time series (green lines), but these were made available online in 2012 (CSIRO [2012](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib5)). They do not differ significantly from the projections of the third IPCC report and thus continue to underestimate the observed upward trend. Figure 2. Sea level measured by satellite altimeter (red with linear trend line; AVISO data from (Centre National d'Etudes Spatiales) and reconstructed from tide gauges (orange, monthly data from Church and White ([2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib4))). Tide gauge data were aligned to give the same mean during 1993–2010 as the altimeter data. The scenarios of the IPCC are again shown in blue (third assessment) and green (fourth assessment); the former have been published starting in the year 1990 and the latter from 2000. [Export PowerPoint slide](http://iopscience.iop.org/1748-9326/7/4/044035/powerpoint/figure/erl439749fig2) [Download figure (91 KB)](http://iopscience.iop.org/1748-9326/7/4/044035/downloadFigure/figure/erl439749fig2) Could this underestimation appear because the high observed rates since 1993 are due to internal multi-decadal variability, perhaps a temporary episode of ice discharge from one of the ice sheets, rather than a systematic effect of global warming? Two pieces of evidence make this very unlikely**.** First, the IPCC fourth assessment report (IPCC [2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib11)) found a similar underestimation also for the time period 1961–2003: the models on average give a rise of 1.2 mm yr−1, while the best data-based estimate is 50% larger at 1.8 mm yr−1 (table 9.2 of the report; Hegerl et al [2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib9)). This is despite using an observed value for ice sheet mass loss (0.19 mm yr−1) in the 'modelled' number in this comparison. Second, the observed rate of sea-level rise on multi-decadal timescales over the past 130 years shows a highly significant correlation with global temperature (Vermeer and Rahmstorf [2009](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib30)) by which the increase in rate over the past three decades is linked to the warming since 1980, which is very unlikely to be a chance coincidence. Another issue is whether non-climatic components of sea-level rise, not considered in the IPCC model projections, should be accounted for before making a comparison to data, namely water storage in artificial reservoirs on land (Chao et al [2008](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib3)) and the extraction of fossil groundwater for irrigation purposes (Konikow [2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib13)). During the last two decades, both contributions approximately cancel (at −0.3 and +0.3 mm yr−1) so would not change our comparison in figure [2](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig2), see figure 11 of Rahmstorf et al ([2012](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib25)) based on the data of Chao et al ([2008](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib3)) and Konikow ([2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib13)). This is consistent with the lack of recent trend in net land-water storage according to the GRACE satellite data (Lettenmaier and Milly [2009](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib16)). For the period 1961–2003, however, the effect of dam building (which peaked in the 1970s at around −0.9 mm yr−1) very likely outstripped groundwater extraction, thus widening the gap between modelled and observed climatically-forced sea-level rise. It is instructive to analyse how the rate of sea-level rise changes over longer time periods (figure [3](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig3)). The tide gauge data (though noisy, see above) show that the rate of sea-level rise was around 1 mm yr−1 in the early 20th century, around 1.5–2 mm yr−1 in mid-20th-century and increased to around 3 mm yr−1 since 1980 (orange curve). The satellite series is too short to meaningfully compute higher order terms beyond the linear trend, which is shown in red (including uncertainty range). Finally, the AR4 projections are shown in three bundles of six emissions scenarios: the 'mid' estimates in green, the 'low' estimates (5-percentile) in cyan and the 'high' estimates (95-percentile) in blue. These are the scenarios that comprise the often-cited AR4-range from 18 to 59 cm sea-level rise for the period 2090–99 relative to 1980–99 (IPCC [2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib11)). For the period 2000–2100, this corresponds to a range of 17–60 cm sea-level rise. Figure 3. Rate of sea-level rise in past and future. Orange line, based on monthly tide gauge data from Church and White ([2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib4)). The red symbol with error bars shows the satellite altimeter trend of 3.2 ± 0.5 mm yr−1 during 1993–2011; this period is too short to determine meaningful changes in the rate of rise. Blue/green line groups show the low, mid and high projections of the IPCC fourth assessment report, each for six emissions scenarios. Curves are smoothed with a singular spectrum filter (ssatrend; Moore et al [2005](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib19)) of 10 years half-width. [Export PowerPoint slide](http://iopscience.iop.org/1748-9326/7/4/044035/powerpoint/figure/erl439749fig3) [Download figure (94 KB)](http://iopscience.iop.org/1748-9326/7/4/044035/downloadFigure/figure/erl439749fig3) Figure [3](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig3) shows that in all 'low' estimates, the rate of rise stays well below 3 mm yr−1 until the second half of the 21st century, in four of the six even throughout the 21st century. The six 'mid' estimates on average give a rise of 34 cm, very close to what would occur if the satellite-observed trend of the last two decades continued unchanged for the whole century. However, figure [3](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig3) shows that the reason for this relatively small projected rise is not an absence of acceleration. Rather, all these scenarios show an acceleration of sea-level rise in the 21st century, but from an initial value that is much lower than the observed recent rise. Figure [3](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig3) further shows that only the 'high' models represented in the range of AR4 models validate when compared to the observational data and can in this regard be considered valid projection models for the future. These 'high' model scenarios represent a range of 21st century rise of 37–60 cm. Nevertheless, this range cannot be assumed to represent the full range of uncertainty of future sea-level rise, since the 95-percentile can only represent a very small number of models, given that 23 climate models were used in the AR4. The model(s) defining the upper 95-percentile might not get the right answer for the right reasons, but possibly by overestimating past temperature rise. Note that the IPCC pointed out that its projections exclude 'future rapid dynamical changes in ice flow'. The projections now published online (CSIRO [2012](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib5)) include an alternative version that includes 'scaled-up ice sheet discharge'. These projections validate equally well (or poorly) with the observed data, since they only differ substantially in the future, not in the past, from the standard projections. The sea-level rise over 2000–2100 of the 'high' bundle of these scenarios is 46–78 cm. Alternative scalings of sea-level rise have been developed, which in essence postulate that the rate of sea-level rise increases in proportion to global warming (e.g. Grinsted et al [2009](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib7), Rahmstorf [2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib22)). This approach can be calibrated with past sea-level data (Kemp et al [2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib12), Vermeer and Rahmstorf [2009](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib30)) and leads to higher projections of future sea-level rise as compared to those of the IPCC. The latter is immediately plausible: if we consider the recently observed 3 mm yr−1 rise to be a result of 0.8 °C global warming since preindustrial times (Rahmstorf et al [2012](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib25)), then a linear continuation of the observed warming of the past three decades (leading to a 21st century warming by 1.6 °C, or 2.4 °C relative to preindustrial times) would linearly raise the rate of sea-level rise to 9 mm yr−1, as in the highest scenario in figure [3](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749fig3)—but already for a rather moderate warming scenario, not the 'worst case' emissions scenario. 4. Conclusions In conclusion, the rise in CO2 concentration and global temperature has continued to closely match the projections over the past five years, while sea level continues to rise faster than anticipated**.** The latter suggests that the 21st Century sea-level projections of the last two IPCC reports may be systematically biased low. Further support for this concern is provided by the fact that the ice sheets in Greenland and Antarctica are increasingly losing mass (Rignot et al [2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib26), Van den Broeke et al [2011](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib29)), while those IPCC projections assumed that Antarctica will gain enough mass in future to largely compensate mass losses from Greenland (see figure 10.33 in Meehl et al ([2007](http://iopscience.iop.org/1748-9326/7/4/044035/article#erl439749bib18))). For this reason, an additional contribution ('scaled-up ice sheet discharge') was suggested in the IPCC fourth assessment. Our results highlight the need to thoroughly validate models with data of past climate changes before applying them to projections.

#### And, it causes extinction – but US leadership can reverse it

Ferris, 1/17/13 [The Big Thaw, [Elizabeth Ferris](http://www.brookings.edu/experts/ferrise) Co-Director, [Brookings-LSE Project on Internal Displacement](http://www.brookings.edu/about/projects/idp), <http://www.brookings.edu/research/papers/2013/01/the-big-thaw>

Global warming is occurring at a faster pace than predicted by scientists. Temperatures are rising, icecaps and glaciers are melting, and extreme weather events are becoming both more frequent and more intense. Last fall, the National Snow and Ice Data Center documented a record low of the level of Arctic sea ice – a figure 49 percent lower than the 1979-2000 average. If these trends continue, the results will be far-reaching for life on this planet. But if the warming accelerates dramatically and if polar ice melts even faster, the results could be catastrophic. This could occur if the Greenland ice sheet or the West Antarctica Ice Sheet (WAIS) collapses, triggering a significant rise in sea levels throughout the world with particularly devastating impacts on populations living in low-lying coastal areas. Although the effects of climate change are likely to be long-term and the worst effects will probably neither be experienced in your presidency nor even in your lifetime, the future is inherently unpredictable. Climate change is already affecting communities around the world. It is likely to produce devastating consequences whether in the near or distant future. Taking bold steps now to address climate change offers an opportunity for you not only to leave a legacy that will impact future generations but also an opportunity to address current problems resulting from the effects of climate change. Recommendations: • Raise the priority of climate change on your foreign policy agenda, in particular by re-vitalizing negotiations over a post-Kyoto treaty. The Doha round of negotiations, which ended last month, was disappointing. Countries are further away today than they were a year ago on reducing emissions. U.S. leadership can reverse current trends of inadequate globalcommitment to reduce greenhouse gases. • Support measures that will enable communities and countries to adapt to the most egregious effects of climate change. On the international level this means supporting and leading the difficult discussions around climate finance and using U.S. aid to support government planning to respond to the effects of climate change, including financial assistance to encourage communities to stay where they are as well as to plan for the relocation of communities whose homes will no longer be habitable. • Support effective multilateral action to increase both mitigation and adaptation measures. Use your influence with the multilateral development banks to encourage more attention to disaster riskreduction measures in development planning. Work with international agencies and legal experts to devise an international legal regime for dealing with the expected increase in trans-border migration. It is easier to put a system in place before a crisis is at hand. • Strengthen domestic efforts to mitigate the effects of climate change by reducing carbon emissions and enhancing domestic capacity to prepare for, respond, and recover from sudden-onset natural disasters. Background: Since the first report of the Intergovernmental Panel on Climate Change (IPCC) in 1990, the projections about the impact of global warming have become direr. From projecting the widespread consequences of a global rise in temperature of 2 degrees Celsius by the end of the century, current projections are that the rise in temperature will double to 4 degrees Celsius. The seas are rising 60 percent faster than predicted by the IPCC. The Greenland ice sheet is shrinking twice as fast as estimated by the IPCC and is losing mass at about five times the rate it was in the early 1990s. If the Greenland ice sheet were to melt completely, global sea rise could reach seven meters. And the consequences of global warming go far beyond sea-level rise. For example, the National Oceanic and Atmospheric Administration warns that the conditions that led to the 2011 Texas drought are 20 times more likely to occur now than in the 1960s as a result of increases in greenhouse gas concentrations. Although climate change will have many negative effects in different parts of the world, including prolonged droughts, reduction in arable land, declining agricultural productivity, and increased flooding due to more extreme weather events, the impact of sea level rise perhaps best illustrates the potential dangers. Throughout the world, more people are living in coastal areas as the result of population growth, urbanization and government policies. Presently 10 percent of the world’s population — 600 million people — live in low-elevation coastal zones and the percentage is growing. Sixty-five percent of the world’s megacities (those over 5 million) are located in these coastal areas. A rise in sea level of even a meter would have major implications for coastal populations; if sea levels were to rise by several meters, the consequences would be catastrophic. Most obviously, sea level rise will submerge land, causing countries to lose physical territory. The areas expected to experience the largest land loss by 2030 are the Arctic Ocean coasts of Canada, Alaska, Siberia and Greenland as well as coastal areas of Pakistan, Sri Lanka, southeast Indonesia, and eastern Africa. In the United States, particularly vulnerable areas include the coastal areas of the east and west coasts and the Gulf of Mexico. Rising sea levels will affect economics, politics, community life and security. For example, the mega-deltas of Asia are the food baskets of the region, and the impact of a sea level rise on food security will be considerable. But perhaps the most significant impact of climate change in general and rising sea levels in particular will be the displacement of people. Migration is a complex process driven by a range of economic, social and political factors but it is becoming clear that environmental factors will increasingly influence migration. In Bangladesh, for example, moving to cities has become a common coping strategy in the face of flooding. One of the IPCC background studies posits that a 40-centimeter rise in sea levels will affect 100 million people. As hundreds of millions of people in Africa and Asia are at risk of flooding by 2060, it is likely that many will move to cities such as Dhaka and Lagos that are located in coastal flood plain areas. In other words, the trend is for people to migrate to areas of greater — not lesser — environmental vulnerability. At the same time, as the UK’s authoritative Foresight study concludes, those who are able to migrate may well be the lucky ones; those who are unable to move may be the most vulnerable. Large-scale migration has many consequences. If sea level rise renders small island states uninhabitable (which is likely to occur long before the islands are actually submerged by the seas), issues of sovereignty, legal status, and responsibility will present the world with huge challenges. Most climate change-induced or displacement will be internal, placing strain on infrastructure and pressure on governments to deliver services. Political instability, conflict poor governance exacerbate these problems. Climate change is a threat multiplier, often affecting those countries least able to respond appropriately. How will governments cope with the movement of large numbers of people from coasts toward inland areas? There is also a possibility that some, perhaps many, will seek to move to other countries because of the effects of climate change. The international legal system is unprepared to deal with trans-border movements triggered by environmental factors or disasters, since the displaced do not fall under the 1951 Refugee Convention (unless they leave because of political turmoil exacerbated by climate change.) Projecting possible massive displacement from climate change is complicated by the difficulty of comprehending the interrelationships between the different effects of climate change, for example, changes in fish stocks and coral reefs brought about by the acidification of the world’s oceans; changing patterns of disease; changing habitats for animals and plants; the intersection of deforestation and increasingly arid climates in some parts of the world. Delicate ecological balances are changing in ways that are as yet poorly understood. Similarly, there is much we do not know about the dynamic nature of the effects of climate change. For example, some scientists are reporting that the melting of Arctic ice itself is releasing more carbon into the atmosphere, increasing global warming which will in turn increase the rate of Arctic ice melt. Most scientists have observed that the climate is becoming warmer and that extreme weather events are becoming more frequent. While it is impossible to attribute any single weather event, such as Hurricane Sandy, to climate change, the global trends clearly demonstrate an increase in the frequency of extreme weather events. These trends are likely to intensify. The interaction between increasing extreme weather events and other effects of climate change – such as increased erosion, acidification of the seas, desertification, sea-level rise – is also likely to lead to large-scale movement of people. Conclusion: There are certainly obstacles and pitfalls to making climate change a centerpiece of your foreign policy. Perhaps the projections of scientists are too pessimistic and the effects of global warming will not be as serious as now thought. Perhaps you will be unable to marshal the necessary political support to enact necessary legislation. Perhaps other governments will fail to rally to your leadership and perhaps the negotiations over climate change mitigation and adaptation will widen, not narrow the North- South divide. It is certainly understandable that you would want to put aside these longer-term challenges and focus on more immediate economic issues. But a climate catastrophe could be lurking around the corner. Unless urgent action is taken now, the effects of climate change on life on this planet and on life in the United States will increase. Climate change is a domestic, foreign policy, security, development, human rights, and intergenerational justice issue. Preparing better for climate change disasters at home and abroad is a good short-term prophylactic. But making serious and sustained efforts to reduce global warming can solidify America’s present leadership in the world. It can lay the foundation for the country’s sustainable future development. It can address the causes of future humanitarian crises and alleviate future human suffering. It can be a legacy issue for the Obama administration that will impact the world for generations.

#### Warming causes ocean acidification – extinction

**Sify 2010 –** Sydney newspaper citing Ove Hoegh-Guldberg, professor at University of Queensland and Director of the Global Change Institute, and John Bruno, associate professor of Marine Science at UNC (Sify News, “Could unbridled climate changes lead to human extinction?”, <http://www.sify.com/news/could-unbridled-climate-changes-lead-to-human-extinction-news-international-kgtrOhdaahc.html>, WEA)

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. The 'fundamental and comprehensive' changes to marine life identified in the report include rapidly warming and acidifying oceans, changes in water circulation and expansion of dead zones within the ocean depths. These are driving major changes in marine ecosystems: less abundant coral reefs, sea grasses and mangroves (important fish nurseries); fewer, smaller fish; a breakdown in food chains; changes in the distribution of marine life; and more frequent diseases and pests among marine organisms. Study co-author John F Bruno, associate professor in marine science at The University of North Carolina, says greenhouse gas emissions are modifying many physical and geochemical aspects of the planet's oceans, in ways 'unprecedented in nearly a million years'. 'This is causing fundamental and comprehensive changes to the way marine ecosystems function,' Bruno warned, according to a GCI release. These findings were published in Science

#### The IFR is the only way to reduce coal emissions sufficiently to avert the worst climate disasters

**Kirsch 9** (Steve Kirsch, Bachelor of Science and a Master of Science in electrical engineering and computer science from the Massachusetts Institute of Technology, American serial entrepreneur who has started six companies: Mouse Systems, Frame Technology, Infoseek, Propel, Abaca, and OneID, "Why We Should Build an Integral Fast Reactor Now," 11/25/9) http://skirsch.wordpress.com/2009/11/25/ifr/

To prevent a climate disaster, we must eliminate virtually all coal plant emissions worldwide in 25 years. The best way and, for all practical purposes, the only way to get all countries off of coal is not with coercion; it is to make them want to replace their coal burners by giving them a plug-compatible technology that is less expensive. The IFR can do this. It is plug-compatible with the burners in a coal plant (see Nuclear Power: Going Fast). No other technology can upgrade a coal plant so it is greenhouse gas free while reducing operating costs at the same time. In fact, no other technology can achieve either of these goals. The IFR can achieve both.¶ The bottom line is that without the IFR (or a yet-to-be-invented technology with similar ability to replace the coal burner with a cheaper alternative), it is unlikely that we’ll be able to keep CO2 under 450 ppm.¶ Today, the IFR is the only technology with the potential to displace the coal burner. That is why restarting the IFR is so critical and why Jim Hansen has listed it as one of the top five things we must do to avert a climate disaster.[4]¶ Without eliminating virtually all coal emissions by 2030, the sum total of all of our other climate mitigation efforts will be inconsequential. Hansen often refers to the near complete phase-out of carbon emissions from coal plants worldwide by 2030 as the sine qua non for climate stabilization (see for example, the top of page 6 in his August 4, 2008 trip report).¶ To stay under 450ppm, we would have to install about 13,000 GWe of new carbon-free power over the next 25 years. That number was calculated by Nathan Lewis of Caltech for the Atlantic, but others such as Saul Griffith have independently derived a very similar number and White House Science Advisor John Holdren used 5,600 GWe to 7,200 GWe in his presentation to the Energy Bar Association Annual Meeting on April 23, 2009. That means that if we want to save the planet, we must install more than 1 GWe per day of clean power every single day for the next 25 years. That is a very, very tough goal. It is equivalent to building one large nuclear reactor per day, or 1,500 huge wind turbines per day, or 80,000 37 foot diameter solar dishes covering 100 square miles every day, or some linear combination of these or other carbon free power generation technologies. Note that the required rate is actually higher than this because Hansen and Rajendra Pachauri, the chair of the IPCC, now both agree that 350ppm is a more realistic “not to exceed” number (and we’ve already exceeded it).¶ Today, we are nowhere close to that installation rate with renewables alone. For example, in 2008, the average power delivered by solar worldwide was only 2 GWe (which is to be distinguished from the peak solar capacity of 13.4GWe). That is why every renewable expert at the 2009 Aspen Institute Environment Forum agreed that nuclear must be part of the solution. Al Gore also acknowledges that nuclear must play an important role.¶ Nuclear has always been the world’s largest source of carbon free power. In the US, for example, even though we haven’t built a new nuclear plant in the US for 30 years, nuclear still supplies 70% of our clean power!¶ Nuclear can be installed very rapidly; much more rapidly than renewables. For example, about two thirds of the currently operating 440 reactors around the world came online during a 10 year period between 1980 and 1990. So our best chance of meeting the required installation of new power goal and saving the planet is with an aggressive nuclear program.¶ Unlike renewables, nuclear generates base load power, reliably, regardless of weather. Nuclear also uses very little land area. It does not require the installation of new power lines since it can be installed where the power is needed. However, even with a very aggressive plan involving nuclear, it will still be extremely difficult to install clean power fast enough.¶ Unfortunately, even in the US, we have no plan to install the clean power we need fast enough to save the planet. Even if every country were to agree tomorrow to completely eliminate their coal plant emissions by 2030, how do we think they are actually going to achieve that? There is no White House plan that explains this. There is no DOE plan. There is no plan or strategy. The deadlines will come and go and most countries will profusely apologize for not meeting their goals, just like we have with most of the signers of the Kyoto Protocol today. Apologies are nice, but they will not restore the environment.¶ We need a strategy that is believable, practical, and affordable for countries to adopt. The IFR offers our best hope of being a centerpiece in such a strategy because it the only technology we know of that can provide an economically compelling reason to change.¶ At a speech at MIT on October 23, 2009, President Obama said “And that’s why the world is now engaged in a peaceful competition to determine the technologies that will power the 21st century. … The nation that wins this competition will be the nation that leads the global economy. I am convinced of that. And I want America to be that nation, it’s that simple.”¶ Nuclear is our best clean power technology and the IFR is our best nuclear technology. The Gen IV International Forum (GIF) did a study in 2001-2002 of 19 different reactor designs on 15 different criteria and 24 metrics. The IFR ranked #1 overall. Over 242 experts from around the world participated in the study. It was the most comprehensive evaluation of competitive nuclear designs ever done. Top DOE nuclear management ignored the study because it didn’t endorse the design the Bush administration wanted.¶ The IFR has been sitting on the shelf for 15 years and the DOE currently has no plans to change that.¶ How does the US expect to be a leader in clean energy by ignoring our best nuclear technology? Nobody I’ve talked to has been able to answer that question.¶ We have the technology (it was running for 30 years before we were ordered to tear it down). And we have the money: The Recovery Act has $80 billion dollars. Why aren’t we building a demo plant?¶ IFRs are better than conventional nuclear in every dimension. Here are a few:¶ Efficiency: IFRs are over 100 times more efficient than conventional nuclear. It extracts nearly 100% of the energy from nuclear material. Today’s nuclear reactors extract less than 1%. So you need only 1 ton of actinides each year to feed an IFR (we can use existing nuclear waste for this), whereas you need 100 tons of freshly mined uranium each year to extract enough material to feed a conventional nuclear plant.¶ Unlimited power forever: IFRs can use virtually any actinide for fuel. Fast reactors with reprocessing are so efficient that even if we restrict ourselves to just our existing uranium resources, we can power the entire planet forever (the Sun will consume the Earth before we run out of material to fuel fast reactors). If we limited ourselves to using just our DU “waste” currently in storage, then using the IFR we can power the US for over 1,500 years without doing any new mining of uranium.[5]¶ Exploits our largest energy resource: In the US, there is 10 times as much energy in the depleted uranium (DU) that is just sitting there as there is coal in the ground. This DU waste is our largest natural energy resource…but only if we have fast reactors. Otherwise, it is just waste. With fast reactors, virtually all our nuclear waste (from nuclear power plants, leftover from enrichment, and from decommissioned nuclear weapons)[6] becomes an energy asset worth about $30 trillion dollars…that’s not a typo…$30 trillion, not billion.[7] An 11 year old child was able to determine this from publicly available information in 2004.

