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#### Russia has dropped out of Nunn-Lugar – without reprocessing, vulnerable fissile material will find its way into the hands of terrorists causing extinction – Russia needs a new, independent, cost-effective program

NYT 10/17 ("Mr. Putin’s Gift to Terrorists," 2012, NYTimes Editorial Board, [www.nytimes.com/2012/10/18/opinion/vladimir-putins-gift-to-terrorists.html?\_r=1&], jam)

There will be plenty of losers from Russia’s recent decision to end two decades of cooperation with Washington on cleaning up nuclear and chemical weapons sites left over from the cold war. Russia will now have to pay for such efforts on its own. The United States will lose the most cost-effective way yet found for reducing nuclear dangers. And the world must watch as Russia’s unsecured weapons and materials remain a temptation for terrorists of all varieties to buy or steal for use in future attacks. The cooperative threat reduction program Russia wants to walk away from next spring is the heart of the so-called Nunn-Lugar initiative, which was passed by Congress in 1991. This range of programs provides American money and expertise to countries of the former Soviet Union to help them eliminate or secure vulnerable nuclear and chemical weapons, materials and sites. Over the past two decades, they have helped deactivate more then 7,600 nuclear warheads, destroy more than 2,000 nuclear capable missiles, convert more than 400 metric tons of highly enriched uranium bomb fuel into low-enriched reactor fuel and destroyed large stockpiles of chemical weapons. This has cost the American taxpayer less than $15 billion over the 20-year life of the program, far less than the Pentagon spends each year for defense and deterrence against nuclear attack. But the job remains barely half-done. Cutting off this successful program now is perverse and reckless — and all too typical of President Vladimir Putin’s sour, xenophobic and self-isolating worldview. Last month, he expelled the United States Agency for International Development, which has sponsored human rights, civil society and public health programs since the fall of communism. Perhaps those civil society programs proved too successful — and too threatening to Mr. Putin — for their own survival. But the nuclear cleanup program affects everyone’s survival. The official explanation for ending them is based on national pride — the wish to proclaim that Russia can take care of these issues by itself, without American help. Another may be Moscow’s reflexive desire to be shielded from foreign eyes that might see things President Putin and his military commanders do not want them to see. Paranoia and xenophobia in the Kremlin predates communism and has now outlasted it by more than two decades. If Moscow lets the cooperative program lapse, it needs to replace it with adequately financed Russian programs. The continuing cleanup must be transparent enough to earn the world’s trust. Currently, that confidence comes from the participation of American contractors in the cleanup work. Maintaining it without them will not be easy. But Mr. Putin, having created that problem, must now solve it.

#### START means there is a lot of new vulnerable fissile material – Russia won’t deal with it

Diakov 12 (Anatoli, Center for Arms Control, Energy and Environmental Studies, "Disposition of Excess Russian Weapon HEU and Plutonium," Feb, [www.unidir.org/pdf/ouvrages/pdf-1-92-9045-012-D-en.pdf], jam)

There is no public indication that Russia has set specific requirements for the quantities of weapons-grade fissile materials that it needs for its weapons arsenal and for future naval reactor use. That makes it difficult to estimate how much additional HEU and weapons-grade plutonium might be declared excess as a result of further reductions in Russia’s warhead stocks. If Russia and the United States each reduced their stocks of deployed nuclear warheads as established by the New START treaty to the level of 1,550, that could free up hundreds of tons of additional material for disposition. It is unlikely, however, that Russia will continue any version of the US–Russian HEU Purchase Agreement after it expires in 2013. The Russian Federal Atomic Agency chief Sergei Kirienko has indicated that Russia will not continue the programme after 2013. 10 With its economy growing and greatly increased federal funding for the nuclear sector, Russia does not need revenue from the HEU deal in the way it did in the early 1990s. Moreover, the way the deal is currently implemented makes it less profitable for Russia than simply marketing enrichment services commercially. Also, some experts believe that sales of an enrichment service is more important to Rosatom than uranium sales. Russia wants to get commercial access to the US enrichment market after 2013. While Russian sales of enrichment services to the United States are currently blocked, under the HEU–LEU deal Russia supplied about 5.5 million separative work units (SWU) per year to the United States—that is 44% of the US utility requirements. 11 After 2013 Rosatom would like to have 20–25% of the US SWU market and it needs assurances that US trade laws will not be used to block Rosatom SWU sales in the United States.

#### Nuclear terrorism is inevitable absent fissile material disposal and Russia is the most likely candidate for theft—Bin Laden was only the beginning—expert consensus

Smith 11 (James F., Communications Director, Belfer Center for Science and International Affairs, Jun 6, [www.nti.org/newsroom/news/first-joint-us-russia-assessment/], jam)

Researchers from the United States and Russia today issued a joint assessment of the global threat of nuclear terrorism, warning of a persistent danger that terrorists could obtain or make a nuclear device and use it with catastrophic consequences. The first joint threat assessment by experts from the world’s two major nuclear powers concludes: “If current approaches toward eliminating the threat are not replaced with a sense of urgency and resolve, the question will become not if but when, and on what scale, the first act of nuclear terrorism occurs.” The study recommends measures to tighten security over existing nuclear weapons and the nuclear materials terrorists would need to make a crude nuclear bomb, along with expanded police and intelligence cooperation to interdict nuclear smuggling and stop terrorist nuclear plots. The report also calls for improved protection of nuclear facilities that might be sabotaged, and of radiological materials that might be used in a dirty bomb. The report, titled "The U.S.-Russia Joint Threat Assessment on Nuclear Terrorism," released on Monday, June 6, in Cambridge, Mass., and in Moscow, results from a nearly year-long partnership by nuclear security experts from the Belfer Center for Science and International Affairs at Harvard Kennedy School and The Institute for U.S. and Canadian Studies in Moscow, a leading Russian research center. The lead U.S. and Russian authors are Rolf Mowatt-Larssen, a senior fellow in the Belfer Center and a former director of intelligence and counter-intelligence at the U.S. Department of Energy, and Pavel S. Zolotarev, a retired army general who is deputy director of Moscow’s Institute for U.S. and Canadian Studies, at the Russian Academy of Sciences, and former head of the Information and Analysis Center of the Russian Ministry of Defense. “ If you look at the U.S. and Russia together, we own about 90% of the problem – more of the weapons, less of the nuclear materials. So it’s only right that these two countries share their expertise and look hard at ways to work together to lower the risks,” said Mowatt-Larssen. “The United States and Russia have never produced a document that could be said to represent a common understanding of the nuclear terrorism threat. This can now be used as a basis for driving action in both governments.” Zolotarev said: "Russia and the United States have paid more attention to nuclear weapons and nuclear deterrence, even though neither of our two countries has a political need to rely threat of nuclear terrorism, which constitutes a more real threat than the enormous arsenals of nuclear weapons in both countries. The threat of nuclear terrorism is increasing. Our response should anticipate the dynamics of the threat rather than lag behind it." The researchers’ joint assessment was reviewed and endorsed by a group of retired U.S. and Russian senior military and intelligence officers, led by General Anatoliy S. Kulikov (former Minister of Interior) and General Eugene E. Habiger (former STRATCOM commander). This “Elbe Group” was established in October 2010 to create an informal communication channel on security issues of concern to both the United States and Russia. The Joint Threat Assessment was coordinated by the Kennedy School’s U.S.-Russia Initiative to Prevent Nuclear Terrorism, which is directed by William Tobey, a senior fellow in the BelferCenter and former top official in the National Nuclear Security Administration. The assessment project was supported by the Nuclear Threat Initiative, a non-profit organization in Washington that works to reduce threats from nuclear, chemical and biological weapons. “The joint threat assessment accomplishes something that so far governments have been unable to do: gauge the threat of nuclear terrorism from differing national perspectives, and thereby form the basis for effective action to defeat it,” said Tobey. “This will help to overcome the number one barrier to improved nuclear security--complacency." Key Findings The joint assessment examines potential terrorist pathways to a nuclear attack, among them buying or stealing an existing weapon, or getting highly enriched uranium or plutonium and fashioning a crude nuclear bomb of their own, which the study warns is distressingly plausible. It also concludes that while the killing of Osama bin Laden damages al Qaeda’s capacity to carry out nuclear terrorism, surviving leaders of the group retain nuclear terror ambitions. The joint report documents that al Qaeda has been working for years to acquire the nuclear materials and expertise needed to make a crude nuclear bomb, getting as far as carrying out explosive tests for their nuclear program in the Afghan desert. The report outlines the steps terrorists could follow and envisions how a terrorist nuclear plot might be structured – and how countries should work together to stop it. The study notes that in addition to al Qaeda, terrorists from the North Caucasus region remain committed to carrying out catastrophic attacks, have carried out reconnaissance at nuclear weapon storage sites, have plotted to hijack a nuclear submarine with nuclear weapons on board, have planted radiological materials in Moscow, and have repeatedly threatened to attack nuclear power plants. These groups include factions in Chechnya, Dagestan, Ingushetia and elsewhere. Among the joint assessment’s recommendations: All stocks of nuclear weapons, highly enriched uranium and plutonium must be protected against all plausible terrorist and criminal threats, and the number of locations where these stocks exist must be reduced as much as practicable. Coordinated U.S.-Russian leadership is vital for this international effort because the two countries hold the largest nuclear stockpiles and are most experienced in dealing with nuclear security. This joint effort should promote and support enhanced intelligence and law enforcement by UN, the International Atomic Energy Agency, and international police organizations.

#### Assume a high risk of nuclear attack – it is too easy to steal weapons grade material

Tirone ‘12 (Jonathan, reporter for Bloomberg News, 3/22/2012, "Missing Nukes Fuel Terror Concern," [www.businessweek.com/news/2012-03-22/missing-nukes-fuel-terror-concern-as-seoul-meeting-draws-obama#p1], jam)

A nuclear-armed terrorist attack on the U.S. port in Long Beach, California, would kill 60,000 people and cost as much as $1 trillion in damage and cleanup, according to a 2006 Rand study commissioned by the Department of Homeland Security. Even a low-level radiological or dirty-bomb attack on Washington, while causing a limited number of deaths, would lead to damages of $100 billion, according to Igor Khripunov, the Soviet Union’s former arms-control envoy to the U.S. He is now at the Athens, Georgia-based Center for International Trade and Security. Because a terrorist needs only about 25 kilograms of highly-enriched uranium or 8 kilograms of plutonium to improvise a bomb, the margin of error for material accounting is small. There are at least 2 million kilograms (4.4 million pounds) of stockpiled weapons-grade nuclear material left over from decommissioned bombs and atomic-fuel plants, according to the International Panel on Fissile Materials, a nonprofit Princeton, New Jersey research institute that tracks nuclear material. That’s enough to make at least 100,000 new nuclear weapons on top of the 20,000 bombs already in weapon-state stockpiles. ‘Poorly Secured’ “The elements of a perfect storm are gathering,” said former Democratic Senator Sam Nunn, founder of the Washington- based Nuclear Threat Initiative, in an e-mail. “There is a large supply of plutonium and highly enriched uranium-weapons- usable nuclear materials spread across hundreds of sites in 32 countries, too much of it poorly secured. There is also greater know-how to build a bomb widely available, and there are terrorist organizations determined to do it.” Greenpeace, the anti-nuclear environmental group, has shown the ease with which intruders could breach security at Electricite de France SA reactors. Activists on Dec. 5 exposed lapses at EDF nuclear reactors near Paris and in southern France, hiding inside one for 14 hours and unfurling a banner reading “Safe Nuclear Doesn’t Exist” on the roof of another. Invading Power Plants Since then, EDF has reviewed existing barriers around reactor sites and added patrols with guard dogs and tasers, said Dominique Miniere, the company’s director of nuclear production. If saboteurs were to penetrate a reactor site and disable the power supply, creating a similar effect as when the tsunami struck the Fukushima Dai-Ichi plant in Japan last year, there would be a danger of the nuclear fuel rods melting and radioactive particles being released into the air. Criminals breached South Africa’s Pelindaba nuclear facility in 2007, overpowering guards who oversaw the country’s stock of bomb-grade material. The U.S. Defense Threat Reduction Agency dismissed staff over nuclear security concerns in May 2008 at a North Dakota base that dispatched nuclear bombs without proper controls. In November 2010, Belgian activists evaded North Atlantic Treaty Organization guards to expose weak security protecting nuclear weapons at a base in Kleine Brogel. Activists spent several hours taking pictures of a bunker containing nuclear warheads before security guards apprehended them. The Global Zero Initiative, whose U.S. arm is headed by former nuclear negotiator Richard Burt, said in a report last month that the greatest nuclear security threat in Russia comes from bases in the country’s west that house tactical nuclear warheads targeting Europe. These bases provide inadequate security against theft or sabotage, according to the report, whose authors included Russian former arms-control negotiators. At the end of the Cold War, the Soviet Union had about 22,000 nuclear weapons in storage in Russia and such satellite states as Armenia, Belarus, Kazakhstan and Ukraine. Allison says there are doubts that all the weapons-usable material was recovered when many warheads were repatriated and dismantled because of the chaos at the time and incomplete records. About 100 grams of highly enriched uranium, lodged inside a nuclear fission chamber, was plucked out of a Rotterdam scrap- metal yard in 2009 by Jewometaal Stainless Processing BV’s radiation-safety chief, Paul de Bruin. The scrap probably came from a decommissioned Soviet nuclear facility, he said. Low Detection Chance The discovery illustrated the ease with which nuclear material can bypass accounting checks and international radiation monitors. The shipment containing the uranium had already been checked for radioactivity. “The inability to accurately account for weapon-usable nuclear material around the world is a major obstacle to eliminating the threat of nuclear terrorism,” said Edwin Lyman, a senior physicist at the Cambridge, Massachusetts-based Union for Concerned Scientists, on March 14. Plutonium can be smuggled from some facilities “without a high probability of detection,” he said. One issue threatening to hobble the security summit is that all nations aren’t invited, wrote Burt, who is also a managing director at Washington’s McLarty Associates. He negotiated nuclear-weapons cuts with the Soviets under President George H.W. Bush. IAEA Role Other countries that weren’t invited include Belarus, home to about 500 pounds of high-enriched uranium that the U.S. wants removed, and Niger, the West African nation falsely accused of supplying uranium to Iraq before the 2003 war over an alleged nuclear-weapons program. Organizers opted to keep participation narrow in 2010 to foster more substantive debate, South Korea’s International Atomic Energy Agency envoy, Cho Hyun, said in a March 15 interview. By excluding some nuclear nations from the proceedings, the summit organizers risk undercutting the role of the Vienna-based IAEA, which verifies nuclear material worldwide. “The summit’s lack of universality affects the ability of the IAEA to take a visible role in nuclear security,” said Cho, who was previously South Korea’s chief negotiator for U.S. nuclear agreements. “The IAEA has been playing an essential role in strengthening international efforts for nuclear security.” Not Yet? The 153-member IAEA, whose powers are granted by consensus, has published guides and helped install detection equipment, in addition to making sure fissile material isn’t diverted for weapons in places like Iran. Lebanon asked the Vienna-based agency in 2008 to help install radiation monitors in Masnaa, along its border with Syria. “Nuclear security is a global issue and it requires a global response,” IAEA spokeswoman Gill Tudor said today in an e-mail, adding that the agency’s security budget will need to grow in order for it to help member states. “The need to improve nuclear security greatly exceeds inflation.” In the absence of binding oversight or an international verification treaty, Harvard’s Allison said he was surprised terrorists haven’t already used nuclear materials in an attack. “There is general agreement in national security circles that” a dirty bomb attack “is long overdue,” he said. “Terrorists have known for a long time that nuclear reactors are potentially vulnerable to attack or sabotage.” Other officials say the threat of nuclear terrorism should be taken seriously without being overplayed in public. “Those of us who are ringing the nuclear terrorism alarm take care to not overstate the odds of such an attack,” former U.S. Energy Department Director of Intelligence Rolf Mowatt- Larssen wrote March 18 in an e-mail. “The population is also suffering from terror-warning fatigue.” “Governments are only now beginning to think about how to raise nuclear security standards worldwide,” Washington-based Arms Control Association President Daryl Kimball said March 14. “Terrorists only need to exploit the weakest link in order to acquire nuclear material that could eventually lead to a detonation that would make the Fukushima disaster pale in comparison.”

#### Terrorism causes global nuclear escalation – national retaliation goes global

Morgan ‘9 (Dennis Ray, Professor of Foreign Studies at Hankuk University, December, “World on fire: two scenarios of the destruction of human civilization and possible extinction of the human race” Futures, Vol 41 Issue 10, p 683-693, ScienceDirect) ORIGINALLY CUT BY MATT GOMEZ FOR THE SCUFI. THANKS, MATT.

In a remarkable website on nuclear war, Carol Moore asks the question "Is Nuclear War Inevitable??" [10].4 In Section 1, Moore points out what most terrorists obviously already know about the nuclear tensions between powerful countries. No doubt, they've figured out that the best way to escalate these tensions into nuclear war is to set off a nuclear exchange. As Moore points out, all that militant terrorists would have to do is get their hands on one small nuclear bomb and explode it on either Moscow or Israel. Because of the Russian "dead hand" system, "where regional nuclear commanders would be given full powers should Moscow be destroyed," it is likely that any attack would be blamed on the United States" [10]. Israeli leaders and Zionist supporters have, likewise, stated for years that if Israel were to suffer a nuclear attack, whether from terrorists or a nation state, it would retaliate with the suicidal "Samson option" against all major Muslim cities in the Middle East. Furthermore, the Israeli Samson option would also include attacks on Russia and even "anti-Semitic" European cities [10]. In that case, of course, Russia would retaliate, and the U.S. would then retaliate against Russia. China would probably be involved as well, as thousands, if not tens of thousands, of nuclear warheads, many of them much more powerful than those used at Hiroshima and Nagasaki, would rain upon most of the major cities in the Northern Hemisphere. Afterwards, for years to come, massive radioactive clouds would drift throughout the Earth in the nuclear fallout, bringing death or else radiation disease that would be genetically transmitted to future generations in a nuclear winter that could last as long as a 100 years, taking a savage toll upon the environment and fragile ecosphere as well.

#### Thorium reactors can’t produce weapons grade waste – stymies proliferation

Donohue 8/17 (Nathan, George Washington University, Elliott School of International Affairs, research intern for the Project on Nuclear Issues, Center for Strategic and International Studies, 2012, "Thorium and its Value in Nonproliferation," [csis.org/blog/thorium-and-its-value-nonproliferation], jam)

The Federation of American Scientists (FAS) recently featured an article on their Science Wonk blog entitled “What about thorium?” As the article discussed, thorium is an element, which like uranium, has the ability to be utilized to produce nuclear power. More importantly, thorium fueled reactors are reported to be more proliferation resistant than uranium fueled reactors. However, despite these assertions, thorium has almost universally been ignored in favor of uranium based nuclear power reactors. The purpose of this piece is to conduct a review of thorium and to develop a better understanding of thorium’s nonproliferation benefits as it relates to nuclear power production. As FAS notes, natural thorium is a fertile material, while not itself fissionable, can be converted into a fissile material suitable to sustain a nuclear fission chain reaction. Accordingly, when natural thorium captures neutrons it becomes a new isotope of thorium which then goes through a process of decay where over a period of weeks, the thorium actually turns into uranium in the form of U-233. Unlike natural thorium, this U-233 is a fissile material suitable to sustain a nuclear fission chain reaction. The use of thorium to produce nuclear power is not a new concept. Research into thorium began in the late 1950’s and in 1965, Alvin Weinberg, the head of the Oak Ridge National Laboratory, and his team built a working thorium reactor using a molten salt bath design. Thorium was used to power one of the first commercial nuclear power plants in the U.S. in Shippingport, Pennsylvania in 1977. Nevertheless, research into thorium never found a foothold in the U.S. nuclear power infrastructure. By 1973, thorium research and development was fading to the uranium based focus of the U.S. nuclear industry, which was in the process of developing 41 new nuclear plants, all of which used uranium. The Shippingport facility was one of the last vestiges of thorium research in the U.S. for decades. Recently there has been a renewed focus on thorium based nuclear power, specifically in regards to the benefits related to spent fuel, including research involving the European Commission, India, Canada, Slovakia, the Russian Federation, China, France and the Republic of Korea. The utilization of thorium is purported to have the ability to reduce spent fuel waste by upwards of 50% while at the same time reducing the amount of plutonium within the fuel. To that end, thorium fuel designs are regarded as a better alternative for power production in terms of the plutonium proliferation risk inherent in spent fuel from uranium-fueled reactors. For example, all 104 reactors in the U.S. use uranium fuel. In these reactors, when the uranium in the form of U-238 captures extra neutrons, it goes through a process of decay whereby plutonium in the form of Pu-239 is produced. The spent fuel can then be reprocessed to isolate and remove this plutonium, which can then be used in the core of a nuclear weapon. Roughly 13 kilograms (kg) of reactor grade plutonium is necessary to power a nuclear weapon. In total, these 104 U.S. reactors accumulate roughly 2,000 tons of spent fuel per year. The 2,000 tons of waste produced annually by these nuclear utilities, contains roughly 25,520 kg of plutonium or enough plutonium to build 1,963 nuclear weapons a year. Globally, the total world generation of reactor-grade plutonium in spent fuel is equal to roughly 70 tons annually; more than two times what the U.S. produces. Conversely, there is the thorium seed and blanket design. This reactor concept is based on a design comprised of inner seed rods of uranium which provide neutrons to an outer blanket of thorium-uranium dioxide rods, creating U-233, which in turn powers the nuclear reactor. The important difference with this design is in the nature of the spent fuel. As advocates of thorium such as the U.S. company Lightbridge purport, this process would realize a significant reduction in the “quantity and quality” of plutonium produced within the spent fuel, achieving upwards of an 80% reduction in plutonium. For example, “a thorium-fueled reactor …would produce a total of 92 kilograms of plutonium per gigawatt-year of electricity generated, whereas a conventional water-cooled reactor would result in 232 kilograms.” In addition to a lower percentage of plutonium in the spent fuel, the composition of the plutonium produced is different as well, featuring a higher content of the plutonium isotopes Pu-238, Pu-240, and Pu-242. Weapons-grade plutonium requires roughly 90% plutonium in the form of Pu-239. Plutonium with higher contents of Pu-238 and Pu-240 is inherently unpredictable, and can spontaneously fission, making it “difficult or impossible to compress a bomb core containing several kilograms of plutonium to supercriticality before the bomb [disassembles] with a greatly reduced yield.” This reduces the reliability of a given nuclear weapon, thus making the thorium process less suitable for the development of plutonium for a nuclear weapon. The International Atomic Energy Agency considers plutonium containing more than 81% Pu-238 “not weapons-usable.” Although thorium offers the ability to reduce the plutonium risk inherent in spent fuel, it does not eliminate the need for enriched uranium. Specifically, Lightbridge’s seed and blanket fuel technology would require uranium enriched to less than 20 % in both the seed and blanket fuel rods. Equally significant, the U-233 that is produced in the seed and blanket design poses its own proliferation concern. A nuclear weapon can be constructed with a significant quantity of U-233, which the IAEA defines as 8 kg of U-233, and both the U.S. and India have detonated nuclear devices which utilized U-233. At the same time though, U-233 produced through this design also contains a small amount of the uranium isotope U-232, which emits a powerful, highly penetrating gamma ray. As noted by Ray Sollychin, the Executive Director of the Neopanora Institute-Network of Energy Technologies, this reportedly makes “U233 weapons significantly more difficult to conceal and much more dangerous to handle.” In addition, reactors which use a thorium based seed and blanket design are engineered so that the U-233 which is produced is simultaneously denatured or blended with U-238, further reducing its suitability for a nuclear weapon. Moreover, the blanket is designed to remain within the reactor for upwards of nine to twelve years. This allows for the U-233 that is produced within the blanket to burn “in situ.” Lastly, any attempt to prematurely remove the blanket and separate the U-233 from the U-238, U-234 and U-236 isotopes will also “remove the fissile U-235 from the resulting enriched steam,” once again making it unsuitable for a nuclear weapon. From this brief review of thorium and its properties, it appears clear that from a proliferation standpoint, that thorium fueled reactors provide for a safer nuclear power production process. In fact, it begs the question why thorium was overlooked in the first place. The simple answer is that the U.S. nuclear infrastructure was originally designed to facilitate mass quantities of plutonium for the production of a nuclear weapons arsenal. According to an article by Richard Martin in Wired magazine, “Locked in a struggle with a nuclear- armed Soviet Union, the U.S. government in the 60’s chose to build uranium-fueled reactors — in part because they produce plutonium that can be refined into weapons-grade material.” During the Cold War, maintaining nuclear parity with the Soviets was an overarching goal. Yet, with the end of the Cold War, the focus has shifted from acquiring nuclear weapons to stymying their development by both state and non-state actors. Therefore, the plutonium byproduct of the global nuclear power infrastructure has now become a liability and a proliferation risk. As the IAEA has noted, “for nuclear power to be accepted as a significant contributor of primary energy in the next century, it should be based on a fuel cycle, which is highly proliferation-resistant.” For this reason, further research and development of thorium needs to be explored, not only in terms of seed and blanket technology but other thorium based designs as well, including thorium-based Pebble Bed Reactor, fast reactors (liquid metal cooled and gas cooled); and advanced designs such as Molten Salt Reactor and Accelerator Driven System.