#### Inventing something cheaper is key – alternative methods can’t solve warming

**Kirsch 9** (Steve Kirsch, Bachelor of Science and a Master of Science in electrical engineering and computer science from the Massachusetts Institute of Technology, American serial entrepreneur who has started six companies: Mouse Systems, Frame Technology, Infoseek, Propel, Abaca, and OneID, "How Does Obama Expect to Solve the Climate Crisis Without a Plan?" 7/16/9) <http://www.huffingtonpost.com/steve-kirsch/how-does-obama-expect-to_b_236588.html-http://www.huffingtonpost.com/steve-kirsch/how-does-obama-expect-to_b_236588.html>

The ship is sinking slowly and we are quickly running out of time to develop and implement any such plan if we are to have any hope of saving the planet. What we need is a plan we can all believe in. A plan where our country's smartest people all nod their heads in agreement and say, "Yes, this is a solid, viable plan for keeping CO2 levels from touching 425ppm and averting a global climate catastrophe."¶ ¶ At his Senate testimony a few days ago, noted climate scientist James Hansen made it crystal clear once again that the only way to avert an irreversible climate meltdown and save the planet is to phase out virtually all coal plants worldwide over a 20 year period from 2010 to 2030. Indeed, if we don't virtually eliminate the use of coal worldwide, everything else we do will be as effective as re-arranging deck chairs on the Titanic.¶ ¶ Plans that won't work¶ ¶ Unfortunately, nobody has proposed a realistic and practical plan to eliminate coal use worldwide or anywhere close to that. There is no White House URL with such a plan. No environmental group has a workable plan either.¶ ¶ Hoping that everyone will abandon their coal plants and replace them with a renewable power mix isn't a viable strategy -- we've proven that in the U.S. Heck, even if the Waxman-Markey bill passes Congress (a big "if"), it is so weak that it won't do much at all to eliminate coal plants. So even though we have Democrats controlling all three branches of government, it is almost impossible to get even a weak climate bill passed.¶ ¶ If we can't pass strong climate legislation in the U.S. with all the stars aligned, how can we expect anyone else to do it? So expecting all countries to pass a 100% renewable portfolio standard (which is far far beyond that contemplated in the current energy bill) just isn't possible. Secondly, even if you could mandate it politically in every country, from a practical standpoint, you'd never be able to implement it in time. And there are lots of experts in this country, including Secretary Chu, who say it's impossible without nuclear (a point which I am strongly in agreement with).¶ ¶ Hoping that everyone will spontaneously adopt carbon capture and sequestration (CCS) is also a non-starter solution. First of all, CCS doesn't exist at commercial scale. Secondly, even if we could make it work at scale, and even it could be magically retrofitted on every coal plant (which we don't know how to do), it would require all countries to agree to add about 30% in extra cost for no perceivable benefit. At the recent G8 conference, India and China have made it clear yet again that they aren't going to agree to emission goals.¶ ¶ Saying that we'll invent some magical new technology that will rescue us at the last minute is a bad solution. That's at best a poor contingency plan.¶ ¶ The point is this: It should be apparent to us that we aren't going to be able to solve the climate crisis by either "force" (economic coercion or legislation) or by international agreement. And relying on technologies like CCS that may never work is a really bad idea.¶ ¶ The only remaining way to solve the crisis is to make it economically irresistible for countries to "do the right thing." The best way to do that is to give the world a way to generate electric power that is economically more attractive than coal with the same benefits as coal (compact power plants, 24x7 generation, can be sited almost anywhere, etc). Even better is if the new technology can simply replace the existing burner in a coal plant. That way, they'll want to switch. No coercion is required.

### New Advantage

#### Chinese nuclear monopoly coming – that causes Egypt prolif and hamstrings Western ability to contain China rise

**Banks 13** [“The Decline of America’s Civil Nuclear Industry and its Impact on Our National Security”, February 9, 2013, Dave Banks, a policy advisor to Heartland and the Director of D.C. Operations for the Alliance of Wise Energy Decisions]

In contrast to America, Chinese nuclear energy capabilities have rapidly developed in recent years. From being widely viewed as a civil nuclear “backwater” only a decade ago, China is quickly becoming self-sufficient in reactor design and construction and other aspects of the fuel cycle. China has sixteen nuclear power reactors in operation and almost 30 under construction with additional reactors planned, according to the World Nuclear Association. With its ambitious program to develop its own civil nuclear capacity, China is poised to develop a world-class manufacturing production line for key nuclear components, as well as train a generation of skilled designers and engineers.¶ China lacks the regulatory environment found in America and other Western countries, which drastically lowers the cost of building reactors. According to Areva, for instance, the construction of a Western-designed reactor in China costs about $4 billion or 40 percent less than one in France and can be completed in 46 months, versus 71 months. This speed of deployment will help Beijing meet its goals of increasing the country’s nuclear capacity to 58 GWe by 2020, 200 GWe by 2030, and 400 GWe by 2050 (1 GWe is roughly equal to one nuclear reactor). In comparison, U.S. capacity is now roughly 100 GWe. Given current trends, China could account for at least one third of the world’s civil nuclear capacity by 2050 – possibly closer to half – while the U.S. share could shrink to no more than 10 percent.¶ This build out of China’s civil nuclear capabilities is likely to create a monopoly for China in exporting nuclear technologies and services. How Beijing would exploit this new found power remains to be seen. Pakistan, perhaps, provides the best recent example of how we should expect Beijing to play its cards on civil nuclear trade and geopolitics. Despite arguments that China’s plan to export nuclear reactors to Pakistan would be a violation of the spirit of its commitments under the Nuclear Suppliers Group (NSG), China has refused to shelve the deal or seek permission from the multinational body, asserting that the commerce was grandfathered by the bilateral pact with Islamabad. More likely, China feels compelled to use civil nuclear technology transfer as a means to help establish a regional balance in South Asia because of the NSG’s lifting of sanctions against its rival India.¶ If China were to decide in the future to use the same logic to check Israel’s nuclear weapons – say, by transferring related technology to Egypt – how could America stop Beijing if U.S. industry was no longer a player in the global marketplace? America would be forced to depend on bilateral diplomacy and coalition building with other non-providers – as well as working through existing multilateral institutions – to convince civil nuclear powers to support a “pro-American” or “status-quo” non-proliferation policy.

#### Egyptian prolif causes nuclear war

Bar 11 [Dr. Shmuel, Director of Studies at the Institute of Policy and Strategy and Longstanding Member of the Israeli Intelligence Community, “Can Cold War Deterrence Apply to a Nuclear Iran?”, Strategic Perspectives, 7, http://www.jcpa.org/text/cold\_war\_deterrence\_nuclear\_iran.pdf]

Even if we assume that the leaderships of the region will normally wish to avoid nuclear confrontation, the command and control (C2) capabilities in the region’s regimes and military establishments raise serious problems. The factors that will influence the C2 paradigms of nuclear weapons in the Middle East include a wide range of political, military, bureaucratic, religious, and technological issues. The C2 paradigms that will evolve in the Middle East may not be able to cope with the hair-trigger situations that nuclear confrontations create. Nascent nuclear powers in the Middle East will begin with different concepts of deployment, command and control. The Iranian motivation for acquisition of nuclear weapons is not only as a deterrent against its enemies but also as a means to achieve a hegemonic status in the region. To implement this, Iran will have to operationalize its nuclear capability into its day-to-day strategic posture. Such operationalization of nuclear assets will create a need for more elaborate models of C2. Other countries, such as Saudi Arabia, may view the weapons almost exclusively as deterrents, and hence to be stored away until extreme circumstances warrant their deployment. However, the attitude of one party toward its nuclear assets will affect that of its potential adversaries. Those states that may initially not opt for operationalization of the weapons may be forced to adopt a more operational (and hence more demanding in command, control, and communication, or C3, procedures) attitude as a response to the behavior of their neighbors. In the light of recent events, special attention should be paid to the implications of a nuclear Muslim Brotherhood-ruled Egypt. If the Muslim Brotherhood (MB) rules Egypt, it will move to acquire military nuclear capabilities. This would be especially true if Iran, and perhaps other states following Iran, appear to be aspiring to a nuclear weapons capability, including Saudi Arabia, or a post-Saudi regime in Arabia, or perhaps Turkey. The Muslim Brotherhood will view this as the implementation of an explicit divine instruction for Muslims to possess all the means required to deter their enemies. In addition, it will consider the possession of such capabilities as the guarantor of its survival in power, deterring external forces from seeking to topple it. Committed to the liquidation of Israel, it will see the possession of nuclear weapons as putting it in a position to abrogate the peace treaty with the Jewish state and to threaten the latter with conventional military action, under the protection of a nuclear “equalizer” that might be perceived to negate any Israeli deterrence in this regard, or even use nuclear weapons if they come to be perceived as valid instruments in the surge towards victory over “infidel” forces of one kind or another. In this sense, an ideologically religious, **fundamentalist Egypt would bear some striking similarities to an ideologically radical Iran with nuclear weapons, where vast geographic, demographic and natural resource reserves could lead a strongly willed anti-status-quo leadership to launch nuclear weapons in the belief that it could still prevail in a nuclear exchange**, while absorbing relatively high attrition rates, which other, less populated or smaller states in the region could not. **Religious fervor and commitment, while not necessarily being irrational per se, could in this sense contribute to nuclear blows by miscalculation**, rather than by premeditated design. Command and Control paradigms that will emerge in the region will probably be closer to the early – and unstable - structures of the veteran nuclear powers, with adaptations for regional cultural, political, and religious idiosyncrasies, and will not necessarily reflect the accumulated lessons of those powers. Furthermore, the suspicion toward the West in the region is likely to bring its actors to reject solutions that are based on “off the shelf” Western technology, and to try to develop local solutions, which will be, initially at least, less sophisticated. In contrast to the Western system of delegation of authority and decentralization of information on a need-to-know basis, we will probably encounter in the Middle East a more individualized chain of command consisting of fewer, but highly loyal and trusted, individuals, with less compartmentalization between them. It is highly unlikely that any of the regimes in the region will adopt procedures for verification of the orders of the head of government (by deputies or ministers). In regimes such as the Iranian or future Jihadi-Salafi ones in which the leader is perceived as inspired by Allah (the Sunni concept of Amir al-Muminin – Commander of the Believers, or the Iranian doctrine of Vali-Faqih – Supreme Leader), restriction of his discretion by a lesser individual would be tantamount to imposing restrictions on the will of Allah. Even the argument that the verification is not meant for regular situations but for contingencies during which the leader may be incapacitated, for any reason, would be difficult to support in these regimes. Research and development (R&D) establishments in the Middle East are also liable to play a role in the decision-making processes even after completing development of the weapons, similar to that of A. Q. Khan in Pakistan. Since these are usually linked to military organizations, they may emerge as “back doors” to the C3 system for the weapons they devised. Thus, these organizations may become “loose cannons” in scenarios of breakdown of the states. Nuclear weapons may filter down to nonstate entities in such a scenario in two ways: to any of a plethora of quasi-states with differing levels of control (Kurdistan, Palestinian Authority), terrorist organizations (al-Qaeda, Hamas, Islamic Jihad), and rival ethnic groups for whom the acquisition of nuclear weapons by a hostile state would be an incentive to acquire at least a limited WMD capability; and to “proxy” or “surrogate” terrorist groups (such as Hizbullah). The Cold War experience that nuclear powers did not transfer nuclear weapons or technology to their allies or proxies would not apply. The break in the dam-gates of proliferation would make it easier for those entities to acquire the weapons, and the states may have an interest in providing them to keep control over their own proxies. Conclusion A nuclear Middle East will be very different from the Cold War in a wide range of aspects. True, we may safely assume that the leaders and peoples of the region have no desire to be the targets of nuclear weapons. However, **the inherent instability of the region and its regimes, the difficulty in managing multilateral nuclear tensions, the weight of religious, emotional, and internal pressures, and the proclivity of many of the regimes in the region toward military adventurism and brinkmanship do not bode well for the future of this region once it enters the nuclear age. Nuclear war** need not erupt as a result of a conscious decision by a leadership to use nuclear weapons. It **is more likely to result from escalation scenarios, misinterpretation of intentions of the other side due to poor intelligence and lack of communication between antagonists, inadvertent use, poor command and control constraints, and underestimation of the other party’s response to nuclear brinkmanship**. Such behavior in a polynuclear environment would be tantamount to lighting a match in a gas depot. The countries of the region will probably be more predisposed than the Cold War protagonists to brandish their nuclear weapons not only rhetorically but through nuclear alerts or nuclear tests in order to deter their enemies, leading to situations of multilateral nuclear escalation. Once one country has taken such measures, the other nuclear countries of the region would probably feel forced to adopt defensive measures, and multilateral escalation will result. However, **such multilateral escalation will not be mitigated by Cold War-type hotlines and means of signaling, and none of the parties involved will have escalation dominance. This and the absence of a credible secondstrike capability may well strengthen the tendency to opt for a first strike**.

#### Continued China rise causes sovereignty disputes and Chinese cyberwarfare

**Mazza 13** [“Cyberattacks: An unprecedented threat to US national security”, Michael Mazza, Testimony before the House Foreign Affairs Committee's Subcommittee on Europe, Eurasia, and Emerging Threats, American Enterprise Institute, March 21, 2013]

While ensuring the Chinese people continue to grow wealthier is itself a primary goal of the CCP, China’s continued rise is also crucial if the party is to validate its claim that it and it alone can lead the country back to greatness. The CCP has long propagated a victim narrative of Chinese history, and nationalist education has been particularly emphasized since the aftermath of the Tiananmen Square massacre. In that narrative, China was Asia’s central power, or “Middle Kingdom,” for millennia before Western powers brought it down and inflicted upon it a so-called “century of humiliation.” It is the CCP who can right those wrongs and return China to its rightful place atop the Asian hierarchy.¶ To do so, Beijing must restore sovereignty over territories wrongfully taken from it, including Taiwan and disputed islands in the East and South China seas. Doing so would not only allow Beijing to complete what it sees as a historic mission, but to enhance its own security. Controlling these islands and the surrounding waters would grant China greater strategic depth, allow it to more easily safeguard or control sea lines, and permit it to more easily access the Pacific and Indian oceans. Of course, these waters are also home to U.S. treaty allies (South Korea, Japan, the Philippines, Thailand, and Australia further afield), long-standing security partners (Taiwan and Singapore), and new friends (Indonesia, for example). It is in these littoral regions where tensions have been running high, where conflict is most likely to break out, and where U.S. and Chinese interests directly clash.¶ For China, cyber capabilities are tools to be used in pursuit of its own interests in this region. In particular, China likely uses or will use cyber capabilities for three related, but different, purposes. First, Chinese hackers will engage in espionage activities in the pursuit of both strategic and tactical intelligence. This, of course, is a natural activity in a competitive relationship—the United States and China are going to spy on one another. The question is, what new counter-intelligence tools are needed to meet this relatively new espionage threat? The more traditional tools of espionage are inherently risky—intelligence operatives can be arrested, spy planes can be shot down—but the risks to hacker-spies are not so clear. How can the United States make cyber espionage a riskier proposition for China and others?

#### SCS conflict risk high now – goes nuclear

**Dupont 13** [“High stakes tension on the China Seas”, Alan Dupont, The Australian, 12 March 2013]

It is clear that the Senkaku/Diaoyu islands in the East China Sea have become the most dangerous, high-stakes maritime dispute in East Asia as a lightning rod for long-standing historical animosities and rising Sino-Japanese tensions over their respective places in the region's new order.¶ It is not simply a territorial dispute amenable to resolution by legal adjudication or reasonable political accommodation. This much is clear from the recent Falklands Islands analogy by Japanese Prime Minister Shinzo Abe, who has put Beijing on notice that he is determined to defend the Senkakus against perceived Chinese encroachments, whatever the cost.¶ ¶ Many observers are sceptical that Abe will match his words with deeds, given the disappointments of his first term, his reputation for pragmatism and deeply entrenched pacifist sentiment in Japan. But public attitudes towards China are hardening, providing more political space for Abe to play the role of defender of the national interest. Moreover, a consensus is emerging among Japan's previously quiescent foreign policy and strategic community, that the Senkakus are critical strategic links in the island chain running from Japan to Indonesia that geographically constrains China's maritime ambitions, and they must not be allowed to fall into Chinese hands.¶ ¶ Should China take control of the Senkakus, they could quickly garrison the islands as they have in the South China Sea, building heliports and radar installations which would allow them to gather unique intelligence on the activities of Japanese and American forces on nearby Okinawa and the Sakashima Islands. This would significantly weaken US and Japanese control of the western Pacific, complicate the defence of Taiwan and breach what China has long regarded as an enclosing maritime ``great wall''.¶ ¶ These strategic anxieties are increasingly driving Japanese and US policy on the Senkakus, and the jockeying for naval pre-eminence in the East and South China Seas explains much about China's preparedness to assert its territorial claims extending as far south as Indonesia's Natuna Islands, thousands of kilometres from the Chinese mainland.¶ ¶ Japan's options are few. They include appeasement and confrontation. But each, for diametrically opposed reasons, would be high-risk choices. Appeasement would only encourage China to ratchet up its pressure on Japan to make further territorial concessions. Confrontation risks serious military conflict, which is in no one's interests, least of all Japan's.¶ ¶ Abe knows this and is likely to pursue a more calibrated, carrot and stick approach, combining elements of co-operation and deterrence. Militarily, the key elements of his strategy are already apparent, notably a willingness to boost defence spending, redeploy significant numbers of troops to the southern region of Japan, increase intelligence collection against China, and the Peoples Liberation Army in particular, and loosen the self-imposed restraints on the export of sensitive defence technologies.¶ ¶ Politically, Abe has toughened his language on China, sought and received reassurances from the Obama administration that the Senkakus fall within the terms of the US-Japan Security Agreement and, unusually in post-war Japan, appealed to Japanese patriotism. He has also reminded China of the enormous investment both countries have in the relationship and that his door remains open to dialogue.¶ ¶ This constitutes a more coherent and workable strategy which ought to give the equally new Chinese leadership pause for reflection, provided Abe sticks to his guns. The worry is that already inflamed Chinese nationalism, never far from the surface on matters Japan, could be deliberately fanned by a PLA intent on dominating China's eponymously named contiguous seas, making it difficult for China's leader, Xi Jinping, to take a more conciliatory approach.¶ ¶ The unwillingness of the Chinese government to curb provocative public interventions by Chinese military representatives is not reassuring. Along with credible reports that the PLA is engaged in aggressive, widespread cyber hacking, this indicates that hawks in the Chinese military have aspirations to play a far more influential role in Chinese domestic and foreign policy than has been the case since the early years of the Chinese Peoples Republic. This is not good news for Sino-Japanese relations.¶ ¶ Abe has to be careful that in taking a firmer stance on the islands, he does not provide China's hawks with gratuitous opportunities for exploiting existing tensions. But he should also resist any demands by Japan's own hawks for the military to pre-emptively occupy the Senkakus and establish a garrison force there. This would almost certainly trigger a countervailing Chinese response and further complicate attempts to take the heat out of what threatens to rival North Korea's nuclear weapons program as East Asia's number one security concern.

#### Cyberwar ensures accidental nuclear war – multiple warrants

**Fritz** ‘**9** (Jason - former Captain of the U.S. Army, July, Hacking Nuclear Command and Control)

The US uses the two-man rule to achieve a higher level of security in nuclear affairs. Under this rule two authorized personnel must be present and in agreement during critical stages of nuclear command and control. The President must jointly issue a launch order with the Secretary of Defense; Minuteman missile operators must agree that the launch order is valid; and on a submarine, both the commanding officer and executive officer must agree that the order to launch is valid. In the US, in order to execute a nuclear launch, an Emergency Action Message (EAM) is needed. This is a preformatted message that directs nuclear forces to execute a specific attack. The contents of an EAM change daily and consist of a complex code read by a human voice. Regular monitoring by shortwave listeners and videos posted to YouTube provide insight into how these work. These are issued from the NMCC, or in the event of destruction, from the designated hierarchy of command and control centres. Once a command centre has confirmed the EAM, using the two-man rule, the Permissive Action Link (PAL) codes are entered to arm the weapons and the message is sent out. These messages are sent in digital format via the secure Automatic Digital Network and then relayed to aircraft via single-sideband radio transmitters of the High Frequency Global Communications System, and, at least in the past, sent to nuclear capable submarines via Very Low Frequency (Greenemeier 2008, Hardisty 1985). The technical details of VLF submarine communication methods can be found online, including PC-based VLF reception. Some reports have noted a Pentagon review, which showed a potential “electronic back door into the US Navy’s system for broadcasting nuclear launch **orders to Trident submarines**” (Peterson 2004). The investigation showed that cyber terrorists could potentially infiltrate this network and **insert false orders for launch**. The investigation led to “elaborate new instructions for validating launch orders” (Blair 2003). Adding further to the concern of cyber terrorists seizing control over submarine launched nuclear missiles; The Royal Navy announced in 2008 that it would be installing a Microsoft Windows operating system on its nuclear submarines (Page 2008). The choice of operating system, apparently based on Windows XP, is not as alarming as the advertising of such a system is. This may attract hackers and narrow the necessary reconnaissance to learning its details and potential exploits. It is unlikely that the operating system would play a direct role in the signal to launch, although this is far from certain. Knowledge of the operating system may lead to the insertion of malicious code, which could be used to gain accelerating privileges, tracking, valuable information, and deception that could subsequently be used to initiate a launch. Remember from Chapter 2 that the UK’s nuclear submarines have the authority to launch if they believe the central command has been destroyed. Attempts by cyber terrorists to **create the illusion of a decapitating strike** could also be used to engage fail-deadly systems. Open source knowledge is scarce as to whether Russia continues to operate such a system. However evidence suggests that they have in the past. Perimetr, also known as Dead Hand, was an automated system set to launch a mass scale nuclear attack in the event of a decapitation strike against Soviet leadership and military. In a crisis, military officials would send a coded message to the bunkers, switching on the dead hand. If nearby ground-level sensors detected a nuclear attack on Moscow, and if a break was detected in communications links with top military commanders, the system would send low-frequency signals over underground antennas to special rockets. Flying high over missile fields and other military sites, these rockets in turn would broadcast attack orders to missiles, bombers and, via radio relays, submarines at sea. Contrary to some Western beliefs, Dr. Blair says, many of Russia's nuclear-armed missiles in underground silos and on mobile launchers can be fired automatically. (Broad 1993) Assuming such a system is still active, cyber terrorists would need to create a crisis situation in order to activate Perimetr, and then fool it into believing a decapitating strike had taken place. While this is not an easy task, the information age makes it easier. Cyber reconnaissance could help locate the machine and learn its inner workings. This could be done by targeting the computers high of level official’s—anyone who has reportedly worked on such a project, or individuals involved in military operations at underground facilities, such as those reported to be located at Yamantau and Kosvinksy mountains in the central southern Urals (Rosenbaum 2007, Blair 2008) Indirect Control of Launch Cyber terrorists could cause **incorrect information to be transmitted**, received, **or displayed at nuclear command** and control centres, or shut down these centres’ computer networks completely. In 1995, a Norwegian scientific sounding rocket was mistaken by Russian early warning systems as a nuclear missile launched from a US submarine. A radar operator used Krokus to notify a general on duty who decided to alert the highest levels. Kavkaz was implemented, all three chegets activated, and the countdown for a nuclear decision began. It took eight minutes before the missile was properly identified—a considerable amount of time considering the speed with which a nuclear response must be decided upon (Aftergood 2000). Creating a false signal in these early warning systems would be relatively easy using computer network operations. The real difficulty would be gaining access to these systems as they are most likely on a closed network. However, if they are transmitting wirelessly, that may **provide an entry point**, and information gained through the internet may reveal the details, such as passwords and software, for **gaining entrance to the closed network**. If access was obtained, a false alarm could be followed by something like a DDoS attack, so the operators believe an attack may be imminent, yet they can no longer verify it. This could add **pressure to the decision making process,** and if coordinated precisely, could appear as a first round EMP burst. Terrorist groups could also attempt to **launch a non-nuclear missile**, such as the one used by Norway, in an attempt to fool the system. The number of states who possess such technology is far greater than the number of states who possess nuclear weapons. Obtaining them would be considerably easier, especially when enhancing operations through computer network operations. Combining traditional terrorist methods with cyber techniques opens opportunities neither could accomplish on their own. For example, radar stations might be more vulnerable to a computer attack, while satellites are more vulnerable to jamming from a laser beam, thus together they deny dual phenomenology. Mapping communications networks through cyber reconnaissance may expose weaknesses, and automated scanning devices created by more experienced hackers can be readily found on the internet. Intercepting or spoofing communications is a highly complex science. These systems are designed to protect against the world’s most powerful and well funded militaries. Yet, there are recurring gaffes, and the very nature of asymmetric warfare is to bypass complexities by finding simple loopholes. For example, commercially available software for voice-morphing could be used to capture voice commands within the command and control structure, cut these sound bytes into phonemes, and splice it back together in order to issue false voice commands (Andersen 2001, Chapter 16). Spoofing could also be used to escalate a volatile situation in the hopes of **start**ing **a nuclear war.** “ “In June 1998, a group of international hackers calling themselves Milw0rm hacked the web site of India’s Bhabha Atomic Research Center (BARC) and put up a spoofed web page showing a mushroom cloud and the text “If a nuclear war does start, you will be the first to scream” (Denning 1999). Hacker web-page defacements like these are often derided by critics of cyber terrorism as simply being a nuisance which causes no significant harm. However, web-page defacements are becoming more common, and they point towards alarming possibilities in subversion. During the 2007 cyber attacks against Estonia, a counterfeit letter of apology from Prime Minister Andrus Ansip was planted on his political party website (Grant 2007). This took place amid the confusion of mass DDoS attacks, real world protests, and accusations between governments.

#### Specifically, the race is on to patent the first gen IV reactor

**Nolan 13** [“Energy Development: The Race to Slow Anthropogenic Climate Change”, Jerry Nolan, Energy Collective, March 4, 2013]

The Generation 4 reactor design race¶ The race is now on to see who can produce the first commercial grade Gen 4 reactor and get international patents for it. The lead has been taken by China. There are over 100 companies in China working on designs for nuclear reactors, including the LFTR design. In fact, the LFTR design in China is receiving 100% Chinese government backing and the U.S. Department of Energy is cooperating with China by giving them all the research that was done at ORNL. The U.S. Dept. of Energy (DOE) describes this as collaboration. China stated clearly that it intends to be sole owner of any international patents on LFTR designs. At the time of this writing, there is no DOE funding for the development of LFTR's in the U.S. Since Kirk Sorensen's grassroots movement was initiated, many countries have begun R&D on molten salt reactors because the design is so promising and simple compared to other designs.¶ Meanwhile, Kirk Sorensen and a partner have started a private company called Flibe Energy, to develop LFTR's. Ironically the U.S. Army is backing Sorensen's efforts. Sorensen expects to have a LFTR power up in 2015. Kirk chose a partner in his company who is a lawyer and expert in international patents. He apparently sees the importance of getting those international patents before China does.¶ There are other nuclear designs in the works. Bill Gates is backing a nuclear reactor design called a Traveling Wave Reactor (TWR), a type of Integral Fast Reactor, that is being developed by Terrapower. Another company worth noting is Trans Atomic Power started by two MIT PhD students. Their design is a molten salt reactor they call Waste Annihilating Molten Salt Reactor (WAMSR) that will burn the nuclear waste produced by today's LWR's. They claim their idea is new but all LFTR fans know that molten salt reactors can burn nuclear waste. Nothing new about that, but good luck to them. I hope they end up joining Kirk Sorensen's company, but there is no reason to think that will happen.¶ The Prize¶ Robert Hargraves' excellent book Thorium: energy cheaper than coal points out that LFTR's could be built in factories and turned out at a rate comparable to Boeing's production of airliners. LFTR's could be used to power ocean going ships, a major source of CO2 , and could provide electric power for high speed rail to replace many commercial jet flights. The heat from LFTR's could be used to synthesize hydrogen based fuels for automobiles, could be used to desalinate sea water in coastal areas, and could be used to bring energy to impoverished nations. Robert Hargraves makes a convincing case for the success of LFTR technology and its likely success in a capitalist economy. The only real question is whether the United States will be a leader or a follower in LFTR technology.¶ This is an important race worth watching. The winner is going to win big. We will all win big. Will we be buying reactors from China, or will Kirk Sorensen's company prevail? In any case, clean energy is coming. I would just like to see Kirk Sorensen win the race. He deserves it. Without him, the Chinese wouldn't even know about molten salt reactors. Moreover, as much as I would like to see Kirk Sorensen win the race, this is too important to be left solely to a small underfunded company. The DOE national labs need to be more involved. Currently the national labs are contributing in some important ways, namely research on materials that work best to contain molten salt for solar power plants. Their research will most likely be available to the private companies working on LFTR's, but they should do more because they have the authority to build and test LFTR's without the interference from the NRC.

#### The plan wins the race

**Stanford 10** [George Stanford, PhD, a physicist, retired from Argonne National Laboratory, B.Sc. with Honours, Acadia University, M.A.,Wesleyan University, Ph.D. in experimental nuclear physics, on symposium hosted by Barry Brook, Professor of Climate Change from University of Adelaide, Brave New Climate, Yale University, (Written 11-29-10), “The IFR vs the LFTR: An Exchange of Emails”, Full conversation posted on 17 November 2011 by Barry Brook]

We’ll see what others on this list have to say, but in my opinion, Carlsen’s enthusiasm for thorium is premature, to say the least. The ONLY significant advantage a thorium cycle would have over fast reactors with metallic fuel (IFR/PRISM) is its lower requirement for start up fissile. That advantage is offset by the fact that the thorium reactor is at a stage of development roughly equivalent to where the IFR was in 1975 — a promising idea with a lot of R&D needed to before it’s ready for a commercial demonstration — which puts its deployment about 20 years behind what could be the IFR’s schedule. The thorium community has not yet even agreed on what will be the optimum thorium technology to pursue.¶ I think that thorium should indeed be investigated as a possible future competitor for the IFR. But what would be gained by putting off demonstrating the IFR/PRISM technology while waiting to see if thorium really lives up to its promise? Nothing would be lost by getting a fleet of IFRs up and running. They could be breeding fissile for decades while a possible thorium fleet gets up and running, and the IFR-bred fissile — several times more than was started with — could be used for expanding the hypothetical thorium fleet at the end of the IFRs’ lifetimes.¶ If the current perceived urgency is to sequester plutonium to put it out of the reach of proliferators, that can be done much faster with early deployment of IFRs rather than by later deployment of thorium reactors — and each IFR will sequester 8 – 10 times as much plutonium (Pu) per GWe as a thorium reactor.

#### Absent expedient nuclear development, competition causes asian resource wars

Evans-Pritchard 13[Ambrose Evans-Pritchard, International Business Editor of The Daily Telegraph. He has covered world politics and economics for 30 years, The Telegraph, “China blazes trail for 'clean' nuclear power from thorium”, 6 Jan 2013]

The Chinese are leading the charge, but they are not alone. Norway's Thor Energy began a four-year test last month with Japan's Toshiba-Westinghouse to see whether they could use thorium at Norway's conventional Halden reactor in Oslo.¶ ¶ The Japanese are keen to go further, knowing they have to come up with something radically new to regain public trust and save their nuclear industry.¶ ¶ Japan's International Institute for Advanced Studies (IIAS) -- now led by thorium enthusiast Takashi Kamei -- is researching molten salt reactors that use liquid fuel.¶ ¶ Is this what Premier Shinzo Abe meant when he revealed before Christmas that he planned to relaunch nuclear power in Japan with "entirely different" technology? We will find out.¶ ¶ The Chinese aim to beat them to it. Technology for the molten salt process already exists. The Oak Ridge National Laboratory in Tennessee built such a reactor in the 1960s. It was shelved by the Nixon Administration. The Pentagon needed plutonium residue from uranium to build nuclear bombs. The imperatives of the Cold War prevailed.¶ The thorium blueprints gathered dust in the archives until retrieved and published by former Nasa engineer Kirk Sorensen. The US largely ignored him: China did not.¶ Mr Jiang visited the Oak Ridge labs and obtained the designs after reading an article in the American Scientist two years ago extolling thorium. His team concluded that a molten salt reactor -- if done the right way -- may answer China's prayers.¶ Mr Jiang says China's energy shortage is becoming "scary" and will soon pose a threat to national security. It is no secret what he means. Escalating disputes with with India, Vietnam, the Philippines, and above all Japan, are quickly becoming the biggest threat to world peace. It is a resource race compounded by a geo-strategic struggle, with echoes of the 1930s.

#### Asian energy conflicts go nuclear

**Emmott, 8** – former editor of the Economist (Bill, ‘Power rises in the east,’ The Australian, June 4, pg. l/n

As well as knitting them, however, this drama is also grinding together Asian powers that had previously kept a strict economic and political separation from one another. China, India and Japan are bumping against each other because their national interests are overlapping and in part competing. Each is suspicious of the others' motives and intentions and all three hope to get their own way in Asia and further afield.

To have three great powers at the same time may be unprecedented for Asia but it is not for the world. There was a similar situation in Europe during the 19th century, when Britain, France, Russia, Austria and, until German unification, Prussia, existed in an uneasy balance in which none was dominant and none was entirely comfortable, but which nevertheless coincided with a period during which Europe prospered and became firmly established as the world's dominant region.

Whether you consider Europe's 19th-century experience with balance-of-power politics as a good or bad omen for Asia depends on how long a sweep of history you consider and on what you think are the most crucial differences between modern times and the world of 150 years ago. If you take a long sweep, then the precedent is bad, since Europe's power balance ended in two devastating world wars. On the other hand, it kept the peace on the continent for about half a century, which would count as an optimistic prospect today.

Today the barriers against the use of war as a tool of national policy are far higher: nuclear weapons, public opinion, international law, instant communication and transparency all militate against conflict, though they do not rule it out altogether. The barriers against colonial or quasi-colonial ambitions are higher still. China and India may battle for influence over Burma, but neither is likely to invade it and turn it into a colony. Nevertheless, Asia is piled high with historical bitterness, unresolved territorial disputes, potential flashpoints and strategic competition that could readily ignite. There are at least five known flashpoints where it is already clear that any could involve the major powers: the Sino-Indian border and Tibet, North and South Korea, the East China Sea and the Senkaku-Diaoyutai islands, Taiwan and Pakistan.

#### American nuclear dependence decimates economic competitiveness

**Martin 11** [Feb 1, Richard, A contributing editor for Wired since 2002, he has written about energy, for Time, Fortune, The Atlantic, and the Asian Wall Street Journal, editorial director for Pike Research, the leading cleantech research and analysis firm, former Technology Producer for ABCNews.com, Technology Editor for The Industry Standard (2000-2001), and Editor-at- Large for Information Week (2005-2008), recipient of the “Excellence in Feature Writing" Award from the Society for Professional Journalists and the White Award for Investigative Reporting, Educated at Yale and the University of Hong Kong, “China Takes Lead in Race for Clean Nuclear Power”, Wired]

China has officially announced it will launch a program to develop a thorium-fueled molten-salt nuclear reactor, taking a crucial step towards shifting to nuclear power as a primary energy source.¶ The project was unveiled at the annual Chinese Academy of Sciences conference in Shanghai last week, and reported in the Wen Hui Bao newspaper (Google English translation here).¶ If the reactor works as planned, China may fulfill a long-delayed dream of clean nuclear energy. The United States could conceivably become dependent on China for next-generation nuclear technology. At the least, the United States could fall dramatically behind in developing green energy.¶ “President Obama talked about a Sputnik-type call to action in his SOTU address,” wrote Charles Hart, a a retired semiconductor researcher and frequent commenter on the Energy From Thorium discussion forum. “I think this qualifies.”¶ While nearly all current nuclear reactors run on uranium, the radioactive element thorium is recognized as a safer, cleaner and more abundant alternative fuel. Thorium is particularly well-suited for use in molten-salt reactors, or MSRs. Nuclear reactions take place inside a fluid core rather than solid fuel rods, and there’s no risk of meltdown.¶ In addition to their safety, MSRs can consume various nuclear-fuel types, including existing stocks of nuclear waste. Their byproducts are unsuitable for making weapons of any type. They can also operate as breeders, producing more fuel than they consume.¶ In the 1960s and 70s, the United States carried out extensive research on thorium and MSRs at Oak Ridge National Laboratory. That work was abandoned — partly, believe many, because uranium reactors generated bomb-grade plutonium as a byproduct. Today, with nuclear weapons less in demand and cheap oil’s twilight approaching, several countries — including India, France and Norway — are pursuing thorium-based nuclear-fuel cycles. (The grassroots movement to promote an American thorium power supply was covered in this December 2009 Wired magazine feature.)¶ China’s new program is the largest national thorium-MSR initiative to date. The People’s Republic had already announced plans to build dozens of new nuclear reactors over the next 20 years, increasing its nuclear power supply 20-fold and weaning itself off coal, of which it’s now one of the world’s largest consumers. Designing a thorium-based molten-salt reactor could place China at the forefront of the race to build environmentally safe, cost-effective and politically palatable reactors.¶ “We need a better stove that can burn more fuel,” Xu Hongjie, a lead researcher at the Shanghai Institute of Applied Physics, told Wen Hui Bao.¶ China’s program is headed by Jiang Mianheng, son of the former Chinese president Jiang Zemin. A vice president of the Chinese Academy of Sciences, the younger Jiang holds a Ph.D. in electrical engineering from Drexel University. A Chinese delegation headed by Jiang revealed the thorium plans to Oak Ridge scientists during a visit to the national lab last fall.¶ The official announcement comes as the Obama administration has committed itself to funding R&D for next-generation nuclear technology. The president specifically mentioned Oak Ridge National Laboratory in his State of the Union address Jan. 25, but no government-funded program currently exists to develop thorium as an alternative nuclear fuel.¶ A Chinese thorium-based nuclear power supply is seen by many nuclear advocates and analysts as a threat to U.S. economic competitiveness. During a presentation at Oak Ridge on Jan. 31, Jim Kennedy, CEO of St. Louis–based Wings Enterprises (which is trying to win approval to start a mine for rare earths and thorium at Pea Ridge, Missouri) portrayed the Chinese thorium development as potentially ~~crippling~~.¶ “If we miss the boat on this, how can we possibly compete in the world economy?” Kennedy asked. “What else do we have left to export?”¶ According to thorium advocates, the United States could find itself 20 years from now importing technology originally developed nearly four decades ago at one of America’s premier national R&D facilities. The alarmist version of China’s next-gen nuclear strategy come down to this: If you like foreign-oil dependency, you’re going to love foreign-nuclear dependency.¶ “When I heard this, I thought, ‘Oboy, now it’s happened,’” said Kirk Sorensen, chief nuclear technologist at Teledyne Brown Engineering and creator of the Energy From Thorium blog. “Maybe this will get some people’s attention in Washington.”¶ While the international “Generation IV” nuclear R&D initiative includes a working group on thorium MSRs, China has made clear its intention to go it alone. The Chinese Academy of Sciences announcement explicitly states that the PRC plans to develop and control intellectual property around thorium for its own benefit.¶ “This will enable China to firmly grasp the lifeline of energy in its own hands,” stated the Wen Hui Bao report.

#### Great power war

**Baru 9** - Visiting Professor at the Lee Kuan Yew School of Public Policy in Singapore (Sanjaya, “Year of the power shift?,”

http://www.india-seminar.com/2009/593/593\_sanjaya\_baru.htm

**T**here is no doubt that economics alone will not determine the balance of global power, but there is no doubt either that economics has come to matter for more.¶ The management of the economy, and of the treasury, has been a vital aspect of statecraft from time immemorial. Kautilya’s *Arthashastra* says, ‘From the strength of the treasury the army is born. …men without wealth do not attain their objectives even after hundreds of trials… Only through wealth can material gains be acquired, as elephants (wild) can be captured only by elephants (tamed)… A state with depleted resources, even if acquired, becomes only a liability.’4 Hence, economic policies and performance do have strategic consequences.5¶ In the modern era, the idea that strong economic performance is the foundation of power was argued most persuasively by historian Paul Kennedy. ‘Victory (in war),’ Kennedy claimed, ‘has repeatedly gone to the side with more flourishing productive base.’6 Drawing attention to the interrelationships between economic wealth, technological innovation, and the ability of states to efficiently mobilize economic and technological resources for power projection and national defence, Kennedy argued that nations that were able to better combine military and economic strength scored over others.¶ ‘The fact remains,’ Kennedy argued, ‘that all of the major shifts in the world’s *military-power* balance have followed alterations in the *productive* balances; and further, that the rising and falling of the various empires and states in the international system has been confirmed by the outcomes of the major Great Power wars, where victory has always gone to the side with the greatest material resources.’7¶ **I**n Kennedy’s view the geopolitical consequences of an economic crisis or even decline would be transmitted through a nation’s inability to find adequate financial resources to simultaneously sustain economic growth and military power – the classic ‘guns vs butter’ dilemma.¶ Apart from such fiscal disempowerment of the state, economic under-performance would also reduce a nation’s attraction as a market, a source of capital and technology, and as a ‘knowledge power’. As power shifted from Europe to America, so did the knowledge base of the global economy. As China’s power rises, so does its profile as a ‘knowledge economy’.¶ Impressed by such arguments the China Academy of Social Sciences developed the concept of Comprehensive National Power (CNP) to get China’s political and military leadership to focus more clearly on economic and technological performance than on military power alone in its quest for Great Power status.8¶ While China’s impressive economic performance and the consequent rise in China’s global profile has forced strategic analysts to acknowledge this link, the recovery of the US economy in the 1990s had reduced the appeal of the Kennedy thesis in Washington DC. We must expect a revival of interest in Kennedy’s arguments in the current context.¶ **A** historian of power who took Kennedy seriously, Niall Ferguson, has helped keep the focus on the geopolitical implications of economic performance. In his masterly survey of the role of finance in the projection of state power, Ferguson defines the ‘square of power’ as the tax bureaucracy, the parliament, the national debt and the central bank. These four institutions of ‘fiscal empowerment’ of the state enable nations to project power by mobilizing and deploying financial resources to that end.9 ¶ Ferguson shows how vital sound economic management is to strategic policy and national power. More recently, Ferguson has been drawing a parallel between the role of debt and financial crises in the decline of the Ottoman and Soviet empires and that of the United States of America. In an early comment on the present financial crisis, Ferguson wrote:¶ ‘We are indeed living through a global shift in the balance of power very similar to that which occurred in the 1870s. This is the story of how an over-extended empire sought to cope with an external debt crisis by selling off revenue streams to foreign investors. The empire that suffered these setbacks in the 1870s was the Ottoman empire. Today it is the US… It remains to be seen how quickly today’s financial shift will be followed by a comparable geopolitical shift in favour of the new export and energy empires of the east. Suffice to say that the historical analogy does not bode well for America’s quasi-imperial network of bases and allies across the Middle East and Asia. Debtor empires sooner or later have to do more than just sell shares to satisfy their creditors*. …*as in the 1870s the balance of financial power is shifting. Then, the move was from the ancient Oriental empires (not only the Ottoman but also the Persian and Chinese) to Western Europe. Today the shift is from the US – and other western financial centres – to the autocracies of the Middle East and East Asia.’10 ¶ An economic or financial crisis may not trigger the decline of an empire. It can certainly speed up a process already underway. In the case of the Soviet Union the financial crunch caused by the Afghan war came on top of years of economic under-performance and the loss of political legitimacy of the Soviet state. In a democratic society like the United States the political legitimacy of the state is constantly renewed through periodic elections. Thus, the election of Barack Obama may serve to renew the legitimacy of the state and by doing so enable the state to undertake measures that restore health to the economy. This the Soviet state was unable to do under Gorbachev even though he repudiated the Brezhnev legacy and distanced himself from it.¶ Hence, one must not become an economic determinist and historic parallels need not always be relevant. Politics can intervene and offer solutions. Political economy and politics, in the form of Keynesian economics and the ‘New Deal’, did intervene to influence the geopolitical implications of the Great Depression. Whether they will do so once again in today’s America remains to be seen.

#### Independently key to heg

**Gelb, 10** - currently president emeritus of the Council on Foreign Relations, (Leslie, Fashioning a Realistic Strategy for the Twenty-First Century,” Fletcher Forum of World Affairs vol.34:2 summer 2010 http://fletcher.tufts.edu/forum/archives/pdfs/34-2pdfs/Gelb.pdf)

**LESLIE H. GELB:** Power is what it always has been. It is the ability to get someone to do something they do not want to do by means of your resources and your position. It was always that. There is no such thing in my mind as “soft” power or “hard” power or “smart” power or “dumb” power. It is people who are hard or soft or smart or dumb. Power is power. And people use it wisely or poorly. Now, what has changed is the composition of power in international affairs. For almost all of history, international power was achieved in the form of military power and military force. Now, particularly in the last fifty years or so, it has become more and more economic. So power consists of economic power, military power, and diplomatic power, but the emphasis has shifted from military power (for almost all of history) to now, more economic power. And, as President Obama said in his West Point speech several months ago, our economy is the basis of our international power in general and our military power in particular. That is where it all comes from. Whether other states listen to us and act on what we say depends a good deal on their perception of the strength of the American economy. A big problem for us in the last few years has been the perception that our economy is in decline.

#### That solves conflict escalation and great power war

Brooks, Ikenberry, and Wohlforth ’13 (Stephen, Associate Professor of Government at Dartmouth College, John Ikenberry is the Albert G. Milbank Professor of Politics and International Affairs at Princeton University in the Department of Politics and the Woodrow Wilson School of Public and International Affairs, William C. Wohlforth is the Daniel Webster Professor in the Department of Government at Dartmouth College “Don’t Come Home America: The Case Against Retrenchment,” International Security, Vol. 37, No. 3 (Winter 2012/13), pp. 7–51)