#### LFTRs provide safe and effective reprocessing without risk of prolif

Hall 10 (Vincent, M.S. Chemical Engineering at University of Tennessee-Knoxville, Process Engineer at Burns & McDonnell, "A REVIEW OF THE BENEFITS AND APPLICATIONS OF THE THORIUM FUEL CYCLE," Sep 21, jam)

What appears to be the most promising reactor design for the thorium fuel cycle is the one for which it originally was intended, that is the Molten Salt Reactor (MSR) or Liquid Fluoride Thermal Reactor (LFTR). Current reactor designs, typified by solid fuel elements, necessitate that the power plant be modeled as a mechanical operation, the primary objective being the simplification of heat transfer equipment. However this is paid for by complicated fuel reprocessing. Solid fuel elements remain in the same position during their service time, accumulating fission and activation products until the fuel is so heavily poisoned that the nuclear reaction can no longer take place. The accumulation of poisons such as xenon requires the presence of more fuel than otherwise necessary, resulting in additional generation of waste. Eventually, the operation must be shutdown so that the fuel can undergo maintenance or replacement (Hron 222-223). At the least, the fuel bundles must be routinely shuffled in the core to avoid build up of neutron poisons, but this still requires downtime. Also, reprocessing is generally not economical as the solid fuel must be first converted to a liquid/gas for separations and then back to solid form for geological disposal. One alternative to this approach is a reactor with the fuel dissolved in a liquid core, modeling the facility morel like a chemical plant. Such a design seeks to maximize the ease of reprocessing and recovery (Briant and Weinberg 797). The Molten Salt Reactor Experiment (MSRE) performed at Oak Ridge National Laboratory (ORNL) from the 1950’s to 1970’s was extremely successful and demonstrated the feasibility of the technology. The continuous and flowing nature of the process provided simple fission product removal and reprocessing. Inherent safety and proliferation resistance features were also key elements of the design. A drawback to reprocessing with a MSR is that a reprocessing plant must be collocated with each plant site, which is an added cost. However, on site reprocessing reduces proliferation threats as it decreases the need for transportation. The MSRE was based upon the idea of dissolving the fertile and fissile materials as fluorides in a molten carrier salt, typically LiF and BeF2. It was designed as a seed- and blanket type reactor and was able to operate 233 U, 235 U, and 239 Pu as fissile fuels. The 232 Th233 U cycle is most applicable to a MSR, as it allows for much higher conversion in the thermal neutron spectrum, which is where the reactor operates, while the 238 U239 Pu cycle needs to take place in the fast spectrum to obtain complete conversion. In the original design of the MSRE, an inner spherical core contains the dissolved 233 UF4 in the fuel salt, where the nuclear reaction takes place. This is surrounded by a second vessel containing 232 ThF4 dissolved in a blanket salt. Neutron flux from the inner core passes into the blanket salt to transmute the thorium to fissile uranium. The blanket salt is continuously sent to a chemical processing plant where the thorium is returned to the blanket while the uranium is sent to the inner core fuel salt. Similarly, the fuel salt is also sent through a chemical separations procedure to remove fission products from the fuel. The rationale behind this design is due to the fact that thorium and the formed fission products are chemically similar, thus isolating the two species greatly simplifies the reprocessing procedure. The problem with this design was that the allowable critical diameter of the inner core was only 1 meter, too small to obtain sufficient power output on an industrial scale. The design was then altered so that the fluids were interlaced by an integrated plumbing scheme to provide sufficient neutron flux between the salts, while still keeping thorium separated from the fission products. However, the graphite present in the core would shrink and swell under the presence of the high irradiation, yielding a complicated and sensitive “plumbing problem”. A subsequent design was adopted that contained all the dissolved species in a single salt mixture. This design was eventually constructed and ran successfully for five years. The simplification of the reactor though, was compensated for by the difficulty in reprocessing the waste. ORNL used a Liquid Bismuth Reductive Extraction (LBRE) process to separate the fission products from thorium, but it was a very costly, complex, and delicate process (LeBlanc “Liquid Fluoride Reactors”). Now, with the current revival of interest in nuclear power, reinvestigations of ORNL’s “plumbing problem” in the two fluid design or optimization of the difficult LBRE process with current pyrochemical methods may provide an effective and economical way of closing the nuclear fuel cycle. Construction of a two fluid MSR capable of handling the flexing problem associated with the plumbing will greatly reduce the challenge of reprocessing. For the blanket salt, bubbling F2 gas through causes dissolved 233 UF4 to form gaseous 233 UF6, which can be easily removed, converted back to 233 UF4 by reacting with H2 and sent to the fuel salt. Likewise, for the removal of fission products from the inner core, uranium and gaseous fission products are first removed separately from the fuel salt based upon fluoride volatility. The salt is then placed in a still to undergo vacuum distillation. The decay heat of the fission products facilitates the evaporation of the salt which is recombined with the uranium, while leaving solid fission products behind for disposal. In addition, the two-fluid design solves the thorium fuel cycle’s protactinium problem. The risk of 233 Pa absorbing neutrons to form transuranic wastes is lessened because the neutron flux in the blanket salt where the protactinium is formed is much lower. Thus, 233 Pa can be allowed to simply remain in the salt and decay to 233 U (LeBlanc “Liquid Fluoride Reactors”). Efficiency, safety, and proliferation resistance features make the MSR a viable technology. The chemical and physical stability of the salt allow the reactor to reach much higher temperatures than traditional solid fuel reactors. The MSRE, a 1000 MWe design, demonstrated an operating temperature of 700°C, significantly higher than that of a typical LWR (~315°C). For any power cycle, higher temperatures result in higher efficiencies. A MSR could potentially allow power plants to replace steam driven turbines with the more efficient gas driven turbines (LeBlanc “Liquid Fluoride Reactors”). Today, a current 1 GW capacity nuclear plant requires up to 800,000 tons mined uranium ore to undergo milling and fuel fabrication, of which results to roughly 35-40 tons of spent fuel per year. A 1GWyr MSR however, only requires around 200 tons of thorium ore and results in about 1 ton of fission products and little to no transuranic waste due to the use of thorium as fuel. The absence of transuranics means that only 300-500 years is needed for the entirety of the fission product waste to decay to a stable and safe state. In addition, in the thermal spectrum, the best way demonstrated of obtaining complete fuel consumption is by use of a MSR run on the thorium fuel cycle. If all of the fuel from the uranium cycle is desired to be burned, the neutronic speeds must be switched to the fast, and arguably less safe, spectrum. With such efficiencies, it is possible that a thorium fueled MSR is capable of producing enough energy so that only 100 grams of pure thorium would represent the average U.S citizen’s lifetime energy consumption. In comparison 3.5kg of Lightly Enriched Uranium (LEU) would represent the same amount of energy (Sorensen “Energy from Thorium) as would 54 tons of coal (ENS “Fuel Comparison”). The design of a MSR is also inherently safe. As the fuel salt heats up inside the core, it expands and flows out of the high neutron flux zone. This loss of fissile material in the core limits the extent of reaction and cools down the system. The process works in reverse as well when the reactor is performing below the desired output temperature, the more dense salt allows more fissile material to flow in and increase the neutron economy. Unlike traditional pressurized water cooled designs, the liquid salt in the MSR serves as its own coolant and its high boiling point allows it to operate at low pressure. This eliminates the risk of a high pressure rupture in the system, so that no expensive containment vessels or piping and equipment designed for high pressure applications are needed. If there were however, a breach in the system, the high melting point of the salt would simply cause it to solidify upon contact with the air and possibly even seal the break. In the event of a loss of power to the system, ORNL developed a simple and effective method for cooling the reactor. Under normal operation, a fan system was used to cool and solidify a section of piping containing the salt, known as the “freeze plug”. If was power was lost, the freeze plug would simply melt and the molten salt would then flow to a passively cooled containment vessel. This is much simpler than current reactor designs were emergency coolant has to be brought to the reactor and override normal operation procedures (Sorensen “Energy from Thorium”). As a guard against weapons proliferation, the simple fact that the fuel exists as a molten liquid form with a temperature of at least 500°C makes it a difficult material to misappropriate. In addition, the use thorium fuel cycle yields 232 U as a side product of the burn-up chain, regardless of the reactor design, which also enhances proliferation resistance as its daughter products are strong gamma emitters that make direct handling and weapons usage difficult (IAEA 66). Furthermore, in the event of the security of the facility being compromised, 238 UF4 can be quickly dumped into the reactor, denaturing it to a form unsuitable for proliferation (LeBlanc “Liquid Fluoride Reactors”). The THOREX process is the most developed method for reprocessing. However, this process which utilizes a liquid-liquid extraction technique for the removal of uranium, thorium, and/or plutonium from the fission products has yet to reach the efficiency and practicality of its equivalent PUREX process (IAEA 65). The first step of reprocessing solid fuel elements from a LWR is the removal of its protective cladding, commonly referred to as the head-end process. This consists of either a series of mechanical de-cladding operations or a chemical de-cladding procedure. For most Zircaloy or stainless steel clad fuel elements the mechanical option is usually implemented, and consists of cutting, grinding, shearing, and crushing away the casing. The chemical option consists of either a dry-fluorination procedure, a SULFEX solution (5 M HNO3 + 2 M HCl and 5 M H2SO4) for SS removal or a ZIRFLEX solution (6 M NH4F + 0.5 M NH4NO3) for Zircaloy removal (IAEA 71). After the head-end process, the fuel is dissolved in the nitric acid based THOREX solution. This solution undergoes a varying degree of feed preparation, extraction, partitioning, and stripping stages depending on whether uranium, uranium and thorium, or uranium, thorium, and if present plutonium are desired to be recovered. Tributyl phosphate (TBP) dissolved in dodecane is generally used as the extractant. Control of the concentration of TBP and acidity of the scrubbing and stripping solutions permits selectivity of what actinides will be recovered (IAEA 72). In the 1980’s, Zimmer and Merz performed much work fine tuning the THOREX process developed by ORNL in the 1950’s by adjusting and optimizing acid and TBP concentrations throughout the extraction process in order to maximize decontamination factors and minimize precipitant crud formation. They also proposed the use of pulse columns for reprocessing thorium fuel. Compared to mixer-settlers, pulse columns provide less contact time between fission products and the organic phase, which leads to less decomposition of TBP into unwanted DBP. Also, any crud precipitation formed in the process is less likely to cause clogging than in mixer-settlers due to the increased flow velocity as well as a decrease in the occurrence of any unwanted third phase complexes associated with thorium and TBP. However, the issue of criticality should be acknowledged with pulse columns, as it was observed that the concentration of uranium in the upper part of the column in the partitioning stage is one order of magnitude higher than in the feed solution (Merz and Zimmer 338-339). The most common method of THOREX reprocessing is the sole retrieval of uranium leaving thorium discarded in the raffinate, known as the INTERIM 23 process. 1.5% to 5% TBP is used in the extraction stage, followed by a series of scrubbing stages with 1-2 M HNO3, and ending with a dilute nitric acid stripping stage to remove the 233 U from the organic solvent. If further purity is desired, an anionic exchange method in HCl solution may be used. This however, presents problems as corrosion control is arduous to maintain and the resulting corrosion products lead to poor decontamination factors (IAEA 72). When the retrieval of both uranium and thorium is desired a 30% to 43% TBP solution is capable of extracting both actinides. An acid strip greater than 0.3M HNO3 used in the partitioning stage removes the majority of the thorium, while a very dilute acid strip removes the uranium from the organic. A problem associated with this procedure is the aforementioned formation of a third phase due to poor solubility of the complexes formed by thorium and TBP in the dodecane diluent. Replacements for dodecane capable of sufficient loading without formation of a third phase are currently being considered such as amides and aromatic diluents (IAEA 73). Little investigation has been undertaken in the development of a three stream process for recovering plutonium if Th-Pu MOX fuel is used. This process would theoretically combine aspects of the PUREX and THOREX processes. A 5% TBP extraction / scrubbing / stripping process will yield a U-Pu nitrate solution that can then undergo traditional PUREX processing for eventual formation of separate oxide powders. The leftover thorium contained in the raffinate will then be removed from the fission products with at 30% TBP extraction / scrubbing / stripping process followed by precipitation and calcination to form an oxide powder. A problem presented in this scheme is the formation of nitrous gases that stabilize plutonium ions, limiting their solubility in the initial 5% TBP extractant. Considerable research is needed concerning the process chemistry of this scheme before its application can be realized (IAEA 74). If the intermediate 233 Pa, in the transmutation of 232 Th to 233 U, is desired for recovery and eventual conversion to 233 U, then considerable technological development must be undertaken. In the current THOREX process, protactinium passes through with the fission products in the raffinate waste. Not only is this a loss of the potentially re-usable 233 Pa as a transitional to 233 U, but it also means that any 231 Pa formed in the burn-up chain of 232 U will be carried with the remaining waste for permanent disposal. 231 Pa is an alpha emitting isotope with a long term radiological impact constituting a half-life of 3 x 10 4 years that is a concern regarding geological disposal. The recovery of both of these isotopes of protactinium would limit the amount and severity of the waste product and reduce fuel consumption as both can be converted to 233 U in the reactor (IAEA 65-66). An alternative to recovering 233 Pa from the spent fuel is to simply allow it to decay to 233 U before reprocessing. However, as stated early, this requires storage time of one year that can be expensive. Oddly enough, it appears that the most viable solution to solving the protactinium problem may have been already solved by ORNL in the 1960s. They were able to successfully absorb 98% of the protactinium dissolved in THOREX solution on pulverized unfired Vycor glass. This was done by introducing agitated contact between the protactinium containing solution and the Vycor glass for 24 hours. The difference in the gross gamma count of the glass and aqueous raffinate was then used to measure the amount of adsorbed protactinium. In order to determine if this technique is transferable to an industrial process, ORNL suggested that a hot-cell experiment involving THOREX solution from spent fuel pins be performed to determine the effects of fission product concentrations on the adsorption of protactinium under normal process conditions (Moore 1-2). It should be noted however, that the attainment of 233 U from 233 Pa from reprocessing poses a significant weapons proliferation problem. Any 233 U obtained from 233 Pa, will be considered Highly Enriched Uranium. This 233 U will have little of the proliferation limiting 232 U that it is normally associated with in the thorium burn-up chain. Thus, the Vycor adsorption process would limit the protactinium problem, so long as the protactinium recovered was sent back to the service end of the fuel cycle before conversion to 233 U. In addition, the THOREX process faces another challenge concerning the role of 232 U. On the one hand, the 232 U formed by (n, 2n) reactions of 232 Th, 233 Pa, and 233 U in the thorium decay chain provides a natural proliferation barrier as its decay products, such as 212 Bi and 208 Tl, yield strong gamma emissions of 0.78MeV and 2.6MeV, respectively. These emissions are capable of compromising the electronic triggering components of a military weapon attempting to utilize reprocessed 233 U, potentially rendering such a bomb unstable or useless. The presence of such radiation will also greatly aid in the exposure of concealed nuclear weaponry due to the growing science and technology of nuclear detection systems (IAEA 9). On the other hand, the presence of 232 U complicates spent fuel reprocessing. It has a half-life of roughly 72 years and the radioactivity of its daughter products necessitates remote, shielded, and preferably automated reprocessing. While this may be beneficial in deterring the proliferation of the spent fuel, it is costly and complicated. This is due to the fact that both 232 U and its alpha decay product 228 Th are chemically inseparable from their respective isotopes of 233 U and 232 Th (IAEA 66). Isotopic separation of the thorium should be easily achievable with current centrifugal effect technology due to the relatively large difference in atomic mass between the isotopes. However, the very slight mass difference between the uranium isotopes may prove to be a challenge. Emerging separation technologies involving mass spectrometry or atomic laser vapor isotope separation (AVLIS) may prove applicable to this process once further developed. If desired, the amount of 232 U can be minimized by controlling the neutron flux spectrum of the reactor. Higher 232 U concentrations are associated with fast neutron spectrums than with thermal. For a fast LWR, for example, the 232 U present is roughly on the order of 2000-3000 ppm. In a thermalized PHWR, 232 U concentration is expected at 500-1000 ppm. However, it has been demonstrated by the BN-350 sodium cooled fast reactor in Kazakhstan, that by introducing a 15-20 cm spacing between the thorium blanket and central core, 232 U can be all but eliminated. The 232 U obtained from this design was only 2-11 ppm, proving that minimization of 232 U can be achieved, but this returns us to the proliferation problem of reprocessing pure 233 U (IAEA 66). Unlike UO2 and PuO2, ThO2 exists in only one oxidation state, making it more stable under most storage and process conditions. While UO2 is easily dissolved in nitric acid, mixed fuels containing over 80% ThO2 cannot be dissolved in pure HNO3. A small amount of HF is needed to aid in the dissolution. The addition of HF, however, introduces a corrosion problem for stainless steel piping and equipment. These effects can be mitigated with the addition of aluminum nitrate, which complexes with excess free fluoride ions that would otherwise instigate corrosion. In the 1950’s ORNL developed a process using the following dissolved acid: 13M HNO3+0.05 M HF+0.1M Al (NO3)3 which is now the accepted THOREX solution formula and has served as the best medium for dissolving ThO2 to date. ThO2 is dissolved in THOREX solution at ~120°C and ambient pressure, while coupled with agitation. Increasing the temperature and pressure to ~200°C and 9 atm greatly increases the dissolution rate, but of course increases safety risk as well. It has been also demonstrated that irradiated fuel dissolves more readily in solution than fresh fuel. This is most likely attributed to disturbances formed in the crystal structure of the spent fuel during the service period. Recent experiments performed with un-irradiated fuel have also shown that the addition of roughly 1.5% MgO during the pellet fabrication stage and replacement of HF with NaF in the THOREX solution lead to increased dissolution rates (IAEA 66). Disposal The direct disposal of spent thorium fuels would be anticipated to be very similar to that of uranium. Currently, different countries have adopted different methodologies for disposing of nuclear waste. In the U.S, civilian waste remains on-site in large cooling ponds. These large concrete structures serve to provide radiation protection and remove heat generated from radioactive decay. It is intended that after sufficient cooling time, the waste from these pools will be encapsulated and transported to a permanent geological repository such as Yucca Mountain in Nevada or the Waste Isolation Pilot Plant in New Mexico (WNA “Waste Management”). In Canada, long term waste management plans involve placement of the waste in corrosion resistant containers enclosed by a clay-based buffer barrier. These containers are then set into a deeply excavated granite vault for permanent disposal (IAEA 76). In Europe, much of the spent fuel is actually reprocessed in either the UK or France. The recovered fuel is returned to the plants, while the waste is vitrified, sealed in stainless containers, and either stored at the reprocessing facility or returned as well. Eventually, the waste will also be sent to permanent geological disposal (WNA “Nuclear Waste Management”). Thus, regardless of when and how the waste gets there, a geological repository is the final step in waste management for all countries. It is here were thorium based fuels hold the advantage over traditional uranium fuels. The high chemical stability of ThO2 and its very low solubility in groundwater aids in its retention of harmful fission products, making it suitable for direct geological disposal. Also, it has bee shown that fission gas release. from defected thorium fuel elements is 1 to 2 orders of magnitude lower than that of uranium and that release of Br, Cs, and Rb from the fuel matrix is much slower as well (IAEA 78). In the event of a rupture of the casing material during permanent disposal, a gas leak containing radioactive material would pose safety and logistics issues, which a thorium fuel cycle would moderate. A dramatic renovation in the operation and protocol of the nuclear power industry must be undertaken in order for the thorium fuel cycle to be utilized. This will be an extremely difficult task, as a whole new nuclear infrastructure will have to be installed and will be in direct competition with very strong and influential enterprises that already have a reliable and profitable system established. Thus, the only way for thorium power to be economically accessible, is for an increased public awareness of the benefits it can provide, so as to feed demand. Thorium is capable of fixing the negative stigma associated with nuclear energy by providing a sustainable, safe, and weapons resistant form of power. When coupled with MSR technology, the thorium fuel cycle will be capable of producing little to no long lived transuranic waste, will have a natural negative void coefficient during service end operation, and will deter weapons proliferation with the presence of 232 U and ease of denaturing. The more minds that are aware of and insist upon the use of thorium power, the sooner it will be economically realizable and available to the public as a very clean form of energy.

#### Plan makes the U.S. a leader in thorium tech – formal mechanisms buoy international adoption

Johnson 6 (Brian, BS Nuclear Engineering from Oregon State U, later received a Ph.D. in Nuclear Science and Engineering from M.I.T., "Thorium for Use in Plutonium Disposition,Proliferation-Resistant Fuels for DevelopingCountries, and Future Reactor Designs," [www.wise-intern.org/journal/2006/Johnson-ANS.pdf], jam)

As it stands, the joint plutonium disposition plans of the United State and Russia have stalled. This is because MOX, the technology chosen to undertake disposition, has taken more time and money than expected. In addition to this, Russia refuses to bear any of the cost of plutonium disposition through the use of MOX. This has opened the door to other options including thorium based fuels. A program in Russia examining thorium-based fuels has made a lot of progress and promises to be an excellent way to dispose of plutonium. The United States cannot directly benefit from this research and should start a program equal in size to the Russian program so that if thorium-based fuels turn out to be a better option for disposition there will be less delay in implementation. The United States outlines a desire in the Global Nuclear Energy Partnership (GNEP) to establish reactors in developing nations to provide potable water, heat for industrial processes, and electricity to growing populations. There are currently no designs that have all of the characteristics desired for reactors to be deployed in developing countries. Thorium-based, proliferation-resistant fuels can provide an evolutionary step until better technologies are developed. The design of this fuel shares a lot of the same technology as thorium-based fuel for plutonium disposition. Because of this, the same program could cover both research objectives with marginal added cost. Molten salt reactors meet all of the goals of next generation fuel cycles. However, the United States is not currently funding research into the technology. Recent research done in France has shown that some of the issues that prohibited development can be resolved. The United States is the only country with operating experience with molten salt reactors. Considering these facts, it makes sense for the United States to fund some research into this promising technology. Thorium could be used to reach several goals in the United States. The technology is not ready for implementation. The United States should fund research into thorium to reach these goals. In doing so, the United States could become a leader in thorium-based technology.

#### Domestic development prompts global exports

Rosner & Goldberg 11 (Robert, William E. Wrather Distinguished Service Professor, Departments of Astronomy and Astrophysics, and Physics, and the College at the U of Chicago, and Stephen, Energy Policy Institute at Chicago, The Harris School of Public Policy Studies, "Small Modular Reactors - Key to Future Nuclear Power Generation in the U.S.," November 2011, [https://epic.sites.uchicago.edu/sites/epic.uchicago.edu/files/uploads/EPICSMRWhitePaperFinalcopy.pdf], jam)

Previous studies have documented the potential for a significant export market for U.S. SMRs, mainly in lesser developed countries that do not have the demand or infrastructure to accommodate GW-scale LWRs. Clearly, the economics of SMR deployment depends not only on the cost of SMR modules, but also on the substantial upgrades in all facets of infrastructure requirements, particularly in the safety and security areas, that would have to be made, and as exemplified by the ongoing efforts in this direction by the United Arab Emirates (and, in particular, by Abu Dhabi). This is a substantial undertaking for these less developed countries. Thus, such applications may be an attractive market opportunity for FOAK SMR plants, even if the cost of such plants may not have yet achieved all of the learning benefits. The Department of Commerce has launched the Civil Nuclear Trade Initiative, which seeks to identify the key trade policy challenges and the most significant commercial opportunities. The Initiative encompasses all aspects of the U.S. nuclear industry, and, as part of this effort, the Department identified 27 countries as “markets of interest” for new nuclear expansion. A recent Commerce Department report identified that “SMRs can be a solution for certain markets that have smaller and less robust electricity grids and limited investment capacity.” Studies performed by Argonne National Laboratory suggest that SMRs would appear to be a feasible power option for countries that have grid capacity of 2,000-3,000 MW. Exports of SMR technology also could play an important role in furthering non-proliferation policy objectives. The design of SMR nuclear fuel management systems, such as encapsulation of the fuel, may have non-proliferation benefits that merit further assessment. Also, the development of an SMR export industry would be step toward a U.S.-centric, bundled reliable fuel services. Exports of FOAK plants help achieve learning without the need for a full array of production incentives required for domestic FOAK deployments. Projected, unsubsidized, electricity market prices will likely be higher in selected foreign markets, particularly when the electricity pricing is based on liquefied natural gas import prices. 49 This situation would enable SMRs to be in a more favorable competitive position. SMR exports would qualify, if needed, for export credit assistance under current U.S. government programs, but this assistance would not require the need for new federal funding.

### #Based Islands

#### #BASED ISLANDS ADVANTAGE

#### *Long-term* grid outages are devastating and highly probable – degrading infrastructure, solar storm, EMP, cyberattack, pandemic, or physical attack

Bartlett et al 12 (Roscoe, Congressman 6th district of Maryland, Rich Andres, Energy Security Chair, National Defense University, Jack Markey, Director, Division of Emergency Management in Frederick County, Maryland, Marshall Hanson, Legislative Director, Reserve Officers Association, R. James Woolsey, Chairman, Foundation for the Defense of Democracies, and Former Director of Central Intelligence, The Honorable Robert McFarlane, former National Security Advisor to President Reagan, Aug 3, [bartlett.house.gov/news/documentsingle.aspx?DocumentID=305763], jam)

Congressman Bartlett noted, “The U.S. electric grid is one of our nation’s 18 critical infrastructures. However, none of the other 17 will function without electricity. America’s grid is vulnerable to widespread blackouts of extended duration. The federal government and the North American Electric Reliability Cor­poration (NERC) agree that there are five separate Low Frequency – High Impact (LFHI) events that could each inflict extended duration grid blackouts, potentially continent-wide including: cyber attack; solar geomagnetic storm electro-magnetic pulse (EMP), coordinated physical attack; nuclear EMP; or a pandemic. In light of these known risks, my legislation encourages communities and organizations to generate at least 20% of their own electricity demand to ensure independent operation of critical infrastructure and vital national security missions and to provide adequate supplies of basic necessities and services. It is critical that we in Congress send the message that it is in the interest of national security that every community and institution, especially our military, reestablish their capabilities to be self-sufficient independent of the grid. We also need to encourage individuals to develop and implement a plan that will provide for themselves and their family sufficient food, water and other emergency supplies necessary to weather an electricity outage when there is no one there to call.” Rich Andres, Energy Security Chair, National Defense University (NDU), said that NDU for the past three years had coordinated workshops in conjunction with other federal government agencies, academics and private sector organizations about the threat to the grid from solar geomagnetic storms. The most recent was Secure Grid 2011 held October 4-5, 2011. “Widespread grid collapse from a solar storm is a serious threat. There are two take aways from these exercises that relate to the legislation introduced today,” said Dr. Andres. “The first is that the federal government does not have the resources to adequately respond to an extended duration grid outage. Local, state, and private sector organizations do have these civil defense capabilities and resources. The second is that what these local organizations lack and that the federal government can provide is threat and risk assessment capabilities.” Jack Markey, Director, Division of Emergency Management in Frederick County, Maryland, reviewed a litany of electricity outages that have affected residents in recent years including the derecho of June 29-30, 2012, the snowmaggeddon blizzard, and hurricanes. He said, “These events illustrate that loss of electricity is not unprecedented, but rather a predictable event. I am pleased by Congressman Bartlett’s introduction of this legislation because it’s important to raise the public’s awareness of threats to the grid in order to garner support for necessary investments and preparation by families, businesses and local community organizations for measures such as generating 20% of their electricity demand.” Mr. Markey also said that his office is actively collaborating with the local utility, First Energy, on measures to improve recovery from electricity outages. Chuck Manto, Lead, National InfraGard Electro Magnetic Pulse Special Interest Group (EMP SIG) and CEO Instant Access Network, LLC, (IAN) explained the history of InfraGard. “InfraGard was initiated in the mid-1990's in Ohio. It was formed to address the reluctance of companies and organizations to share their vulnerabilities out of fear that it would hurt them with competitors or become known to bad guys. Members sign non-disclosure agreements. The FBI performs background checks on prospective members and coordinates information sharing by members nationwide. There are now 50,000 members.” He added, “In the last year and a half, InfraGard established an interest group called EMP SIG. It is focused on an all-hazards approach to mitigate any threat that could cause a nationwide collapse of infrastructure for more than a month. That work is what led to the recommendation of local distributed generation of 20% of electricity and a great deal of interest in renewable sources, such as solar and wind.” Mary Lasky, Business Continuity, Johns Hopkins Applied Physics Lab (JHU-APL) and also chair of Howard County, Maryland's Community Emergency Response Network as well as President of the Maryland Chapter of Contingency Planners, coordinated an exercise at JHU-APL on October 6, 2011 as an adjunct to the NDU Secure Grid 2011. She said that “Americans have become too reliant upon government to take care of them after an emergency. That's just not realistic in the event of a widespread grid outage. Trying to ignite citizen preparation as this bill does is extremely valuable. Generating 20% of electricity locally is important because none of our other critical functions, such as hospitals, work at all or work well without electricity.” Marshall Hanson, Legislative Director, Reserve Officers Association (ROA) said, “I was in the Navy and learned in my training that that the EMP nuclear threat is real. It was intensively studied by the Soviet Union. Nuclear capability is being pursued by Iran. A non-state actor, such as al Qaeda, could inflict a crippling EMP attack if they acquired the capability to launch a crude nuclear weapon from a scud launcher on a tramp steamer. The importance of this new legislation is that it refocuses attention and effort at the community level. That is consistent with the mission and history of the ROA. ROA not only supports this bill but will encourage members to become involved in their community preparations.” A number of distinguished supporters of the bill were unable to attend the news conference but released statements about it. R. James Woolsey, Chairman, Foundation for the Defense of Democracies, and Former Director of Central Intelligence: “Congressman Roscoe Bartlett has been an indefatigable leader to change the dangerous vulnerability at the heart of our civilization's ability to operate: multiple natural and man-made threats to the electric grid. Each could cause extended outages for tens of millions of Americans, our nation’s critical infrastructures and vital national security assets and missions. We could see a repeat of what is now happening in India but with outages lasting months not days. Congressman Bartlett’s new bill sounds this alarm once more with a different tack. It will encourage America’s best in the world hackers, inventors, engineers, first responders and entrepreneurs to help lead the rest of us toward having a much more resilient electric grid. Local communities and organizations that take steps to generate 20% of their electricity load independent of the grid will strengthen our national security by becoming more self-reliant and self-sustaining.” The Honorable Robert McFarlane, former National Security Advisor to President Reagan: "It's human nature to welcome technologies that enhance the quality of our lives while ignoring how our dependence on them poses catastrophic risks. Throughout his life and service in the House of Representatives, Congressman Roscoe Bartlett has been virtually alone in understanding the complex family of natural and man-made risks. He has made it his business to focus on what could go horribly wrong and to propose measures designed to prevent them or to prepare for and cope with the results. He has been the persistent leader of efforts to identify the vulnerabilities of our national electric power grid, as well as the risks we are running by relying on a single fuel -- a fuel that is priced by a foreign cartel -- to power over 90% of all air, sea and land transportation in our country. More importantly, having defined the problems, he has taken the initiative to introduce measures that offer a solution. His leadership in shaping the Open Fuel Standard -- a measure that will enable competition in transportation fuels -- is a landmark measure that will add immeasurably to our national and economic security. It is a measure of his standing on energy issues that he has garnered such solid bipartisan support for his initiatives. Every member of the House knows that Roscoe Bartlett is the go-to man on energy and environmental policies."

#### Civilian grid blackouts wreck national command authority, fracture global military operations, collapse deterrence, and escalate to nuclear war—vulnerability independently invites cyber-attacks

Andres & Breetz 11 (Richard B., Professor of national Security Strategy at the national War College and a Senior fellow and energy and environmental Security and Policy Chair in the Center for Strategic research, institute for national Strategic Studies, at the national Defense University, Hanna L., doctoral candidate in the Department of Political Science at the Massachusetts institute of technology, "Small Nuclear Reactors for Military Installations: Capabilities, Costs, and Technological Implications," February 2011, [www.ndu.edu/press/lib/pdf/StrForum/SF-262.pdf], jam)

Grid Vulnerability. DOD is unable to provide its bases with electricity when the civilian electrical grid is offline for an extended period of time. Currently, domestic military installations receive 99 percent of their electricity from the civilian power grid. As explained in a recent study from the Defense Science Board: DOD’s key problem with electricity is that critical missions, such as national strategic awareness and national command authorities, are almost entirely dependent on the national transmission grid . . . [which] is fragile, vulnerable, near its capacity limit, and outside of DOD control. In most cases, neither the grid nor on-base backup power provides sufficient reliability to ensure continuity of critical national priority functions and oversight of strategic missions in the face of a long term (several months) outage. 7 The grid’s fragility was demonstrated during the 2003 Northeast blackout in which 50 million people in the United States and Canada lost power, some for up to a week, when one Ohio utility failed to properly trim trees. The blackout created cascading disruptions in sewage systems, gas station pumping, cellular communications, border check systems, and so forth, and demonstrated the interdependence of modern infrastructural systems. 8 More recently, awareness has been growing that the grid is also vulnerable to purposive attacks. A report sponsored by the Department of Homeland Security suggests that a coordinated cyberattack on the grid could result in a third of the country losing power for a period of weeks or months. 9 Cyberattacks on critical infrastructure are not well understood. It is not clear, for instance, whether existing terrorist groups might be able to develop the capability to conduct this type of attack. It is likely, however, that some nation-states either have or are working on developing the ability to take down the U.S. grid. In the event of a war with one of these states, it is possible, if not likely, that parts of the civilian grid would cease to function, taking with them military bases located in affected regions. Government and private organizations are currently working to secure the grid against attacks; however, it is not clear that they will be successful. Most military bases currently have backup power that allows them to function for a period of hours or, at most, a few days on their own. If power were not restored after this amount of time, the results could be disastrous. First, military assets taken offline by the crisis would not be available to help with disaster relief. Second, during an extended blackout, global military operations could be seriously compromised; this disruption would be particularly serious if the blackout was induced during major combat operations. During the Cold War, this type of event was far less likely because the United States and Soviet Union shared the common understanding that blinding an opponent with a grid blackout could escalate to nuclear war. America’s current opponents, however, may not share this fear or be deterred by this possibility.

#### Loss of national command authority and cyber attack causes miscalc and extinction

Lawson 9 (Sean - assistant professor in the Department of Communication at the University of Utah, Cross-Domain Response to Cyber Attacks and the Threat of Conflict, 5/13, http://www.seanlawson.net/?p=477)

At a time when it seems impossible to avoid the seemingly growing hysteria over the threat of cyber war,[1] network security expert Marcus Ranum delivered a refreshing talk recently, “The Problem with Cyber War,” that took a critical look at a number of the assumptions underlying contemporary cybersecurity discourse in the United States. He addressed one issue in partiuclar that I would like to riff on here, the issue of conflict escalation–i.e. the possibility that offensive use of cyber attacks could escalate to the use of physical force. As I will show, his concerns are entirely legitimate as current U.S. military cyber doctrine assumes the possibility of what I call “cross-domain responses” to cyberattacks. Backing Your Adversary (Mentally) into a Corner Based on the premise that completely blinding a potential adversary is a good indicator to that adversary that an attack is iminent, Ranum has argued that “The best thing that you could possibly do if you want to start World War III is launch a cyber attack. [...] When people talk about cyber war like it’s a practical thing, what they’re really doing is messing with the OK button for starting World War III. We need to get them to sit the f-k down and shut the f-k up.” [2] He is making a point similar to one that I have made in the past: Taking away an adversary’s ability to make rational decisions could backfire. [3] For example, Gregory Witol cautions that “attacking the decision maker’s ability to perform rational calculations may cause more problems than it hopes to resolveÃ¢â‚Â¦ Removing the capacity for rational action may result in completely unforeseen consequences, including longer and bloodier battles than may otherwise have been.” [4] Ã¯Â»Â¿Cross-Domain Response So, from a theoretical standpoint, I think his concerns are well founded. But the current state of U.S. policy may be cause for even greater concern. It’s not just worrisome that a hypothetical blinding attack via cyberspace could send a signal of imminent attack and therefore trigger an irrational response from the adversary. What is also cause for concern is that current U.S. policy indicates that “kinetic attacks” (i.e. physical use of force) are seen as potentially legitimate responses to cyber attacks. Most worrisome is that current U.S. policy implies that a nuclear response is possible, something that policy makers have not denied in recent press reports. The reason, in part, is that the U.S. defense community has increasingly come to see cyberspace as a “domain of warfare” equivalent to air, land, sea, and space. The definition of cyberspace as its own domain of warfare helps in its own right to blur the online/offline, physical-space/cyberspace boundary. But thinking logically about the potential consequences of this framing leads to some disconcerting conclusions. If cyberspace is a domain of warfare, then it becomes possible to define “cyber attacks” (whatever those may be said to entail) as acts of war. But what happens if the U.S. is attacked in any of the other domains? It retaliates. But it usually does not respond only within the domain in which it was attacked. Rather, responses are typically “cross-domain responses”–i.e. a massive bombing on U.S. soil or vital U.S. interests abroad (e.g. think 9/11 or Pearl Harbor) might lead to air strikes against the attacker. Even more likely given a U.S. military “way of warfare” that emphasizes multidimensional, “joint” operations is a massive conventional (i.e. non-nuclear) response against the attacker in all domains (air, land, sea, space), simultaneously. The possibility of “kinetic action” in response to cyber attack, or as part of offensive U.S. cyber operations, is part of the current (2006) National Military Strategy for Cyberspace Operations [5]: (U) Kinetic Actions. DOD will conduct kinetic missions to preserve freedom of action and strategic advantage in cyberspace. Kinetic actions can be either offensive or defensive and used in conjunction with other mission areas to achieve optimal military effects. Of course, the possibility that a cyber attack on the U.S. could lead to a U.S. nuclear reply constitutes possibly the ultimate in “cross-domain response.” And while this may seem far fetched, it has not been ruled out by U.S. defense policy makers and is, in fact, implied in current U.S. defense policy documents. From the National Military Strategy of the United States (2004): “The term WMD/E relates to a broad range of adversary capabilities that pose potentially devastating impacts. WMD/E includes chemical, biological, radiological, nuclear, and enhanced high explosive weapons as well as other, more asymmetrical ‘weapons’. They may rely more on disruptive impact than destructive kinetic effects. For example, cyber attacks on US commercial information systems or attacks against transportation networks may have a greater economic or psychological effect than a relatively small release of a lethal agent.” [6] The authors of a 2009 National Academies of Science report on cyberwarfare respond to this by saying, “Coupled with the declaratory policy on nuclear weapons described earlier, this statement implies that the United States will regard certain kinds of cyberattacks against the United States as being in the same category as nuclear, biological, and chemical weapons, and thus that a nuclear response to certain kinds of cyberattacks (namely, cyberattacks with devastating impacts) may be possible. It also sets a relevant scale–a cyberattack that has an impact larger than that associated with a relatively small release of a lethal agent is regarded with the same or greater seriousness.” [7]

#### SMRs efficiently island bases from grid failure—deters by denial

Andres & Breetz 11 (Richard B., Professor of national Security Strategy at the national War College and a Senior fellow and energy and environmental Security and Policy Chair in the Center for Strategic research, institute for national Strategic Studies, at the national Defense University, Hanna L., doctoral candidate in the Department of Political Science at the Massachusetts institute of technology, "Small Nuclear Reactors for Military Installations: Capabilities, Costs, and Technological Implications," February 2011, [www.ndu.edu/press/lib/pdf/StrForum/SF-262.pdf], jam)

In 2008, the Defense Science Board stressed that DOD should mitigate the electrical grid’s vulnerabilities by turning military installations into “islands” of energy self-sufficiency. 10 The department has made efforts to do so by promoting efficiency programs that lower power consumption on bases and by constructing renewable power generation facilities on selected bases. Unfortunately, these programs will not come close to reaching the goal of islanding the vast majority of bases. Even with massive investment in efficiency and renewables, most bases would not be able to function for more than a few days after the civilian grid went offline. Unlike other alternative sources of energy, small reactors have the potential to solve DOD’s vulnerability to grid outages. Most bases have relatively light power demands when compared to civilian towns or cities. Small reactors could easily support bases’ power demands separate from the civilian grid during crises. In some cases, the reactors could be designed to produce enough power not only to supply the base, but also to provide critical services in surrounding towns during long-term outages. Strategically, islanding bases with small reactors has another benefit. One of the main reasons an enemy might be willing to risk reprisals by taking down the U.S. grid during a period of military hostilities would be to affect ongoing military operations. Without the lifeline of intelligence, communication, and logistics provided by U.S. domestic bases, American military operations would be compromised in almost any conceivable contingency. Making bases more resilient to civilian power outages would reduce the incentive for an opponent to attack the grid. An opponent might still attempt to take down the grid for the sake of disrupting civilian systems, but the powerful incentive to do so in order to win an ongoing battle or war would be greatly reduced.

#### Thorium is the only energy capable of reliably supporting bases

Ackerman 11 (Spencer, senior reporter at Wired, "Latest Pentagon Brainstorm: Nuke-Powered War Bases," Feb 18, [www.wired.com/dangerroom/2011/02/nuke-bases/], jam)

Imagine the snow-capped peaks of mountainous eastern Afghanistan. Wouldn’t it be better topped off with a cooling tower for a nuclear reactor? The Pentagon’s way-out research arm thinks so. It’s all part of a big push to make the military more eco-friendly. Buried within Darpa’s 2012 budget request under the innocuous name of “Small Rugged Reactor Technologies” is a $10 million proposal to fuel wartime Forward Operating Bases with nuclear power. It springs from an admirable impulse: to reduce the need for troops or contractors to truck down roads littered with bombs to get power onto the base. It’s time, Darpa figures, for a “self-sufficient” FOB. Only one problem. “The only known technology that has potential to address the power needs of the envisioned self-sufficient FOB,” the pitch reads, “is a nuclear-fuel reactor.” Now, bases could mitigate their energy consumption, like the solar-powered Marine company in Helmand Province, but that’s not enough of a game-changer for Darpa. Being self-sufficient is the goal; and that requires going nuclear; and that requires … other things. To fit on a FOB, which can be anywhere from Bagram Air Field’s eight square miles to dusty collections of wooden shacks and concertina wire, the reactor would have to be “well below the scale of the smallest reactors that are being developed for domestic energy production,” Darpa acknowledges. That’s not impossible, says Christine Parthemore, an energy expert at the Center for a New American Security. The Japanese and the South Africans have been working on miniature nuclear power plants for the better part of a decade; Bill Gates has partnered with Toshiba to build mini-nuke sites. (Although it’s not the most auspicious sign that one prominent startup for modular reactors suspended its operations after growing cash-light last month.) Those small sites typically use uranium enriched to about 2 percent. “It would be really, really difficult to divert the fuel” for a bomb “unless you really knew what you were doing,” Parthemore says. But Darpa doesn’t want to take that chance. Only “non-proliferable fuels (i.e., fuels other than enriched uranium or plutonium) and reactor designs that are fundamentally safe will be required of reactors that may be deployed to regions where hostile acts may compromise operations.” Sensible, sure. But it limits your options: outside of uranium or plutonium, thorium is the only remaining source for generating nuclear fuel. The Indians and now the Chinese have experimented with thorium for their nuclear programs, but, alas, “no one has ever successfully found a way” to build a functioning thorium reactor, Parthemore says, “in a safe and economical manner.” For now, Darpa proposes to spend $10 million of your money studying the feasibility of the project. But it’s just one part of the researchers’ new push to green the military. Another $10 million goes to a project called Energy Distribution, which explores bringing down energy consumption on the FOBs. An additional $5 million will look at ways to keep fuel storage from degrading in extreme temperatures. For $50 million, Darpa proposes to build a turbine engine that uses 20 percent less energy. But all of that is mere isotopes compared to the Nuclear FOB. Darpa appears to have thought about it a lot. It says it plans to work with the Department of Energy “to ensure that existing advanced reactor development activities are being exploited and/or accelerated as appropriate, based on the military’s needs.” Still, if it can’t find the right non-proliferable fuel, it suggests that it might look to the “development of novel fuels.” Says a stunned Parthemore, “I have no idea why you’d want to bring that upon the world.”

### Meltdowns

#### MELTDOWNS ADVANTAGE

#### Conventional nuclear meltdowns are inevitable and cause extinction

Lendman 11 – Research Associate of the Centre for Research on Globalization (Stephen, 03/ 13, “Nuclear Meltdown in Japan,” http://www.thepeoplesvoice.org/TPV3/Voices.php/2011/03/13/nuclear-meltdown-in-japan)

For years, Helen Caldicott warned it's coming. In her 1978 book, "Nuclear Madness," she said: "As a physician, I contend that nuclear technology threatens life on our planet with extinction. If present trends continue, the air we breathe, the food we eat, and the water we drink will soon be contaminated with enough radioactive pollutants to pose a potential health hazard far greater than any plague humanity has ever experienced." More below on the inevitable dangers from commercial nuclear power proliferation, besides added military ones. On March 11, New York Times writer Martin Fackler headlined, "Powerful Quake and Tsunami Devastate Northern Japan," saying: "The 8.9-magnitude earthquake (Japan's strongest ever) set off a devastating tsunami that sent walls of water (six meters high) washing over coastal cities in the north." According to Japan's Meteorological Survey, it was 9.0. The Sendai port city and other areas experienced heavy damage. "Thousands of homes were destroyed, many roads were impassable, trains and buses (stopped) running, and power and cellphones remained down. On Saturday morning, the JR rail company" reported three trains missing. Many passengers are unaccounted for. Striking at 2:46PM Tokyo time, it caused vast destruction, shook city skyscrapers, buckled highways, ignited fires, terrified millions, annihilated areas near Sendai, possibly killed thousands, and caused a nuclear meltdown, its potential catastrophic effects far exceeding quake and tsunami devastation, almost minor by comparison under a worst case scenario. On March 12, Times writer Matthew Wald headlined, "Explosion Seen at Damaged Japan Nuclear Plant," saying: "Japanese officials (ordered evacuations) for people living near two nuclear power plants whose cooling systems broke down," releasing radioactive material, perhaps in far greater amounts than reported. NHK television and Jiji said the 40-year old Fukushima plant's outer structure housing the reactor "appeared to have blown off, which could suggest the containment building had already been breached." Japan's nuclear regulating agency said radioactive levels inside were 1,000 times above normal. Reuters said the 1995 Kobe quake caused $100 billion in damage, up to then the most costly ever natural disaster. This time, from quake and tsunami damage alone, that figure will be dwarfed. Moreover, under a worst case core meltdown, all bets are off as the entire region and beyond will be threatened with permanent contamination, making the most affected areas unsafe to live in. On March 12, Stratfor Global Intelligence issued a "Red Alert: Nuclear Meltdown at Quake-Damaged Japanese Plant," saying: Fukushima Daiichi "nuclear power plant in Okuma, Japan, appears to have caused a reactor meltdown." Stratfor downplayed its seriousness, adding that such an event "does not necessarily mean a nuclear disaster," that already may have happened - the ultimate nightmare short of nuclear winter. According to Stratfor, "(A)s long as the reactor core, which is specifically designed to contain high levels of heat, pressure and radiation, remains intact, the melted fuel can be dealt with. If the (core's) breached but the containment facility built around (it) remains intact, the melted fuel can be....entombed within specialized concrete" as at Chernobyl in 1986. In fact, that disaster killed nearly one million people worldwide from nuclear radiation exposure. In their book titled, "Chernobyl: Consequences of the Catastrophe for People and the Environment," Alexey Yablokov, Vassily Nesterenko and Alexey Nesterenko said: "For the past 23 years, it has been clear that there is a danger greater than nuclear weapons concealed within nuclear power. Emissions from this one reactor exceeded a hundred-fold the radioactive contamination of the bombs dropped on Hiroshima and Nagasaki." "No citizen of any country can be assured that he or she can be protected from radioactive contamination. One nuclear reactor can pollute half the globe. Chernobyl fallout covers the entire Northern Hemisphere." Stratfor explained that if Fukushima's floor cracked, "it is highly likely that the melting fuel will burn through (its) containment system and enter the ground. This has never happened before," at least not reported. If now occurring, "containment goes from being merely dangerous, time consuming and expensive to nearly impossible," making the quake, aftershocks, and tsunamis seem mild by comparison. Potentially, millions of lives will be jeopardized. Japanese officials said Fukushima's reactor container wasn't breached. Stratfor and others said it was, making the potential calamity far worse than reported. Japan's Nuclear and Industrial Safety Agency (NISA) said the explosion at Fukushima's Saiichi No. 1 facility could only have been caused by a core meltdown. In fact, 3 or more reactors are affected or at risk. Events are fluid and developing, but remain very serious. The possibility of an extreme catastrophe can't be discounted. Moreover, independent nuclear safety analyst John Large told Al Jazeera that by venting radioactive steam from the inner reactor to the outer dome, a reaction may have occurred, causing the explosion. "When I look at the size of the explosion," he said, "it is my opinion that there could be a very large leak (because) fuel continues to generate heat." Already, Fukushima way exceeds Three Mile Island that experienced a partial core meltdown in Unit 2. Finally it was brought under control, but coverup and denial concealed full details until much later. According to anti-nuclear activist Harvey Wasserman, Japan's quake fallout may cause nuclear disaster, saying: "This is a very serious situation. If the cooling system fails (apparently it has at two or more plants), the super-heated radioactive fuel rods will melt, and (if so) you could conceivably have an explosion," that, in fact, occurred. As a result, massive radiation releases may follow, impacting the entire region. "It could be, literally, an apocalyptic event. The reactor could blow." If so, Russia, China, Korea and most parts of Western Asia will be affected. Many thousands will die, potentially millions under a worse case scenario, including far outside East Asia. Moreover, at least five reactors are at risk. Already, a 20-mile wide radius was evacuated. What happened in Japan can occur anywhere. Yet Obama's proposed budget includes $36 billion for new reactors, a shocking disregard for global safety. Calling Fukushima an "apocalyptic event," Wasserman said "(t)hese nuclear plants have to be shut," let alone budget billions for new ones. It's unthinkable, he said. If a similar disaster struck California, nuclear fallout would affect all America, Canada, Mexico, Central America, and parts of South America. Nuclear Power: A Technology from Hell Nuclear expert Helen Caldicott agrees, telling this writer by phone that a potential regional catastrophe is unfolding. Over 30 years ago, she warned of its inevitability. Her 2006 book titled, "Nuclear Power is Not the Answer" explained that contrary to government and industry propaganda, even during normal operations, nuclear power generation causes significant discharges of greenhouse gas emissions, as well as hundreds of thousands of curies of deadly radioactive gases and other radioactive elements into the environment every year. Moreover, nuclear plants are atom bomb factories. A 1000 megawatt reactor produces 500 pounds of plutonium annually. Only 10 are needed for a bomb able to devastate a large city, besides causing permanent radiation contamination. Nuclear Power not Cleaner and Greener Just the opposite, in fact. Although a nuclear power plant releases no carbon dioxide (CO2), the primary greenhouse gas, a vast infrastructure is required. Called the nuclear fuel cycle, it uses large amounts of fossil fuels. Each cycle stage exacerbates the problem, starting with the enormous cost of mining and milling uranium, needing fossil fuel to do it. How then to dispose of mill tailings, produced in the extraction process. It requires great amounts of greenhouse emitting fuels to remediate. Moreover, other nuclear cycle steps also use fossil fuels, including converting uranium to hexafluoride gas prior to enrichment, the enrichment process itself, and conversion of enriched uranium hexafluoride gas to fuel pellets. In addition, nuclear power plant construction, dismantling and cleanup at the end of their useful life require large amounts of energy. There's more, including contaminated cooling water, nuclear waste, its handling, transportation and disposal/storage, problems so far unresolved. Moreover, nuclear power costs and risks are so enormous that the industry couldn't exist without billions of government subsidized funding annually. The Unaddressed Human Toll from Normal Operations Affected are uranium miners, industry workers, and potentially everyone living close to nuclear reactors that routinely emit harmful radioactive releases daily, harming human health over time, causing illness and early death. The link between radiation exposure and disease is irrefutable, depending only on the amount of cumulative exposure over time, Caldicott saying: "If a regulatory gene is biochemically altered by radiation exposure, the cell will begin to incubate cancer, during a 'latent period of carcinogenesis,' lasting from two to sixty years." In fact, a single gene mutation can prove fatal. No amount of radiation exposure is safe. Moreover, when combined with about 80,000 commonly used toxic chemicals and contaminated GMO foods and ingredients, it causes 80% of known cancers, putting everyone at risk everywhere. Further, the combined effects of allowable radiation exposure, uranium mining, milling operations, enrichment, and fuel fabrication can be devastating to those exposed. Besides the insoluble waste storage/disposal problem, nuclear accidents happen and catastrophic ones are inevitable. Inevitable Meltdowns Caldicott and other experts agree they're certain in one or more of the hundreds of reactors operating globally, many years after their scheduled shutdown dates unsafely. Combined with human error, imprudently minimizing operating costs, internal sabotage, or the effects of a high-magnitude quake and/or tsunami, an eventual catastrophe is certain. Aging plants alone, like Japan's Fukushima facility, pose unacceptable risks based on their record of near-misses and meltdowns, resulting from human error, old equipment, shoddy maintenance, and poor regulatory oversight. However, under optimum operating conditions, all nuclear plants are unsafe. Like any machine or facility, they're vulnerable to breakdowns, that if serious enough can cause enormous, possibly catastrophic, harm.