A core premise of deep engagement is that it prevents the emergence of a far more dangerous global security environment. For one thing, as noted above, the United States’ overseas presence gives it the leverage to restrain partners from taking provocative action. Perhaps more important, its core alliance commitments also deter states with aspirations to regional hegemony from contemplating expansion and make its partners more secure, reducing their incentive to adopt solutions to their security problems that threaten others and thus stoke security dilemmas. The contention that engaged U.S. power dampens the baleful effects of anarchy is consistent with influential variants of realist theory. Indeed, arguably the scariest portrayal of the war-prone world that would emerge absent the “American Pacifier” is provided in the works of John Mearsheimer, who forecasts dangerous multipolar regions replete with security competition, arms races, nuclear proliferation and associated preventive war temptations, regional rivalries, and even runs at regional hegemony and full-scale great power war. 72 How do retrenchment advocates, the bulk of whom are realists, discount this benefit? Their arguments are complicated, but two capture most of the variation: (1) U.S. security guarantees are not necessary to prevent dangerous rivalries and conflict in Eurasia; or (2) prevention of rivalry and conflict in Eurasia is not a U.S. interest. Each response is connected to a different theory or set of theories, which makes sense given that the whole debate hinges on a complex future counterfactual (what would happen to Eurasia’s security setting if the United States truly disengaged?). Although a certain answer is impossible, each of these responses is nonetheless a weaker argument for retrenchment than advocates acknowledge. The first response flows from defensive realism as well as other international relations theories that discount the conflict-generating potential of anarchy under contemporary conditions. 73 Defensive realists maintain that the high expected costs of territorial conquest, defense dominance, and an array of policies and practices that can be used credibly to signal benign intent, mean that Eurasia’s major states could manage regional multipolarity peacefully without the American pacifier. Retrenchment would be a bet on this scholarship, particularly in regions where the kinds of stabilizers that nonrealist theories point to—such as democratic governance or dense institutional linkages—are either absent or weakly present. There are three other major bodies of scholarship, however, that might give decisionmakers pause before making this bet. First is regional expertise. Needless to say, there is no consensus on the net security effects of U.S. withdrawal. Regarding each region, there are optimists and pessimists. Few experts expect a return of intense great power competition in a post-American Europe, but many doubt European governments will pay the political costs of increased EU defense cooperation and the budgetary costs of increasing military outlays. 74 The result might be a Europe that is incapable of securing itself from various threats that could be destabilizing within the region and beyond (e.g., a regional conflict akin to the 1990s Balkan wars), lacks capacity for global security missions in which U.S. leaders might want European participation, and is vulnerable to the influence of outside rising powers. What about the other parts of Eurasia where the United States has a substantial military presence? Regarding the Middle East, the balance begins to swing toward pessimists concerned that states currently backed by Washington— notably Israel, Egypt, and Saudi Arabia—might take actions upon U.S. retrenchment that would intensify security dilemmas. And concerning East Asia, pessimism regarding the region’s prospects without the American pacifier is pronounced. Arguably the principal concern expressed by area experts is that Japan and South Korea are likely to obtain a nuclear capacity and increase their military commitments, which could stoke a destabilizing reaction from China. It is notable that during the Cold War, both South Korea and Taiwan moved to obtain a nuclear weapons capacity and were only constrained from doing so by a still-engaged United States. 75 The second body of scholarship casting doubt on the bet on defensive realism’s sanguine portrayal is all of the research that undermines its conception of state preferences. Defensive realism’s optimism about what would happen if the United States retrenched is very much dependent on its particular—and highly restrictive—assumption about state preferences; once we relax this assumption, then much of its basis for optimism vanishes. Specifically, the prediction of post-American tranquility throughout Eurasia rests on the assumption that security is the only relevant state preference, with security defined narrowly in terms of protection from violent external attacks on the homeland. Under that assumption, the security problem is largely solved as soon as offense and defense are clearly distinguishable, and offense is extremely expensive relative to defense. Burgeoning research across the social and other sciences, however, undermines that core assumption: states have preferences not only for security but also for prestige, status, and other aims, and they engage in trade-offs among the various objectives. 76 In addition, they define security not just in terms of territorial protection but in view of many and varied milieu goals. It follows that even states that are relatively secure may nevertheless engage in highly competitive behavior. Empirical studies show that this is indeed sometimes the case. 77 In sum, a bet on a benign postretrenchment Eurasia is a bet that leaders of major countries will never allow these nonsecurity preferences to influence their strategic choices. To the degree that these bodies of scholarly knowledge have predictive leverage, U.S. retrenchment would result in a significant deterioration in the security environment in at least some of the world’s key regions. We have already mentioned the third, even more alarming body of scholarship. Offensive realism predicts that the withdrawal of the American pacifier will yield either a competitive regional multipolarity complete with associated insecurity, arms racing, crisis instability, nuclear proliferation, and the like, or bids for regional hegemony, which may be beyond the capacity of local great powers to contain (and which in any case would generate intensely competitive behavior, possibly including regional great power war). Hence it is unsurprising that retrenchment advocates are prone to focus on the second argument noted above: that avoiding wars and security dilemmas in the world’s core regions is not a U.S. national interest. Few doubt that the United States could survive the return of insecurity and conflict among Eurasian powers, but at what cost? Much of the work in this area has focused on the economic externalities of a renewed threat of insecurity and war, which we discuss below. Focusing on the pure security ramifications, there are two main reasons why decisionmakers may be rationally reluctant to run the retrenchment experiment. First, overall higher levels of conflict make the world a more dangerous place. Were Eurasia to return to higher levels of interstate military competition, one would see overall higher levels of military spending and innovation and a higher likelihood of competitive regional proxy wars and arming of client states—all of which would be concerning, in part because it would promote a faster diffusion of military power away from the United States. Greater regional insecurity could well feed proliferation cascades, as states such as Egypt, Japan, South Korea, Taiwan, and Saudi Arabia all might choose to create nuclear forces. 78 It is unlikely that proliferation decisions by any of these actors would be the end of the game: they would likely generate pressure locally for more proliferation. Following Kenneth Waltz, many retrenchment advocates are proliferation optimists, assuming that nuclear deterrence solves the security problem. 79 Usually carried out in dyadic terms, the debate over the stability of proliferationchanges as the numbers go up. Proliferation optimism rests on assumptions of rationality and narrow security preferences. In social science, however, such assumptions are inevitably probabilistic. Optimists assume that most states are led by rational leaders, most will overcome organizational problems and resist the temptation to preempt before feared neighbors nuclearize, and most pursue only security and are risk averse. Confidence in such probabilistic assumptions declines if the world were to move from nine to twenty, thirty, or forty nuclear states. In addition, many of the other dangers noted by analysts who are concerned about the destabilizing effects of nuclear proliferation—including the risk of accidents and the prospects that some new nuclear powers will not have truly survivable forces—seem prone to go up as the number of nuclear powers grows. 80 Moreover, the risk of “unforeseen crisis dynamics” that could spin out of control is also higher as the number of nuclear powers increases. Finally, add to these concerns the enhanced danger of nuclear leakage, and a world with overall higher levels of security competition becomes yet more worrisome. The argument that maintaining Eurasian peace is not a U.S. interest faces a second problem. On widely accepted realist assumptions, acknowledging that U.S. engagement preserves peace dramatically narrows the difference between retrenchment and deep engagement. For many supporters of retrenchment, the optimal strategy for a power such as the United States, which has attained regional hegemony and is separated from other great powers by oceans, is offshore balancing: stay over the horizon and “pass the buck” to local powers to do the dangerous work of counterbalancing any local rising power. The United States should commit to onshore balancing only when local balancing is likely to fail and a great power appears to be a credible contender for regional hegemony, as in the cases of Germany, Japan, and the Soviet Union in the midtwentieth century. The problem is that China’s rise puts the possibility of its attaining regional hegemony on the table, at least in the medium to long term. As Mearsheimer notes, “The United States will have to play a key role in countering China, because its Asian neighbors are not strong enough to do it by themselves.” 81 Therefore, unless China’s rise stalls, “the United States is likely to act toward China similar to the way it behaved toward the Soviet Union during the Cold War.” 82 It follows that the United States should take no action that would compromise its capacity to move to onshore balancing in the future. It will need to maintain key alliance relationships in Asia as well as the formidably expensive military capacity to intervene there. The implication is to get out of Iraq and Afghanistan, reduce the presence in Europe, and pivot to Asia— just what the United States is doing. 83 In sum, the argument that U.S. **security** commitments are unnecessary **for peace** is countered by a lot of scholarship, including highly influential realist scholarship. In addition, the argument that Eurasian peace is unnecessary for U.S. security is weakened by the potential for a large number of nasty security consequences as well as the need to retain a latent onshore balancing capacity that dramatically reduces the savings retrenchment might bring. Moreover, switching between offshore and onshore balancing could well be difªcult. Bringing together the thrust of many of the arguments discussed so far underlines the degree to which the case for retrenchment misses the underlying logic of the deep engagement strategy. By supplying reassurance, deterrence, and active management, the United States lowers security competition in the world’s key regions, thereby preventing the emergence of a hothouse atmosphere for growing new military capabilities. Alliance ties dissuade partners from ramping up and also provide leverage to prevent military transfers to potential rivals. On top of all this, the United States’ formidable military machine may deter entry by potential rivals. Current great power military expenditures as a percentage of GDP are at historical lows, and thus far other major powers have shied away from seeking to match top-end U.S. military capabilities. In addition, they have so far been careful to avoid attracting the “focused enmity” of the United States. 84 All of the world’s most modern militaries are U.S. allies (America’s alliance system of more than sixty countries now accounts for some 80 percent of global military spending), and the gap between the U.S. military capability and that of potential rivals is by many measures growing rather than shrinking. 85

### Plan

#### The United States federal government should provide initial funding for integral fast reactors using the S-PRISM design in the United States.

### Solvency

#### Plan results in successful commercial demonstration

**Kirsch et all 9** [Steve Kirsch, Bachelor of Science and a Master of Science in electrical engineering and computer science from the Massachusetts Institute of Technology, “The Integral Fast Reactor (IFR) project: Q&A”, collaborative attempt to answer questions regarding the integral fast reactor, contribution material, peer editing and review by George Stanford, PhD, a physicist, retired from Argonne National Laboratory, B.Sc. with Honours, Acadia University, M.A.,Wesleyan University, Ph.D. in experimental nuclear physics, Yale University, Tom Blees, Science Council for Global Initiatives, Carl Page, computer science professor at MSU, page last modified 2013]

Q. What's the next step?¶ The commercial demonstration should be a top national priority. A private consortium involving GE might be able to do it as well.¶ Ideally, Congress should fund DOE to have GE build a demonstration plant built. In order to expedite certification and licensing by the NRC, the most expeditious way would be to build a reactor vessel for $50 million, stick it at a university or national lab, and instead of filling it with sodium fill it with water. Build a mockup of the fuel assemblies, also out of non-radioactive material, and use that setup-which would require no licensing-as a prototype to demonstrate to the NRC the efficacy of the systems. For example, the NRC would say, what happens if you drop a fuel assembly when refueling. So you'd go over and run through it with the prototype. Once the thing is certified, you could drain it and use it in an actual power plant, where a single module would produce 380 MWe. They're designed to be built in power blocks of 2 reactor vessels each, feeding one large turbine that would put out 760 MW. You could fire up the first power block as soon as it's ready, even as you build further ones at the same facility. All would share a central control room and recycling facility.

#### That gets commercialization in a few years

**Blees 9** [“Integral Fast Reactors for the masses”, Brave New Climate, Posted on 12 February 2009 on post by Barry Brook, Professor of Climate Change @ University of Adelaide, Tom Blees, National Center for Atmospheric Research]

Well, it’s not magic but it is nearly sitting there. GE could start building one right away. It’s a question of political support from Obama and the Dept. of Energy. I’m expecting to have some high-level meetings of the principals very soon. With support from Obama we could have a working version of the PRISM up and running in 2-3 years, a full IFR in five (including a PRISM and the recycling facility). After that point, we could roll them out quickly because of their modularity, with companies from all over the world each getting a piece of the action. They could almost assuredly be built in the time frame of GE’s ABWR (3-4 years). I get into that whole time frame/economics thing in P4TP, and the latest info from all quarters (which I keep up with) gives me no reason to think those estimates are off. Your estimates of long time scales assume a rate predicated on a business-as-usual mode of operation. Mine do not. It is entirely feasible to make major inroads far faster than you project if the political will is there. Just as an example from the USA (in regard to your concerns about the money): The spent fuel fund has almost $30 billion dollars in it. If we decide to use IFRs to rid ourselves (productively) of spent fuel, that could build quite a few IFRs. In point of fact, going the IFR route is cheaper than business as usual (again, it’s in the book). As for the carbon deficit caused by building the plants, they are not only small but also there is no carbon penalty from mining and enrichment of uranium, which is unnecessary. So the “payback” time, if you will, is very short. The amount of building materials per megawatt is tiny compared to similar outputs of wind and solar generation. Their carbon deficit will be far greater than that of IFRs, with far less capacity available under any realistic scenario.

#### It’d expand globally

**Kirsch et all 9** [Steve Kirsch, Bachelor of Science and a Master of Science in electrical engineering and computer science from the Massachusetts Institute of Technology, “The Integral Fast Reactor (IFR) project: Q&A”, collaborative attempt to answer questions regarding the integral fast reactor, contribution material, peer editing and review by George Stanford, PhD, a physicist, retired from Argonne National Laboratory, B.Sc. with Honours, Acadia University, M.A.,Wesleyan University, Ph.D. in experimental nuclear physics, Yale University, Tom Blees, Science Council for Global Initiatives, Carl Page, computer science professor at MSU, page last modified 2013]

Q. If this is really so good, how come GE isn't building S-PRISM on their own nickel?¶ Nobody wants to risk it since it isn't a slam dunk. You don't get a reward if you solve global warming. And government funding doesn't seem to be so easy. DOE tried to get funding for GNEP (which included IFR technology) and got shot down (so far).¶ GE is a large conservative corporation. They already service a fleet of lightwater reactors, are building more of them around the world, and have the promise of yet more. It's hard enough in this country to move into new levels of reactor technology without trying to leapfrog straight into the 4th generation. Their 3rd generation ESBWR is in the 5th round of NRC certification, whereas the S-PRISM (a souped up and more developed version of the PRISM) isn't at the starting gate. These things take years at the glacial pace of the NRC, though of course if President Obama decided to go all Manhattan project on it we could most definitely get there quickly enough. If GE started pushing 4th generation breeder reactors, can you imagine the hue and cry from the antie groups? What's their incentive to do that? If they're convinced that ultimately we'll end up at 4th generation reactors anyway and they can make plenty of dough and keep a low profile just taking the go slow approach, don't you imagine that's exactly what they'll do? Besides, conceivably another country with whom we have nuclear technology sharing agreements might very well certify and build it before the NRC ever gets out of the starting gate, which would make it much easier for the eventual NRC certification.¶ Q. If this is really so good, how come someone in government isn't trying to get it restarted?¶ The DOE is attempting to resuscitate fast-reactor technology, as part of the GNEP (Global Nuclear Energy Partnership) initiative. See¶ http://www.gnep.energy.gov/gnepPRs/gnepPR011007.html, and http://www.gnep.energy.gov/.¶ The IFR is one form of fast-reactor technology (metallic fuel with pyroprocessing), but there are others -- inferior, according to the IFR scientists. The important thing these days is to get the U.S. back into a leadership role in the development and management of nuclear power, recognizing that recycling in fast reactors is necessary if the long-lived waste is to be consumed, and if the full energy potential of the uranium is to be exploited. The GNEP would resuscitate fast-reactor technology in this country.¶ Q. Critics claim fast reactors are “expensive to build, complex to operate, susceptible to prolonged shutdown as a result of even minor malfunctions, and difficult and time-consuming to repair.”¶ I'm not aware of anyone who is an expert on Integral Fast Reactor technology (who actually really understands the science) who has this view. One Nobel prize winning physicist who was recently briefed on the IFR (Burton Richter, former Director of SLAC) told me that, at best, there is insufficient scientific evidence to make such a statement. Is there someone who knows the fast reactor science as well as Dr. Chang or Dr. Till who holds that view? Certainly not the MIT study (as they admitted up front). So whose expert opinion are you relying on here?¶ Secondly, if your statement was true, then aren't these statements directly in direct conflict with the facts? If the critics are to be relied upon, then none of the following would have been possible at all:¶ – The Monju reactor was undamaged by the fire (rated 1 on a scale of 0 to 7, with 7 being the most serious accident), and has been kept shut down for political reasons. I think it has been given the go-ahead to start up.¶ – The EBR-II fast reactor worked flawlessly for many years (http://www.world-nuclear.org/info/inf98.html 31 years from 1963-1994)¶ – The Phenix fast reactor in France has been on-line for decades.¶ – The Superphenix reactor was shut down for political reasons, after it finally had its problems behind it and was working well.¶ – The Russian BN-600 has been working well for decades.¶ Ray Hunter was for the past 29 years as the former Deputy Director of the Office of Nuclear Energy, Science and Technology in the U.S. Department of Energy (DOE). Should his view count? Here's what he wrote to me:¶ My name is Ray Hunter. I am the former Deputy Director of the Office of Nuclear Energy, Science and Technology in the U.S. Department of Energy (DOE). I spent more than 29 years in DOE and the predecessor agencies working on developing advanced nuclear reactors for civilian nuclear power applications. After evaluating several alternatives, I came to the conclusion that a sodium cooled fast reactor using metal fuel and non aqueous reprocessing offered the best option to compliment and eventually replace Light Water Reactors (LWR’s). The basis for my conclusion was the successful proof of principle demonstration work completed by Argonne National Laboratory. It is important to understand that there were had two versions of the IFR concept; the second version involved a sodium cooled reactor using mixed uranium oxide and plutonium oxide fuel and aqueous reprocessing. The second version required separating Plutonium-239 for fabrication into new fuel which was considered to be a major proliferation issue. Unfortunately, the Clinton administration considered all fast reactors concepts as too much of a proliferation risk and cancelled all work on fast reactors. Actually, the decision to forgo processing of LWR fuel as enacted into law by 1982 Radioactive Waste Management Policy Act was the precursor for ending fast reactor technology development. The Department did continue to support in corporation with industry advanced LWR designs for future use. These advanced designs have been approved by the Nuclear Regulatory Commissions but none have been ordered in the U.S. because of the unresolved waste issue and the economic risk of trying to build and license a nuclear power plant in the U.S. Versions of these advanced LWR designs have already been built and are operating in Japan and South Korea.¶ The ill conceived U.S. policy of a once through LWR fuel cycle has never been adopted by any other nuclear power nation. According to Senator Reid, Yucca Mountain will not proceed as long as his any say in the matter. Until there is a path forward on LWR spent fuel, it is unlikely any new nuclear plant will be built in the U.S. The technical facts clearly show that the most cost effective and environmentally sound way to deal with LWR spent fuel is use the IFR concept with metal fuel and non aqueous reprocessing. While the proposed GNEP concept does not require plutonium separation, it is still based on oxide fuel and aqueous reprocessing which does allay proliferation concerns. Also, the GNEP concept is being offered as global solution for minimizing nuclear proliferation based on certain countries doing reprocessing including the U.S. but our current law precludes it. ¶ I am attaching a recent letter I sent to Senator Reid. In my judgment, we need to focus on the waste issue to break the logjam on nuclear power in the U.S. We don’t need to deploy the IFR in the private sector for the foreseeable future to get the benefits of expanded nuclear power use. If inviting the IAEA to oversee IFR facilities at government sites would promote acceptance of reprocessing, then we should proceed accordingly. Any thoughts you have on this matter would be appreciated.¶ Q. A lot of critics claim the plants will be too expensive to build.¶ The cost of a power plant is often expressed in terms of dollars per kilowatt of capacity. Every $1,000/kWe in initial cost adds, very roughly, one cent per kilowatt-hour to the cost of the electricity (assuming a 40-year write-off period and an interest rate of 8.5% per year).¶ The cost of a nuclear plant is very hard to predict these days, because it depends heavily on the regulatory climate. In more detail, here's something Eric Loewen (GE) has written on the subject of cost:¶ . . . This is not to say that PRISM or any other nuclear reactor will be inexpensive when built in the United States. The same GE Hitachi reactors that were built in Japan in the late 90s for about $1,400/kW are estimated to cost several times that much in the USA. Considering that the actual cost of raw materials is an insignificant portion of that price (about $35/kW), and that interest rates are at record low levels, the significantly higher price tags being bandied about by private utility companies reflects a regulatory/corporate/governmental environment that needs fixing. Part of the problem could be solved by a commitment to nuclear power from the federal government, streamlined licensing procedures for standardized designs, and shielding from interminable lawsuits like those that crippled the nuclear power industry in the 70s and 80s. ¶ There is nothing inherently uneconomical about nuclear power. Japan imports virtually all their building materials and has high labor costs. If they can build GE ABWR plants for a very reasonable price, there is no reason why the USA shouldn't be able to do the same.¶ Q. How many IFR plants do we need to replace all the coal plants in the US?¶ There are 200 nuclear plants now supplying 20% of our power. Coal provides about half our power. So you'd need about 400 new nuclear plants to displace all the coal plants.

#### Plug-compatibility and modularity are key to quick expansion

**Salmon 9** [Reuters, “Nuclear power: Going fast”, Felix Salmon, finance editor for Reuters, graduate of University of Glasgow, winner of 2010 Excellence in Statistical Reporting Award presented by the American Statistical Association, over a decade of financial reporting experience, JUNE 23, 2009]

I was offline most of yesterday attending a high-intensity series of presentations hosted by Esquire magazine in the magnificent suite of rooms at the top of the new Hearst tower. GE’s Eric Loewen was there, talking about nuclear power, and specifically what he calls a PRISM reactor — a fourth-generation nuclear power station which runs on the nuclear waste generated by all the previous generations of nuclear power stations.¶ PRISM is GE’s name for an integral fast reactor, or IFR, and it’s a pretty great technology. The amount of fuel which already exists for such reactors would be enough to power the world for millennia — no new mining needed. Fast reactors also solve at a stroke the problem of what to do with the vast amounts of nuclear waste which are being stockpiled unhappily around the world. They’re super-safe: if they fail they just stop working, they don’t melt down. And they can even literally replace coal power stations:¶ One nice thing about the S-PRISM is that they’re modular units and of relatively low output (one power block of two will provide 760 MW). They could be emplaced in excavations at existing coal plants and utilize the same turbines, condensers (towers or others), and grid infrastructure as the coal plants currently use, and the proper number of reactor vessels could be used to match the capabilities of those facilities. Essentially all you’d be replacing is the burner (and you’d have to build a new control room, of course, or drastically modify the current one). Thus you avoid most of the stranded costs. If stranded costs can thus be kept to a minimum, both here and, more importantly, in China, we’ll be able to talk realistically not just about stopping to build new coal plants but replacing the existing ones, even the newest ones.¶ And best of all they’re eminently affordable: Loewen showed that they could be profitable selling energy at just 5 cents per KwH — which means that you don’t need to price carbon emissions at all to make these power stations economically attractive.

#### IFR’s are more cost-effective than coal

**Nicholson 12** [“The Power Makers’ Challenge – and the need for Fission Energy (Part 2)”, Posted on 18 May 2012 by Barry Brook, Prof of Climate Change at U Adelaide, Energy Collective, Article by Martin Nicholson. Martin studied mathematics, engineering and electrical sciences at Cambridge University in the UK and graduated with a Masters degree in 1974. He has spent most of his working life as business owner and chief executive of a number of information technology companies in Australia, author of Energy in a Changing Climate, lead author of a 2011 paper in the journal Energy]

PART 2¶ Fission Energy¶ The big difference between a coal and fission energy is that coal is combusted (that is, burned in a chemical reaction with oxygen) to boil the water, whereas fission relies on a nuclear reaction by splitting uranium atoms to generate heat.¶ Fig. G.2 Fission Energy. From US Energy Information Administration (2008)¶ The most common type of nuclear fission reactors are thermal reactors called ‘light-water’ reactors (LWR). Thermal reactors were first used commercially to generate electricity in the late 1950s and there are now over 400 thermal reactors installed in more than 30 countries world-wide. Together they generate about 16% of the world’s electricity. France is one of the largest users of fission energy and gets almost 80% of its electricity from its 59 nuclear power stations.¶ Fig.G.1 Nuclear Power Plant. From Lange P (2009)¶ Both coal and fission reactor plants use fuels mined from the earth. A big difference is in the amounts of fuel. A 1,000 MW coal power station needs about 3 to 4 million tonnes of coal a year. A 1,000 MW fission reactor plant accounts for only about 150 to 200 tonnes of natural uranium a year. Less fuel used means less fuel to store and less waste. No huge coal storage areas and waste slag heaps containing toxic metals like arsenic and lead are needed for fission reactor plants, and there is no need for thousands of kilometres of coal freight trains.¶ Fission reactor fuel is significantly less expensive than coal per unit of energy generated. Fuel in a fission plant makes up about 5-10% of the cost of running the plant. For a coal plant that can be 30-60%. Fission energy is 30% cheaper than the least expensive CCS solution and less than half the cost of solar thermal.¶ Fig. G.3 Nuclear Fuel Cycles. From Chang Y (2010)¶ Coal and fission are both improving their efficiency in process technology. However light-water reactors use less than 1% of the energy in the natural uranium while coal plants use closer to 40% of the energy in the coal. Thus there is substantially greater scope for efficiency improvement with fission than fossil fuels. There are no physical impediments to extracting practically all the energy in the natural uranium by recycling the used fuel. Fission energy has the unique advantage of using a fuel with an energy density millions of times greater than any other known energy source.¶ Fission energy was a massive breakthrough in 1951, yet it has only been exploited to a fraction of its potential. Since those early days of ‘atomic’ energy, as it used to be called, it has steadily expanded despite some heavy setbacks in the 1980s. Unlike other energy sources, it is on the brink of improving its efficiency 100 fold. This is unlikely to be possible for any existing renewable energy resources or fossil fuels. So why do many in the community still resist using it?

#### IFR’s are really safe

**Blees et al 11** (Tom Blees1, Yoon Chang2, Robert Serafin3, Jerry Peterson4, Joe Shuster1, Charles Archambeau5, Randolph Ware3, 6, Tom Wigley3,7, Barry W. Brook7, 1Science Council for Global Initiatives, 2Argonne National Laboratory, 3National Center for Atmospheric Research, 4University of Colorado, 5Technology Research Associates, 6Cooperative Institute for Research in the Environmental Sciences, 7(climate professor) University of Adelaide, "Advanced nuclear power systems to mitigate climate change (Part III)," 2/24/11) http://bravenewclimate.com/2011/02/24/advanced-nuclear-power-systems-to-mitigate-climate-change/-http://bravenewclimate.com/2011/02/24/advanced-nuclear-power-systems-to-mitigate-climate-change/

Metal Fuel: The Ultimate Safety Valve¶ One of the most important of the many superlatives of the IFR is its use of a metal fuel comprised of uranium, plutonium and zirconium, and the ingenious manner in which the Argonne team solved the problems of fuel expansion and fuel fabrication, as well as the potentially dangerous overheating scenario. Unlike the fuel fabrication of oxide-fueled reactors that requires the dimensions of the fuel pellets to be uniform to very exacting tolerances, the metal fuel for the IFR can be simply injected into molds and then cooled and inserted into metal tubes (cladding) with a great deal of dimensional tolerance, with a sodium bond filling any voids. If an accident situation occurs that would cause the core to overheat, such as a loss of coolant flow accident, the metal fuel itself will expand, causing neutron leakage to terminate the chain reaction, relying on nothing but the laws of physics.¶ The passive safety characteristics of the IFR were tested in EBR-II on April 3, 1986, against two of the most severe accident events postulated for nuclear power plants. The first test (the Loss of Flow Test) simulated a complete station blackout, so that power was lost to all cooling systems. The second test (the Loss of Heat Sink Test) simulated the loss of ability to remove heat from the plant by shutting off power to the secondary cooling system. In both of these tests, the normal safety systems were not allowed to function and the operators did not interfere. The tests were run with the reactor initially at full power.¶ In both tests, the passive safety features simply shut down the reactor with no damage. The fuel and coolant remained within safe temperature limits as the reactor quickly shut itself down in both cases. Relying only on passive characteristics, EBR-II smoothly returned to a safe condition without activation of any control rods and without action by the reactor operators. The same features responsible for this remarkable performance in EBR-II will be incorporated into the design of future IFR plants, regardless of how large they may be [xi].¶ While the IFR was under development, a consortium of prominent American companies led by General Electric collaborated with the IFR team to design a commercial-scale reactor based upon the EBR-II research. This design, currently in the hands of GE, is called the PRISM (Power Reactor Innovative Small Module). A somewhat larger version (with a power rating of 380 MWe) is called the S-PRISM. As with all new nuclear reactor designs (and many other potentially hazardous industrial projects), probabilistic risk assessment studies were conducted for the S-PRISM. Among other parameters, the PRA study estimated the frequency with which one could expect a core meltdown. This occurrence was so statistically improbable as to defy imagination. Of course such a number must be divided by the number of reactors in service in order to convey the actual frequency of a hypothetical meltdown. Even so, if one posits that all the energy humanity requires were to be supplies solely by IFRs (an unlikely scenario but one that is entirely possible), the world could expect a core meltdown about once every 435,000 years [xii]. Even if the risk assessment understated the odds by a factor of a thousand, this would still be a reactor design that even the most paranoid could feel good about.