#### Only a fraction of reactors need to meltdown to cause extinction from agricultural collapse

IB Times ‘11 (International Business Times, Mike Adams – author and journalist, Solar Flare Could Unleash Nuclear Holocaust Across Planet Earth, Forcing Hundreds of Nuclear Power Plants Into Total Meltdowns, <http://au.ibtimes.com/articles/213249/20110914/solar-flare-could-unleash-nuclear-holocaust-across-planet-earth-forcing-hundreds-of-nuclear-power-pl.htm>, AV)

But here's the real issue: There are 700 nuclear power facilities in the world, remember? Let's suppose that in the aftermath of a massive solar flare, the nations of the world are somehow able to control half of those facilities and nurse them into cold shutdown status. That still leaves roughly 350 nuclear facilities at risk. Now let's suppose half of those are somehow luckily offline and not even functioning when the solar flare hits, so they need no special attention. This is a very optimistic assumption, but that still leaves 175 nuclear power plants where all attempts fail. Let's be outrageously optimistic and suppose that a third of those somehow don't go into a total meltdown by some miracle of God, or some bizarre twist in the laws of physics. So we're still left with 115 nuclear power plants that "go Chernobyl." Fukushima was one power plant. Imagine the devastation of 100+ nuclear power plants, all going into meltdown all at once across the planet. It's not the loss of electricity that's the real problem; it's the global tidal wave of invisible radiation that blankets the planet, permeates the topsoil, irradiates everything that breathes and delivers the final crushing blow to human civilization as we know it today. Because if you have 100 simultaneous global nuclear meltdowns, the tidal wave of radiation will make farming nearly impossible for years. That means no food production for several years in a row. And that, in turn, means a near-total collapse of the human population on our planet. How many people can survive an entire year with no food from the farms? Not one in a hundred people. Even beyond that, how many people can essentially live underground and be safe enough from the radiation that they can have viable children and repopulate the planet? It's a very, very small fraction of the total population. Solar flares far more likely to hit nuclear power plants than tidal waves or earthquakes What's the chance of all this actually happening? A report by the Oak Ridge National Laboratory said that "...over the standard 40-year license term of nuclear power plants, solar flare activity enables a 33 percent chance of long-term power loss, a risk that significantly outweighs that of major earthquakes and tsunamis." ([http://www.IBTimes.com/articles/194](http://www.ibtimes.com/articles/194)...) The world's reliance on nuclear power, you see, has doomed us to destroy our own civilization. Of course, this is all preventable if we would only dismantle and shut down ALL nuclear power plants on the planet. But what are the chances of that happening? Zero, of course. There are too many commercial and political interests invested in nuclear power. So the power plants will stay, and we will therefore be vulnerable to a solar flare which could strike us at any time and unleash a global nuclear holocaust. Planet Earth has been struck by solar flares before, of course, but all the big hits in recorded human history took place long before the age of modern electronics, so the impacts were minimal. Today, society cannot function without electronics. Nor can nuclear facility coolant pumps. Once you realize that, you begin to understand the true danger in which humanity has placed itself by relying on nuclear power. By relying on nuclear power, we are risking everything. And we're doing it blindly, with no real acknowledgement of the dangers of running 700+ nuclear facilities in a constant state of "near meltdown" while foolishly relying on the steady flow of electricity to keep the fuel rods cool. If Fukushima, all by itself, could unleash a tidal wave of deadly radiation all by itself, imagine a world where hundreds of nuclear facilities go into a total meltdown simultaneously.

#### Meltdowns are *impossible* with LFTRs – passive design and chemically inert liquid salt

Lerner 12 (George, president of Lerner Consulting, a consulting firm, "Can Use LFTRs to Consume Nuclear Waste," Jan 17, [liquidfluoridethoriumreactor.glerner.com/2012-can-use-lftrs-to-consume-nuclear-waste/], jam)

If the reactor overheats, a frozen plug melts and the fuel quickly drains out of the core into tanks where nuclear reaction is physically impossible. Radiation is contained by materials that remain solid at temperatures much higher than inside the reactor, with passive air cooling. (In solid-fueled reactors, you have to override everything that normally happens in the core and bring in coolant.) Fuel draining to the storage tanks could be triggered by seismic alert, chemical or temperature sensors, power outage, or the operators. [The 1989 Loma Prieta earthquake about 60 miles from Oakland, CA, reached Oakland about 30 seconds later. Japan has a seismic alert network, industrial plants shut down, elevators open at the nearest floor, trains stop, etc. California is building one.] “LFTR designs have a freeze plug at the bottom of the core—a plug of salt, cooled by a fan to keep it at a temperature below the freezing point of the salt. If temperature rises beyond a critical point, the plug melts, and the liquid fuel in the core is immediately evacuated, pouring into a subcritical geometry in a catch basin. This formidable safety tactic is only possible if the fuel is a liquid.” Hargraves, American Scientist, July 2010 “A passive core drain system activated by a melt plug enables draining the radioactive inventory into geometrically subcritical drain tanks that are passively thermally coupled to the environment.” Fast Spectrum Molten Salt Reactor Options, Oak Ridge National Laboratory, July 2011 “One of the current requirements of the Nuclear Regulatory Commission (NRC) for certification of a new nuclear plant design is that in the event of a complete electricity outage, the reactor remain at least stable for several days if it is not automatically deactivated. As it happens, the freeze-plug safety feature is as old as Alvin Weinberg’s 1965 Molten Salt Reactor Experiment design, yet it meets the NRC’s requirement; at ORNL, the [engineers] would routinely shut down the reactor by simply cutting the power to the freeze-plug cooling system. This setup is the ultimate in safe poweroutage response. Power isn’t needed to shut down the reactor, for example by manipulating control elements. Instead power is needed to prevent the shutdown of the reactor.” Hargraves, American Scientist, July 2010 Inherent Safety: Low Pressure LFTRs operate at atmospheric pressure. No high pressure to contain, no risk of pressure containment explosively failing. In a LFTR, there is no coolant boiling away. “A signature safety feature of the LFTR design is that the coolant — liquid fluoride salt — is not under pressure. The fluoride salt does not boil below 1400 degrees Celsius. Neutral pressure reduces the cost and the scale of LFTR plant construction by reducing the scale of the containment requirements, because it obviates the need to contain a pressure explosion. Disruption in a transport line would result in a leak, not an explosion, which would be captured in a noncritical configuration in a catch basin, where it would passively cool and harden.” Hargraves, American Scientist Volume 98, July 2010 “Only a low pressure vessel is needed as the salts run near atmospheric pressure as opposed to the thick walled vessels needed for LWR or PBMR. No water or sodium means no possible steam explosion or hydrogen production within the containment. In designs without graphite moderator, there is not even combustible material present.” D. LeBlanc / Nuclear Engineering and Design 240 (2010) p.1644-1656 “The containment walls are only required to contain a low-pressure internal environment and endure when subjected to external seismic and impact stressors. Halide salts are chemically inert, so they do not have exothermic reactions with the environment (oxygen, water) as would hot sodium or hot zirconium. With a greater than 500°C margin to boiling, the halide salts also do not have a credible route to pressurizing containment as would a water-cooled reactor. FS-MSRs also do not have any hydrogenous material within containment; thus they cannot generate hydrogen.” Fast Spectrum Molten Salt Reactor Options, Oak Ridge National Laboratory, July 2011 Inherent Safety: Containing Radioactive Material Radioactive cesium and iodine that were released in Fukushima-Daiichi would not be released in a LFTR accident. Cesium fluoride, strontium bi-fluoride are very stable salts. “Fluoride combines ionically with almost any transmutation product. This is an MSFR’s first level of containment. It is especially good at containing biologically active ‘salt loving’ wastes such as Cesium 137. The salts do not burn, explode or degrade in air or water, and the fluoride salts of the radioactive actinides and fission products are generally not soluble in water or air.” Wikipedia There are much less fissile materials (compared with LWR) in the fuel salt at any time, as continuous refueling enables operating with just enough to sustain reactivity. About half of the total fissile material is in the reactor core, the rest in the heat transfer and chemical processing loops. Thorium is one of the least radioactive materials, so (unless the LFTR is for waste burning, at a high security storage site) there is no hazardous fuel storage. Gasseous fission byproducts are easily and continuously removed from the reactor and safely stored. There is far less radioactive gas (that could leak in an accident) than in a LWR, and it isn’t pressurized. Inherent Safety: Self-Regulating The temperature in the reactor is self-regulating. The liquid fuel naturally expands if it gets hotter, slowing nuclear reaction, and contracts if it gets cooler (strong negative temperature coefficient of reactivity). [The nuclear reaction in the poorly-designed Chernobyl reactor got Hotter and Stronger as coolant boiled away.] Remove less heat (making less electricity), and the reactor throttles down. Remove more heat (making more electricity) and the reactor throttles up. “Most MSR designs have very strong negative temperature and void coefficients which act instantly, aiding safety and allowing automatic load following operation.” D. LeBlanc / Nuclear Engineering and Design 240 (2010) 1644-1656 Gasseous fission products are easily removed from the molten salt, making the reactor much more stable. (Xenon gas in LWR absorbs neutrons so readily it affects fission rate, so restarting the LWR must be done very carefully.) “Removing the most significant neutron poison xenon-135 made the reactor safer and easier to restart. In solid-fuel reactors, on restart the 135Xe in the fuel absorbs neutrons, followed by a sudden jump in reactivity as the 135Xe is burned out. Conventional reactors may have to wait hours until xenon-135 decays after shutting down and not immediately restarting.” Wikipedia – Molten Salt Reactor Experiment “The MSRE confirmed expectations and predictions. For example, it was demonstrated that: the fuel salt was immune to radiation damage, the graphite was not attacked by the fuel salt, and the corrosion of Hastelloy-N was negligible. Noble gases were stripped from the fuel salt by a spray system, reducing the 135Xe poisoning by a factor of about 6. The bulk of the fission product elements remained stable in the salt. Additions of uranium and plutonium to the salt during operation were quick and uneventful, and recovery of uranium by fluorination was efficient.” Wikipedia – Molten Salt Reactor Experiment Inherent Safety: Stable Chemistry “FS-MSRs have a negative salt void coefficient (expanded fuel is pushed out of the core) and a negative thermal reactivity feedback that avoids a set of major design constraints in solid-fuel fast reactors. A passive core drain system activated by a melt plug enables draining the radioactive inventory into geometrically subcritical drain tanks that are passively thermally coupled to the environment. FS-MSRs have a low operating pressure even at high temperatures; and FS-MSR salts are chemically inert, thermodynamically lacking the energetic reactions with environmental materials seen in other reactor types (hot zirconium and sodium with water). FS-MSRs do involve more intensive manipulation of highly radioactive materials than other reactor classes and thus small spills and contamination accidents appear to be more likely with this reactor class.” Fast Spectrum Molten Salt Reactor Options, Oak Ridge Nat’l Lab 2011

### Solvency

#### Text: The Department of Defense should substantially increase market-fixed production cost incentives for electricity from Small Modular Liquid Fluoride Thorium Reactors for military facilities in the United States.

#### Thorium reactor tech exists—but no domestic development now

Evans-Pritchard ’10 Ambrose Evans-Pritchard, International Business Editor, “Obama could kill fossil fuels overnight with a nuclear dash for thorium,” The Telegraph (UK), 8/29/2010, http://www.telegraph.co.uk/finance/comment/7970619/Obama-could-kill-fossil-fuels-overnight-with-a-nuclear-dash-for-thorium.html

Muddling on with the status quo is not a grown-up policy. The International Energy Agency says the world must invest $26 trillion (£16.7 trillion) over the next 20 years to avert an energy shock. The scramble for scarce fuel is already leading to friction between China, India, and the West. There is no certain bet in nuclear physics but work by Nobel laureate Carlo Rubbia at CERN (European Organization for Nuclear Research) on the use of thorium as a cheap, clean and safe alternative to uranium in reactors may be the magic bullet we have all been hoping for, though we have barely begun to crack the potential of solar power. Dr Rubbia says a tonne of the silvery metal – named after the Norse god of thunder, who also gave us Thor’s day or Thursday - produces as much energy as 200 tonnes of uranium, or 3,500,000 tonnes of coal. A mere fistful would light London for a week. Thorium burns the plutonium residue left by uranium reactors, acting as an eco-cleaner. "It’s the Big One," said Kirk Sorensen, a former NASA rocket engineer and now chief nuclear technologist at Teledyne Brown Engineering. "Once you start looking more closely, it blows your mind away. You can run civilisation on thorium for hundreds of thousands of years, and it’s essentially free. You don’t have to deal with uranium cartels," he said. Thorium is so common that miners treat it as a nuisance, a radioactive by-product if they try to dig up rare earth metals. The US and Australia are full of the stuff. So are the granite rocks of Cornwall. You do not need much: all is potentially usable as fuel, compared to just 0.7pc for uranium. After the Manhattan Project, US physicists in the late 1940s were tempted by thorium for use in civil reactors. It has a higher neutron yield per neutron absorbed. It does not require isotope separation, a big cost saving. But by then America needed the plutonium residue from uranium to build bombs. "They were really going after the weapons," said Professor Egil Lillestol, a world authority on the thorium fuel-cycle at CERN. "It is almost impossible make nuclear weapons out of thorium because it is too difficult to handle. It wouldn’t be worth trying." It emits too many high gamma rays. You might have thought that thorium reactors were the answer to every dream but when CERN went to the European Commission for development funds in 1999-2000, they were rebuffed. Brussels turned to its technical experts, who happened to be French because the French dominate the EU’s nuclear industry. "They didn’t want competition because they had made a huge investment in the old technology," he said. Another decade was lost. It was a sad triumph of vested interests over scientific progress. "We have very little time to waste because the world is running out of fossil fuels. Renewables can’t replace them. Nuclear fusion is not going work for a century, if ever," he said. The Norwegian group Aker Solutions has bought Dr Rubbia’s patent for an accelerator-driven sub-critical reactor, and is working on his design for a thorium version at its UK operation. Victoria Ashley, the project manager, said it could lead to a network of pint-sized 600MW reactors that are lodged underground, can supply small grids, and do not require a safety citadel. It will take £2bn to build the first one, and Aker needs £100mn for the next test phase. The UK has shown little appetite for what it regards as a "huge paradigm shift to a new technology". Too much work and sunk cost has already gone into the next generation of reactors, which have another 60 years of life. So Aker is looking for tie-ups with countries such as the US, Russia, or China. The Indians have their own projects - none yet built - dating from days when they switched to thorium because their weapons programme prompted a uranium ban. America should have fewer inhibitions than Europe in creating a leapfrog technology. The US allowed its nuclear industry to stagnate after Three Mile Island in 1979. Anti-nuclear neorosis is at last ebbing. The White House has approved $8bn in loan guarantees for new reactors, yet America has been strangely passive. Where is the superb confidence that put a man on the moon? A few US pioneers are exploring a truly radical shift to a liquid fuel based on molten-fluoride salts, an idea once pursued by US physicist Alvin Weinberg at Oak Ridge National Lab in Tennessee in the 1960s. The original documents were retrieved by Mr Sorensen. Moving away from solid fuel may overcome some of thorium’s "idiosyncracies". "You have to use the right machine. You don’t use diesel in a petrol car: you build a diesel engine," said Mr Sorensen. Thorium-fluoride reactors can operate at atmospheric temperature. "The plants would be much smaller and less expensive. You wouldn’t need those huge containment domes because there’s no pressurized water in the reactor. It’s close-fitting," he said. Nuclear power could become routine and unthreatening. But first there is the barrier of establishment prejudice. When Hungarian scientists led by Leo Szilard tried to alert Washington in late 1939 that the Nazis were working on an atomic bomb, they were brushed off with disbelief. Albert Einstein interceded through the Belgian queen mother, eventually getting a personal envoy into the Oval Office. Roosevelt initially fobbed him off. He listened more closely at a second meeting over breakfast the next day, then made up his mind within minutes. "This needs action," he told his military aide. It was the birth of the Manhattan Project. As a result, the US had an atomic weapon early enough to deter Stalin from going too far in Europe. The global energy crunch needs equal "action". If it works, Manhattan II could restore American optimism and strategic leadership at a stroke: if not, it is a boost for US science and surely a more fruitful way to pull the US out of perma-slump than scattershot stimulus.

#### Federal production cost-incentives are key to widespread commercialization – learning benefits and aggregation of demand

Rosner & Goldberg 11 (Robert, William E. Wrather Distinguished Service Professor, Departments of Astronomy and Astrophysics, and Physics, and the College at the U of Chicago, and Stephen, Energy Policy Institute at Chicago, The Harris School of Public Policy Studies, "Small Modular Reactors - Key to Future Nuclear Power Generation in the U.S.," November 2011, [https://epic.sites.uchicago.edu/sites/epic.uchicago.edu/files/uploads/EPICSMRWhitePaperFinalcopy.pdf], jam)

As illustrated in the previous discussion, until significant learning benefits are achieved, the LEAD SMR plant and some number of FOAK SMR plants may not be competitive with new natural gas combined-cycle generation. Estimates of the number of SMR modules that may not be competitive and the magnitude of the difference in cost are subject to significant uncertainty. The estimates are dependent upon at least three key variables: the initial cost estimates 39 for the LEAD SMR design, the learning rate, and the future price of natural gas. 40 The potential range of uncertainty is illustrated in Figure 4, which identifies the generation cost differential ($/MWh) between the family of SMR plants (LEAD, FOAK, and NOAK) and gas-fired plants for a variety of natural gas price scenarios. This analysis adopts the 10% learning assumption and the overnight cost estimate of $4,700/kW. Assuming that early SMR deployments will carry cost premiums (until the benefits of learning are achieved), the issue is whether federal government incentives are needed to help overcome this barrier. Some may argue that commercial deployment will occur, albeit at a slower pace, as the cost of alternatives increases to a level that makes initial SMR deployments competitive. Others may argue that SMR vendors should market initial modules at market prices and absorb any losses until a sufficient number of modules are sold that will begin to generate a profit. However, the combination of the large upfront capital investment, the long period before a return on capital may be achieved, and the large uncertainty in the potential level of return on investment make it unlikely that SMRs will be commercialized without some form of government incentive. The present analysis assumes that government incentives will be essential to bridging this gap and accelerating private sector investment (see Appendix D). It is the study team’s understanding that DOE has proposed to share the cost of certain SMR design and licensing study activities. This section analyzes possible options for government incentives for early deployments (LEAD and FOAK plants) in addition to federal cost sharing for the design and licensing effort. The present analysis considers several alternative approaches to providing such incentives, either in the form of direct or indirect government financial incentives, or through market transformation actions that will spur demand for FOAK plants in competitive applications. The study team’s approach is to identify targeted, least-cost incentives that could form the basis for further dialogue between stakeholders and policy makers. Possible financial incentives need to be designed and evaluated relative to a particular management model for deployment of LEAD and FOAK plants. The study team’s management model assumes that these initial SMR plants will be managed and financed by the private sector, consisting of a possible consortium of the SMR vendor, the reactor module manufacturer, other major vendors, a host-site utility company, and one or more other electricity generation or vertically integrated utilities. The types of incentives that could be structured for this type of management model are discussed in the subsections that follow. Other management models were considered by the team. These alternative models would have a greater direct government role in the ownership, financing, and marketing of the SMR plant. Under a build-own-operate-transfer (BOOT) model, for example, the federal government would license, build, finance, and operate an SMR plant, and upon successful operation, seek to transfer ownership to the private sector. Another model would provide for the federal government to lease a privately developed SMR plant and take full responsibility for operation of the plant and marketing of the power generation. The various possible management models are described and contrasted further in Appendix E. Several forms of government support programs could assist the learning modules in reducing the cost differential, assuming competitive market conditions: x Capital Cost Incentive: A capital cost incentive would reduce the effective overnight capital cost through either direct government cost sharing or through an investment tax credit. 41 There are policy precedents for both. DOE provides direct cost sharing for demonstration projects involving FOAK coal generation technology under the Clean Coal Power Initiative (CCPI). Congress provided a capital cost incentive for renewable energy projects in the form of an Investment Tax Credit (ITC), which currently can be converted to an upfront cash grant. 42 Capital cost incentives help “buy down” the initial capital cost of SMR deployments, thus reducing the capital recovery requirements that would otherwise be reflected in the LCOE. A direct buy-down of the capital cost protects project sponsors against construction risk for SMRs by shifting a portion of that risk to the government. It also shifts performance risk from the project sponsor to the federal government, i.e., the federal government pays the capital cost incentive regardless of whether the project performs as planned or not. In the case of SMRs, shifting a portion of performance risk from the SMR community to the government also may adversely impact the risk-reward structure guiding the learning process. For example, a capital cost incentive for SMRs would be fixed, regardless of whether the investment achieved the estimated learning performance. Consequently, capital cost incentives were not incorporated into the business case analysis for SMRs. x Production Cost Incentive: A production cost incentive is a performance-based incentive. With a production cost incentive, the government incentive would be triggered only when the project successfully operates. The project sponsors would assume full responsibility for the upfront capital cost and would assume the full risk for project construction. The production cost incentive would establish a target price, a so-called “market-based benchmark.” Any savings in energy generation costs over the target price would accrue to the generator. Thus, a production cost incentive would provide a strong motivation for cost control and learning improvements, since any gains greater than target levels would enhance project net cash flow. Initial SMR deployments, without the benefits of learning, will have significantly higher costs than fully commercialized SMR plants and thus would benefit from production cost incentives. Because any production cost differential would decline rapidly due to the combined effect of module manufacturing rates and learning experience, the financial incentive could be set at a declining rate, and the level would be determined on a plant-by-plant basis, based on the achievement of cost reduction targets. 43 The key design parameters for the incentive include the following: The magnitude of the deployment incentive should decline with the number of SMR modules and should phase out after the fleet of LEAD and FOAK plants has been deployed. 2. The incentive should be market-based rather than cost-based; the incentive should take into account not only the cost of SMRs but also the cost of competing technologies and be set accordingly. 3. The deployment incentive could take several forms, including a direct payment to offset a portion of production costs or a production tax credit. The Energy Policy Act of 2005 authorized a production tax credit of $18/MWh (1.8¢/kWh) for up to 6,000 MW of new nuclear power plant capacity. To qualify, a project must commence operations by 2021. Treasury Department guidelines further required that a qualifying project initiate construction, defined as the pouring of safetyrelated concrete, by 2014. Currently, two GW-scale projects totaling 4,600 MW are in early construction; consequently, as much as 1,400 MW in credits is available for other nuclear projects, including SMRs. The budgetary cost of providing the production cost incentive depends on the learning rate and the market price of electricity generated from the SMR project. Higher learning rates and higher market prices would decrease the magnitude of the incentive; lower rates and lower market prices would increase the need for production incentives. Using two scenarios (with market prices based on the cost of natural gas combined-cycle generation) yields the following range of estimates of the size of production incentives required for the FOAK plants described earlier. For a 10% learning rate, ƒ Based on a market price of $60/MWh 44 (6¢/kWh), the LEAD plant and the subsequent eight FOAK plants would need, on average, a production credit of $13.60/MWh (1.4¢/kWh), 24% less than the $18 credit currently available to renewable and GW-scale nuclear technologies. (The actual credit would be on a sliding scale, with the credit for the LEAD plant at approximately $31/MWh, or 3.1¢/kWh, declining to a credit of about $6/MWh, or 0.6¢/kWh, by the time of deployment of FOAK-8). The total cost of the credit would be about $600 million per year (once all plants were built and operating). ƒ If the market price were about $70/MWh (7¢/kWh), the LEAD and only four subsequent FOAK plants would require a production incentive. In this case, the average incentive would be $8.40/MWh (0.8¢/kWh), with a total cost of about $200 million per year. Higher learning rates would drive down the size of the production incentive. For example, at a 12% learning rate, ƒ At a market price of $60/MWh (6¢/kWh), the LEAD and the subsequent five FOAK plants would require a production incentive, with an average incentive level of about $15/MWh (1.5¢/kWh). Total annual cost (after all plants are in full operation) would be about $450 million per year. ƒ At a market price of $70/MWh (7¢/kWh), the LEAD and three FOAK plants would require a production incentive averaging $9.00/MWh (0.9¢/kWh, half of the current statutory incentive), with a total annual cost of about $170 million per year. The range of costs for the production incentive illustrates the sensitivity of the incentive level to the learning rate and the market price of electricity. Thus, efforts to achieve higher learning rates, including fully optimized engineering designs for the SMRs and the manufacturing plant, as well as specially targeted market introduction opportunities that enable SMRs to sell electricity for higher priced and higher value applications, can have a critical impact on the requirements for production incentives. The potential size of the incentive should be subject to further analysis as higher quality cost estimates become available. x Loan Guarantees: Loan guarantees do not directly impact project capital costs, but guarantees facilitate the ability of the project sponsors to access capital at lower cost. The effect of the guarantee is to broaden the pool of potential equity and debt investors, and thus to lower the WACC of the project. The lower WACC is then reflected in a lower LCOE. Loan guarantees can be particularly effective in mitigating the risk premium typically associated with the financing of FOAK technology deployments. For example, federal loan guarantees are viewed as having a key role in mitigating the risk premium and lowering the WACC early-mover, GW-scale nuclear plants. As discussed earlier, the smaller investment requirements for the first-of-a-kind SMR plant (both the LEAD and one or more early FOAK plants) significantly reduce the risk premium that may otherwise be sought by private equity and debt holders; this reduced risk premium would obviate the need for loan guarantees. Appendix F discusses the relationship between size of investment relative to the size of the sponsor and its potential effect on risk premium. The business case analysis assumes that a robust SMR DD&E effort will mitigate the risk premium sufficiently so that loan guarantees will not be part of the incentive program. However, it is possible that a federal loan guarantee may be appropriate for the LEAD and the FOAK-1 plant. 45 Similar to other important energy technologies, such as energy storage and renewables, “market pull” activities coupled with the traditional “technology push” activities would significantly increase the likelihood of timely and successful commercialization. Market transformation incentives serve two important objectives. They facilitate demand for the off-take of SMR plants, thus reducing market risk and helping to attract private investment without high risk premiums. In addition, if such market transformation opportunities could be targeted to higher price electricity markets or higher value electricity applications, they would significantly reduce the cost of any companion production incentives. There are three special market opportunities that may provide the additional market pull needed to successfully commercialize SMRs: the federal government, international applications, and the need for replacement of existing coal generation plants. 6.2.1 Purchase Power Agreements with Federal Agency Facilities Federal facilities could be the initial customer for the output of the LEAD or FOAK SMR plants. The federal government is the largest single consumer of electricity in the U.S., but its use of electricity is widely dispersed geographically and highly fragmented institutionally (i.e., many suppliers and customers). Current federal electricity procurement policies do not encourage aggregation of demand, nor do they allow for agencies to enter into long-term contracts that are “bankable” by suppliers. President Obama has sought to place federal agencies in the vanguard of efforts to adopt clean energy technologies and reduce greenhouse gas emissions. Executive Order 13514, issued on October 5, 2009, calls for reductions in greenhouse gases by all federal agencies, with DOE establishing a target of a 28% reduction by 2020, including greenhouse gases associated with purchased electricity. SMRs provide one potential option to meet the President’s Executive Order. One or more federal agency facilities that can be cost effectively connected to an SMR plant could agree to contract to purchase the bulk of the power output from a privately developed and financed LEAD plant. 46 A LEAD plant, even without the benefits of learning, could offer electricity to federal facilities at prices competitive with the unsubsidized significant cost of other clean energy technologies. Table 4 shows that the LCOE estimates for the LEAD and FOAK-1plants are in the range of the unsubsidized national LCOE estimates for other clean electricity generation technologies (based on the current state of maturity of the other technologies). All of these technologies should experience additional learning improvements over time. However, as presented earlier in the learning model analysis, the study team anticipates significantly greater learning improvements in SMR technology that would improve the competitive position of SMRs over time. Additional competitive market opportunities can be identified on a region-specific, technology-specific basis. For example, the Southeast U.S. has limited wind resources. While the region has abundant biomass resources, the estimated unsubsidized cost of biomass electricity is in the range of $90-130 per MWh (9-13¢/kWh), making LEAD and FOAK plants very competitive (prior to consideration of subsidies). 47 Competitive pricing is an important, but not the sole, element to successful SMR deployment. A bankable contractual arrangement also is required, and this provides an important opportunity for federal facilities to enter into the necessary purchase power arrangements. However, to provide a “bankable” arrangement to enable the SMR project sponsor to obtain private sector financing, the federal agency purchase agreement may need to provide a guaranteed payment for aggregate output, regardless of actual generation output. 48 Another challenge is to establish a mechanism to aggregate demand among federal electricity consumers if no single federal facility customer has a large enough demand for the output of an SMR module. The study team believes that high-level federal leadership, such as that exemplified in E.O. 13514, can surmount these challenges and provide critical initial markets for SMR plants.