#### Plan causes international modeling

**Blees et al** 11 (Tom Blees1, Yoon Chang2, Robert Serafin3, Jerry Peterson4, Joe Shuster1, Charles Archambeau5, Randolph Ware3, 6, Tom Wigley3,7, Barry W. Brook7, 1Science Council for Global Initiatives, 2Argonne National Laboratory, 3National Center for Atmospheric Research, 4University of Colorado, 5Technology Research Associates, 6Cooperative Institute for Research in the Environmental Sciences, 7(climate professor) University of Adelaide, "Advanced nuclear power systems to mitigate climate change (Part III)," 2/24/11) <http://bravenewclimate.com/2011/02/24/advanced-nuclear-power-systems-to-mitigate-climate-change/-http://bravenewclimate.com/2011/02/24/advanced-nuclear-power-systems-to-mitigate-climate-change/>

There are many compelling reasons to pursue the rapid demonstration of a full-scale IFR, as a lead-in to a subsequent global deployment of this technology within a relatively short time frame. Certainly the urgency of climate change can be a potent tool in winning over environmentalists to this idea. Yet political expediency—due to widespread skepticism of anthropogenic causes for climate change—suggests that the arguments for rolling out IFRs can be effectively tailored to their audience. Energy security—especially with favorable economics—is a primary interest of every nation.¶ The impressive safety features of new nuclear power plant designs should encourage a rapid uptick in construction without concern for the spent fuel they will produce, for all of it will quickly be used up once IFRs begin to be deployed. It is certainly manageable until that time. Burying spent fuel in non-retrievable geologic depositories should be avoided, since it represents a valuable clean energy resource that can last for centuries even if used on a grand scale.¶ Many countries are now beginning to pursue fast reactor technology without the cooperation of the United States, laboriously (and expensively) re-learning the lessons of what does and doesn’t work. If this continues, we will see a variety of different fast reactor designs, some of which will be less safe than others. Why are we forcing other nations to reinvent the wheel? Since the USA invested years of effort and billions of dollars to develop what is arguably the world’s safest and most efficient fast reactor system in the IFR, and since several nations have asked us to share this technology with them (Russia, China, South Korea, Japan, India), there is a golden opportunity here to develop a common goal—a standardized design, and a framework for international control of fast reactor technology and the fissile material that fuels them. This opportunity should be a top priority in the coming decade, if we are serious about replacing fossil fuels worldwide with sufficient pace to effectively mitigate climate change and other environmental and geopolitical crises of the 21st century.

#### Modularity is key – economies of scale

**Barton 13** [Charles, Lecturer in the Department of Physics at The University of York, February 24, 2013, “Small Nuclear Power and Nuclear Scalability”, Nuclear Green Energy]

We have, at present, many useful nuclear technological ideas that could help with carbon technology replacement. The best of them would use advanced forms of nuclear power. Small reactors can be constructed in factories. By increasing the number of reactors manufactured in the factory, costs can be lowered. Small reactors can be housed in caves or mines or in underground silos that can protect reactors from aircraft and other forms of terrorism. Power reactors can be built at old coal fired steam plant sites thus replacing dirty coal with clean nuclear power. All of these would tend to lower the cost of nuclear generated electricity.¶ Factory produced small reactors can be build in large numbers over relatively short periods of time. By increasing the number of factory built small reactors, we lower the cost of individual units and thus decreasing the amount of time it would take to replace carbon technology in electrical generation with nuclear generated electricity. There are a significant number of different nuclear technologies that can be build in large numbers quickly. Since we lack evidence that would help us to determine which of them is the best, we ought to pick out several as most promising and move forward with them quickly.¶ China has given us an example of this. The Chinese have built a prototype of a small Pebble Bed Reactor and are spending several hundred million dollars a year to develop Molten Salt Reactors as well as Liquid Sodium Breeder Reactors.

#### NRC licensing not required

**Shellenberger and Nordhaus 13** [January 24, 2013, Michael Shellenberger, Ted Nordhaus, “America’s nuclear future”, leading global thinkers on energy, climate, security, human development, and politics, The Breakthrough Institute]

Consider the fact that the DOE can, at one of its labs, go ahead with an experimental fission system that is not approved by the Nuclear Regulatory Commission (NRC). After all, the DOE is supposed to develop new technologies, while the NRC is supposed to deal with things in the civilian nuclear world.¶ In other words, the labs don't need NRC approval to make a 5MW version of TerraPower's reactor. They could just go do it. But it's so agonizing to get [lab] approval for that kind of thing. So political.

#### Stable, continual funding key to certainty and effectiveness of DOE labs

**Shellenberger and Nordhaus 13** [January 24, 2013, Michael Shellenberger, Ted Nordhaus, “America’s nuclear future”, leading global thinkers on energy, climate, security, human development, and politics, The Breakthrough Institute]

Is the problem with Congress or DOE?¶ Both. At DOE there are a lot of layers of bureaucracy and very little continuity. Everything changes with every new administration. The long-term goals change. The result is that the labs have become very conservative.¶ With a system that keeps changing its priorities every few years, the labs are pretty demoralized. We cannot get a coherent accepted long-term plan. The French have a long-term plan. The Koreans, the Chinese, the Russians have it. We don't have it. That's not the fault of the labs, that's the fault of the administrations.¶ Is this a problem of ideological and partisan polarization?¶ George W. Bush actually had a good program on next generation nuclear. We were part of the Generation IV International Forum, working closely with Japan and France. We had a program that was headed toward certain kinds of advanced reactors, including liquid sodium, and a high temperature gas reactor. When the Obama people came in all the Gen IV activities were stopped. Yucca Mountain was shut down. And we're off in totally new directions.¶ Partly, but there were even changes between the first George W. Bush term and the second. In first term, they were talking about reprocessing, and the second Gen IV designs. We have an on again off again program that changes too often. The next problem is the budget. The DOE nuclear budget is a complete mess. They are working off of a continuing resolution, and in that process you always take the lower budget line from either the Senate or House. This creates massive amounts of uncertainty in the programs.¶ Who can change that? Can Obama just tell the labs to build a next gen nuclear reactor?¶ No, it has to go to Congress to change. The whole structure has to change.¶ What’s your general impression of the integral fast reactor (IFR), the prototype of which ran at Argonne-West [which is now part of Idaho] National Lab, and is now being marketed by General Electric as the PRISM reactor?¶ The IFR is a sodium-cooled fast spectrum reactor with all the good and bad that come with it. The one sodium cooled reactor at Hanford ran for thirty years until we drilled a hole into it [after Congress ended funding for it in 1994]. France and Russia built versions as well.¶ What's new to the IFR is the on-site reprocessing, and the feeding back of the actinides [radioactive elements like uranium and plutonium] back into the fuel, so that nothing ever leaves it. The new IFR trick is in the electrorefining [sometimes called pyroprocessing] to reprocess the waste into new fuel, making it a continuous fuel cycle. So think of the IFR as a liquid sodium fast spectrum breeder reactor with a trick as to how to do the separation of actinides in an effective fashion.

#### Nuclear terrorism is extremely likely and is comparatively the largest threat to international stability

**Jaspal 12** – Associate Professor at the School of Politics and International Relations, Quaid-i-Azam University, Islamabad, Pakistan

(Zafar Nawaz, “Nuclear/Radiological Terrorism: Myth or Reality?”, Journal of Political Studies, Vol. 19, Issue - 1, 2012, 91:111, dml)

The misperception, miscalculation and above all ignorance of the ruling elite about security puzzles **are perilous** for the national security of a state. Indeed, in an age of transnational terrorism and **unprecedented dissemination of dualuse nuclear technology**, ignoring nuclear terrorism threat is an imprudent policy choice. The incapability of terrorist organizations to engineer fissile material **does not eliminate** completely the possibility of nuclear terrorism. At the same time, the absence of an example or precedent of a nuclear/ radiological terrorism **does not qualify the assertion** that the nuclear/radiological terrorism ought to be remained a myth. Farsighted rationality obligates that one should not miscalculate **transnational terrorist groups** — whose behavior suggests that they have a death wish — of acquiring nuclear, radiological, chemical and biological material producing capabilities. In addition, one could be sensible about the published information that **huge amount of nuclear material** is spread around the globe. According to estimate it is enough to build **more than** 120,000 **Hiroshima-sized nuclear bombs** (Fissile Material Working Group, 2010, April 1). The alarming fact is that a few storage sites of nuclear/radiological materials **are inadequately secured** and continue to be accumulated in unstable regions (Sambaiew, 2010, February). Attempts at stealing fissile material had already been discovered (Din & Zhiwei, 2003: 18). Numerous evidences confirm **that terrorist groups had aspired to acquire fissile material** for their terrorist acts. Late Osama bin Laden, the founder of al Qaeda stated that acquiring nuclear weapons was a“religious duty” (Yusufzai, 1999, January 11). The IAEA also reported that “al-Qaeda was actively seeking an atomic bomb.” Jamal Ahmad al-Fadl, a dissenter of Al Qaeda, in his trial testimony had “revealed his extensive but unsuccessful efforts to acquire enriched uranium for al-Qaeda” (Allison, 2010, January: 11). On November 9, 2001, Osama bin Laden claimed that “we have chemical and nuclear weapons as a deterrent and if America used them against us we reserve the right to use them (Mir, 2001, November 10).” On May 28, 2010, Sultan Bashiruddin Mahmood, a Pakistani nuclear scientist confessed that he met Osama bin Laden. He claimed that “I met Osama bin Laden before 9/11 not to give him nuclear know-how, but to seek funds for establishing a technical college in Kabul (Syed, 2010, May 29).” He was arrested in 2003 and after extensive interrogation by American and Pakistani intelligence agencies he was released (Syed, 2010, May 29). Agreed, Mr. Mahmood did not share nuclear know-how with Al Qaeda, but his meeting with Osama establishes the fact that the terrorist organization was in contact with nuclear scientists. Second, the terrorist group **has sympathizers in the nuclear scientific bureaucracies**. It also authenticates bin Laden’s Deputy Ayman Zawahiri’s claim which he made in December 2001: “If you have $30 million, go to the black market in the central Asia, contact any disgruntled Soviet scientist and a lot of dozens of smart briefcase bombs are available (Allison, 2010, January: 2).” The covert meetings between nuclear scientists and al Qaeda members **could not be interpreted as idle threats** and thereby the threat of nuclear/radiological terrorism is real. The 33Defense Secretary Robert Gates admitted in 2008 that “what keeps every senior government leader awake at night is the thought of a terrorist ending up with a weapon of mass destruction, especially nuclear (Mueller, 2011, August 2).” Indeed, **the nuclear deterrence strategy** cannot deter **the transnational terrorist syndicate** from nuclear/radiological terrorist attacks. Daniel Whiteneck pointed out: “**Evidence suggests**, for example, that al Qaeda might not only use WMD simply to demonstrate the magnitude of its capability but that it might actually welcome **the escalation of a strong U.S. response**, **especially if it included** catalytic effects **on governments** and societies in the Muslim world. An adversary that prefers escalation regardless of the consequences cannot be deterred” (Whiteneck, 2005, Summer: 187) Since taking office, President Obama has been reiterating that “nuclear weapons represent the ‘gravest threat’ to United States and international security.” While realizing that the US could not prevent nuclear/radiological terrorist attacks singlehandedly, he launched 47an international campaign to convince the international community about the increasing threat of nuclear/ radiological terrorism. He stated on April 5, 2009: “Black market trade in nuclear secrets and nuclear materials abound. The technology to build a bomb has spread. Terrorists are determined to buy, build or steal one. Our efforts to contain these dangers are centered on **a global non-proliferation regime**, but as more people and nations break the rules, we could reach the point where **the center cannot hold** (Remarks by President Barack Obama, 2009, April 5).” He added: “One terrorist with one nuclear weapon could unleash massive destruction. Al Qaeda has said it seeks a bomb and that it would have no problem with using it. And we know that there is unsecured nuclear material across the globe” (Remarks by President Barack Obama, 2009, April 5). In July 2009, at the G-8 Summit, President Obama announced the convening of a Nuclear Security Summit in 2010 to deliberate on the mechanism to “secure nuclear materials, combat nuclear smuggling, and prevent nuclear terrorism” (Luongo, 2009, November 10). President Obama’s nuclear/radiological threat perceptions were also accentuated by the United Nations Security Council (UNSC) Resolution 1887 (2009). The UNSC expressed its grave concern regarding ‘the threat of nuclear terrorism.” It also recognized the need for all States “to take effective measures to prevent nuclear material or technical assistance becoming available to terrorists.” The UNSC Resolution called “for universal adherence to the Convention on Physical Protection of Nuclear Materials and its 2005 Amendment, and the Convention for the Suppression of Acts of Nuclear Terrorism.” (UNSC Resolution, 2009) The United States Nuclear Posture Review (NPR) document revealed on April 6, 2010 declared that “terrorism and proliferation are far greater threats **to the United States and international stability**.” (Security of Defence, 2010, April 6: i). The United States declared that it reserved the right to“hold fully accountable” any state or group “that supports or enables terrorist efforts to obtain or use weapons of mass destruction, whether by facilitating, financing, or providing expertise or safe haven for such efforts (Nuclear Posture Review Report, 2010, April: 12)”. This declaration underscores the possibility that terrorist groups could acquire fissile material from the rogue states.

#### IFR can solves alt-causes

**Blees 12** [“Roads Not Taken (yet)”, Posted on 31 May 2012 by Tom Blees. Tom Blees is the author of Prescription for the Planet – The Painless Remedy for Our Energy & Environmental Crises. Tom is also the president of the Science Council for Global Initiatives and a board member of the UN-affiliated World Energy Forum [wef21.org]. Many of the goals of SCGI, and the methods to achieve them, are elucidated in the pages of Blees’s book. He is a member of the selection committee for the Global Energy Prize, considered Russia’s equivalent of the Nobel Prize for energy research. His work has generated considerable interest among scientists and political figures around the world. Tom has been a consultant and advisor on energy technologies on the local, state, national, and international levels, Brave New Climate]

This state of affairs would completely overturn the energy status quo. Liquid fuels could be generated with the excess power in a number of different ways. Hydrogen derived from electrolysis of water could be combined with nitrogen from the air to produce ammonia, which is not only a widely-used fertilizer but can also be used as a liquid fuel for automobiles or trucks. And of course the deployment of electric vehicles would be far more desirable once their electricity wasn’t being generated by dirty coal.¶ After a decade-long conversion to IFRs, the fossil fuel industries would soon be on their way out. Coal would be first, the direct victim of the conversion. But natural gas and oil wouldn’t have much time left either. And let’s not forget that desalination projects (and the energy to move the freshwater to wherever it’s needed) would be possible on hitherto unimagined scales, enabling semi-arid and even arid regions to bloom.¶ Had the IFR road been taken in 1994, we would be well along on this path, and greenhouse gas emissions would be diminishing rapidly and on their way to a negligible level. Instead, emissions are rising precipitously, methane is bubbling out of the tundra, and the prospects for a future of severe weather, population dislocation from rising sea levels, and even runaway greenhouse effects threaten our very survival.

# 2AC

### AT: Past the Tipping Point

#### Carbon cuts delay warming to solve adaptation – solves the tipping point

**Sydney Morning Herald 13** [Reuters, “Climate change damage can be limited by carbon cuts: study”, January 14, 2013]

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

### AT: Safety

#### IFR’s are really safe

**Blees et al 11** (Tom Blees1, Yoon Chang2, Robert Serafin3, Jerry Peterson4, Joe Shuster1, Charles Archambeau5, Randolph Ware3, 6, Tom Wigley3,7, Barry W. Brook7, 1Science Council for Global Initiatives, 2Argonne National Laboratory, 3National Center for Atmospheric Research, 4University of Colorado, 5Technology Research Associates, 6Cooperative Institute for Research in the Environmental Sciences, 7(climate professor) University of Adelaide, "Advanced nuclear power systems to mitigate climate change (Part III)," 2/24/11) http://bravenewclimate.com/2011/02/24/advanced-nuclear-power-systems-to-mitigate-climate-change/-http://bravenewclimate.com/2011/02/24/advanced-nuclear-power-systems-to-mitigate-climate-change/

Metal Fuel: The Ultimate Safety Valve¶ One of the most important of the many superlatives of the IFR is its use of a metal fuel comprised of uranium, plutonium and zirconium, and the ingenious manner in which the Argonne team solved the problems of fuel expansion and fuel fabrication, as well as the potentially dangerous overheating scenario. Unlike the fuel fabrication of oxide-fueled reactors that requires the dimensions of the fuel pellets to be uniform to very exacting tolerances, the metal fuel for the IFR can be simply injected into molds and then cooled and inserted into metal tubes (cladding) with a great deal of dimensional tolerance, with a sodium bond filling any voids. If an accident situation occurs that would cause the core to overheat, such as a loss of coolant flow accident, the metal fuel itself will expand, causing neutron leakage to terminate the chain reaction, relying on nothing but the laws of physics.¶ The passive safety characteristics of the IFR were tested in EBR-II on April 3, 1986, against two of the most severe accident events postulated for nuclear power plants. The first test (the Loss of Flow Test) simulated a complete station blackout, so that power was lost to all cooling systems. The second test (the Loss of Heat Sink Test) simulated the loss of ability to remove heat from the plant by shutting off power to the secondary cooling system. In both of these tests, the normal safety systems were not allowed to function and the operators did not interfere. The tests were run with the reactor initially at full power.¶ In both tests, the passive safety features simply shut down the reactor with no damage. The fuel and coolant remained within safe temperature limits as the reactor quickly shut itself down in both cases. Relying only on passive characteristics, EBR-II smoothly returned to a safe condition without activation of any control rods and without action by the reactor operators. The same features responsible for this remarkable performance in EBR-II will be incorporated into the design of future IFR plants, regardless of how large they may be [xi].¶ While the IFR was under development, a consortium of prominent American companies led by General Electric collaborated with the IFR team to design a commercial-scale reactor based upon the EBR-II research. This design, currently in the hands of GE, is called the PRISM (Power Reactor Innovative Small Module). A somewhat larger version (with a power rating of 380 MWe) is called the S-PRISM. As with all new nuclear reactor designs (and many other potentially hazardous industrial projects), probabilistic risk assessment studies were conducted for the S-PRISM. Among other parameters, the PRA study estimated the frequency with which one could expect a core meltdown. This occurrence was so statistically improbable as to defy imagination. Of course such a number must be divided by the number of reactors in service in order to convey the actual frequency of a hypothetical meltdown. Even so, if one posits that all the energy humanity requires were to be supplies solely by IFRs (an unlikely scenario but one that is entirely possible), the world could expect a core meltdown about once every 435,000 years [xii]. Even if the risk assessment understated the odds by a factor of a thousand, this would still be a reactor design that even the most paranoid could feel good about.

### SMR’s CP

Coal retrofit k/t solve warming

Doesn’t provide commercialization

Reprocesisng k/t solve proliferation and terror to eat up spent fuel

Links to ptx nuke unpop

Base personnel don’t have the requisite training to operate SMRs effectively -- means the aff fails.

Parthemore & Rogers, ‘10

[Christine, Fellow, Will, Bacevich Fellow, Center for New American Security, “Nuclear Reactors on Military Bases May Be Risky,” Center for a New American Security, 5-20, http://www.cnas.org/node/4502]

Many serious complications must be weighed as well. Military base personnel often do not have the necessary training in nuclear reactor management, oversight and regulatory credentials. Nuclear reactors would necessitate additional qualified personnel and improved physical security requirements to meet the 24/7 operations needs. As with siting for all energy production, local public resistance could be problematic. When considering the impact of a reactor casualty, the resulting impact on the operational mission effectiveness of the tenant commands on the base must also be considered so as to avoid a single point vulnerability that disables all military operations on site. And while many private companies are touting new designs for small reactors that would work well in this capacity, the technology may still be years away from fully meeting technical requirements and federal regulatory standards.13 Proliferation considerations would also need to be part of any adjudication of what types of reactors are most suitable for these purposes.

#### Siting issues prevent solvency.

#### King et al., ‘11

[Marcus, Research Analyst and Project Director at CNA Corporation's Center for Naval Analyses, LaVar Huntzinger, Thoi Nguyen, March, “Feasibility of Nuclear Power on U.S. Military Installations,” http://www.cna.org/sites/default/files/research/Nuclear%20Power%20on%20Military%20Installations%20D0023932%20A5.pdf]

Finding specific sites for nuclear power plants on or near military installations will be challenging. There are many considerations that affect whether a site is appropriate. Some of the considerations relate to safety and others to limiting risks of attack or sabotage, and still others to public opinion. Being located on a military installation provides some advantages, but it also imposes some constraints on how portions of the installation near the nuclear power plant can be used. Trade-offs will be required.

#### Military SMRs cause huge vulnerabilities -- magnifies safety concerns and makes attacks on spent fuel inevitable -- outweighs any benefits.

Baker, 6-22-12

[Matthew, American Security Project, “Do Small Modular Reactors Present a Serious Option for the Military’s Energy Needs?” <http://americansecurityproject.org/blog/2012/do-small-modular-reactors-present-a-serious-option-for-the-militarys-energy-needs/>]

The speakers at the DESC briefing suggested a surge is needed in SMR production to combat a major vulnerability in America’s national security: possible attacks to the power grid. Such attacks could cause blackouts for over a year according to Congressman Bartlett, leading to blackouts never before experienced in the United States. In such an event the U.S. military would still need to function 24/7. Current predictions made by the DESC suggest that up to 90% of the US military’s energy needs could be supplied by SMRs.¶ Congressman Bartlett also pointed out that current military bases such as Guam – which is fueled by the transport of diesel – are extremely vulnerable should the energy transport system be disrupted. Fuel supplies are even more unstable in Afghanistan, where one out of every twenty-four convoys results in a casualty. According to Congressman Bartlett, SMRs could make such bases energy self-sufficient.¶ Unfortunately all the hype surrounding SMRs seems to have made the proponents of SMR technology oblivious to some of its huge flaws.¶ Firstly like large reactors, one of the biggest qualms that the public has to nuclear is problems associated with nuclear waste. A more decentralized production of nuclear waste inevitably resulting from an increase in SMRs production was not even discussed. The danger of transporting gas into some military bases in the Middle East is already extremely volatile; dangers of an attack on the transit of nuclear waste would be devastating.¶ Secondly, SMRs pose many of the same problems that regular nuclear facilities face, sometimes to a larger degree. Because SMRs are smaller than conventional reactors and can be installed underground, they can be more difficult to access should an emergency occur. There are also reports that because the upfront costs of nuclear reactors go up as surface area per kilowatt of capacity decreases, SMRs will in fact be more expensive than conventional reactors.¶ Thirdly, some supporters of SMR technology seem to have a skewed opinion of public perception toward nuclear energy. Commissioner of the U.S. Nuclear Regulatory Commission, William C. Ostendorff, didn’t seem to think that the recent Fukushima disaster would have any impact on the development on SMRs. Opinion polls suggest Americans are more likely to think that the costs of nuclear outweigh its benefits since the Fukushima disaster. For SMRs to be the philosopher’s stone of the military’s energy needs the public needs to be on board.¶ The DESC’s briefing did illustrate the hype that the nuclear community has surrounding SMRs, highlighting some pressing issues surrounding the military’s energy vulnerability. But proponents of SMRs need to be more realistic about the flaws associated with SMRs and realize that the negative impacts of nuclear technology are more costly than its benefits.

#### Plan key to naval readiness

**Banks 13** [“The Decline of America’s Civil Nuclear Industry and its Impact on Our National Security”, February 9, 2013, Dave Banks, a policy advisor to Heartland and the Director of D.C. Operations for the Alliance of Wise Energy Decisions]

A decline in the civil nuclear sector is also likely to negatively impact American military capabilities. Maintaining U.S. nuclear naval fleet preparedness with top recruits could become more difficult with fewer domestic commercial opportunities. The U.S. nuclear Navy is able to attract the best recruits with the prospect of significant civilian employment opportunities after they leave military service. And in turn, the success of the U.S. commercial nuclear power industry – in terms of operating efficiency, safety, and effectiveness – comes in part from the well-trained and disciplined personnel that are supplied by the U.S. nuclear Navy.

#### Great power war

Eaglen and McGrath 11 [5/16/11, Mackenzie, research fellow for national security – Heritage, and Bryan, former naval officer and director – Delex Consulting, Studies and Analysis, “Thinking About a Day Without Sea Power: Implications for U.S. Defense Policy,” Heritage Foundation]

Global Implications. Under a scenario of dramatically reduced naval power, the United States would cease to be active in any international alliances. While it is reasonable to assume that land and air forces would be similarly reduced in this scenario, the lack of credible maritime capability to move their bulk and establish forward bases would render these forces irrelevant, even if the Army and Air Force were retained at today’s levels. In Iraq and Afghanistan today, 90 percent of material arrives by sea, although material bound for Afghanistan must then make a laborious journey by land into theater.¶ China’s claims on the South China Sea, previously disputed by virtually all nations in the region and routinely contested by U.S. and partner naval forces, are accepted as a fait accompli, effectively turning the region into a “Chinese lake.” China establishes expansive oil and gas exploration with new deepwater drilling technology and secures its local sea lanes from intervention. Korea, unified in 2017 after the implosion of the North, signs a mutual defense treaty with China and solidifies their relationship.¶ Japan is increasingly isolated and in 2020–2025 executes long-rumored plans to create an indigenous nuclear weapons capability.[11] By 2025, Japan has 25 mobile nuclear-armed missiles ostensibly targeting China, toward which Japan’s historical animus remains strong.¶ China’s entente with Russia leaves the Eurasian landmass dominated by Russia looking west and China looking east and south. Each cedes a sphere of dominance to the other and remains largely unconcerned with the events in the other’s sphere.¶ Worldwide, trade in foodstuffs collapses. Expanding populations in the Middle East increase pressure on their governments, which are already stressed as the breakdown in world trade disproportionately affects food importers. Piracy increases worldwide, driving food transportation costs even higher.¶ In the Arctic, Russia aggressively asserts its dominance and effectively shoulders out other nations with legitimate claims to seabed resources. No naval power exists to counter Russia’s claims.¶ India, recognizing that its previous role as a balancer to China has lost relevance with the retrenchment of the Americans, agrees to supplement Chinese naval power in the Indian Ocean and Persian Gulf to protect the flow of oil to Southeast Asia. In exchange, China agrees to exercise increased influence on its client state Pakistan.¶ The great typhoon of 2023 strikes Bangladesh, killing 23,000 people initially, and 200,000 more die in the subsequent weeks and months as the international community provides little humanitarian relief. Cholera and malaria are epidemic.¶ Iran dominates the Persian Gulf and is a nuclear power. Its navy aggressively patrols the Gulf while the Revolutionary Guard Navy harasses shipping and oil infrastructure to force Gulf Cooperation Council (GCC) countries into Tehran’s orbit. Russia supplies Iran with a steady flow of military technology and nuclear industry expertise. Lacking a regional threat, the Iranians happily control the flow of oil from the Gulf and benefit economically from the “protection” provided to other GCC nations.¶ In Egypt, the decade-long experiment in participatory democracy ends with the ascendance of the Muslim Brotherhood in a violent seizure of power. The United States is identified closely with the previous coalition government, and riots break out at the U.S. embassy. Americans in Egypt are left to their own devices because the U.S. has no forces in the Mediterranean capable of performing a noncombatant evacuation when the government closes major airports.¶ Led by Iran, a coalition of Egypt, Syria, Jordan, and Iraq attacks Israel. Over 300,000 die in six months of fighting that includes a limited nuclear exchange between Iran and Israel. Israel is defeated, and the State of Palestine is declared in its place. Massive “refugee” camps are created to house the internally displaced Israelis, but a humanitarian nightmare ensues from the inability of conquering forces to support them.¶ The NATO alliance is shattered. The security of European nations depends increasingly on the lack of external threats and the nuclear capability of France, Britain, and Germany, which overcame its reticence to military capability in light of America’s retrenchment. Europe depends for its energy security on Russia and Iran, which control the main supply lines and sources of oil and gas to Europe. Major European nations stand down their militaries and instead make limited contributions to a new EU military constabulary force. No European nation maintains the ability to conduct significant out-of-area operations, and Europe as a whole maintains little airlift capacity.¶ Implications for America’s Economy. If the United States slashed its Navy and ended its mission as a guarantor of the free flow of transoceanic goods and trade, globalized world trade would decrease substantially. As early as 1890, noted U.S. naval officer and historian Alfred Thayer Mahan described the world’s oceans as a “great highway…a wide common,” underscoring the long-running importance of the seas to trade.[12]

#### No neg fiat – no counter-resolution means no legitimate basis for neg offense

#### Plan key to nuclear arsenal

**Jones 12** [The Hill, “US must remain leader in nuclear enrichment”, Retired General James L. Jones, senior fellow at the Bipartisan Policy Center and co-chairman of its Energy Project. He was national security adviser to President Obama from January 2009 to November 2010, 01/17/12]

The disappearance of a domestically owned capability would not only undermine U.S. leadership in a highly consequential arena of global commerce and security, it would render us dependent on foreign-controlled sources of uranium enrichment. This could increase the vulnerability not only of America’s commercial nuclear industry but of our national nuclear arsenal. Tritium, produced using enriched uranium, is necessary to maintain and modernize our nuclear weapons. Relying on foreign suppliers for material essential for maintaining the safety, security and reliability of our nuclear capability is unacceptable.

**Credible nuclear arsenal deters all war and solves Russia and China nuclear war**

**Payne ’12** – professor and head of Defense and Strategic Studies at Missouri State

(Dr. Keith B., Testimony to the Congressional Strategic Posture Commission, United States Senate Appropriations Subcommittee on Energy and Water Development, 7-25-2012)

The GNZC report, however, essentially dismisses this concern by asserting that Russia and China are not now opponents and are unlikely ever to be so again: “The risk of nuclear confrontation between the United States and either Russia or China belongs to the past, not the future.” Such a prediction fits the narrative for further deep reductions, but it does not appear to fit Russian or Chinese actions and statements concerning their ambitions and nuclear developments. Over the past several years, top Russian leaders have made numerous threats of pre-emptive and preventive nuclear attack against US allies and friends. Most recently, the Chief of the Russian General Staff, Gen. Nikolai Makarov threatened a pre-emptive attack against NATO states, and the threat was implicitly nuclear. 11 (Please see the attached compilation of Russian nuclear threats since 2007 by Dr. Mark Schneider). Such threats challenge Western sensibilities and faith in a powerful, global nuclear “taboo,” but they are within the norm of Russian behavior and doctrine regarding nuclear forces. To claim that nuclear weapons will not be salient in contemporary or future US relations with Russia or China is an unwarranted and highly optimistic prediction, not a prudent basis for calculating US deterrence strategies and forces. If wrong, Minimum Deterrence and corresponding low force levels could invite serious risk and provocations. Second, the question of having an adequate deterrence capability cannot be answered simply by determining if we can threaten some given, contemporary set of targets. Deterrence must work in contemporary and future crises, and we will come to those crises with the forces we have in hand. No one knows with confidence “how much of what force” will be necessary for credible deterrence now, and future requirements are particularly arcane because opponents and threats can shift rapidly in this post-Cold War era and the requirements for deterrence correspondingly can change rapidly. This reality complicates the task of calculating “how much is enough” for deterrence. The priority deterrence question now is whether we have sufficient force options and diversity to threaten credibly the wide spectrum of targets that opponents may value over the course of decades. In some plausible scenarios, a small and undiversified US nuclear force may be adequate for deterrence, in other cases, effective deterrence may demand a large and diverse nuclear arsenal with capabilities well beyond those envisaged for Minimum Deterrence. Confident declarations that some fixed Minimum Deterrence force level will prove adequate cannot be based on substance; they reflect only hope and carry considerable risk. Instead, the flexibility and resilience of our forces to adapt to differing deterrence requirements should be considered a fundamental requirement of US force adequacy, and our standing capabilities must be sufficiently large and diverse to adapt to a variety of shifting deterrence demands. It may be convenient to pick some fixed, low number and claim that 300, 400, or 500 weapons will be adequate for deterrence now and in the future, but no one can possibly know if such statements are true. We do know that the more diverse and flexible our forces, the more likely we are to have the types of capabilities needed for deterrence in a time of shifting and uncertain threats, stakes and opponents. But force diversity and flexibility does not come automatically. It is important that our nuclear force posture and infrastructure incorporate these characteristics and that they are manifest to opponents and allies for deterrence and assurance purposes respectively.

#### Conditionality is bad – generates 2ac strategic skew by disincentivizng best use of offense – creates argumentative irresponsibility making debate poor advocate training – rigorous pre-round research solves offense

### Adv CP

Perm

Links to ptx

NFU fails – not credible nobody would follow

No model

Plif req incentive

#### Carbon sequestration captures so little CO2 that it would actually increase the net amount of CO2 in the atmosphere, exacerbating global warming

Bast, 2k3 (Joseph, president of the Heartland institute, “Statement of Joseph L. Bast President, The Heartland Institute”, http://web.lexis-nexis.com.proxy.lib.umich.edu/congcomp/document?\_m=0a9740655fca62f7bd18f2faed28fca4&\_docnum=4&wchp=dGLzVzz-zSkSA&\_md5=3e9453e4b6ede045bce699f185c89f25)

Even if a carbon sequestration program benefited farmers, it would do little to moderate global warming. Agricultural soils in the U.S. today capture only one-twentieth of 1 percent of total annual greenhouse gas emissions, according to EPA, or 1 percent according to USDA. According to EPA, agricultural greenhouse emissions are 35 times greater than the amount being sequestered. And once saturation levels were reached, there could be no more gains on cropland with known farming systems, meaning sequestration is not a long-term solution. The biggest gains in carbon storage occur when cropland is returned to forests. Subsidizing tree planting, however, would reduce U.S. farm exports and prompt more farm output in countries where there are no artificial constraints on farming. This would lead to more clearing of forests in Third World countries, where deforestation is already a major problem. On a global scale, more carbon, not less, would be released into the atmosphere.

#### Case turns solvency – a crisis means the project stops and warming becomes inevitable

**Robock 8** – is a professor of climatology in the Department of Environmental Sciences at Rutgers University and the associate director of its Center for Environmental Prediction. Prof. Robock has been a researcher in the area of climate change for more than 30 years. His current research focuses on soil moisture variations, the effects of volcanic eruptions on climate, effects of nuclear war on climate, and regional atmosphere/hydrology modeling. He has served as Editor of climate journals, including the Journal of Climate and Applied Meteorology and the Journal of Geophysical Research-Atmospheres. He has published more than 250 articles on his research, including more than 150 peer-reviewed papers (Alan, May/June, “20 reasons why geoengineering may be a bad idea” http://www.atmos.washington.edu/academics/classes/2012Q1/111/20Reasons.pdf) Jacome

10.Rapid warming if deployment stops.A technological, societal, or political crisis could halt a project of stratospheric aerosol injection in mid- deployment.

Such an abrupt shift would result in rapid climate warming, which would produce much more stress on society and ecosystems than gradual global warming.17

#### CP fails and causes extinction

**Mark 9 –** co-manager at San Francisco's Alemany Farm and the editor of the quarterly environmental magazine, Earth Island Journal. (Jason, September 24th “Geoengineering Could Save the Planet, and in the Process Sacrifice the World,” <http://www.alternet.org/story/142687/geo-engineering_could_save_the_planet_%C3%A2%E2%82%AC%C2%A6_and_in_the_process_sacrifice_the_world/?page=entire>) Jacome

Earth is busted. Like a supercomputer whose elaborate code has developed a few bugs, the core operating systems of the planet are frayed: Ocean populations are collapsing, forests are disappearing, soils have become thin. Perhaps most worrisome, the globe's atmosphere, the ecosystem on which all other ecosystems depend, is overheating. The machinery of life appears to have malfunctioned. Since the scale of the climate crisis became clear, the strategy for fixing this glitch has focused on remediation. To maintain the atmosphere's equilibrium, we need to reduce our emissions of greenhouse gases. Our chief goal should be to return the climate to something approximating the pre-industrial status quo. But what if such a return isn't possible? What if the planet has gone permanently haywire? As the effects of climate change become obvious and global leaders remain unable to halt emissions, a growing number of scientists say we need to begin researching what's called "geo-engineering" -- ways to artificially reduce global temperatures and/or manipulate plants or the oceans to absorb huge amounts of CO2. Having unintentionally warmed the planet, we may have little choice but to intentionally cool it back down. Even those most interested in geo-engineering say that the idea of deliberately deforming the planet in order to save it from ourselves is, as Stanford University's Ken Caldeira told NPR this summer, "scary." Yet if we shy away from manipulating the whole globe and continue on our present course, we could be left with a burnt Earth unlike anything ever seen. The scientists who are encouraging government-funded research into geo-engineering are driven by a powerful motive: fear. All too aware of the implications of unchecked CO2 emissions -- and worried that political systems aren't moving quickly enough to respond to changes in the planet's physical systems -- these scientists say we may have no other option than to tinker with the sky. That some of the world's foremost climatologists are contemplating this measure of last resort reveals how desperate our predicament is. We face the prospect of leaping into a new epoch of planetary history, one in which a single species will be responsible for all other life here. Or else finding some way of accommodating ourselves to the world as we have undone it. This places us at a moral moment involving a dangerous gamble. Do we chance toying with the entire atmosphere? Can we afford not to? Possible geo-engineering technologies range from the whimsy of science fiction to the purely hypothetical to the unsettlingly plausible. Some are so outlandish they defy gravity. A few have undergone small-scale experimentation. At least one has the advantage of a real-world analogue. All remain on the drawing board. None are free from concerns about unintended consequences. Geo-engineering schemes fall into two categories: attempts to absorb the CO2 in the atmosphere and efforts to manipulate the way Earth reflects sunlight, called the planet's "albedo." The first group is less controversial, because such techniques mimic natural processes. They are, however, slower, which reduces their effectiveness as a response to the kind of climate emergencies some scientists fear. Devices to re-jigger the planet's albedo can seem more worrisome, as they would create what critics have dubbed a "Frankenplanet." They are also more likely to work. One idea for absorbing CO2 involves seeding the oceans with iron to spur plankton blooms, which inhale large amounts of carbon and then die, pulling the gas to the bottom of the sea. Another brainstorm suggests that by creating "biochar" we can arrest the amount of carbon dioxide that naturally goes into the atmosphere during plant decay. Giant kilns would take agricultural waste and dead trees and, using a process called pyrolysis, burn them without using oxygen. The resulting CO2-laden charcoal then would be buried. If that proves unfeasible, some scientists say we could genetically modify plants to absorb more of the heat-trapping gas. Or, in case that doesn't work, Professor Klaus Lackner at Columbia University proposes building "synthetic trees" that will capture CO2 and turn it into a liquid form to store underground. The second line of thought entails reducing the sunlight that strikes the planet. In a global version of pulling down the shades, this would cool temperatures and at least ameliorate the greenhouse effect. Roger Angel, a professor at the University of Arizona, imagines launching a trillion mirrors into a stable orbit between Earth and the sun, creating a kind of space-based umbrella. Or we could build a fleet of 1,500 computer-directed boats that will splash seawater into the clouds to make them whiter. John Latham of the National Center for Atmospheric Research predicts that increasing the reflective power of the clouds by three percent could offset humanity's contribution to global warming. Another method of cooling the planet involves spraying sulfur dioxide into the stratosphere as a way to deflect sunlight. Until recently, such outlandish ideas weren't discussed in polite company, for fear that loose talk about geo-engineering would distract from the goal of doing everything possible to halt greenhouse gas emissions. Now, a significant number of influential people are taking the idea seriously. The US National Academy of Science held a one-day conference in June to discuss the idea. Last fall, the British Royal Academy of Sciences launched a study to examine geo-engineering options and their risks. NASA is looking at ways of managing how solar radiation hits the planet. Some environmentalists are also interested. In an essay published last year in Orion, Mike Tidwell, a veteran climate activist, wrote: "Human beings must quickly figure out some sort of mechanical or chemical means of reflecting a portion of the sun's light away from our planet … Like it or not, we are where we are." An indicator of the force of the idea -- and the touchy politics surrounding the subject -- came in April, when John Holdren, head of President Obama's Office of Science and Technology Policy, said in an interview with the Associated Press that he had mentioned geo-engineering in White House discussions. After the account came out, Holdren rushed to clarify his statements, saying that geo-engineering, though it warrants study, isn't an alternative to curbing emissions. Holdren's defensiveness is revealing. His carefully parsed statements show that few scientists are enthusiastic about the notion of engineering Earth. Even those who are curious about the possibilities are anxious over the prospect of actual deployment. "It's not anything that anybody should look on with any sort of glee," Ken Caldeira, a fellow at the Carnegie Institution at Stanford, told me recently. "It's the kind of thing that you hope you don't need. But I don't see anything in our current policies that makes me think we will reduce emissions in time." "When you are talking about global modification of the environment, that's scary, because it would be the most ambitious -- and some would say arrogant and dangerous -- experiment in human history," Samuel Thernstrom, a fellow at the American Enterprise Institute and a vocal proponent of increased geo-engineering research, says. "Geo-engineering is neither a perfect solution nor a permanent one. You'd have to be crazy to consider this a first, best option." The mixed emotions surrounding geo-engineering hint at a dark mood. Among those who understand the climate science best, there is a creeping resignation that we won't make the hard choices necessary to halt catastrophic global warming. This is, it seems to me, a staggering admission just at a time when, to avert disaster, we need a buoyant sense of potential. If mitigation (reducing emissions) is the hope of the idealist, and adaptation (preparing for rising waters) is the consolation of the realist, then geo-engineering (call it circumvention) has become the refuge of the cynic. Geo-engineering assumes that although we may be able to alter how the planet works, we are incapable of changing the way we run the world. Of course, idealism is often a privilege, and cynicism in unflinching wisdom. Which proves that geo-engineering -- dystopian though it may be -- is at least honest, the last chance of survival for a planet on the brink of collapse. But can it work? According to climatologists, the answer is … perhaps. Many geo-engineering proposals are flawed. The mirrors-in-space scheme is wildly implausible. The physics of launching 20 million tons of material into space is untested, and the plan would cost about $400 trillion. The iron fertilization of the ocean had generated optimism until an experiment earlier this year dampened hopes. When the theory was tested in a 115-square-mile area of the Southern Ocean, tiny crustacean zooplankton ate up all the phytoplankton. The idea of whipping up ocean spray to whiten the clouds seems possible. Climate models, however, suggest that the benefits would only be regional. A prototype of an artificial "tree" that uses plastic, resin-coated "leaves" to capture carbon has shown promise. But, as with any kind of carbon sequestration, it's unclear where all the carbon would be stored. The geo-engineering proposal attracting the most attention is the one that involves injecting a sulfur dioxide (SO2) aerosol into the atmosphere as a way of reflecting more sunlight back into space. Unlike the other geo-engineering proposals, the sulfur scheme has already undergone a successful experiment -- by the planet itself. In 1991, Mount Pinatubo, a long-smoldering volcano on the Philippine island of Luzon, blew its top off in an explosion 10 times stronger than the Mount St. Helens eruption. The volcano hurled a stream of ash 22 miles into air. An estimated 20 million tons of sulfur dioxide were let loose into the stratosphere, where they turned into droplets of sulfuric acid that scattered the sun's light. During the next year, global temperatures dropped by half a degree Celsius; the summer melt at the top of the Greenland ice sheet slowed. Computer models have demonstrated that humans could replicate the Pinatubo experience. Artificial stratospheric sulfur injection could cool the planet just enough to offset the greenhouse effect, giving us a buffer from the worst effects of global warming as we reduce emissions. "A continuous injection of a few tens of kilograms per second would be enough to offset a doubling of CO2," Caldeira says. "You could imagine deploying a system one percent this year and two percent next year and three percent next year. And if something bad happened, you could taper it off. From an environmental perspective, that is probably the lowest risk approach." Caldeira and other scientists have imagined several ways to get sulfur to the top of the planet. One option is to use powerful artillery to launch the aerosol. Another method would employ giant, high-altitude blimps equipped with hoses to carry sulfur from the planet's surface to the sky. The sulfur strategy has key advantages. SO2 is plentiful, a byproduct of the very coal combustion that is warming the planet. And the price is cheap. As little as $1 billion a year could decrease sunlight by one percent. That is far less than the cost of ratcheting down global CO2 emissions. The plausibility of the sulfur concept has provided realism to the geo-engineering discussion. Still, no one is arguing that we employ geo-engineering next year, or even in five years. For now, the consensus in the scientific community is that there should be an internationally coordinated research program. Even critics say more study is needed. "There should be government funding for geo-engineering," says Alan Robock, a Rutgers University meteorologist who has a National Science Foundation grant to investigate geo-engineering. Last year, Robock published a paper in The Bulletin of the Atomic Scientists titled "20 Reasons Why Geoengineering May Be a Bad Idea." "Let's say there was a global warming emergency," he told me. "Policy makers would want to know, Would it work? Could we do it? Should we do it? And right now we don't know how to advise them. But if there is no Plan B, we should know that too." "There are no reasons not to have a research program," Thernstrom said to me. "There is no advantage to ignorance on geo-engineering." Research alone seems harmless enough. If caution warns against the consequences of jury-rigging the atmosphere, prudence argues that it's wise to have a backup plan in case of climate disaster. As Ken Caldeira put it, a coastal city would want to have dykes to protect itself against storm surges and sea level rise. But that doesn't mean city leaders wouldn't also have an evacuation plan in case the dykes failed. Geo-engineering is that evacuation plan. Only in this case, the evacuation would be a retreat from the entire world, the planet as we have always known it. If we spray tons of sulfur into the air and, as scientists expect, it turns the sky a milky shade (while making sunsets a deep, blood red), we will alter not just Earth, but also ourselves, our understanding of how we fit within the natural environment. This is itself a dicey experiment. If we were to make the clouds glossy and the sky white, dot the horizon with dirigibles in a kind of Blade Runner set piece, what would be the impact on the collective human psyche? We may be technologically capable of hacking the sky, but politically and ethically unprepared to do so. After all, it's been more than 20 years since the public learned that there were "human fingerprints" on the global climate. And as the impasse over emissions reductions proves, we still haven't come to terms with the moral implications of that fact. Are we ready, then, to go a step further and put our hand on a lever controlling the weather? The idea of dimming the sun carries a number of problems. First, take the ethical conundrum of unequal benefits. What if world leaders decided to deploy the sulfur option and, as one climate model has suggested, an engineered cooling led to a decrease in monsoon rains over Asia? In such a scenario, geo-engineering could benefit some 5 billion people, while putting another 2 billion people in danger of drought and famine. The risk of unequal benefits connects to a second difficult question: Who would control such powerful technology? Few people would want the US (or Chinese) military to run the weather. Corporate control would have its own drawbacks. As Robock put it to me: "Would you trust the ExxonMobil geo-engineering unit?" Leaving management of a makeshift sky to the lowest bidder seems imprudent, to say the least. Thernstrom says one of the virtues of geo-engineering is precisely this centralized control. While unilateral emissions reductions are pointless, unilateral geo-engineering could work. Any industrial power could likely do it on its own -- which means you don't need collective action to cool the planet; you just need countries not to object. But even if the major powers agreed to cool the globe, reaching consensus on how exactly wouldn't be simple. "How do we even decide what the temperature of the planet will be?" Robock wonders. "Whose hand will be on the thermostat? What if Russia and Canada decide they want it warmer and India wants it cooler? How do you decide those things?" Imagine that the United Nations took control of the planetary thermostat. That would prevent any country from having a monopoly over geo-engineering or, worse, having several countries deploy geo-engineering at cross-purposes. But UN oversight would still involve geo-politics. It's been close to impossible to get the major polluters to agree to emissions reductions. Finding cooperation on something as powerful as geo-engineering would be at least as complicated. That's a concern of James Lovelock, founder of the Gaia theory. Lovelock's new book, The Vanishing Face of Gaia, warns that climate change will wreck civilization. Still, he doesn't think that geo-engineering provides a way out. "If we can't predict what's happening now, how can we predict what's happening in 50 years with some kind of artificial mechanism?" he said to me in a conversation this summer. "It's just moonshine. I think that if we ever take on the task of trying to manage the planet completely -- if we succeed with geo-engineering and we have to run the planet ourselves, doing what the system now does for free -- that we will be on a course for extinction. Because we can never manage it. We haven't learned to live with ourselves yet."