#### Plan bypasses licensing restrictions—causes rapid commercialization

Hunt 11 (Gary L, 30 years experience in the energy, software and information technology industries, Tech&Creative Labs, "Is there a Small Modular Nuke in our Distributed Energy Future?," May 31, [www.tclabz.com/2011/05/31/is-there-a-small-modular-nuke-in-our-distributed-energy-future/], jam)

What the US military needs according to Colonel Roege is clean, modular, transportable energy sources for forward operating bases, the lift to get them there and move them around, and a fast-track path to development and commercialization to supply them anywhere in the world. This Army Colonel said the US military already has a solution in mind based upon the experience of the US Navy. That solution is small scale, modular nuclear power plants like the ones used on aircraft carriers and submarines. Only the new version would be likely smaller, more portable and safer by design with passive safety systems. The Colonel says the military does not believe the NRC will license such a modular design anytime soon enough to meet the military need so he is recommending that the Department of Defense use its authority to license such technology for military purposes since doing so does not require NRC approval. Once proven and deployed, these military applications should speed the path to small modular nuclear units in civilian applications. GO ARMY! Speeding the development of transportable, small scale, safe microgrid solutions based upon small modular nuclear plants could transform the power system not just for the US military but for civilian applications as well. By substituting the economies of scale from modular design for the economy of scale from building large sized nuclear plants as was done in the first generation nukes, the hope is that nuclear energy will find a larger market share place in our clean energy economy. It may not be the fuel cell alchemy the military would love to have, but it is technology the military knows made better, safer and, they hope, cheaper by modern design and manufacturing methods. WHY THIS IS A DER BIG DEAL Transforming our energy future with clean, sustainable, low emission choices is the goal of much of our energy strategy today. In a distributed energy future we need more choices with greater efficiency than currently available from wind and solar. Small modular nuclear reactors meet that need and give both our military and potentially, a wide range of civilian applications the best available technology with the capability to displace coal and replace the first generation nuclear units as they retire.

#### LFTRs are cheap and will get cheaper

Hargraves and Moir ’10 Robert Hargraves, teaches energy policy at the Institute for Lifelong Education at Dartmouth, PhD in physics from Brown, and Ralph Moir, Sc.D. in nuclear engineering from MIT, published 10 papers on molten-salt reactors during his career at Lawrence Livermore National Laboratory, “Liquid Fluoride Thorium Reactors: An old idea in nuclear power gets reexamined,” American Scientist, Vol. 98, No. 4, July-August 2010, http://www.americanscientist.org/issues/feature/liquid-fluoride-thorium-reactors

In terms of cost, the ideal would be to compete successfully against coal without subsidies or market-modifying legislation. It may well be possible. Capital costs are generally higher for conventional nuclear versus fossil-fuel plants, whereas fuel costs are lower. Capital costs are outsized for nuclear plants because the construction, including the containment building, must meet very high standards; the facilities include elaborate, redundant safety systems; and included in capital costs are levies for the cost of decommissioning and removing the plants when they are ultimately taken out of service. The much-consulted MIT study The Future of Nuclear Power, originally published in 2003 and updated in 2009, shows the capital costs of coal plants at $2.30 per watt versus $4 for light-water nuclear. A principal reason why the capital costs of LFTR plants could depart from this ratio is that the LFTR operates at atmospheric pressure and contains no pressurized water. With no water to flash to steam in the event of a pressure breach, a LFTR can use a much more close-fitting containment structure. Other expensive high-pressure coolant-injection systems can also be deleted. One concept for the smaller LFTR containment structure is a hardened concrete facility below ground level, with a robust concrete cap at ground level to resist aircraft impact and any other foreseeable assaults. Other factors contribute to a favorable cost structure, such as simpler fuel handling, smaller components, markedly lower fuel costs and significantly higher energy efficiency. LFTRs are high-temperature reactors, operating at around 800 degrees Celsius, which is thermodynamically favorable for conversion of thermal to electrical energy—a conversion efficiency of 45 percent is likely, versus 33 percent typical of coal and older nuclear plants. The high heat also opens the door for other remunerative uses for the thermal energy, such as hydrogen production, which is greatly facilitated by high temperature, as well as driving other industrial chemical processes with excess process heat. Depending on the siting of a LFTR plant, it could even supply heat for homes and offices. Thorium must also compete economically with energy-efficiency initiatives and renewables. A mature decision process requires that we consider whether renewables and efficiency can realistically answer the rapidly growing energy needs of China, India and the other tiers of the developing world as cheap fossil fuels beckon—at terrible environmental cost. Part of the cost calculation for transitioning to thorium must include its role in the expansion of prosperity in the world, which will be linked inexorably to greater energy demands. We have a pecuniary interest in avoiding the enviromental blowback of a massive upsurge in fossil-fuel consumption in the developing world. The value of providing an alternative to that scenario is hard to monetize, but the consequences of not doing so are impossible to hide from. Perhaps the most compelling idea on the drawing board for pushing thorium-based power into the mainstream is mass production to drive rapid deployment in the U.S. and export elsewhere. Business economists observe that commercialization of any technology leads to lower costs as the number of units increases and the experience curve delivers benefits in work specialization, refined production processes, product standardization and efficient product redesign. Given the diminished scale of LFTRs, it seems reasonable to project that reactors of 100 megawatts can be factory produced for a cost of around $200 million. Boeing, producing one $200 million airplane per day, could be a model for LFTR production. Modular construction is an important trend in current manufacturing of traditional nuclear plants. The market-leading Westinghouse AP1000 advanced pressurized-water reactor can be built in 36 months from the first pouring of concrete, in part because of its modular construction. The largest module of the AP1000 is a 700-metricton unit that arrives at the construction site with rooms completely wired, pipefitted and painted. Quality benefits from modular construction because inspection can consist of a set of protocols executed by specialists operating in a dedicated environment. One potential role for mass-produced LFTR plants could be replacing the power generation components of existing fossil-fuel fired plants, while integrating with the existing electrical-distribution infrastructure already wired to those sites. The savings from adapting existing infrastructure could be very large indeed.

#### Transition takes 30 months

Sorensen 11 (Kirk, studying thorium technology since 2000 and has been a public advocate for its use and development since 2006, masters’ degree in aerospace engineering from the Georgia Institute of Technology and is studying nuclear engineering at the University of Tennessee under Dr. Laurence Miller, May 28, [www.financialsense.com/financial-sense-newshour/big-picture/2011/05/28/03/kirk-sorensen/thorium-could-be-our-energy-silver-bullet], jam)

Jim: (32:00) Let me throw another idea, and I've often had this conversation, with the late Matt Simmons, who was a big believer in peak oil, and was kind of looking for that silver bullet. And that is, could it take a crisis? I know in the midst of a crisis, World War II, you know, we discovered nuclear power and also weapon grade uranium in the Manhattan project where we basically produced a bomb in a short period of time. So if we were faced with a severe energy crisis, global warming, or just shortages of fuel, could we turn this into a Manhattan project and turn thorium? In other words, how quickly can we turn the table and really start to get this thing running? Kirk: (32:47) If we were talking Manhattan project, and that’s where you're taking the smartest people out of society. You’re putting them in a place and they work on it six days a week, 18 hours a day, we could probably have one of these reactors up and running within 18 months. And we could be to a production level within a year or so after that. I mean, it would be a lot like World War II. Imagine the factories turning out B-29 bombers, you know, it would be like that. Jim: (33:11) Wow. Kirk: (33:11) Now Manhattan style projects, that’s a severe disruption though, to the flow society. That is a heavy governmental hand reaching and deciding how to allocate resources. And that’s really not what I would hope would happened. What I would hope would happen would be a much more market-driven approach where a fair and clear regulatory environment allows businesses and investors to make wise decisions, with a high certainty that if they fulfill the obligations laid out, and the regulations, they will be able to build and operate the machines they have designed. In that scenario, which I would call more the skunk works approach, having worked at Lockheed when I was younger, I think we could have this ready in four or five years. With abundant private financing and a clear and realistic regulatory environment. That's not really the world we live in right now. Now that may change, but that's not how it is right now. Right now we have a regulatory challenge and we are looking for ways to move the technology forward under situations that have a stronger need for the technology. For instance, the military's need for base islanding, and so, in that scenario that does stretch out the time. But I guess maybe I’m getting past your original question, which was could we do this in a Manhattan style project, and the answer is absolutely yes. And it would go quite quickly.

#### Thorium can be introduced into existing nuclear fuel cycles

IAEA ‘5 “Thorium fuel cycle — Potential benefits and challenges,” International Atomic Energy Agency, Nuclear Fuel Cycle and Materials Section, May 2005, http://www-pub.iaea.org/mtcd/publications/pdf/te\_1450\_web.pdf

Several thorium-based fuel design options investigated in recent years [28], have demonstrated the basic feasibility of Th–based fuel cycles for light water reactor (LWRs) of current and next generation technology. Activities have focused on examining the Th–233 U cycle as a replacement for conventional uranium-based fuels in existing LWRs, as well as a way to manage the growth of plutonium stockpiles by burning plutonium, or achieving a “net zero production,” sustainable re-cycle scenario. The fuel has to be designed to withstand very high burnup (above 100 000 MWd/kg). The fuel cycle costs are similar to those of conventional fuel. Two main implementation scenarios have been the focus of recent studies for pressurized water reactors (PWRs): homogeneous and heterogeneous. The homogeneous designs employ a mixture of ThO2 UO2, within each fuel rod, with uranium volume fraction and enrichment sufficient to obtain the required burnup and cycle length. The heterogeneous designs consider a seed-blanket approach, where U and Th fuel parts are spatially separated either within a given assembly, or between assemblies. The homogeneous studies have also considered “micro heterogeneous” schemes where the uranium and thorium fuel are spatially separated within a given fuel rod. Two heterogeneous options have been examined under the Nuclear Energy Research Initiative (NERI) funded by the United States Department of Energy. The two approaches are: 1) the Seed-Blanket Unit (SBU, also known as the Radkowsky Thorium Fuel (RTF)) concept, which employs a seed-blanket unit that is a one-for-one replacement for a conventional PWR fuel assembly; and 2) the whole assembly seed and blanket (WASB), where the seed and blanket units each occupy one full-size PWR assembly and the assemblies are arranged in the core in a modified checkerboard array (Fig. 2). The SBU and WASB approaches are both new fuel assembly designs, not new reactors, and are intended to be retrofittable into existing PWRs/WWERs with minimum changes to existing systems/hardware. In order to be attractive/receive serious consideration, they should also be competitive economically, and have characteristics comparable to those of existing LWRs (i.e., within the current “safety envelope”).

#### No disads—SMR incentives inevitable

Tomich 11-2 Jeffrey Tomich, “Ameren, Westinghouse still waiting for decision on nuclear grant,” St. Louis Post-Dispatch, 11/2/2012, <http://www.equities.com/news/headline-story?dt=2012-11-02&val=666817&cat=energy>

President Barack Obama announced the availability of grant funding for so-called small nuclear reactors in March during a stop in Columbus, Ohio, as part of his all-of-the-above energy strategy. Two projects will share the $452 million over a five-year span. The small-scale reactors, generally less than a third the size of today's plants, have been touted by the nuclear industry as carbon-free sources of around-the-clock electric generation that offer safety benefits and would be easier for utilities to finance and deploy. That's only part of the reason the federal government is willing to throw almost half a billion dollars at developing the technology. The Obama administration also sees modular nuclear plants as another piece of an American manufacturing revival -- one with potential to generate thousands of jobs building components that can be shipped overseas. The possibility for jobs is also a big draw for Nixon and other local politicians, especially because Westinghouse has said it would build a manufacturing plant in Missouri if it wins the grant and a market for the mini reactors develops. The Ameren-Westinghouse team is one of four that applied for the federal grant in May. Other competing ventures include established names, such as Babcock & Wilcox Co., as well as NuScale Power LLC and Holtec International Inc., both relative newcomers. Nick Cunningham, a policy analyst for the American Security Project, a nonprofit research group, believes the upcoming election may have temporarily derailed an announcement, but he believes it will come eventually since both candidates are on record as supporting advances of nuclear power. "I think it will move forward next year," he said.

#### Optimists are wrong—prolif is destabilizing—induces brinksmanship which causes miscalc, accidental launch, out of control escalation

Kroenig ’12 Matthew Kroenig, Council on Foreign Relations Stanton Nuclear Security Fellow and Georgetown University assistant professor of government, “The History of Proliferation Optimism: Does It Have A Future?” Nonproliferation Policy Education Center, 5/26/2012, http://www.npolicy.org/article.php?aid=1182&tid=30

First and foremost, proliferation optimists do not appear to understand contemporary deterrence theory. I do not say this lightly in an effort to marginalize or discredit my intellectual opponents. Rather, I make this claim with all due caution and with complete sincerity. A careful review of the contemporary proliferation optimism literature does not reflect an understanding of, or engagement with, the developments in academic deterrence theory in top scholarly journals such as the American Political Science Review and International Organization over the past few decades.[35] While early optimists like Viner and Brodie can be excused for not knowing better, the writings of contemporary proliferation optimists ignore the past fifty years of academic research on nuclear deterrence theory. In the 1940s, Viner, Brodie, and others argued that the advent of Mutually Assured Destruction (MAD) rendered war among major powers obsolete, but nuclear deterrence theory soon advanced beyond that simple understanding.[36] After all, great power political competition does not end with nuclear weapons. And nuclear-armed states still seek to threaten nuclear-armed adversaries. States cannot credibly threaten to launch a suicidal nuclear war, but they still want to coerce their adversaries. This leads to a credibility problem: how can states credibly threaten a nuclear-armed opponent? Since the 1960s academic nuclear deterrence theory has been devoted almost exclusively to answering this question.[37] And, unfortunately for proliferation optimists, the answers do not give us reasons to be optimistic. Thomas Schelling was the first to devise a rational means by which states can threaten nuclear-armed opponents.[38] He argued that leaders cannot credibly threaten to intentionally launch a suicidal nuclear war, but they can make a “threat that leaves something to chance.”[39] They can engage in a process, the nuclear crisis, which increases the risk of nuclear war in an attempt to force a less resolved adversary to back down. As states escalate a nuclear crisis there is an increasing probability that the conflict will spiral out of control and result in an inadvertent or accidental nuclear exchange. As long as the benefit of winning the crisis is greater than the incremental increase in the risk of nuclear war, threats to escalate nuclear crises are inherently credible. In these games of nuclear brinkmanship, the state that is willing to run the greatest risk of nuclear war before back down will win the crisis as long as it does not end in catastrophe. It is for this reason that Thomas Schelling called great power politics in the nuclear era a “competition in risk taking.”[40] This does not mean that states eagerly bid up the risk of nuclear war. Rather, they face gut-wrenching decisions at each stage of the crisis. They can quit the crisis to avoid nuclear war, but only by ceding an important geopolitical issue to an opponent. Or they can the escalate the crisis in an attempt to prevail, but only at the risk of suffering a possible nuclear exchange. Since 1945 there were have been many high stakes nuclear crises (by my count, there have been twenty) in which “rational” states like the United States run a risk of nuclear war and inch very close to the brink of nuclear war.[41] By asking whether states can be deterred or not, therefore, proliferation optimists are asking the wrong question. The right question to ask is: what risk of nuclear war is a specific state willing to run against a particular opponent in a given crisis? Optimists are likely correct when they assert that Iran will not intentionally commit national suicide by launching a bolt-from-the-blue nuclear attack on the United States or Israel. This does not mean that Iran will never use nuclear weapons, however. Indeed, it is almost inconceivable to think that a nuclear-armed Iran would not, at some point, find itself in a crisis with another nuclear-armed power and that it would not be willing to run any risk of nuclear war in order to achieve its objectives. If a nuclear-armed Iran and the United States or Israel have a geopolitical conflict in the future, over say the internal politics of Syria, an Israeli conflict with Iran’s client Hezbollah, the U.S. presence in the Persian Gulf, passage through the Strait of Hormuz, or some other issue, do we believe that Iran would immediately capitulate? Or is it possible that Iran would push back, possibly even brandishing nuclear weapons in an attempt to deter its adversaries? If the latter, there is a real risk that proliferation to Iran could result in nuclear war. An optimist might counter that nuclear weapons will never be used, even in a crisis situation, because states have such a strong incentive, namely national survival, to ensure that nuclear weapons are not used. But, this objection ignores the fact that leaders operate under competing pressures. Leaders in nuclear-armed states also have very strong incentives to convince their adversaries that nuclear weapons could very well be used. Historically we have seen that in crises, leaders purposely do things like put nuclear weapons on high alert and delegate nuclear launch authority to low level commanders, purposely increasing the risk of accidental nuclear war in an attempt to force less-resolved opponents to back down.

## 2AC

### Case

#### System collapses are the squo—SMRs solve

Kessides ’12 Ioannis N. Kessides, Lead Economist, Development Research Group, The World Bank, “The future of the nuclear industry reconsidered: Risks, uncertainties, and continued promise,” Energy Policy, Vol. 48, September 2012, pp. 185-208

The design, construction, and operational challenges of nuclear plants became more severe as the reactors have increased in size and complexity. One particularly challenging aspect of design is anticipating potential failure modes within a single nuclear plant component and guarding against the potential interaction among different components—i.e., ensuring that the operation of safety systems is not impaired by failures in unrelated and less critical areas. The risks of such adverse interactions, and hence the design and construction challenges, increased considerably as nuclear plants have become larger because of the concomitant increase in the number and complexity of plant components. The operation of plants also has become more difficult. Many of the control functions required to operate the reactor, or to shut it down during an accident, are handled automatically. During an accident, however, a combination of unanticipated events can interfere with the proper functioning of these automatic safety systems. Nuclear reactor operators are therefore trained to respond to such low probability but potentially very damaging events. Such human interventions are not too problematic in the case of very simple, small reactors which can be designed with a great deal of inherent safety and operated with less sophisticated control systems. Large nuclear reactors, on the other hand, contain many complex systems that have the potential to interact in unpredictable ways thus making it extremely difficult for operators to respond correctly.

#### U233 only ignites the initial reaction—then a LFTR just needs a steady supply of thorium—and it can reprocess other fissile materials

Cannara ’11 Alexander Cannara, received his BSEE degree from Lehigh University, and received MSEE, DEE and MS Statistics degrees from Stanford, returned to Stanford for a PhD in Mathematical Methods in Educational Research and a Master of Science in Statistics, during which time he designed analog and digital instrumentation, applying for a patent on one design, has taught courses in engineering, programming and networking at Stanford, University of San Francisco, International Technological University, Golden Gate and Silicon Valley University, and has worked both for the government and in the corporate arena with such organizations as Ballantine Laboratories, RMC Research, Zilog, Gibbons & Associates, Mitsubishi Semiconductor, AMD, 3Com, Network General, Vitesse, PacketMotion and Xambala, “IEER/PSR Thorium “Fact Sheet” Rebuttal,” response to the 2009 Makhijani and Boyd piece on thorium, posted 3/23/2011 by Kirk Sorenson on Energy From Thorium, http://energyfromthorium.com/ieer-rebuttal/

On the contrary, thorium is very much a fuel because in the steady-state operation of a LFTR, it is the only thing that is consumed to make energy. Makhijani and Boyd are correct that any nuclear reactor needs fissile material to start the chain reaction, and the LFTR is no different, but the important point is that once started on fissile material, LFTR can run indefinitely on only thorium as a feed—it will not continue to consume fissile material. That is very much the characteristic of a true fuel. “Burning thorium” in this manner is possible because the LFTR uses the neutrons from the fissioning of uranium-233 to convert thorium into uranium-233 at the same rate at which it is consumed. The “inventory” of uranium-233 remains stable over the life of the reactor when production and consumption are balanced. Today’s reactors use solid-uranium oxide fuel that is covalently-bonded and sustains radiation damage during its time in the reactor. The fluoride fuel used in LFTR is ionically-bonded and impervious to radiation damage no matter what the exposure duration. LFTR can be used to consume uranium-235 or plutonium-239 recovered from nuclear weapons and “convert” it, for all intents and purposes, to uranium-233 that will enable the production of energy from thorium indefinitely. Truly this is a reactor design that can “beat swords into plowshares” in a safe and economically attractive way.