#### Doesn’t solve ocean acidification which leads to extinction

**Robock 8** – is a professor of climatology in the Department of Environmental Sciences at Rutgers University and the associate director of its Center for Environmental Prediction. Prof. Robock has been a researcher in the area of climate change for more than 30 years. His current research focuses on soil moisture variations, the effects of volcanic eruptions on climate, effects of nuclear war on climate, and regional atmosphere/hydrology modeling. He has served as Editor of climate journals, including the Journal of Climate and Applied Meteorology and the Journal of Geophysical Research-Atmospheres. He has published more than 250 articles on his research, including more than 150 peer-reviewed papers (Alan, May/June, “20 reasons why geoengineering may be a bad idea” http://www.atmos.washington.edu/academics/classes/2012Q1/111/20Reasons.pdf) Jacome

2. Continued ocean acidification.

If humans adopted geoengineering as a solution to global warming, with no restriction on continued carbon emissions, the ocean would continue to become more acidic, because about half of all excess carbon dioxide in the atmosphere is removed by ocean uptake. The ocean is already 30 percent more acidic than it was before the Industrial Revolution, and continued acidification threatens the entire oceanic biological chain, from coral reefs right up to humans.7

### Immigration DA

#### Doesn’t solve competitiveness

#### Immigrants don’t contribute more to entrepreneurship, their studies cook the data

**Miano, 9 -** – IT worker, founder of the Programmer’s Guild (John, “The America-Bashers”, 12/4,

http://www.cis.org/miano/americabashers)

The fuel for this American-bashing comes from some recent studies that use techniques right out of the book How to Lie with Statistics that cook data for the very purpose of belittling natives.

Immigrants make up about 12.5 percent of the U.S. population. These studies report that immigrants found about 25 percent of the companies. From that you are to conclude "Americans are unwilling or unable to contribute their fair share."

Here's how the gaming of the data works: Compare apples to oranges. It not that 25 percent of the founders are immigrants but rather 25 percent of the companies have immigrant founders.

To illustrate, take Intel, Hewlett-Packard, Google, and Microsoft (four big names in the industry).

Their founders are Intel: Robert Noyce (born Iowa) and Gordon Moore (born California); HP: William Hewlett (born Michigan) and David Packard (born Colorado); Google: Larry Page (born Michigan) and Sergey Brin (born Soviet Union); and Microsoft: William Gates (born Washington) and Paul Allen (born Washington).

Among these founders, 1 in 8 is an immigrant -- the same representation as in the nation as a whole. However 1 in 4 of the companies is founded by an immigrant.

The purpose of using the measurement is to artificially inflate the contributions of immigrants for the purpose of promoting more guest workers From this number trick, you are supposed to conclude Americans are not doing their "fair share."

If you really wanted to compare immigrant founders to native founders, you would need to know the average number of founders being considered. If the average number is founders is 2, immigrants would have to be founding 23 percent of companies to be doing their "fair share." If the average number is 3, immigrants would have to be founding 32 percent of companies. If it's 4, immigrants should be founding 40 percent of companies. None of these studies purporting to show disproportionate immigrant founding report the number of people they considered as founders.

This denigration of Americans even goes so far as to claim that Intel was founded by immigrants. That's not what Intel says, unless of course you count people born in Iowa or California as immigrants.

You've heard it all before: Americans can't do math. Americans can't read. Americans can't program. Americans don't do their fair share. If that were the case, America should be like Somalia.

The end game of this American-bashing is to obtain more cheap foreign labor through guest worker visas. Use bogus statistics to "prove" Americans are not doing their "fair share" to get more cheap labor overseas to drive more Americans out of work where they won't be doing their fair share.

This is not to say that immigrants have not made major contributions to economy -- they have. However, the anti-Americans who throw around these bogus statistics need to be called on the carpet for their abuse of this country and its citizens.

#### Not top of the agenda and not passing now

Kathleen Hennessey (writer for the LA Times) 3/25, 2013 “Obama tries to push stalled immigration talks forward” http://www.latimes.com/news/politics/la-pn-obama-stalled-immigration-talks-20130325,0,7503326.story

Obama’s time frame may be tough for senators to reach. U.S. Sen. Patrick J. Leahy (D-Vt.), chairman of the judiciary committee, already has cast doubt on the chances of getting a bill through his committee by the end of April. Even if the bill comes to the floor next month a vote would not necessarily follow quickly. Senate Majority Leader Harry Reid (D-Nev.) has said he plans to let senators debate the legislation at length, and there remains no clear path for the bill through the Republican-led House.¶ The senators remain deadlocked over several issues, including the details of a guest-worker program and how the legislation will implement and define security at the border.

#### PC not key

Amie Parnes and Justin Sink (writers for The Hill) 3/20, 2013 “Obama honeymoon may be over” http://thehill.com/homenews/administration/289179-obama-honeymoon-may-be-over

The White House disputes any notion that Obama has lost any political capital in recent weeks.¶ “The president set out an ambitious agenda and he’s doing big things that are not easy, from immigration to gun control,” the senior administration official said. “Those are policies you can’t rack up easily, and no one here is naive about that.”¶ The White House is aware that the clock is ticking to push its hefty agenda, but the official added, “The clock is not ticking because of president’s political capital. The clock is ticking because there’s a timetable in achieving all of this. [Lawmakers] are not going to sign on because the president’s popular.” ¶ And administration officials believe they still have the leverage.

#### Econ thumps

Xinhua News March 26, 2013 “Obama pushes Congress to put forward immigration bill next month” http://news.xinhuanet.com/english/world/2013-03/26/c\_124501794.htm

About 63 percent of Americans agree that the immigration system should deal with immigrants who are currently living in the country by allowing them a way to become citizens, according to a survey released last Thursday by the Public Religion Research and the Brookings Institution.¶ However, a bad news for supporters of immigration reform is that among the seven issues with political priority for the White House and Congress, immigration only ranked sixth, far behind economic issues.

#### **Guns too**

Steve Holland (writer for Reuters) March 28, 2013 “Obama makes impassioned plea for gun control legislation” http://www.reuters.com/article/2013/03/28/us-usa-obama-agenda-idUSBRE92R11J20130328

President Barack Obama attempted on Thursday to inject fresh momentum into efforts to pass gun-control legislation, pleading with U.S. lawmakers not to forget those shot to death in Newtown, Connecticut three months ago.¶ Amid signs that he may have to accept a scaled-down version of gun legislation, Obama sounded a note of frustration in calling upon Americans to demand action from the U.S. Congress in the weeks ahead.

#### **Not intrinsic – rational policymaker can do plan and pass immigration**

#### **Floating city solves worker crisis – immigration regulations**

McKendrick, 2011 (Joe is a contributing editior and is an independent analyst who tracks the impact of information technology on management and markets. He is the author of the SOA Manifesto and has written for Forbes, ZDNet and Database Trends & Applications. He holds a degree from Temple University. smart planet, CBS Interactive has unveiled a new website dedicated to people who realize the need to make our world a better place to live, for all of us, and for generations to come. “Tech Skills shortage solution, set up workplace in international waters” <http://www.smartplanet.com/blog/business-brains/tech-skills-shortage-solution-set-up-workplace-in-international-waters/20333?tag=content;siu-container>)

The Silicon Valley tech scene is again one of the brightest stars in the US economy, but its growth is hitting a ceiling: there just aren’t enough visionary entrepreneurs, skilled engineers, developers, technicians and other professionals to sustain growth. Hampering the ability to attract global talent — which has fueled the growth of the US tech industry in the past — is a limit on the number of foreign entrepreneurs or workers that can enter and work within the country. Currently, work visas are capped at 140,000 people a year. With recent economic conditions, there has been considerable pressure on Congress to maintain restrictions on the inflow of foreign workers.¶ One entrepreneur, however, has come up with an interesting workaround to the challenge: anchor a large ship off the coast of San Fransisco, in international waters, and recruit professionals from other nations to work on board.¶ Blueseed, a startup incubator (and startup itself), proposes to set such a ship afloat as a “high-tech visa-free entrepreneurship and technology incubator on an ocean vessel in international waters.” The ship will be positioned as “a short ferry ride away from Silicon Valley so that great ideas and talent from around the world can live, work, and play while having convenient access to the San Francisco Bay Area.” International entrepreneurs and professionals would be able to use tourist or short-term business visas — which are easier to obtain the work visas — to take regular jaunts to the mainland.

#### Plan’s a concession to Rubio

**OTI citing Rubio 12** [On The Issues, citing Marco Rubio “Marco Rubio on Energy & Oil”, last updated Dec 23, 2012]

I dislike cap-&-trade, but it is inevitable as national law¶ The previous summer the governor had issued a series of executive orders instituting global warming cap-and-trade regulations, which would become law unless the legislature overrode them. We passed a bill that instructed Florida's Dept. of Environmental Protection to create an outline of cap-and-trade plan for the state. However, the plan couldn't take effect unless the legislature approved it. The governor signed it because he could claim he got a signature initiative passed by the legislature. The legislature passed it because we knew we could stop it later.¶ [During the Senate primary], Crist falsely claimed I had supported cap and trade. He cited an interview in which I made the assumption that some form of cap and trade would eventually become national law. I suggested that Florida should prepare for the inevitable by adopting a policy of its own. But I didn't support cap and trade. I wrote an opinion piece denouncing the governor's executive orders shortly after he announced them.¶ Source: An American Son, by Marco Rubio, p.157-158 , Jun 19, 2012¶ Cap-and-trade scheme destroys jobs¶ As a U.S. senator, I would oppose a national energy tax on American consumers, farmers and business owners. At a time when our economy is struggling, a cap-and-trade scheme would further strain family budgets and destroy jobs. Creating jobs in the energy sectors and becoming more energy efficient requires entrepreneurial innovation, not big government mandates. Instead of higher energy bills and job losses, the American people deserve a comprehensive, job-creating energy policy.¶ Source: 2010 Senate campaign website, www.marcorubio.com, "Issues" , Feb 3, 2010¶ Explore ANWR & outer continental shelf¶ I support a comprehensive energy plan that encourages nuclear energy, exploration in the Arctic National Wildlife Refuge and environmentally safe leasing of oil and natural gas fields in the outer continental shelf and on federally owned lands with oil shale in the West. As senator, I will stand for policies that make us more energy efficient, less reliant on foreign sources of oil, create jobs and ease the burden on family budgets.

#### He’s key to immigration

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

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

#### PC’s not real and thumpers disprove

Michael Hirsch (chief correspondent for National Journal, previously served as the senior editor and national economics correspondent for Newsweek, based in its Washington bureau) February 7, 2013 “There’s No Such Thing as Political Capital” <http://www.nationaljournal.com/magazine/there-s-no-such-thing-as-political-capital-20130207>

On Tuesday, in his State of the Union address, President Obama will do what every president does this time of year. For about 60 minutes, he will lay out a sprawling and ambitious wish list highlighted by gun control and immigration reform, climate change and debt reduction. In response, the pundits will do what they always do this time of year: They will talk about how unrealistic most of the proposals are, discussions often informed by sagacious reckonings of how much “political capital” Obama possesses to push his program through.¶ Most of this talk will have no bearing on what actually happens over the next four years.¶ Consider this: Three months ago, just before the November election, if someone had talked seriously about Obama having enough political capital to oversee passage of both immigration reform and gun-control legislation at the beginning of his second term—even after winning the election by 4 percentage points and 5 million votes (the actual final tally)—this person would have been called crazy and stripped of his pundit’s license. (It doesn’t exist, but it ought to.) In his first term, in a starkly polarized country, the president had been so frustrated by GOP resistance that he finally issued a limited executive order last August permitting immigrants who entered the country illegally as children to work without fear of deportation for at least two years. Obama didn’t dare to even bring up gun control, a Democratic “third rail” that has cost the party elections and that actually might have been even less popular on the right than the president’s health care law. And yet, for reasons that have very little to do with Obama’s personal prestige or popularity—variously put in terms of a “mandate” or “political capital”—chances are fair that both will now happen.¶ What changed? In the case of gun control, of course, it wasn’t the election. It was the horror of the 20 first-graders who were slaughtered in Newtown, Conn., in mid-December. The sickening reality of little girls and boys riddled with bullets from a high-capacity assault weapon seemed to precipitate a sudden tipping point in the national conscience. One thing changed after another. Wayne LaPierre of the National Rifle Association marginalized himself with poorly chosen comments soon after the massacre. The pro-gun lobby, once a phalanx of opposition, began to fissure into reasonables and crazies. Former Rep. Gabrielle Giffords, D-Ariz., who was shot in the head two years ago and is still struggling to speak and walk, started a PAC with her husband to appeal to the moderate middle of gun owners. Then she gave riveting and poignant testimony to the Senate, challenging lawmakers: “Be bold.”¶ As a result, momentum has appeared to build around some kind of a plan to curtail sales of the most dangerous weapons and ammunition and the way people are permitted to buy them. It’s impossible to say now whether such a bill will pass and, if it does, whether it will make anything more than cosmetic changes to gun laws. But one thing is clear: The political tectonics have shifted dramatically in very little time. Whole new possibilities exist now that didn’t a few weeks ago.¶ Meanwhile, the Republican members of the Senate’s so-called Gang of Eight are pushing hard for a new spirit of compromise on immigration reform, a sharp change after an election year in which the GOP standard-bearer declared he would make life so miserable for the 11 million illegal immigrants in the U.S. that they would “self-deport.” But this turnaround has very little to do with Obama’s personal influence—his political mandate, as it were. It has almost entirely to do with just two numbers: 71 and 27. That’s 71 percent for Obama, 27 percent for Mitt Romney, the breakdown of the Hispanic vote in the 2012 presidential election. Obama drove home his advantage by giving a speech on immigration reform on Jan. 29 at a Hispanic-dominated high school in Nevada, a swing state he won by a surprising 8 percentage points in November. But the movement on immigration has mainly come out of the Republican Party’s recent introspection, and the realization by its more thoughtful members, such as Sen. Marco Rubio of Florida and Gov. Bobby Jindal of Louisiana, that without such a shift the party may be facing demographic death in a country where the 2010 census showed, for the first time, that white births have fallen into the minority. It’s got nothing to do with Obama’s political capital or, indeed, Obama at all.¶ The point is not that “political capital” is a meaningless term. Often it is a synonym for “mandate” or “momentum” in the aftermath of a decisive election—and just about every politician ever elected has tried to claim more of a mandate than he actually has. Certainly, Obama can say that because he was elected and Romney wasn’t, he has a better claim on the country’s mood and direction. Many pundits still defend political capital as a useful metaphor at least. “It’s an unquantifiable but meaningful concept,” says Norman Ornstein of the American Enterprise Institute. “You can’t really look at a president and say he’s got 37 ounces of political capital. But the fact is, it’s a concept that matters, if you have popularity and some momentum on your side.”¶ The real problem is that the idea of political capital—or mandates, or momentum—is so poorly defined that presidents and pundits often get it wrong. “Presidents usually over-estimate it,” says George Edwards, a presidential scholar at Texas A&M University. “The best kind of political capital—some sense of an electoral mandate to do something—is very rare. It almost never happens. In 1964, maybe. And to some degree in 1980.” For that reason, political capital is a concept that misleads far more than it enlightens. It is distortionary. It conveys the idea that we know more than we really do about the ever-elusive concept of political power, and it discounts the way unforeseen events can suddenly change everything. Instead, it suggests, erroneously, that a political figure has a concrete amount of political capital to invest, just as someone might have real investment capital—that a particular leader can bank his gains, and the size of his account determines what he can do at any given moment in history.¶ Naturally, any president has practical and electoral limits.

#### Winners win – momentum

Michael Hirsch (chief correspondent for National Journal, previously served as the senior editor and national economics correspondent for Newsweek, based in its Washington bureau) February 7, 2013 “There’s No Such Thing as Political Capital” <http://www.nationaljournal.com/magazine/there-s-no-such-thing-as-political-capital-20130207>

THE REAL LIMITS ON POWER¶ Presidents are limited in what they can do by time and attention span, of course, just as much as they are by electoral balances in the House and Senate. But this, too, has nothing to do with political capital. Another well-worn meme of recent years was that Obama used up too much political capital passing the health care law in his first term. But the real problem was that the plan was unpopular, the economy was bad, and the president didn’t realize that the national mood (yes, again, the national mood) was at a tipping point against big-government intervention, with the tea-party revolt about to burst on the scene. For Americans in 2009 and 2010—haunted by too many rounds of layoffs, appalled by the Wall Street bailout, aghast at the amount of federal spending that never seemed to find its way into their pockets—government-imposed health care coverage was simply an intervention too far. So was the idea of another economic stimulus. Cue the tea party and what ensued: two titanic fights over the debt ceiling. Obama, like Bush, had settled on pushing an issue that was out of sync with the country’s mood.¶ Unlike Bush, Obama did ultimately get his idea passed. But the bigger political problem with health care reform was that it distracted the government’s attention from other issues that people cared about more urgently, such as the need to jump-start the economy and financial reform. Various congressional staffers told me at the time that their bosses didn’t really have the time to understand how the Wall Street lobby was riddling the Dodd-Frank financial-reform legislation with loopholes. Health care was sucking all the oxygen out of the room, the aides said.¶ Weighing the imponderables of momentum, the often-mystical calculations about when the historic moment is ripe for an issue, will never be a science. It is mainly intuition, and its best practitioners have a long history in American politics. This is a tale told well in Steven Spielberg’s hit movie Lincoln. Daniel Day-Lewis’s Abraham Lincoln attempts a lot of behind-the-scenes vote-buying to win passage of the 13th Amendment, banning slavery, along with eloquent attempts to move people’s hearts and minds. He appears to be using the political capital of his reelection and the turning of the tide in the Civil War. But it’s clear that a surge of conscience, a sense of the changing times, has as much to do with the final vote as all the backroom horse-trading. “The reason I think the idea of political capital is kind of distorting is that it implies you have chits you can give out to people. It really oversimplifies why you elect politicians, or why they can do what Lincoln did,” says Tommy Bruce, a former political consultant in Washington.¶ Consider, as another example, the storied political career of President Franklin Roosevelt. Because the mood was ripe for dramatic change in the depths of the Great Depression, FDR was able to push an astonishing array of New Deal programs through a largely compliant Congress, assuming what some described as near-dictatorial powers. But in his second term, full of confidence because of a landslide victory in 1936 that brought in unprecedented Democratic majorities in the House and Senate, Roosevelt overreached with his infamous Court-packing proposal. All of a sudden, the political capital that experts thought was limitless disappeared. FDR’s plan to expand the Supreme Court by putting in his judicial allies abruptly created an unanticipated wall of opposition from newly reunited Republicans and conservative Southern Democrats. FDR thus inadvertently handed back to Congress, especially to the Senate, the power and influence he had seized in his first term. Sure, Roosevelt had loads of popularity and momentum in 1937. He seemed to have a bank vault full of political capital. But, once again, a president simply chose to take on the wrong issue at the wrong time; this time, instead of most of the political interests in the country aligning his way, they opposed him. Roosevelt didn’t fully recover until World War II, despite two more election victories.¶ In terms of Obama’s second-term agenda, what all these shifting tides of momentum and political calculation mean is this: Anything goes. Obama has no more elections to win, and he needs to worry only about the support he will have in the House and Senate after 2014. But if he picks issues that the country’s mood will support—such as, perhaps, immigration reform and gun control—there is no reason to think he can’t win far more victories than any of the careful calculators of political capital now believe is possible, including battles over tax reform and deficit reduction.¶ Amid today’s atmosphere of Republican self-doubt, a new, more mature Obama seems to be emerging, one who has his agenda clearly in mind and will ride the mood of the country more adroitly. If he can get some early wins—as he already has, apparently, on the fiscal cliff and the upper-income tax increase—that will create momentum, and one win may well lead to others. “Winning wins.”

#### XO solves

Keegan Hamilton (writer for the Atlantic) 3/26, 2013 “How Obama Could (but Probably Won't) Stop Deporting Illegal Immigrants Today” http://www.theatlantic.com/politics/archive/2013/03/how-obama-could-but-probably-wont-stop-deporting-illegal-immigrants-today/274352/

If the current congressional push for immigration reform were to fail, however, a presidential pardon for undocumented immigrants with no criminal history might be Obama's last ditch alternative to prosecutorial discretion. Rather than scaling back on detentions, Obama could instantly--and permanently-- legalize millions of illegal immigrants. Beck, the Georgia law scholar, notes that the Constitution empowers the president to "grant reprieves and pardons for offences against the United States, except in cases of impeachment."¶ The question, he says, is "whether coming into the country in violation of the immigration laws or overstaying a visa could be deemed an 'offense against the United States.'" But the president has broad powers of pardon, and it seems that Obama could exercise those powers here. Beck cites United States v. Klein, an 1871 Supreme Court case that involved a presidential pardon issued during the Civil War to confederates who rejoined the union and took an oath of loyalty.

#### Plan popular

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

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

#### CIR fails –

#### A. Watered down

Morrison 12-9 – Bruce Morrison, a former U.S. Representative from Connecticut, was the chairman of the House immigration subcommittee and the author of the Immigration Act of 1990. December 9th, 2012, "One Bill of Compromises Isn’t the Answer” www.nytimes.com/roomfordebate/2012/12/09/understanding-immigration-reform/one-immigration-bill-of-compromises-isnt-the-answer

To many, “comprehensive immigration reform” means “fix it and forget it.” But doing it all in one bill reprises what got us in the current mess in the first place. After major reform bills in 1986 and 1990, the failing employment verification scheme and the clogged green card process were allowed to go unattended. The “enforcement only” 1996 law only froze the mess in place. Save the 'punishment' for those that do not comply with a system that works, not those ensnared in the current system that does not. **A huge compromise of all competing immigration fixes larded into one bill will involve compromises that do not serve the nation’s interests.** Instead we need to assemble the votes to do the two things that must be done — a broad earned legalization program for the 11 million now illegally resident in the country in conjunction with the assurance that this problem will not happen again. That assurance will come from a universal, electronic, identity-authenticating screening of all workers to ensure that they are authorized to work in the U.S. Because almost all who make unauthorized entries and overstays do so to seek and accept employment, no other tool will get the result we need to make legalization politically and philosophically justified — that we have fixed the source of the problem. And this also means using the employment relationship to roll-in legalization while rolling out universal verification. The key point is that prevention of illegal presence is the goal. Save the “punishment” for those that do not comply with a system that works, not those ensnared in the current system that does not. Our legal immigration system needs lots of fixing, like the increase of STEM green cards passed by the House last week and much more. But these fixes, including all future flows beyond the current one million annual immigrants and the millions who will be legalized, will get much easier to negotiate when the legalization-prevention barrier is removed.