#### Smart grid’s increase vulnerability exponentially

Mo et al 12 (Yilin Mo received the Bachelor of Engineering degree from Department of Automation, Tsinghua University, Beijing, China, in 2007. He is currently working towards the Ph.D. degree at the Electrical and Computer Engineering Department, Carnegie Mellon University, Tiffany Hyun-Jin Kim received the B.A. degree in computer science from University of California at Berkeley, Berkeley, in 2002 and the M.S. degree in computer science from Yale University, New Haven, CT, in 2004. She is currently working towards the Ph.D. degree at the Electrical and Computer Engineering Department, Carnegie Mellon University, Kenneth Brancik completed a rigorous one year program in systems analysis at the former Grumman Data Information Systems in 1984 and an intensive two year program at Columbia University in the analysis and design of information systems in 1997. He received the M.S. degree in management and systems from New York University (NYU), New York, in 2002 and the Ph.D. degree in computing from Pace University, Dona Dickinson received the B.A. degree in industrial psychology from California State University, Heejo Lee received the B.S., M.S., and Ph.D. degrees in computer science and engineering from POSTECH, Pohang, Korea, Adrian Perrig received the Ph.D. degree in computer science from Carnegie Mellon University, Bruno Sinopoli received the Dr. Eng. degree from the University of Padova, Padova, Italy, in 1998 and the M.S. and Ph.D. degrees in electrical engineering from the University of California at Berkeley, “Cyber–Physical Security of a Smart Grid Infrastructure” “Proceedings of the IEEE” January 2012, Vol. 100, No. 1)

A wide variety of motivations exist for launching an attack on the power grid, ranging from economic reasons (e.g., reducing electricity bills), to pranks, and all the way to terrorism (e.g., threatening people by controlling electricity and other life-critical resources). The emerging smart grid, while benefiting the benign participants (consumers, utility companies), also provides powerful tools for adversaries. The smart grid will reach every house and building, giving potential attackers easy access to some of the grid components. While incorporating information technology (IT) systems and networks, the smart grid will be exposed to a wide range of security threats [5]. Its large scale also makes it nearly impossible to guarantee security for every single subsystem. Furthermore, the smart grid will be not only large but also very complex. It needs to connect different systems and networks, from generation facilities and distribution equipment to intelligent end points and communication networks, which are possibly deregulated and owned by several entities. It can be expected that the heterogeneity, diversity, and complexity of smart grid components may introduce new vulnerabilities, in addition to the common ones in interconnected networks and stand-alone microgrids [3]. To make the situation even worse, the sophisticated control, estimation, and pricing algorithms incorporated in the grid may also create additional vulnerabilities. The first-ever control system malware called Stuxnet was found in July 2010. This malware, targeting vulnerable SCADA systems, raises new questions about power grid security [6]. SCADA systems are currently isolated, preventing external access. Malware, however, can spread using USB drives and can be specifically crafted to sabotage SCADA systems that control electric grids. Furthermore, increasingly interconnected smart grids will unfortunately provide external access which in turn can lead to compromise and infection of components.

#### Doesn’t solve regulatory confusion or cyberdefense

Sater 11 (Daniel, Research Fellow at Global Green USA’s Security and Sustainability Office, “Military Energy Security: Current Efforts and Future Solutions”, August, http://globalgreen.org/docs/publication-185-1.pdf)

Cybersecurity remains one of the leading challenges impeding the development of a smart grid. In January 2011, the GAO published a report on the progress being made on cybersecurity as it related to smart grids71. Unfortunately, the report did not specifically address microgrids. The GAO found six challenges, however, to the development of a smart grid. The DOD is nonetheless well suited to handle the challenges listed by the GAO and the confinement of microgrids to military installations should mitigate many cybersecurity risks. The challenges listed by the GAO and the advantages of military microgrids for cybersecurity appear below. Challenge 1: Aspects of the regulatory environment may make it difficult to ensure smart grid systems’ cybersecurity. The federal government and state governments regulate electricity production and distribution. Having multiple entities produce regulations can lead to conflicting rules and thus confusion. Microgrids on military installations should avoid many of the regulatory issues the GAO found with the smart grid. The confinement of microgrids to military bases means that only the DOD will have regulatory control over them. There is precedent for states to exempt military installations from state regulations. According to a different GAO report, states often excluded military installations from their renewable energy-production goals.72 Furthermore, it is unlikely that any state government would want to get into the politically untenable battle with the Pentagon over issuing competing regulations governing military bases. Challenge 2: Utilities are focusing on regulatory compliance instead of comprehensive security. Microgrid cybersecurity will benefit from having the same entity, the DOD, issue the microgrid regulations and own the microgrids. Utilities have little incentive to invest in security measures past the bare minimum necessary for regulatory compliance. However, unlike a utility, the DOD will suffer in the event of a cybersecurity failure and thus has incentives to pursue comprehensive security. Challenge 3: The electric industry does not have an effective mechanism for sharing information on cybersecurity. Different utility companies across different states do not have a central authority analogous to that which military bases have in the Pentagon. Though there will certainly be bureaucracy, the DOD has more capacity to share information about cybersecurity and cyber-attacks than utilities. Challenge 4: Consumers are not adequately informed about the benefits, costs, and risks associated with smart grid systems. The DOD can take steps to inform all of its employees about microgrids in ways that may not be available to utilities to inform their customers. The DOD could require short classes on the benefits and risks of microgrids for all its employees and more rigorous education for its base commanders and others making decisions about grid implementation. A utility company cannot require its customers to take a class. A utility’s best option for educating its customers would be to send out information packets with monthly bills and hope that consumers read them. Challenge 5: There is a lack of security features being built into certain smart grid systems. Given the importance of the DOD’s mission and the potentially catastrophic repercussions of lax cybersecurity, the Pentagon will not take the security of its microgrids lightly, especially with the recent publication of the “Department of Defense Strategy for Operating in Cyberspace.”73 Challenge 6: The electricity industry does not have metrics for evaluating cybersecurity. The lack of evaluation metrics is a serious problem, but the DOD could instruct USCYBERCOM to create a specific set of metrics for microgrid development.

#### SMRs are key to grid invulnerability – renewables are a step back

Barton 11 (Charles, founder of the Nuclear Green Revolution blog, MA in philosophy, “Future storm damage to the grid may carry unacceptable costs”, April 30, http://nucleargreen.blogspot.com/2011\_04\_01\_archive.html)

Amory Lovins has long argued that the traditional grid is vulnerable to this sort of damage. Lovins proposed a paradigm shift from centralized to distributed generation and from fossil fuels and nuclear power to renewable based micro-generation. Critics have pointed to flaws in Lovins model. Renewable generation systems are unreliable and their output varies from locality to locality, as well as from day to day, and hour to hour. In order to bring greater stability and predictability to the grid, electrical engineers have proposed expanding the electrical transmission system with thousands of new miles of transmission cables to be added to bring electricity from high wind and high sunshine areas, to consumers. This would lead, if anything, to greater grid vulnerability to storm damage in a high renewable penetration situation. Thus Lovins renewables/distributed generation model breaks down in the face of renewables limitations. Renewables penetration, will increase the distance between electrical generation facilities and customer homes and businesses, increasing the grid vulnerable to large scale damage, rather than enhancing reliability. Unfortunately Lovins failed to note that the distributed generation model actually worked much better with small nuclear power plants than with renewable generated electricity. Small nuclear plants could be located much closer to customer's homes, decreasing the probability of storm damage to transmission lines. At the very worst, small NPPs would stop the slide toward increased grid expansion. Small reactors have been proposed as electrical sources for isolated communities that are too remote for grid hookups. If the cost of small reactors can be lowered sufficiently it might be possible for many and perhaps even most communities to unhook from the grid while maintaining a reliable electrical supply. It is likely that electrical power will play an even more central role in a post-carbon energy era. Increased electrical dependency requires increased electrical reliability, and grid vulnerabilities limit electrical reliability. Storm damage can disrupt electrical service for days and even weeks. In a future, electricity dependent economy, grid damage can actually impede storm recovery efforts, making large scale grid damage semi-self perpetuating. Such grid unreliability becomes a threat to public health and safety. Thus grid reliability will be a more pressing future issue, than it has been. It is clear that renewable energy sources will worsen grid reliability, Some renewable advocates have suggested that the so called "smart grid" will prevent grid outages. Yet the grid will never be smart enough to repair its own damaged power lines. In addition the "smart grid" will be venerable to hackers, and would be a handy target to statures. A smart grid would be an easy target for a Stuxnet type virus attack. Not only does the "smart grid" not solve the problem posed by grid vulnerability to storm damage, but efficiency, another energy approach thought to be a panacea for electrical supply problems would be equally useless. Thus, decentralized electrical generation through the use of small nuclear power plants offers real potential for increasing electrical reliability, but successful use of renewable electrical generation approaches may worsen rather than improved grid reliability.

### Kritik

#### Engagement with nuclear technocracy is critical to solve

Nordhaus 11, chairman – Breakthrough Instiute, and Shellenberger, president – Breakthrough Insitute, MA cultural anthropology – University of California, Santa Cruz, 2/25/‘11

(Ted and Michael, <http://thebreakthrough.org/archive/the_long_death_of_environmenta>)

Tenth, we are going to have to get over our suspicion of technology, especially nuclear power. There is no credible path to reducing global carbon emissions without an enormous expansion of nuclear power. It is the only low carbon technology we have today with the demonstrated capability to generate large quantities of centrally generated electrtic power. It is the low carbon of technology of choice for much of the rest of the world. Even uber-green nations, like Germany and Sweden, have reversed plans to phase out nuclear power as they have begun to reconcile their energy needs with their climate commitments. Eleventh, we will need to embrace again the role of the state as a direct provider of public goods. The modern environmental movement, borne of the new left rejection of social authority of all sorts, has embraced the notion of state regulation and even creation of private markets while largely rejecting the generative role of the state. In the modern environmental imagination, government promotion of technology - whether nuclear power, the green revolution, synfuels, or ethanol - almost always ends badly. Never mind that virtually the entire history of American industrialization and technological innovation is the story of government investments in the development and commercialization of new technologies. Think of a transformative technology over the last century - computers, the Internet, pharmaceutical drugs, jet turbines, cellular telephones, nuclear power - and what you will find is government investing in those technologies at a scale that private firms simply cannot replicate. Twelveth, big is beautiful. The rising economies of the developing world will continue to develop whether we want them to or not. The solution to the ecological crises wrought by modernity, technology, and progress will be more modernity, technology, and progress. The solutions to the ecological challenges faced by a planet of 6 billion going on 9 billion will not be decentralized energy technologies like solar panels, small scale organic agriculture, and a drawing of unenforceable boundaries around what remains of our ecological inheritance, be it the rainforests of the Amazon or the chemical composition of the atmosphere. Rather, these solutions will be: large central station power technologies that can meet the energy needs of billions of people increasingly living in the dense mega-cities of the global south without emitting carbon dioxide, further intensification of industrial scale agriculture to meet the nutritional needs of a population that is not only growing but eating higher up the food chain, and a whole suite of new agricultural, desalinization and other technologies for gardening planet Earth that might allow us not only to pull back from forests and other threatened ecosystems but also to create new ones. The New Ecological Politics The great ecological challenges that our generation faces demands an ecological politics that is generative, not restrictive. An ecological politics capable of addressing global warming will require us to reexamine virtually every prominent strand of post-war green ideology. From Paul Erlich's warnings of a population bomb to The Club of Rome's "Limits to Growth," contemporary ecological politics have consistently embraced green Malthusianism despite the fact that the Malthusian premise has persistently failed for the better part of three centuries. Indeed, the green revolution was exponentially increasing agricultural yields at the very moment that Erlich was predicting mass starvation and the serial predictions of peak oil and various others resource collapses that have followed have continue to fail. This does not mean that Malthusian outcomes are impossible, but neither are they inevitable. We do have a choice in the matter, but it is not the choice that greens have long imagined. The choice that humanity faces is not whether to constrain our growth, development, and aspirations or die. It is whether we will continue to innovate and accelerate technological progress in order to thrive. Human technology and ingenuity have repeatedly confounded Malthusian predictions yet green ideology continues to cast a suspect eye towards the very technologies that have allowed us to avoid resource and ecological catastrophes. But such solutions will require environmentalists to abandon the "small is beautiful" ethic that has also characterized environmental thought since the 1960's. We, the most secure, affluent, and thoroughly modern human beings to have ever lived upon the planet, must abandon both the dark, zero-sum Malthusian visions and the idealized and nostalgic fantasies for a simpler, more bucolic past in which humans lived in harmony with Nature.

#### ‘Nuclear apartheid’ arguments erase the internal differences between marginalized groups that becomes apologia for conservative violence and reinscribes nuclearism

Biswas ‘1 Shampa Biswas, professor of political science at Whitman College, ““Nuclear Apartheid” as Political Position: Race as a Postcolonial Resource?” Alternatives: Global, Local, Political, October 2001, vol. 28 no. 4, 10.1177/030437540102600406

Where does that leave us with the question of “nuclear apartheid”? As persuasive as the nuclear-apartheid argument may be at pointing to one set of global exclusions, its complicity in the production of boundaries that help sustain a whole other set of exclusions also makes it suspect. It is precisely the resonances of the concept of apartheid, and the strong visceral response it generates, that gives it the ability to bound and erase much more effectively. In one bold move, the nuclear-apartheid argument announces the place of nuclear weaponry as the arbiter of global power and status, and how its inaccessibility or unavailability to a racialized Third World relegates it forever to the dustheap of history. It thus makes it possible for “Indians” to imagine themselves as a “community of resistance.” However, with that same stroke, the nuclear-apartheid position creates and sustains yet another racialized hierarchy, bringing into being an India that is exclusionary and oppressive. And it is precisely the boldness of this racial signifier that carries with it the ability to erase, mask, and exclude much more effectively. In the hands of the BJP, the “nuclear apartheid” position becomes dangerous—because the very boldness of this racial signifier makes it possible for the BJP to effect closure on its hegemonic vision of the Hindu/Indian nation. Hence, this article has argued, in taking seriously the racialized exclusions revealed by the use of the “nuclear apartheid” position at the international level, one must simultaneously reveal another set of racialized exclusions effected by the BJP in consolidating its hold on state power. I have argued that comprehending the force and effect of the invocation of “race” through the nuclear-apartheid position means to understand this mutually constitutive co-construction of racialized domestic and international hierarchical orders.

### Politics

#### Science diplomacy happens now – scientists don’t care about politics.

Dickson ’9 Dave Dickson, Director of SciDev, SciDev, June 4, 2009, http://www.scidev.net/en/editorials/the-limits-of-science-diplomacy.html

The scientific community has a deserved reputation for its international perspective — scientists often ignore national boundaries and interests when it comes to exchanging ideas or collaborating on global problems. So it is not surprising that science attracts the interest of politicians keen to open channels of communication with other states. Signing agreements on scientific and technological cooperation is often the first step for countries wanting to forge closer working relationships. More significantly, scientists have formed key links behind-the-scenes when more overt dialogue has been impossible. At the height of the Cold War, for example, scientific organisations provided a conduit for discussing nuclear weapons control.

#### Science diplomacy fails—politics is not an effective framework to scientific cooperation

Dickson ’9 Dave Dickson, Director of SciDev, SciDev, June 4, 2009, http://www.scidev.net/en/editorials/the-limits-of-science-diplomacy.html

 Perhaps the most contentious area discussed at the meeting was how science diplomacy can frame developed countries' efforts to help build scientific capacity in the developing world. There is little to quarrel with in collaborative efforts that are put forward with a genuine desire for partnership. Indeed, partnership — whether between individuals, institutions or countries — is the new buzzword in the "science for development" community. But true partnership requires transparent relations between partners who are prepared to meet as equals. And that goes against diplomats' implicit role: to promote and defend their own countries' interests. John Beddington, the British government's chief scientific adviser, may have been a bit harsh when he told the meeting that a diplomat is someone who is "sent abroad to lie for his country". But he touched a raw nerve.

#### Top docket

NYT 11/8 (“Back to Work, Obama Is Greeted by Looming Fiscal Crisis” http://www.nytimes.com/2012/11/08/us/politics/president-obama-begins-work-on-second-term.html?hp&pagewanted=all)

It may be weeks before Mr. Obama starts making personnel announcements. His first priority is policy, and its politics — positioning for the budget showdown in the lame-duck session, to try to avoid the fiscal cliff by agreeing with Republicans to alternative deficit-reduction measures.¶ If Mr. Obama got a mandate for anything after a campaign in which he was vague on second-term prescriptions, he can and will claim one for his argument that wealthy Americans like himself and his vanquished Republican rival, Mitt Romney, should pay higher income taxes. That stance was a staple of Mr. Obama’s campaign stump speeches for more than a year. And most voters, in surveys of those leaving the polls on Tuesday, agreed with him.

#### Winners win- fast legislative victory key to second term agenda

Baker 11/7 (Peter, NYT, “Question for the Victor: How Far Do You Push?” http://www.nytimes.com/2012/11/07/us/politics/obama-second-term-has-immediate-challenges.html?pagewanted=all)

Mr. Obama is acutely aware that time for progress is limited in any second term, as he increasingly becomes a lame duck. “The first 14 months are productive, the last 14 months are productive, and you sag in the middle,” said Mayor Rahm Emanuel of Chicago, Mr. Obama’s first White House chief of staff.¶ Given that dynamic, Democrats said Mr. Obama must move quickly to establish command of the political process. “If you don’t put anything on the board, you die faster,” said Patrick Griffin, who was President Bill Clinton’s liaison to Congress and is now associate director of the Center for Congressional and Presidential Studies at American University. “If you have no credibility, if you can’t establish some sort of victory here, you will be marginalized by your own party and the other side very quickly.”

#### Plan is uniquely insulated from politics – bipartisan consensus

Shaw 12 (Andrew, member of the Government Affairs team where he focuses primarily on energy issues at the intersection of Canada-U.S. relations, uses his knowledge and experience of Congress and the Executive Branch to advise clients on critical energy and environmental public policy issues, “ A “Chunks” Approach to Climate Policy,” 2012, [[www.politicsandlawblog.com/2012/05/15/a-chunks-approach-to-climate-policy/](http://www.politicsandlawblog.com/2012/05/15/a-chunks-approach-to-climate-policy/)], jam)

While ideally President Obama would seek a “comprehensive” approach to climate change, Zichal acknowledged that the Administration would likely approach this issue in “chunks.” Specifically, Zichal talked about seeking “tools and policies that can garner bipartisan support.” One example provided by Zichal was extending the production tax credit for renewable production, which is set to expire at the end of this year. The “chunks” mention appears to reinforce the notion that President Obama would be unlikely to pursue cap-and-trade, or some variant, in a second-term. Following Zichal’s comments, Senator Lamar Alexander (R-TN) spoke – his remarks suggested that there are other “chunks” where consensus is achievable on energy policy between the Administration and Congress. Specifically, Senator Alexander expressed support for the Advanced Research Projects Agency-Energy (ARPA-E), an agency focused on R&D for breakthrough energy technologies, such as small modular reactors, smart grids, carbon capture and electric car batteries. ARPA-E is modeled after the Defense Advanced Research Projects Agency (DARPA), which, among other achievements, helped in inventing the internet. The American Recovery and Reinvestment Act provided the first appropriations for ARPR-E, which has subsequently used that money to fund over 180 projects focused on emerging energy technologies. In an election year, Republicans and Democrats spend an inordinate amount of time highlighting their differences on energy policy. Yet on ARPA-E, both President Obama and Governor Mitt Romney have expressed support for a continued commitment to the program. Senator Alexander’s comments indicate that an important and achievable “chunk” of climate policy, regardless of the outcome of the election, could be a renewed emphasis on ARPA-E.

#### DOD energy programs don’t link – conservative won’t oppose

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

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

### REE

#### Rare earth shortage now – Chinese monopoly

Worstall 10/10 (Tim, Senior Fellow at the Adam Smith Institute and an expert on rare earth metals according to The Telegraph, “The rare earths shortage isn’t over yet” Forbes <http://www.forbes.com/sites/timworstall/2012/10/10/the-rare-earths-shortage-isnt-over-yet/>) wg

The Rare Earths Shortage Isn't Over Yet¶ Back a couple of years the great panic was that China’s 97% of the rare earths market was going to be exploited. That near monopoly would, when export licences were limited, mean that those companies that used the materials would have to locate themselves in China in order to get stocks. I’ve certainly had a conversation or two with companies that do use rare earths where they’ve indicated that they have at least considered such a move.¶ The panic was rather overdone in my opinion. Rare earths just aren’t rare (nor are they earths, thoise are the first two things you need to know about them) and there are multitudes of places around the world where you can mine them. As Molycorp, Lynas and others have shown. Indeed, as I hope to be showing in a few months time as we start to produce (very small indeed amounts it has to be said) one of the rare earths.¶ However, as I’ve been saying over this time there is indeed a limit in the market. A chokepoint, something that China does have and no one else really does. That’s the ability to process the rare earths. The real difficulty is in separating the 15 lanthanides, one from each other. Molycorp has part of a plant (they can only separate some, not all). There’s a few small plants in the CIS, remnants of the Soviet industry. But they’re not really ready to run at present. There’s a small plant in France but that has problems with storage of the waste and one more being built in South Africa (disclosure, I know one of the directors there). The big breakthrough though, the one that was going to break China’s grip, was the Lynas plant in Malaysia. Big enough to actually make a difference, complete in that it would be able to process all of the different lanthanides. And that’s running into problems:¶ A Malaysian court has kept on hold a license granted to Lynas Corp Ltd’s controversial rare earth plant, delaying until next month a decision on whether to consider judicial reviews aimed at permanently blocking production.¶ It’s complete and it’s ready to roll but they’ve huge problems in getting that license to allow them to actually operate. The problem is that there was a previous plant there (processing material from the local tin ores) which left quite a bit of radioactive residue around the place. This shouldn’t be a problem for the new plant: partly because they’re going to be more careful. But mainly because the ore they want to process is much lower in that radioactivity in the first place.¶ But a delay this is and no one is really quite sure yet which way the court case and license is going to go. For there’s a good suspicion that it’s more likely to be a political decision than a legal one.¶ It really isn’t all over yet. Not licensing this plant will mean that the world becomes reliant once again on Chinese supplies, reinforcing that monopoly.

#### Thorium incentives solve global rare earth shortage

Halper 12 (Mark, Energy editor for Smart Planet, “Solve the energy AND rare earth crisis: join the thorium bank” Smart Planet, 7/24/12 <http://www.smartplanet.com/blog/intelligent-energy/solve-the-energy-and-rare-earth-crisis-join-the-thorium-bank/17845>) wg

Put this idea into the “killing two birds with one stone” category.¶ The “birds” in this case are nothing less than two great economic and environmental challenges facing the West: How to establish carbon-free, sustainable energy independence, and how to cut reliance on China for the rare earth metals vital to products ranging from missiles to mobile phones.¶ The “stone” is literally a stone - okay, a rock - called monazite.¶ As I’ve noted before on SmartPlanet, monazite is a mineral rich in rare earth elements, and also in thorium, the element that could replace uranium and usher in a future of safe, efficient nuclear power that helps cut the fossil fuel cord and that greatly reduces nuclear waste hazards including weapons proliferation.¶ Two problems: Most countries in the West lack policy that supports thorium nuclear. Likewise, countries like the U.S. years ago took measures that handed the rare earth business to China.¶ Co-operative Kennedy. Jim Kennedy speaking in Chicago recently.¶ Another issue: Although mining monazite in say, the U.S., could help free the country from China’s rare earth shackles, the presence of thorium in the rock discourages such initiative. That’s because - with no federal thorium nuclear approval in place - mildly radioactive thorium is a costly rare earth byproduct that someone has to safely store away.¶ You would think it’s high time to solve this riddle.¶ Jim Kennedy’s Thorium Bank to the rescue!¶ Kennedy, one of the organizers of the recent Thorium Energy Alliance Conference in Chicago, made a compelling case at the conference for Congress to authorize - but not fund - a “cooperative” responsible for not only taking the thorium off the hands of rare earth mining companies, but also for developing thorium uses and markets, including energy.¶ You can watch a video of Kennedy making his case below. In it, he describes how he and fellow TEAC organizer John Kutsch have been lobbying Congress - so far unsuccessfully.¶ Kennedy is a St. Louis consultant who is also president of a company called ThREEM3 that owns rights to the rare earth byproducts from Missouri’s Pea Ridge iron ore mine (which would come from monazite at the mine, I believe).¶ He notes, ”As John and I have been trying to convince Congress…you could create a rare earth cooperative that could receive the thorium-baring monazites, and essentially pull out the rare earths, and then take the thorium liability and hand it over to another entity, something we can just simply call the thorium bank.¶ “And the thorium bank would have a very simple elegant one sentence piece of legislation along with it that says, ‘Congress gives the thorium bank the authority to develop uses and markets for thorium, including energy.’ ”¶ That, he says, would provide “the big tent to develop a thorium energy economy,” and would include Western partners and owners who would participate in the revenue stream and, by the way, create jobs.¶ Kennedy suggests calling the entity the “Thorium Storage and Industrial Products Corporation.”¶ He describes it as, “Something to give the public confidence - a federally chartered facility that’s going to accept every single gram of thorium and all the other actinides that are produced.¶ “That thorium bank would solve the rare earth crisis in the United States in Japan in Korea in Europe. Everyone could participate and own. And own the offtake. Because it would be a co-op. And then you would relegate the risk over to this facility. And this facility would be the big tent where people could come in and either contribute capital or IP.”

#### No impact—Chinese supply is insignificant

Miklian ’11 Jason Miklian, researcher at the Peace Research Institute Oslo, “I Was a Rare Earths Day Trader,” Foreign Policy, 1/21/2011, http://www.foreignpolicy.com/articles/2011/01/21/i\_was\_a\_rare\_earths\_day\_trader?page=full

Cooler heads have weighed in on rare earths, but since the frenzy began they've largely been ignored. Six months before the China-Japan incident, the U.S. Geological Survey issued a report showing that the world has a 1,000-year global supply of proven rare-earth reserves, 63 of them outside China. The U.S. Defense Department released its own assessment in November saying that the national security implications of China's rare-earth lockdown -- a key factor in the initial burst of panic -- had been overblown. Demand for rare earths, meanwhile, is almost totally inelastic, and the market is already adjusting to concerns over a Chinese monopoly. The big buyers in Japan started importing from India and Vietnam three years ago, and Molycorp alone may be delivering more than six times what the United States needs by 2012.

#### No SCS conflict—common economic interests and legal commitments

Gupta ’11 Rukmani Gupta, Associate Fellow at the Institute for Defence Studies and Analyses in New Delhi, “South China Sea Conflict? No Way,” The Diplomat, 23 October 2011, <http://the-diplomat.com/2011/10/23/south-china-sea-conflict-no-way/2/>

These suggestions to recalibrate Indian policy towards the South China Sea and its relationship with Vietnam are premature at best. Despite the rhetoric, conflict in the South China Sea may well not be inevitable. If the history of dialogue between the parties is any indication, then current tensions are likely to result in forward movement. In the aftermath of statements by the United States, and skirmishes over fishing vessels, ASEAN and China agreed upon the Guidelines on the Implementation of the Declaration on the Conduct of Parties in the South China Sea at the Bali Summit in July 2010. And recent tensions may well prod the parties towards a more binding code of conduct. This isn’t to suggest that territorial claims and sovereignty issues will be resolved, but certainly they can become more manageable to prevent military conflict. There’s a common interest in making the disputes more manageable, essentially because, nationalistic rhetoric notwithstanding, the parties to the dispute recognize that there are real material benefits at stake. A disruption of maritime trade through the South China Sea would entail economic losses – and not only for the littoral states. No party to the dispute, including China, has thus far challenged the principle of freedom of navigation for global trade through the South China Sea. The states of the region are signatories to the UNCLOS, which provides that ‘Coastal States have sovereign rights in a 200-nautical mile exclusive economic zone (EEZ) with respect to natural resources and certain economic activities, and exercise jurisdiction over marine science research and environmental protection’ but that ‘All other States have freedom of navigation and over flight in the EEZ, as well as freedom to lay submarine cables and pipelines.’ The prospect of threats to SLOCS thus seems somewhat exaggerated.

### Consult Locals CP

#### Public would hate the plan- all their ev is biased

Baker 2012, (Matthew, Adjunct Junior Fellow at the American Security Project “Do Small Modular Reactors Present a Serious Option for the Military’s Energy Needs?,” June 22nd, http://americansecurityproject.org/blog/2012/do-small-modular-reactors-present-a-serious-option-for-the-militarys-energy-needs/)

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.

#### SMRs for the military cause environmental backlash over *siting* and *waste*

Andres and Breetz 2011 (Richard, Professor of National Security Strategy at the National War College, Senior Fellow and Energy and Environmental Security and Policy Chair in the Center for Strategic Research, Institute for National Strategic Studies, at the National Defense University, Hanna, doctoral candidate in the Department of Political Science at The Massachusetts Institute of Technology, “Small Nuclear Reactors for Military Installations: Capabilities, Costs, and Technological Implications” Institute for National Strategic Studies -- February -- www.ndu.edu/press/lib/pdf/StrForum/SF-262.pdf)

Small reactors used on domestic military bases are ¶ likely to face a number of additional siting hurdles. As a ¶ distributed energy source, they are likely to face substantial “not-in-my-backyard” battles. Moreover, dispersing a ¶ large number of reactors leads to questions about longterm nuclear waste disposal.¶ 27¶ Arguably, reactors should be ¶ relatively safe on domestic military installations, certainly ¶ more secure than, for instance, the reactors situated in developing countries or intended for processing tar sands. ¶ Nevertheless, no issue involving nuclear energy is simple. ¶ Institutional and technical uncertainties—such as the security of sealed modules, the potential and unintended ¶ social and environmental consequences, or the design of ¶ reliable safeguards—make dispersing reactors across the ¶ country challenging. Some key issues that require consideration include securing sealed modules, determining how ¶ terrorists might use captured nuclear materials, carefully ¶ considering the social and environmental consequences of ¶ dispersing reactors, and determining whether Permissive ¶ Action Links technology could be used to safeguard them.

## 1AR

### Politics

#### spending capital gives Obama leverage on other issues

Brooks 10/18 (Rosa, law prof at Georgetown and former counselor and senior advisor to DOD and State, The Case For Intervention, Foreign Policy <http://www.foreignpolicy.com/articles/2012/10/18/the_case_for_intervention?page=full>)

5. Get a backbone. President Obama has sound moral instincts, but he often backs away from them at the first sign of resistance. He came into office with a mandate and Democratic control of both houses of Congress. Had he been willing to use some political capital -- and twist a few arms on the Hill -- in those early months, Guantanamo would be closed, and the United States might have a more coherent approach to national security budgeting. But on these and other issues, the president backed off at the first sign of congressional resistance, apparently deciding (presumably on the advice of the campaign aides who already populated his national security staff) that these issues were political losers.¶ Of course, it was a self-fulfilling prophesy; the issues became losers because the White House abandoned them. Ultimately, Congress began to view him as weak: a man who wouldn't push them very hard. As a result, Congress pushed back hard on everything, including health care, economic stimulus, and regulation of the financial industry, and Obama was forced to live with watered-down legislation across the board.¶ If he gets a second term, Obama needs to start thinking about his legacy, and that will require him to fight for his principles, not abandon them. Even if he fights, he won't win every battle -- but if he doesn't fight,

### Kritik

#### apartheid args homogenize marginalized groups

Biswas ‘1 Shampa Biswas, professor of political science at Whitman College, ““Nuclear Apartheid” as Political Position: Race as a Postcolonial Resource?” Alternatives: Global, Local, Political, October 2001, vol. 28 no. 4, 10.1177/030437540102600406

Where does that leave us with the question of "nuclear apartheid"? As persuasive as the nuclear-apartheid argument may be at pointing to one set of global exclusions, its complicity in the production of boundaries that help sustain a whole other set of exclusions also makes it suspect. It is precisely the resonances of the concept of apartheid, and the strong visceral response it generates, that gives it the ability to bound and erase much more effectively. In one bold move, the nuclear-apartheid argument announces the place of nuclear weaponry as the arbiter of global power and status, and how its inaccessibility or unavailability to a racialized Third World relegates it forever to the dustheap of history. It thus makes it possible for "Indians" to imagine themselves as a "community of resistance." However, with that same stroke, the nuclear-apartheid position creates and sustains yet another racialized hierarchy, bringing into being an India that is exclusionary and oppressive. And it is precisely the boldness of this racial signifier that carries with it the ability to erase, mask, and exclude much more effectively. In the hands of the BJP, the "nuclear apartheid" position becomes dangerous--because the very boldness of this racial signifier makes it possible for the BJP to effect closure on its hegemonic vision of the Hindu/Indian nation. Hence, this article has argued, in taking seriously the racialized exclusions revealed by the use of the "nuclear apartheid" position at the international level, one must simultaneously reveal another set of racialized exclusions effected by the BJP in consolidating its hold on state power. I have argued that comprehending the force and effect of the invocation of "race" through the nuclear-apartheid position means to understand this mutually constitutive co-construction of racialized domestic and international hierarchical orders.

#### Individual level strategies fail and make global violence inevitable

Monbiot ‘4 George Monbiot, journalist, academic, and political and environmental activist, 2004, Manifesto for a New World Order, p. 11-13

The quest for global solutions is difficult and divisive. Some members of this movement are deeply suspicious of all institutional power at the global level, fearing that it could never be held to account by the world’s people. Others are concerned that a single set of universal prescriptions would threaten the diversity of dissent. A smaller faction has argued that all political programmes are oppressive: our task should not be to replace one form of power with another, but to replace all power with a magical essence called ‘anti-power’. But most of the members of this movement are coming to recognize that if we propose solutions which can be effected only at the local or the national level, we remove ourselves from any meaningful role in solving precisely those problems which most concern us. Issues such as cli­mate change, international debt, nuclear proliferation, war, peace and the balance of trade between nations can be addressed only globally or internationally. Without global measures and global institutions, it is impossible to see how we might distribute wealth from rich nations to poor ones, tax the mobile rich and their even more mobile money, control the shipment of toxic waste, sustain the ban on landmines, prevent the use of nuclear weapons, broker peace between nations or prevent powerful states from forcing weaker ones to trade on their terms. If we were to work only at the local level, we would leave these, the most critical of issues, for other people to tackle. Global governance will take place whether we participate in it or not. Indeed, it must take place if the issues which concern us are not to be resolved by the brute force of the powerful. That the international institutions have been designed or captured by the dictatorship of vested interests is not an argument against the existence of international institutions, but a reason for overthrowing them and re­placing them with our own. It is an argument for a global political system which holds power to account. In the absence of an effective global politics, moreover, local solutions will always be undermined by communities of interest which do not share our vision. We might, for example, manage to persuade the people of the street in which we live to give up their cars in the hope of preventing climate change, but unless everyone, in all communities, either shares our politics or is bound by the same rules, we simply open new road space into which the neighbouring communities can expand. We might declare our neighbour­hood nuclear-free, but unless we are simultaneously work­ing, at the international level, for the abandonment of nuclear weapons, we can do nothing to prevent ourselves and everyone else from being threatened by people who are not as nice as we are. We would deprive ourselves, in other words, of the power of restraint. By first rebuilding the global politics, we establish the political space in which our local alternatives can flourish. If, by contrast, we were to leave the governance of the necessary global institutions to others, then those institutions will pick off our local, even our national, solutions one by one. There is little point in devising an alternative economic policy for your nation, as Luis Inacio ‘Lula’ da Silva, now president of Brazil, once advocated, if the International Monetary Fund and the financial speculators have not first been overthrown. There is little point in fighting to protect a coral reef from local pollution, if nothing has been done to prevent climate change from destroying the conditions it requires for its survival.

#### Policy analysis should precede discourse – most effective way to challenge power

Taft-Kaufman ’95 Jill Taft-Kaufman, Speech prof @ CMU, 1995, Southern Comm. Journal, Spring, v. 60, Iss. 3, “Other Ways”, p pq

The postmodern passwords of "polyvocality," "Otherness," and "difference," unsupported by substantial analysis of the concrete contexts of subjects, creates a solipsistic quagmire. The political sympathies of the new cultural critics, with their ostensible concern for the lack of power experienced by marginalized people, aligns them with the political left. Yet, despite their adversarial posture and talk of opposition, their discourses on intertextuality and inter-referentiality isolate them from and ignore the conditions that have produced leftist politics--conflict, racism, poverty, and injustice. In short, as Clarke (1991) asserts, postmodern emphasis on new subjects conceals the old subjects, those who have limited access to good jobs, food, housing, health care, and transportation, as well as to the media that depict them. Merod (1987) decries this situation as one which leaves no vision, will, or commitment to activism. He notes that academic lip service to the oppositional is underscored by the absence of focused collective or politically active intellectual communities. Provoked by the academic manifestations of this problem Di Leonardo (1990) echoes Merod and laments: Has there ever been a historical era characterized by as little radical analysis or activism and as much radical-chic writing as ours? Maundering on about Otherness: phallocentrism or Eurocentric tropes has become a lazy academic substitute for actual engagement with the detailed histories and contemporary realities of Western racial minorities, white women, or any Third World population. (p. 530) Clarke's assessment of the postmodern elevation of language to the "sine qua non" of critical discussion is an even stronger indictment against the trend. Clarke examines Lyotard's (1984) The Postmodern Condition in which Lyotard maintains that virtually all social relations are linguistic, and, therefore, it is through the coercion that threatens speech that we enter the "realm of terror" and society falls apart. To this assertion, Clarke replies: I can think of few more striking indicators of the political and intellectual impoverishment of a view of society that can only recognize the discursive. If the worst terror we can envisage is the threat not to be allowed to speak, we are appallingly ignorant of terror in its elaborate contemporary forms. It may be the intellectual's conception of terror (what else do we do but speak?), but its projection onto the rest of the world would be calamitous....(pp. 2-27) The realm of the discursive is derived from the requisites for human life, which are in the physical world, rather than in a world of ideas or symbols.(4) Nutrition, shelter, and protection are basic human needs that require collective activity for their fulfillment. Postmodern emphasis on the discursive without an accompanying analysis of how the discursive emerges from material circumstances hides the complex task of envisioning and working towards concrete social goals (Merod, 1987). Although the material conditions that create the situation of marginality escape the purview of the postmodernist, the situation and its consequences are not overlooked by scholars from marginalized groups. Robinson (1990) for example, argues that "the justice that working people deserve is economic, not just textual" (p. 571). Lopez (1992) states that "the starting point for organizing the program content of education or political action must be the present existential, concrete situation" (p. 299). West (1988) asserts that borrowing French post-structuralist discourses about "Otherness" blinds us to realities of American difference going on in front of us (p. 170). Unlike postmodern "textual radicals" who Rabinow (1986) acknowledges are "fuzzy about power and the realities of socioeconomic constraints" (p. 255), most writers from marginalized groups are clear about how discourse interweaves with the concrete circumstances that create lived experience. People whose lives form the material for postmodern counter-hegemonic discourse do not share the optimism over the new recognition of their discursive subjectivities, because such an acknowledgment does not address sufficiently their collective historical and current struggles against racism, sexism, homophobia, and economic injustice. They do not appreciate being told they are living in a world in which there are no more real subjects. Ideas have consequences. Emphasizing the discursive self when a person is hungry and homeless represents both a cultural and humane failure. The need to look beyond texts to the perception and attainment of concrete social goals keeps writers from marginalized groups ever-mindful of the specifics of how power works through political agendas, institutions, agencies, and the budgets that fuel them.

# Rd 4 vs Rochester BS

## 1AC

See rd 2

## 2AC

### Case

#### Their study is biased

Rees ’11 Eifion Rees, “Don't believe the spin on thorium being a ‘greener’ nuclear option,” The Ecologist, 6/23/2011, http://www.theecologist.org/News/news\_analysis/952238/dont\_believe\_the\_spin\_on\_thorium\_being\_a\_greener\_nuclear\_option.html

Proponents counter that the NNL paper fails to address the question of MSR technology, evidence of its bias towards an industry wedded to PWRs. Reliant on diverse uranium/plutonium revenue streams – fuel packages and fuel reprocessing, for example – the nuclear energy giants will never give thorium a fair hearing, they say.

#### No fabrication necessary in LFTRs

Cannara ’11 Alexander Cannara, received his BSEE degree from Lehigh University, and received MSEE, DEE and MS Statistics degrees from Stanford, returned to Stanford for a PhD in Mathematical Methods in Educational Research and a Master of Science in Statistics, during which time he designed analog and digital instrumentation, applying for a patent on one design, has taught courses in engineering, programming and networking at Stanford, University of San Francisco, International Technological University, Golden Gate and Silicon Valley University, and has worked both for the government and in the corporate arena with such organizations as Ballantine Laboratories, RMC Research, Zilog, Gibbons & Associates, Mitsubishi Semiconductor, AMD, 3Com, Network General, Vitesse, PacketMotion and Xambala, “IEER/PSR Thorium “Fact Sheet” Rebuttal,” response to the 2009 Makhijani and Boyd piece on thorium, posted 3/23/2011 by Kirk Sorenson on Energy From Thorium, http://energyfromthorium.com/ieer-rebuttal/

Previously I mentioned the implications of the presence of uranium-232 contamination within uranium-233 and its anti-proliferative nature with regards to nuclear weapons. U-232 contamination also makes fabrication of solid thorium-oxide fuel containing uranium-233-oxide very difficult. In the liquid-fluoride reactor, fuel fabrication is unnecessary and this difficulty is completely averted.

#### U233 only ignites the initial reaction—then a LFTR just needs a steady supply of thorium—and it can reprocess other fissile materials

Cannara ’11 Alexander Cannara, received his BSEE degree from Lehigh University, and received MSEE, DEE and MS Statistics degrees from Stanford, returned to Stanford for a PhD in Mathematical Methods in Educational Research and a Master of Science in Statistics, during which time he designed analog and digital instrumentation, applying for a patent on one design, has taught courses in engineering, programming and networking at Stanford, University of San Francisco, International Technological University, Golden Gate and Silicon Valley University, and has worked both for the government and in the corporate arena with such organizations as Ballantine Laboratories, RMC Research, Zilog, Gibbons & Associates, Mitsubishi Semiconductor, AMD, 3Com, Network General, Vitesse, PacketMotion and Xambala, “IEER/PSR Thorium “Fact Sheet” Rebuttal,” response to the 2009 Makhijani and Boyd piece on thorium, posted 3/23/2011 by Kirk Sorenson on Energy From Thorium, http://energyfromthorium.com/ieer-rebuttal/

On the contrary, thorium is very much a fuel because in the steady-state operation of a LFTR, it is the only thing that is consumed to make energy. Makhijani and Boyd are correct that any nuclear reactor needs fissile material to start the chain reaction, and the LFTR is no different, but the important point is that once started on fissile material, LFTR can run indefinitely on only thorium as a feed—it will not continue to consume fissile material. That is very much the characteristic of a true fuel. “Burning thorium” in this manner is possible because the LFTR uses the neutrons from the fissioning of uranium-233 to convert thorium into uranium-233 at the same rate at which it is consumed. The “inventory” of uranium-233 remains stable over the life of the reactor when production and consumption are balanced. Today’s reactors use solid-uranium oxide fuel that is covalently-bonded and sustains radiation damage during its time in the reactor. The fluoride fuel used in LFTR is ionically-bonded and impervious to radiation damage no matter what the exposure duration. LFTR can be used to consume uranium-235 or plutonium-239 recovered from nuclear weapons and “convert” it, for all intents and purposes, to uranium-233 that will enable the production of energy from thorium indefinitely. Truly this is a reactor design that can “beat swords into plowshares” in a safe and economically attractive way.

#### Thorium solves waste and prolif problems – this ev is answering Makhijani in person

Martin 12 (Richard, author of "SuperFuel: Thorium, The Green Energy Source for the future, and he's a contributing editor for Wired and editorial director for Pike Research, May 4, "Is Thorium a Magic Bullet for Our Energy Problems?" [www.npr.org/2012/05/04/152026805/is-thorium-a-magic-bullet-for-our-energy-problems], jam)

MARTIN: However - you're welcome. However, some of those conclusions are just wrong. So when we talk about the waste, one of the things that skeptics of the liquid fuel thorium reactor ignore is the fact that because the core is a liquid, you can continually process waste, even from existing conventional reactors into forms that are much smaller in terms of volume, and the radioactivity drops off much, much quicker. We're talking about a few hundred years as opposed to tens of thousands of years. So to say that thorium reactors, like any other reactor, will create waste that needs to be handled and stored, et cetera, is true, but the volume, we're talking tenths of a percent of the comparable volume from a conventional reactor. And not only that, but we've got all that waste from our existing nuclear reactor fleet, just sitting around, and we've got no plan for it. And so we're talking about building a reactor that can process that into forms that are much, much easier to deal with. And so that's the waste issue. The proliferation issue is complicated. And the point that Dr. Makhijani, in the paper that I've read, brings up but then kind of dismisses is that in order to build a bomb with uranium-233, you somehow have to obtain it out of the reactor. And because this is a self-contained, liquid fuel system, it's - there's no point at which you can divert material. There's no material sitting in a warehouse somewhere, getting ready to be put in the reactor and so on. And to be able to obtain that material, you would have to somehow breach the reactor, shut it down, separate out the fissionable material and get away with it. And as I say in "SuperFuel," the book, good luck with that. But the other point is that even if you did manage to do that, the uranium-233 is contaminated with yet another isotope, U-232, which is one of the nastiest substances in the universe, and it makes handling and processing and separating out the U-233 virtually impossible, even for a sophisticated nuclear power lab, much less for a rogue nation, or terrorist group or someone of that ilk. So to say that in principle you could obtain material with which you could make a bomb from a liquid-fueled thorium reactor is true. In the real world, the chances of that are, you know, very, very slim - so much as to be negligible.

#### Squo doesn’t solve

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

In recent years, the U.S. Department of Defense (DOD) has become increasingly interested in the potential of small (less than 300 megawatts electric [MWe]) nuclear reactors for military use.1 DOD’s attention to small reactors stems mainly from two critical vulnerabilities it has identified in its infrastructure and operations: the dependence of U.S. military bases on the fragile civilian electrical grid, and the challenge of safely and reliably supplying energy to troops in forward operating locations. DOD has responded to these challenges with an array of initiatives on energy efficiency and renewable and alternative fuels. Unfortunately, even with massive investment and ingenuity, these initiatives will be insufficient to solve DOD’s reliance on the civilian grid or its need for convoys in forward areas. The purpose of this paper is to explore the prospects for addressing these critical vulnerabilities through small-scale nuclear plants.

### Eco-Fem K

#### Individual level strategies fail and make global violence inevitable

Monbiot ‘4 George Monbiot, journalist, academic, and political and environmental activist, 2004, Manifesto for a New World Order, p. 11-13

The quest for global solutions is difficult and divisive. Some members of this movement are deeply suspicious of all institutional power at the global level, fearing that it could never be held to account by the world’s people. Others are concerned that a single set of universal prescriptions would threaten the diversity of dissent. A smaller faction has argued that all political programmes are oppressive: our task should not be to replace one form of power with another, but to replace all power with a magical essence called ‘anti-power’. But most of the members of this movement are coming to recognize that if we propose solutions which can be effected only at the local or the national level, we remove ourselves from any meaningful role in solving precisely those problems which most concern us. Issues such as cli­mate change, international debt, nuclear proliferation, war, peace and the balance of trade between nations can be addressed only globally or internationally. Without global measures and global institutions, it is impossible to see how we might distribute wealth from rich nations to poor ones, tax the mobile rich and their even more mobile money, control the shipment of toxic waste, sustain the ban on landmines, prevent the use of nuclear weapons, broker peace between nations or prevent powerful states from forcing weaker ones to trade on their terms. If we were to work only at the local level, we would leave these, the most critical of issues, for other people to tackle. Global governance will take place whether we participate in it or not. Indeed, it must take place if the issues which concern us are not to be resolved by the brute force of the powerful. That the international institutions have been designed or captured by the dictatorship of vested interests is not an argument against the existence of international institutions, but a reason for overthrowing them and re­placing them with our own. It is an argument for a global political system which holds power to account. In the absence of an effective global politics, moreover, local solutions will always be undermined by communities of interest which do not share our vision. We might, for example, manage to persuade the people of the street in which we live to give up their cars in the hope of preventing climate change, but unless everyone, in all communities, either shares our politics or is bound by the same rules, we simply open new road space into which the neighbouring communities can expand. We might declare our neighbour­hood nuclear-free, but unless we are simultaneously work­ing, at the international level, for the abandonment of nuclear weapons, we can do nothing to prevent ourselves and everyone else from being threatened by people who are not as nice as we are. We would deprive ourselves, in other words, of the power of restraint. By first rebuilding the global politics, we establish the political space in which our local alternatives can flourish. If, by contrast, we were to leave the governance of the necessary global institutions to others, then those institutions will pick off our local, even our national, solutions one by one. There is little point in devising an alternative economic policy for your nation, as Luis Inacio ‘Lula’ da Silva, now president of Brazil, once advocated, if the International Monetary Fund and the financial speculators have not first been overthrown. There is little point in fighting to protect a coral reef from local pollution, if nothing has been done to prevent climate change from destroying the conditions it requires for its survival.

#### Debate over policy options is a prerequisite to the K

McClean ‘1 David E. McClean, 2001, “The Cultural Left and the Limits of Social Hope,” Am. Phil. Conf., www.american-philosophy.org/archives/past\_conference\_programs/pc2001/Discussion%20papers/david\_mcclean.htm

Yet for some reason, at least partially explicated in Richard Rorty's Achieving Our Country, a book that I think is long overdue, leftist critics continue to cite and refer to the eccentric and often a priori ruminations of people like those just mentioned, and a litany of others including Derrida, Deleuze, Lyotard, Jameson, and Lacan, who are to me hugely more irrelevant than Habermas in their narrative attempts to suggest policy prescriptions (when they actually do suggest them) aimed at curing the ills of homelessness, poverty, market greed, national belligerence and racism. I would like to suggest that it is time for American social critics who are enamored with this group, those who actually want to be relevant, to recognize that they have a disease, and a disease regarding which I myself must remember to stay faithful to my own twelve step program of recovery. The disease is the need for elaborate theoretical "remedies" wrapped in neological and multi-syllabic jargon. These elaborate theoretical remedies are more "interesting," to be sure, than the pragmatically settled questions about what shape democracy should take in various contexts, or whether private property should be protected by the state, or regarding our basic human nature (described, if not defined (heaven forbid!), in such statements as "We don't like to starve" and "We like to speak our minds without fear of death" and "We like to keep our children safe from poverty"). As Rorty puts it, "When one of today's academic leftists says that some topic has been 'inadequately theorized,' you can be pretty certain that he or she is going to drag in either philosophy of language, or Lacanian psychoanalysis, or some neo-Marxist version of economic determinism. . . . These futile attempts to philosophize one's way into political relevance are a symptom of what happens when a Left retreats from activism and adopts a spectatorial approach to the problems of its country. Disengagement from practice produces theoretical hallucinations"(italics mine).(1) Or as John Dewey put it in his The Need for a Recovery of Philosophy, "I believe that philosophy in America will be lost between chewing a historical cud long since reduced to woody fiber, or an apologetics for lost causes, . . . . or a scholastic, schematic formalism, unless it can somehow bring to consciousness America's own needs and its own implicit principle of successful action." Those who suffer or have suffered from this disease Rorty refers to as the Cultural Left, which left is juxtaposed to the Political Left that Rorty prefers and prefers for good reason. Another attribute of the Cultural Left is that its members fancy themselves pure culture critics who view the successes of America and the West, rather than some of the barbarous methods for achieving those successes, as mostly evil, and who view anything like national pride as equally evil even when that pride is tempered with the knowledge and admission of the nation's shortcomings. In other words, the Cultural Left, in this country, too often dismiss American society as beyond reform and redemption. And Rorty correctly argues that this is a disastrous conclusion, i.e. disastrous for the Cultural Left. I think it may also be disastrous for our social hopes, as I will explain. Leftist American culture critics might put their considerable talents to better use if they bury some of their cynicism about America's social and political prospects and help forge public and political possibilities in a spirit of determination to, indeed, achieve our country - the country of Jefferson and King; the country of John Dewey and Malcom X; the country of Franklin Roosevelt and Bayard Rustin, and of the later George Wallace and the later Barry Goldwater. To invoke the words of King, and with reference to the American society, the time is always ripe to seize the opportunity to help create the "beloved community," one woven with the thread of agape into a conceptually single yet diverse tapestry that shoots for nothing less than a true intra-American cosmopolitan ethos, one wherein both same sex unions and faith-based initiatives will be able to be part of the same social reality, one wherein business interests and the university are not seen as belonging to two separate galaxies but as part of the same answer to the threat of social and ethical nihilism. We who fancy ourselves philosophers would do well to create from within ourselves and from within our ranks a new kind of public intellectual who has both a hungry theoretical mind and who is yet capable of seeing the need to move past high theory to other important questions that are less bedazzling and "interesting" but more important to the prospect of our flourishing - questions such as "How is it possible to develop a citizenry that cherishes a certain hexis, one which prizes the character of the Samaritan on the road to Jericho almost more than any other?" or "How can we square the political dogma that undergirds the fantasy of a missile defense system with the need to treat America as but one member in a community of nations under a "law of peoples?" The new public philosopher might seek to understand labor law and military and trade theory and doctrine as much as theories of surplus value; the logic of international markets and trade agreements as much as critiques of commodification, and the politics of complexity as much as the politics of power (all of which can still be done from our arm chairs.) This means going down deep into the guts of our quotidian social institutions, into the grimy pragmatic details where intellectuals are loathe to dwell but where the officers and bureaucrats of those institutions take difficult and often unpleasant, imperfect decisions that affect other peoples' lives, and it means making honest attempts to truly understand how those institutions actually function in the actual world before howling for their overthrow commences. This might help keep us from being slapped down in debates by true policy pros who actually know what they are talking about but who lack awareness of the dogmatic assumptions from which they proceed, and who have not yet found a good reason to listen to jargon-riddled lectures from philosophers and culture critics with their snobish disrespect for the so-called "managerial class."