#### B. Backlogs

David North, former Assistant to the U.S. Secretary of Labor and Center for Immigration Studies Fellow, April 7, 2010, “Would Legalization Backlogs Delay Other USCIS Applications? Probably,” Center for Immigration Studies, http://cis.org/north/legalization-backlogs

An interesting question has arisen as a result of a congressional hearing: would a massive legalization program, as many advocates want, slow the processing of applications filed routinely by citizens and legal aliens wanting immigration benefits? The numbers are daunting. U.S. Citizenship and Immigration Services (USCIS) currently faces six million applications a year according to one news story. The estimates of the number of illegal aliens in the nation runs to 11 or 12 million. Could USCIS handle both these multi-million caseloads with its current paper-based systems? There are many complaints that the backlogs are currently too long on the normal collection of six million cases a year. The government's expert on such things, Frank W. Deffer, Assistant Inspector General for Information Technology in the Department of Homeland Security, told a congressional committee on March 23: "adding 12 million more people to the system would be the mother of all backlogs. Clearly to us the systems could not handle it now."

#### Dems won’t backlash or drain PC

Hughes 2/6 Brian, "Obama's base increasingly wary of drone program", 2013, washingtonexaminer.com/obamas-base-increasingly-wary-of-drone-program/article/2520787

"Democrats, they're going to want the president to succeed on domestic priorities and don't want to do anything to erode his political capital," said Christopher Preble, vice president for defense and foreign policy studies at the Cato Institute. "It's just so partisan right now. An awful lot of [lawmakers] think the president should be able to do whatever he wants."

### Uranium Prices DA

#### No tradeoff – existing gen III reactors will be used to support IFR transition

**Brook 10** [“IFR FaD 5 – the Gen III and Gen IV nuclear power synergy – why we need both”, Posted on 10 June 2010 by Barry Brook, Professor of Climate Change at University of Adelaide, Brave New Climate]

To have any realistic chance of achieving this goal — which we must, for the sake of climate change mitigation and peak oil-related energy security — we will need to expand global nuclear power capacity as rapidly as possible over the next 20 years. The most feasible way to do this is by constructing a fleet of generation III+ reactors, such as the AP-1000.¶ Integral fast reactors and liquid fluoride thorium reactors have so far operated successfully only as demonstration plants and experimental reactors. Nevertheless, a 500-megawatt (0.5 gigawatt) fast reactor is to become operational in India during 2010. Some commercial “generation IV” units have been operated (such as the Phenix fast reactor in France and the BN-350 and BN-600 in Russia) but only a few are currently being built. This is largely because uranium is still plentiful and cheap. That means there is insufficient incentive to invest in this “leap” technology, despite its advantages. Even so, construction is about to start in Russia and China on three BN-800s, scheduled for completion within five years.¶ As a significant number of generation IV units start to come online over the next few decades, they will need fissile “start charges” to kick them off. A new 1 gigawatt fast spectrum reactor, for instance, needs to be fuelled with about eight tonnes\* of fissile uranium 235 or plutonium (or some other mixture of fissile actinides) to get it going. After that, it can breed all the new fuel it will ever need from uranium 238.

#### Alt-cause – US ISR

**Energy Report 13** [“How to Make the Most of the Upcoming Price Spike in Uranium”, The Energy Report | Wed, 23 January 2013]

CM: Over 45% of the world's uranium is now produced using this low-cost, environmentally friendly mining method. However, ISR is only amenable in certain situations, ideally to mine uranium-mineralized sandstone deposits that are confined in an aquifer.¶ Compared to underground or open-pit mining, ISR is an elegant process. A leaching solution of carbon dioxide, baking soda and oxygen is injected into the sandstone ore, dissolving the uranium. This is then pumped out and ionized pellets are added, which the uranium bonds to. These pellets are then stripped of the uranium for further processing. After processing the yellowcake, the inert material leftover is returned to the ground.¶ From a financial perspective, U.S. ISR requires less labor, capital and operating costs, and mines are faster to permit and construct. From an environmental perspective, it's cleaner and safer with less of a footprint and no leach pads if a deep disposal well is employed. These savings can boost ISR uranium mine margins to be profitable even at low ore grades. I can't think of a reason why a uranium miner wouldn't use ISR given the option.

#### Prices low now and decline inevitably

IB Times, 11/6/12 [“Uranium's Worst Month Since Fukushima”http://au.ibtimes.com/articles/401761/20121105/uranium-apos-s-worst-month-since-fukushima.htm#.UJ0-dIZ1v3U]

Despite a widely held belief of commodities analysts that the global demand-supply balance for uranium into the medium term points to higher prices, spot uranium has continued to slide away on lack of genuine buying interest, dragging medium and longer term price indicators down with it. Spot uranium endured its worst month in October since March 2011, in the wake of Fukushima.¶ http://img.ibtimes.com/www/site/us/images/1px.gif¶ Since Fukushima, commentators had come to assume US$50/lb provided a floor level for spot pricing, below which genuine consumers (utilities) are happy to accumulate inventories. However these past couple of months those utilities are missing in action, while those on the supply side needing to sell (mostly traders and speculators) have become increasingly anxious. To that end, light interest on the buy-side has allowed the spot price to tumble 13% over the course of October, down US$5.50 to US$41.00/lb by October 31. Only 5.4mlbs traded hands in 29 transactions, notes industry consultant TradeTech, as buyers continued to back off.¶ The good news is that buyers did finally emerge right at the end of the month, perhaps seeing US$41 as the new US$50. As soon as they did, it was the sellers' turn to back off. Yet at month end it all went quiet again, such that TradeTech has dropped its spot price indicator for the week ending last Friday to US$40.75/lb, down US50c from a week earlier. Seven transactions were recorded for the week totalling 1.2mlbs. ¶ Demand also weakened for mid-term contracts over October, with one deal transacted as Paladin Energy ((PDN)) sealed a large offtake deal with Eletrice de France. The impact of a plunging spot price has been felt in the mid-term market, such that TradeTech has dropped its mid-term price indicator by US$5.25 to US$45.00/lb. TradeTech has also subsequently moved its long-term price indicator down US$2.00 to US$59.00/lb.

#### And, mined supply shortfalls now – status quo tanks prices

Financial News, 10/30/12 [10/30/12“Uranium Still Looking for a Bottom”, http://www.fnarena.com/index2.cfm?type=dsp\_newsitem&n=AE0F32CB-E613-5FE6-9992BAAB6D703CCC

Let’s add up some numbers. The Megatons to Megawatts Program, the program that sees Russia convert uranium taken from Soviet era ¶ warheads and supply itto the US, is supplying around 50% of the US’s uranium demand. Mining accounts for eight percent The electricity for ¶ roughly one in ten American homes, businesses, schools and hospitals is generated by Megatons to Megawatts fuel. ¶ The US nuclear reactor fleet required 55 million pounds of uranium to keep running in 2011, while the mined supply of uranium in the US in ¶ 2011 was about four million pounds. Megatons to Megawatts ends this year and mined supply certainly isn’t pacing itself to pick up the slack, ¶ given uranium prices that are becoming increasingly sub-economic for a growing number of producers. ¶ And here’s another bit of news: China is set to approve a small number of nuclear power projects by 2015 in its push to steadily get back to a ¶ normal schedule of building nuclear power facilities. New plants are to be built based on the strictest global safety standards and conform to ¶ third-generation safety requirements, the Chinese government said. ¶ Here’s the funny thing, there is absolutely no shortage of uranium in the ground. What is in short supply is mined uranium. Starting very soon, ¶ and continuing for at least as long as is needed to develop, permit and construct new uranium mines, there is going to be a big significant ¶ shortfall of uranium supply. ¶ But that’s all tomorrow. Last week, uranium continued on its slow and steady march southward. Turnover was light, with just 500,000 pounds ¶ changing hands. The announcement from China did get plenty of play, but a still did little to inspire optimism about the prospect for an increase ¶ in near-term uranium demand. ¶ Industry consultant TradeTech notes that market participants are increasingly hopeful the price may be approaching a bottom and are thus ¶ consideringwhetherto enterthe market Yetatthe sametime, buyers remain hesitantto committo purchases untilthe price eitherstabilises or ¶ shows signs of going back up. ¶ In the meantime, while sellers aren’t exactly falling over themselves to get stock out to the marketplace, they’re still being forced to lower offer ¶ prices to get deal done given there remains, for the time being, more than sufficient supply to soak of the currently low levels of spot demand. ¶ By Friday, TradeTech’s Weekly U308 Spot Price Indicator was at US$43.00 per pound, down US$0.50 per pound from the week prior¶ No transactions were reported last week on the term uranium market, although some new demand did emerge. TradeTech reports one US ¶ utility entered the market looking for offers for material to be delivered between 2014 and 2019. In the meantime, TradeTech’s Mid-Term U3 0 8 ¶ Price Indicator stayed put at US $50.25 per pound and the Long-Term Indicator stayed put at US $61.00 per pound.

#### Economy diversifying now – uranium not key

Seretsky, 11/8/12 [“Doing Business in Kazakhstan: Two Thumbs Up from the IFIs”, Chair (contract), Central Asia Area Studies at Foreign Service Institute, US Department of State ¶ [http://www.jamestown.org/single/?no\_cache=1&tx\_ttnews[tt\_news]=40082&tx\_ttnews[backPid]=7&cHash=097a8d9ff31583f1d5ec2a18edbeb4b9](http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5btt_news%5d=40082&tx_ttnews%5bbackPid%5d=7&cHash=097a8d9ff31583f1d5ec2a18edbeb4b9)]

The latest World Bank (WB)/International Finance Corporation (IFC) Doing Business 2013 (DB) report reveals remarkable progress achieved by Kazakhstan in creating a business-friendly environment: it ranks 49th out of 185 countries surveyed. Especially impressive is the country’s improvement in one of the key indicators—ease of starting a business—where Kazakhstan moved from 55th place to 25th in one year. To compare, Russia is ranked 112th, while the closest Central Asian country on the list, Kyrgyzstan, is in 70th place (www.doingbusiness.org). The findings of the DB report are supported by other studies such as, for example, the 2012–2013 Global Competitiveness Report (GCR) by the World Economic Forum, which puts the country in 51st place in the overall rating (www.weforum.org). To compare, Russia is ranked 67th. Remarkably, Kazakhstan is ranked 16th in the world in the all-important category of macroeconomic stability, an indication that despite the adverse impact of the 2007–2009 global financial and economic crisis, Kazakhstan managed to recover quickly and expand economic activity. The findings of these reports attest to the substantial advancement made by Kazakhstan in creating a business- and investor-friendly environment, needed to implement Astana’s major developmental objective—the diversification of the economy by creating non-oil sectors to move away from its dependence on extractive indubstries. Kazakhstan’s government understands that the development of new economic sectors cannot be achieved without attracting foreign investment. Since independence, the country has been successful in attracting more than $122 billion in foreign direct investment (FDI). Yet, these investments went primarily to the oil sector. Today, the task is to bring foreign investment and expertise into the emerging sectors. To achieve that goal, Kazakhstan has made significant strides in creating a favorable legal and operational environment for domestic and foreign investors. As a result, it is ranked 10th in the world in “protecting investors” and 28th in enforcing contracts in the DB report. It is also showing steady improvement in providing access to credit for domestic businesses that allowed the Central Asian republic to move from 97th place last year to the current 83rd place. That improvement in the business and investor climate is not just a function of number crunching. Rather, it is supported by a survey of investors’ attitudes to doing business in Kazakhstan. One such survey, the 2012 “Kazakhstan: Bridging the Perception Gap Attractiveness Survey” by Ernst & Young, asked the following question: “If you had a chance to reconsider your investment, would you still decide to invest in Kazakhstan?” In answering it, 92 percent of existing investors responded positively (www.ey.com).

#### Kazakh instability and econ decline inevitable – crumbling authoritartianism

Liana Fix 2-11-2012; postgraduate masters degree student in the Department of International History at the LSE. “Kazakhstan: The Myth of Stability” <http://blogs.lse.ac.uk/ideas/2012/02/kazakhstan-the-myth-of-stability/>

The brutal police crackdown marks the darkest hour in the former Soviet republic’s young history. Kazakhstan’s image as Central Asia’s oasis of stability is starting to crumble. And so is the legitimacy of the President. The leitmotif of Nazarbayev’s faux-democratic reign is his alleged concern for stability and prosperity. But Zhanaozen poses a crucial question: Can an authoritarian regime actually provide social stability? Or does authoritarian governance imperil stability in the long term? Indeed, Zhanaozen is not Cairo. And the people who took to the streets in Zhanaozen had no intention of regime change. Neither are they starving, or even unemployed. They merely demanded better pay and more labour rights. But an autocratic regime that proved to be incapable even of handling union strikes seems an incapable guarantor for social stability in the future.

#### Uranium not key – diversified economy

CIA World Fact Book 2-23-2012; “Kazakhstan Economy 2012” <http://www.theodora.com/wfbcurrent/kazakhstan/kazakhstan_economy.html>

Economy - overview:

Kazakhstan, geographically the largest of the former Soviet republics, excluding Russia, possesses enormous fossil fuel reserves and plentiful supplies of other minerals and metals, such as uranium, copper, and zinc. It also has a large agricultural sector featuring livestock and grain. In 2002 Kazakhstan became the first country in the former Soviet Union to receive an investment-grade credit rating, and from 2000 through 2007, Kazakhstan's economy grew more than 9% per year. Extractive industries, particularly hydrocarbons and mining, have been the engines of this growth. However, geographic limitations and decaying infrastructure present serious obstacles. Landlocked, with restricted access to the high seas, Kazakhstan relies on its neighbors to export its products, especially oil and gas. Although its Caspian Sea ports and rail lines carrying oil have been upgraded, civil aviation has been neglected. Telecoms are improving, but require considerable investment, as does the information technology base. Supply and distribution of electricity can be erratic. At the end of 2007, global financial markets froze up and the loss of capital inflows to Kazakhstani banks caused a credit crunch. The subsequent and sharp fall of oil and commodity prices in 2008 aggravated the economic situation, and Kazakhstan plunged into recession. While the global financial crisis took a significant toll on Kazakhstan's economy, it has rebounded well. In response to the crisis, Kazakhstan's government devalued the tenge (Kazakhstan's currency) to stabilize market pressures and injected $19 billion in economic stimulus. Rising commodity prices have helped revive Kazakhstan's economy, which registered roughly 7% growth in 2010-11. Despite solid macroeconomic indicators, the government realizes that its economy suffers from an overreliance on oil and extractive industries, the so-called "Dutch disease." In response, Kazakhstan has embarked on an ambitious diversification program, aimed at developing targeted sectors like transport, pharmaceuticals, telecommunications, petrochemicals and food processing.

#### No Kazak escalation

**Stratfor, 12** [1/18/12, “Annual Forecast 2012”, global intelligence company, http://www.stratfor.com/forecast/annual-forecast-2012]

Numerous factors will undermine Central Asia's stability in 2012, but they **will not lead to a major breaking point** in the region this year. Protests over deteriorating economic conditions will occur throughout the region, particularly in Kazakhstan, though these will be contained to the region and will not result in overly disruptive violence. Serious issues in Kazakhstan's banking sector could lead to a financial crisis, though the government will be able to manage the difficulties and contain it during 2012 by using the oil revenues it has saved up.

#### Great powers don’t want to antagonize each other—checks outside escalation

**Kucera 10**—regular contributor to U.S. News and World Report, Slate and EurasiaNet. (Joshua, Central Asia Security Vacuum, 16 June 2010, <http://the-diplomat.com/2010/06/16/central-asia%E2%80%99s-security-vacuum/>)

Note – CSTO = Collective Security Treaty Organization

Yet when brutal violence broke out in one of the CSTO member countries, Kyrgyzstan, just days later, the group didn’t respond rapidly at all. Kyrgyzstan’s interim president, Roza Otunbayeva, even asked Russia to intervene, but Russian President Dmitry Medvedev responded that Russians would only do so under the auspices of the CSTO. And nearly a week after the start of the violence—which some estimate has killed more than 1000 people and threatens to tear the country apart—the CSTO has still not gotten involved, but says it is ‘considering’ intervening. ‘We did not rule out the use of any means which are in the CSTO’s potential, and the use of which is possible regardless of the development of the situation in Kyrgyzstan,’ Russian National Security Chief Nikolai Patrushev said Monday. On June 10-11, another regional security group, the Shanghai Cooperation Organisation, held its annual summit in Tashkent, Uzbekistan. The SCO has similar collective security aims as the CSTO, and includes Russia, China and most of the Central Asian republics, including Kyrgyzstan. But despite the violence that was going on even as the SCO countries’ presidents met in Uzbekistan, that group also didn’t involve itself in the conflict, and made only a tepid statement calling for calm. Civil society groups in Kyrgyzstan and Uzbekistan (much of the violence is directed toward ethnic Uzbeks in Kyrgyzstan, and the centre of the violence, the city of Osh, is right on the border of Uzbekistan) called on the United Nations to intervene. And Otunbayeva said she didn’t ask the US for help. Even Uzbekistan, which many in Kyrgyzstan and elsewhere feared might try to intervene on behalf of ethnic Uzbeks, has instead opted to stay out of the fray, and issued a statement blaming outsiders for ‘provoking’ the brutal violence. The violence has exposed a security vacuum in Central Asia that no one appears interested in filling. In spite of all of the armchair geopoliticians who have declared that a ‘new Great Game’ is on in Central Asia, the major powers seem distinctly reluctant to expand their spheres of influence there. Why? It’s possible that, amid a tentative US-Russia rapprochement and an apparent pro-Western turn in Russian foreign policy, neither side wants to antagonize the other. The United States, obviously, also is overextended in Iraq and Afghanistan and has little interest in getting in the middle of an ethnic conflict in Kyrgyzstan. It’s possible that the CSTO Rapid Reaction Force isn’t ready for a serious intervention as would be required in Kyrgyzstan. (It’s also possible that Russia’s reluctance is merely a demure gesture to ensure that they don’t seem too eager to get involved; only time will tell.)

#### Their internal link evidence concedes

McDermott 11 (Roger, Senior Fellow, Foreign Military Studies Office, Fort Leavenworth, “Kazakhstan: Countering nuclear proliferation, Action to develop a nuclear and terrorist-free world,” in Kazakhstan 2011: Twenty Years of Peace and Creation, *First: The Forum for Global Decision Makers*, 2011, <http://www.firstmagazine.com/Publishing/SpecialReportsDetail.aspx?RegionId=4&SpecialReportId=96>)

Kazakhstan’s ambitions are likely to be realized if uranium prices stay high and Kazatomprom is successful in further expanding its international partnerships. Kazatomprom’s most immediate task is to secure customers for its final nuclear fuel product--fuel assemblies, an extra fuel fabrication stage which Kazatomprom plans to start carrying out domestically. Having a nearly complete nuclear fuel cycle, save for enrichment, will ensure a stable cash flow for Kazatomprom and limit its dependence on the fluctuating market price of raw uranium. In the meantime, increased uranium sales will help alleviate the country’s overdependence on oil exports and help modernize its nuclear sector. If Kazakhstan does become the world’s leading uranium and nuclear fuel supplier, the ramifications for the country both in terms of increased gross domestic product and status on the world stage will be profound.

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### No Commercialization – SMR’s

#### No commercialization

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

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

#### Restrictions don’t solve

**Peskoe 12** [Ari Peskoe, associate in the law firm of McDermott Will and Emery LLP and focuses his practice on regulatory, legislative, compliance, and transactional issues related to energy markets, 4-20-2012, "A Solution Looking For a Problem: Building More Nuclear Reactors after Vogtle," The Electricty Journal, vol 25 issue 3, Science Direct]

IV. Mandating that Markets Value the Long-Term¶ In organized wholesale electricity markets, generators must recover capital costs in a competitive market rather than through a ratemaking process. Given the low price of natural gas, it is difficult to make a business case for investing today in new reactors. Over the long term, gas prices may rise and the nation's coal and nuclear base load plants continue to age, which could create opportunities for nuclear.68 This section will highlight the current mismatch between market outcomes and public policy goals, provide examples of how regulators have layered public policy goals on top of electricity markets, and suggest that renewable mandates may provide a useful starting point for policymakers hoping to provide the right environment for new reactor construction in the coming decades.¶ In organized wholesale markets, power is traded on day-ahead and/or real-time markets. The premise is that markets match bids to buy energy with suppliers’ offers to sell energy thereby “enabl[ing] an area-wide optimization process designed to meet electricity demand at the lowest cost, given the operational and reliability limitations of the area's generation fleet and transmission system.”69 This “optimization process” aims to instantaneously minimize system costs based on several short-term variables, such as transmission constraints, ramp rates, and net generation. The process has spawned an array of tradable products, such as financial transmission rights and non-spinning reserves.¶ One widely recognized issue with organized wholesale electricity markets is whether they can “deliver adequate and timely investment signals to ensure security of supply…[and] appropriate incentives for diversification to deliver the macroeconomically optimal fuel diversity.”70 In organized wholesale markets, profit-motivated firms favor investments in projects with shorter lead times, lower upfront capital costs, rapid cost recovery, and overall less risk. Based on these factors, investing in new natural gas capacity is far more attractive than financing a new nuclear reactor

### Russia Impact D

#### Bostrom changed his mind

**Bostrom, 07** [Future of Humanity Institute, Faculty of Philosophy & James Martin 21st Century School, Oxford University, 2009 Gannon Award Recipient, The Future of Humanity, 2007, [www.nickbostrom.com/papers/future.pdf](http://www.nickbostrom.com/papers/future.pdf)]

Extinction risks constitute an especially severe subset of what could go badly wrong for humanity. There are many possible global catastrophes that would cause immense worldwide damage, maybe even the collapse of modern civilization, yet fall short of terminating the human species. An all-out nuclear war between Russia and the United States might be an example of a global catastrophe that would be unlikely to result in extinction. A terrible pandemic with high virulence and 100% mortality rate among infected individuals might be another example: if some groups of humans could successfully quarantine themselves before being exposed, human extinction could be avoided even if, say, 95% or more of the world’s population succumbed. What distinguishes extinction and other existential catastrophes is that a comeback is impossible. A non-existential disaster causing the breakdown of global civilization is, from the perspective of humanity as a whole, a potentially recoverable setback: a giant massacre for man, a small misstep for mankind.

**Common interests and interdependence**

**VOA 7** (3/27, Experts Do Not Foresee US Conflict with Russia, http://www.voanews.com/english/2007-03-27-voa75.cfm)

The short answer to the question posed at the Hudson Institute is no. Armed conflict between the United States and Russia is neither inevitable nor likely. Indeed, Mikhail Delyagin, an adviser to former Russian Prime Minister Evgeny Primakov, says a struggle with the West in general it is not in the interests of Russian elites. He spoke through an interpreter.

"Representatives of the ruling groups have their bank accounts in the West. And the second point is to understand that the Russian army does not exist and the Russian economy is extremely weak. Our Black Sea fleet is not even at the level of the forces of Bulgaria and Romania," he said.

One of the panel members at the Hudson Institute conference, Moscow political analyst Andrei Piontkovsky, says Russia and the United States, dominant powers of the 20th Century, now need to cooperate with one another. "In the 21st century, both the West and Russia are in a much more vulnerable position. We are both challenged by Islamic radicalism, and then, maybe more long term and less obvious, but maybe more dangerous -- the potential challenge of a rising China," he said.

Russian journalist Evgeny Kiselyev agrees that the United States and Russia have common interests. He says that Russians who communicate with Americans or have been to the United States generally have a good impression of this country. However, Kiselyev says some members of Russia's ruling class continue to resent America.

### XT Diversification

#### Other sectors solve – and business climate is improving investment

IMF 8-17-2011; International Monetary Fund, “Kazakhstan: Making the Most of Its Oil Wealth” IMF Survey online <http://www.imf.org/external/pubs/ft/survey/so/2011/int081611a.htm>

IMF Survey online: What options does Kazakhstan have to diversify away from oil? Raman: Other than industries related to the sector like transportation and communication, the experience of other resource-rich countries points to the chemicals sector as an area of comparative advantage. Improving the business and investment climate to facilitate private sector activity in this sector—as well as others—would help spur development. Kazakhstan has made significant progress on this front. According to the World Bank’s 2011 Doing Business rankings, Kazakhstan rose by an impressive 15 places during the year—the fastest improvement in the region. Kazakhstan scores well in terms of registering property (28th) and has significantly improved in the ease of starting a business (from 85th in 2010 to 47th in 2011). Other surveys point to strengths in public finance, infrastructure, and labor market flexibility.