#### Policy analysis should precede discourse – most effective way to challenge power

Taft-Kaufman ’95 Jill Taft-Kaufman, Speech prof @ CMU, 1995, Southern Comm. Journal, Spring, v. 60, Iss. 3, “Other Ways”, p pq

The postmodern passwords of "polyvocality," "Otherness," and "difference," unsupported by substantial analysis of the concrete contexts of subjects, creates a solipsistic quagmire. The political sympathies of the new cultural critics, with their ostensible concern for the lack of power experienced by marginalized people, aligns them with the political left. Yet, despite their adversarial posture and talk of opposition, their discourses on intertextuality and inter-referentiality isolate them from and ignore the conditions that have produced leftist politics--conflict, racism, poverty, and injustice. In short, as Clarke (1991) asserts, postmodern emphasis on new subjects conceals the old subjects, those who have limited access to good jobs, food, housing, health care, and transportation, as well as to the media that depict them. Merod (1987) decries this situation as one which leaves no vision, will, or commitment to activism. He notes that academic lip service to the oppositional is underscored by the absence of focused collective or politically active intellectual communities. Provoked by the academic manifestations of this problem Di Leonardo (1990) echoes Merod and laments: Has there ever been a historical era characterized by as little radical analysis or activism and as much radical-chic writing as ours? Maundering on about Otherness: phallocentrism or Eurocentric tropes has become a lazy academic substitute for actual engagement with the detailed histories and contemporary realities of Western racial minorities, white women, or any Third World population. (p. 530) Clarke's assessment of the postmodern elevation of language to the "sine qua non" of critical discussion is an even stronger indictment against the trend. Clarke examines Lyotard's (1984) The Postmodern Condition in which Lyotard maintains that virtually all social relations are linguistic, and, therefore, it is through the coercion that threatens speech that we enter the "realm of terror" and society falls apart. To this assertion, Clarke replies: I can think of few more striking indicators of the political and intellectual impoverishment of a view of society that can only recognize the discursive. If the worst terror we can envisage is the threat not to be allowed to speak, we are appallingly ignorant of terror in its elaborate contemporary forms. It may be the intellectual's conception of terror (what else do we do but speak?), but its projection onto the rest of the world would be calamitous....(pp. 2-27) The realm of the discursive is derived from the requisites for human life, which are in the physical world, rather than in a world of ideas or symbols.(4) Nutrition, shelter, and protection are basic human needs that require collective activity for their fulfillment. Postmodern emphasis on the discursive without an accompanying analysis of how the discursive emerges from material circumstances hides the complex task of envisioning and working towards concrete social goals (Merod, 1987). Although the material conditions that create the situation of marginality escape the purview of the postmodernist, the situation and its consequences are not overlooked by scholars from marginalized groups. Robinson (1990) for example, argues that "the justice that working people deserve is economic, not just textual" (p. 571). Lopez (1992) states that "the starting point for organizing the program content of education or political action must be the present existential, concrete situation" (p. 299). West (1988) asserts that borrowing French post-structuralist discourses about "Otherness" blinds us to realities of American difference going on in front of us (p. 170). Unlike postmodern "textual radicals" who Rabinow (1986) acknowledges are "fuzzy about power and the realities of socioeconomic constraints" (p. 255), most writers from marginalized groups are clear about how discourse interweaves with the concrete circumstances that create lived experience. People whose lives form the material for postmodern counter-hegemonic discourse do not share the optimism over the new recognition of their discursive subjectivities, because such an acknowledgment does not address sufficiently their collective historical and current struggles against racism, sexism, homophobia, and economic injustice. They do not appreciate being told they are living in a world in which there are no more real subjects. Ideas have consequences. Emphasizing the discursive self when a person is hungry and homeless represents both a cultural and humane failure. The need to look beyond texts to the perception and attainment of concrete social goals keeps writers from marginalized groups ever-mindful of the specifics of how power works through political agendas, institutions, agencies, and the budgets that fuel them.

#### Policy changes in energy production can reverberate throughout the socius to reduce inequality and engender a militant pluralistic assemblage

Connolly ’12 William E. Connolly, Krieger-Eisenhower Professor of Political Science at Johns Hopkins University, “Steps toward an Ecology of Late Capitalism,” Theory & Event, Vol. 15, Issue 1, 2012, Muse

3. Today, perhaps the initial target should be on reconstituting established patterns of consumption by a combination of direct citizen actions in consumption choices, publicity of such actions, and social movements to reconstitute the state/market supported infrastructure of consumption. By the infrastructure of consumption I mean state support for market subsystems such as a national highway system, a system of airports, medical care through private insurance, etc., etc., that enable some modes of consumption in the zones of travel, education, diet, retirement, medical care, energy use, health, and education and render others more difficult or expensive to procure.21 To shift several of these in the correct direction would already reduce extant inequalities. To change the infrastructure is also to affect the types of work and investment available. Social movements that work upon the infrastructure and ethos in tandem can make a real difference directly, encourage more people to extend their critical perspectives, and thereby open more people to a militant politics if and as a new disruptive event emerges. Perhaps a cross-state citizen goal should be to construct a pluralist assemblage by moving back and forth between shifts in role performance, revisions in political ideology, and adjustments in political sensibility, doing so to generate enough collective energy to launch a general strike simultaneously in several countries in the near future. Its aim would be to reduce inequality and to reverse the deadly future created by established patterns of climate change by fomenting significant shifts in patterns of consumption, corporate policies, state law and the priorities of interstate organizations. Again, the dilemma of today is that the fragility of things demands shifting and slowing down intrusions into several aspects of nature as we speed up shifts in identity, role performance, cultural ethos, market regulation, and citizen activism.

#### Perm: Do Both

#### The aff embodies the practical side of ecofeminism—only the perm disrupts the dualism at the heart of masculine culture through its holistic engagement with feminist ideals and material structures

Gaard ’93 Greta Gaard, assistant professor of composition and women’s studies at the University of Minnesota-Duluth, “Living Interconnections with Animals and Nature,” Ecofeminism: Women, Animals, Nature, 1993, p. 2-3

It is now common knowledge that rights-based ethics (most characteristic of dominant-culture men, although women may share this view as well) evolve from a sense of self as separate, existing within a society of individuals who must be protected from each other in competing for scarce resources. In contrast, Gilligan describes a different approach, more common to women, in which "the moral problem arises from conflicting responsibilities rather than from competing rights and requires for its resolution a mode of thinking that is contextual and narrative rather than formal and abstract. This conception of morality as concerned with the activity of care centers moral development around the understanding of responsibility and relationships, just as the conception of morality as fairness ties moral development to the understanding of rights and rules." [4](http://www.questia.com/read/99286383) Similarly, Karen Warren's "Toward an Ecofeminist Ethic" describes eight boundary conditions of a feminist ethic; that is, conditions within which ethical decision making may be seen as feminist. These conditions include coherence within a given historical and conceptual framework, an understanding of feminism as striving to end all systems of oppression, a pluralistic structure, and an inclusive and contextual framework that values and emphasizes humans in relationships, denies abstract individualism, and provides a guide to action. [5](http://www.questia.com/read/99286383) The analyses of Gilligan and Warren indicate that ecofeminism, which asserts the fundamental interconnectedness of all life, offers an appropriate foundation for an ecological ethical theory for women and men who do not operate on the basis of a self/other disjunction. In brief, this psychological -- and political -- construction of the self and the associated ethical system explains why ecofeminists do not find their concerns fully addressed in other branches of the environmental movement. Though some may agree with social ecologists, for example, that the root cause of all oppression is hierarchy, ecofeminists tend to believe hierarchy takes place as a result of the self/other opposition. Ecofeminists' interconnected sense of self requires us to create a theory that will provide, as fully as possible, an inclusive and global analysis of oppression. To do this, theorists must meet with activists to exchange information and to create political strategy; ideally, theorists must also be activists, thereby enacting the goal of ecofeminist praxis. A meeting of theorists and activists concerned about the fate of women and the earth, the World Women's Congress for a Healthy Planet, took place on November 9-12, 1991. In Miami, Florida, over a thousand women from around the world gathered to create a women's action agenda for presentation at the 1992 United Nations Conference on Environment and Development (UNCED). Throughout the conference, a number of topics reappeared which are of concern within ecofeminism. These included population, global economics, Third World debt, the ideology of development, environmental destruction, world hunger, reproductive choice, homelessness, militarism, and political strategies for creating change globally.

#### Their criticism will be co-opted by the right – ensures worse exploitation

Wapner ‘3 Paul Wapner, associate professor and director of the Global Environmental Policy Program at American University. “Leftist Criticism of "Nature" Environmental Protection in a Postmodern Age,” Dissent Winter 2003 http://www.dissentmagazine.org/menutest/archives/2003/wi03/wapner.htm

The postmodern argument also poses challenges for anyone concerned with environmental protection. Environmentalism is fundamentally about conserving and preserving nature. Whether one worries about climate change, loss of biological diversity, dwindling resources, or overall degradation of the earth's air, water, soil, and species, the nonhuman world is the backdrop of concern. What happens when critics call this backdrop into question? What happens when they claim that one understanding of "nature" is at odds with another and that there is no definitive way to judge which one is better? How can a movement dedicated to protecting nature operate if the very identity of its concern is in doubt? These may seem like academic questions, but they go to the heart of environmentalism and have begun to worry even the most committed environmentalists. After scholars such as William Cronon, Timothy Luke, and J. Baird Callicott introduced "eco-criticism" to the scholarly and popular publics, various environmental activists and thinkers have struggled to articulate a response. Their inability to do so in a decisive and persuasive manner has further damaged the environmentalist position. Even more troubling, now that the critique is out of the bag, it is being co-opted by people on the right. Anti-environmentalists such as Charles Rubin and Alston Chase, for example, now claim that, if there is no such thing as "real" nature, we need not treat the nonhuman world with unqualified respect. If we think it is in our interest, we can freely choose to pave the rainforest, wipe out the last panda bear, or pump high levels of carbon dioxide into the atmosphere. What is critical to notice in both cases is that criticisms of "nature," whether they come from the left or are co-opted by the right, are playing an increasing role in structuring the confrontation between anti- and pro-environmentalists. And they are re-setting the fault lines within the environmental movement itself.

#### Thorium reprocess all the bad stuff—byproducts of LFTRs are harmless

Cannara ’11 Alexander Cannara, received his BSEE degree from Lehigh University, and received MSEE, DEE and MS Statistics degrees from Stanford, returned to Stanford for a PhD in Mathematical Methods in Educational Research and a Master of Science in Statistics, during which time he designed analog and digital instrumentation, applying for a patent on one design, has taught courses in engineering, programming and networking at Stanford, University of San Francisco, International Technological University, Golden Gate and Silicon Valley University, and has worked both for the government and in the corporate arena with such organizations as Ballantine Laboratories, RMC Research, Zilog, Gibbons & Associates, Mitsubishi Semiconductor, AMD, 3Com, Network General, Vitesse, PacketMotion and Xambala, “IEER/PSR Thorium “Fact Sheet” Rebuttal,” response to the 2009 Makhijani and Boyd piece on thorium, posted 3/23/2011 by Kirk Sorenson on Energy From Thorium, http://energyfromthorium.com/ieer-rebuttal/

Again, the authors make blanket statements about “thorium” but then confine their examination to some variant of solid thorium fuel in a conventional reactor. In a LFTR, thorium can be consumed with exceptionally high efficiency, approaching completeness. Unburned thorium and valuable uranium-233 is simply recycled to the next generation of fluoride reactor when a reactor is decommissioned. The fuel is not damaged by radiation. Thus thorium and uranium-233 would not enter a waste stream during the use of a LFTR. All fission produces a similar set of fission products, each with roughly half the mass of the original fissile material. Most have very short half-lives, and are highly radioactive and highly dangerous. A very few have very long half-lives, very little radioactivity, and little concern. A simple but underappreciated truth is that the longer the half-life of a material, the less radioactive and the less dangerous it is. Technetium-99 (Tc-99) has a half-life of 100,000 years and indeed is a product of the fission of uranium-233, just as it is a product of the fission of uranium-235 or plutonium-239. Its immediate precursor, technetium-99m (Tc-99m), has a half-life of six hours and so is approximately 150 million times more radioactive than Tc-99. Nevertheless, it might come as a surprise to the casual reader that hundreds of thousands of people intentionally ingest Tc-99m every year as part of medical imaging procedures because it produces gamma rays that allow radiography technicians to image internal regions of the body and diagnose concerns. The use of Tc-99m thus allows physicians to forego thousands of exploratory and invasive surgeries that would otherwise risk patient health. The Tc-99m decays over the period of a few days to Tc-99, with its 100,000 half-life, extremely low levels of radiation, and low risk. What is the ultimate fate of the Tc-99? It is excreted from the body through urination and ends up in the municipal water supply. If the medical community and radiological professionals intentionally cause patients to ingest a form of technetium that is 150 million times more radioactive than Tc-99, with the intent that its gamma rays be emitted within the body, and then sees no risk from the excretion of Tc-99 into our water supply, where is the concern? It is yet another example of fear, uncertainty, and doubt that Makhijani and Boyd would raise this issue as if it represented some sort of condemnation of the use of thorium for nuclear power.

#### No mining or supply issues—we already have more than enough stored

Cannara ’11 Alexander Cannara, received his BSEE degree from Lehigh University, and received MSEE, DEE and MS Statistics degrees from Stanford, returned to Stanford for a PhD in Mathematical Methods in Educational Research and a Master of Science in Statistics, during which time he designed analog and digital instrumentation, applying for a patent on one design, has taught courses in engineering, programming and networking at Stanford, University of San Francisco, International Technological University, Golden Gate and Silicon Valley University, and has worked both for the government and in the corporate arena with such organizations as Ballantine Laboratories, RMC Research, Zilog, Gibbons & Associates, Mitsubishi Semiconductor, AMD, 3Com, Network General, Vitesse, PacketMotion and Xambala, “IEER/PSR Thorium “Fact Sheet” Rebuttal,” response to the 2009 Makhijani and Boyd piece on thorium, posted 3/23/2011 by Kirk Sorenson on Energy From Thorium, http://energyfromthorium.com/ieer-rebuttal/

Thorium is found with rare-earth mineral deposits, and global demand for rare-earth mining will inevitably bring up thorium deposits. At the present time, we in the US have the strange policy of considering this natural material as a “radioactive waste” that must be disposed at considerable cost. Other countries like China have taken a longer view on the issue and simply stockpile the thorium that they recover during rare-earth mining for future use in thorium reactors. In addition, the United States has an already-mined supply of 3200 metric tonnes of thorium in Nevada that will meet energy needs for many decades. The issues surrounding thorium mining are immaterial to its discussion as a nuclear energy source because thorium will be mined under any circumstance, but if we use it as a nuclear fuel we can save time and effort by avoiding the expense of trying to throw it away.

#### Engagement with nuclear technocracy is critical to solve

Nordhaus 11, chairman – Breakthrough Instiute, and Shellenberger, president – Breakthrough Insitute, MA cultural anthropology – University of California, Santa Cruz, 2/25/‘11

(Ted and Michael, <http://thebreakthrough.org/archive/the_long_death_of_environmenta>)

Tenth, we are going to have to get over our suspicion of technology, especially nuclear power. There is no credible path to reducing global carbon emissions without an enormous expansion of nuclear power. It is the only low carbon technology we have today with the demonstrated capability to generate large quantities of centrally generated electrtic power. It is the low carbon of technology of choice for much of the rest of the world. Even uber-green nations, like Germany and Sweden, have reversed plans to phase out nuclear power as they have begun to reconcile their energy needs with their climate commitments. Eleventh, we will need to embrace again the role of the state as a direct provider of public goods. The modern environmental movement, borne of the new left rejection of social authority of all sorts, has embraced the notion of state regulation and even creation of private markets while largely rejecting the generative role of the state. In the modern environmental imagination, government promotion of technology - whether nuclear power, the green revolution, synfuels, or ethanol - almost always ends badly. Never mind that virtually the entire history of American industrialization and technological innovation is the story of government investments in the development and commercialization of new technologies. Think of a transformative technology over the last century - computers, the Internet, pharmaceutical drugs, jet turbines, cellular telephones, nuclear power - and what you will find is government investing in those technologies at a scale that private firms simply cannot replicate. Twelveth, big is beautiful. The rising economies of the developing world will continue to develop whether we want them to or not. The solution to the ecological crises wrought by modernity, technology, and progress will be more modernity, technology, and progress. The solutions to the ecological challenges faced by a planet of 6 billion going on 9 billion will not be decentralized energy technologies like solar panels, small scale organic agriculture, and a drawing of unenforceable boundaries around what remains of our ecological inheritance, be it the rainforests of the Amazon or the chemical composition of the atmosphere. Rather, these solutions will be: large central station power technologies that can meet the energy needs of billions of people increasingly living in the dense mega-cities of the global south without emitting carbon dioxide, further intensification of industrial scale agriculture to meet the nutritional needs of a population that is not only growing but eating higher up the food chain, and a whole suite of new agricultural, desalinization and other technologies for gardening planet Earth that might allow us not only to pull back from forests and other threatened ecosystems but also to create new ones. The New Ecological Politics The great ecological challenges that our generation faces demands an ecological politics that is generative, not restrictive. An ecological politics capable of addressing global warming will require us to reexamine virtually every prominent strand of post-war green ideology. From Paul Erlich's warnings of a population bomb to The Club of Rome's "Limits to Growth," contemporary ecological politics have consistently embraced green Malthusianism despite the fact that the Malthusian premise has persistently failed for the better part of three centuries. Indeed, the green revolution was exponentially increasing agricultural yields at the very moment that Erlich was predicting mass starvation and the serial predictions of peak oil and various others resource collapses that have followed have continue to fail. This does not mean that Malthusian outcomes are impossible, but neither are they inevitable. We do have a choice in the matter, but it is not the choice that greens have long imagined. The choice that humanity faces is not whether to constrain our growth, development, and aspirations or die. It is whether we will continue to innovate and accelerate technological progress in order to thrive. Human technology and ingenuity have repeatedly confounded Malthusian predictions yet green ideology continues to cast a suspect eye towards the very technologies that have allowed us to avoid resource and ecological catastrophes. But such solutions will require environmentalists to abandon the "small is beautiful" ethic that has also characterized environmental thought since the 1960's. We, the most secure, affluent, and thoroughly modern human beings to have ever lived upon the planet, must abandon both the dark, zero-sum Malthusian visions and the idealized and nostalgic fantasies for a simpler, more bucolic past in which humans lived in harmony with Nature.

### Fiscal Cliff DA

#### CBO estimates ignore basic incentives – austerity won’t hurt the economy

Mulligan 12 (Casey B., economics professor at the University of Chicago, Ph.D. in economics from the University of Chicago, visiting professor teaching public economics at Harvard University, Clemson University, and Irving B. Harris Graduate School of Public Policy Studies at the University of Chicago, "Is the Fiscal Cliff a Big Deal?", Aug 29, [economix.blogs.nytimes.com/2012/08/29/is-the-fiscal-cliff-a-big-deal/], jam)

With their Keynesian analysis, the Congressional Budget Office and others have exaggerated the effects of the “fiscal cliff” on the labor market and the economy. Come January, current law provides for significant cuts in federal spending and for tax increases – and thereby significant federal budget-deficit reduction. These provisions have been collectively described as the “fiscal cliff,” which emerged when Democratic and Republican leaders could not agree on plans on spending and taxes. The Congressional Budget Office has warned that the fiscal cliff will cause a double-dip recession, but its analysis for 2013 is based on the Keynesian proposition that anything that shrinks the federal budget deficit shrinks the economy, and the more the deficit is reduced the more the economy is reduced. In many circumstances, the Keynesian proposition reaches the wrong conclusions about economic activity, because deficits do not necessarily expand the economy or prevent it from shrinking. For example, reducing the deficit by cutting unemployment insurance – it’s one of the programs that would be cut in January – would shrink the economy in the C.B.O.’s view. But in reality, cutting unemployment insurance would increase employment, as it would end payments for people who fail to find work and would reduce the cushion provided after layoffs. Helping people who are out of work may be intrinsically valuable because it’s the right thing to do, but the Congressional Budget Office is incorrect to conclude that it also grows the economy or prevents it from shrinking. Paying people for not working is no way to put them to work. The Keynesian proposition about budget deficits ignores incentives of all kinds, so its incorrect conclusions about the fiscal cliff are not limited to unemployment insurance. Another example: the fiscal cliff would put millions of Americans on the alternative minimum tax, which Keynesian analysis said would shrink the economy solely because it collected more revenue. Yet economists who have studied the alternative minimum tax have found that its effects on incentives to work and produce are essentially neutral, compared with the ordinary federal personal income tax.

#### Plan’s good for the economy in the short-term

Rosner & Goldberg 11 (Robert, William E. Wrather Distinguished Service Professor, Departments of Astronomy and Astrophysics, and Physics, and the College at the U of Chicago, and Stephen, Energy Policy Institute at Chicago, The Harris School of Public Policy Studies, "Small Modular Reactors - Key to Future Nuclear Power Generation in the U.S.," Nov 2011, [https://epic.sites.uchicago.edu/sites/epic.uchicago.edu/files/uploads/EPICSMRWhitePaperFinalcopy.pdf], jam)

As stated earlier, SMRs have the potential to achieve significant greenhouse gas emission reductions. They could provide alternative baseload power generation to facilitate the retirement of older, smaller, and less efficient coal generation plants that would, otherwise, not be good candidates for retrofitting carbon capture and storage technology. They could be deployed in regions of the U.S. and the world that have less potential for other forms of carbon-free electricity, such as solar or wind energy. There may be technical or market constraints, such as projected electricity demand growth and transmission capacity, which would support SMR deployment but not GW-scale LWRs. From the on-shore manufacturing perspective, a key point is that the manufacturing base needed for SMRs can be developed domestically. Thus, while the large commercial LWR industry is seeking to transplant portions of its supply chain from current foreign sources to the U.S., the SMR industry offers the potential to establish a large domestic manufacturing base building upon already existing U.S. manufacturing infrastructure and capability, including the Naval shipbuilding and underutilized domestic nuclear component and equipment plants. The study team learned that a number of sustainable domestic jobs could be created – that is, the full panoply of design, manufacturing, supplier, and construction activities – if the U.S. can establish itself as a credible and substantial designer and manufacturer of SMRs. While many SMR technologies are being studied around the world, a strong U.S. commercialization program can enable U.S. industry to be first to market SMRs, thereby serving as a fulcrum for export growth as well as a lever in influencing international decisions on deploying both nuclear reactor and nuclear fuel cycle technology. A viable U.S.-centric SMR industry would enable the U.S. to recapture technological leadership in commercial nuclear technology, which has been lost to suppliers in France, Japan, Korea, Russia, and, now rapidly emerging, China. SMR design, licensing, and detailed engineering activities are in an early stage. Licensing and design certification documents are expected to be ready for NRC filing in the 2013 time frame, and detailed engineering is about 10-20% complete. At the time of this analysis, limited cost data were publicly available, and current estimates have a significant amount of uncertainty. The study team estimates that GW-level reactors have roughly two orders of magnitude greater manhours already expended in this early engineering design work as compared with design work carried out for SMRs to date. Finally, the tooling up at a factory dedicated to SMR manufacturing is still in the planning stages and will likely require significant investment for a dedicated plant to manufacture SMRs for an n th-of-a-kind (NOAK) economy.

#### No deal – GOP hard-line stance on tax hikes

Taylor 11/8 (Andrew, the AP, "Fiscal cliff: Impasse on tax rates is big hurdle," [www.pjstar.com/free/x1890075006/Fiscal-cliff-would-spark-recession?zc\_p=0], jam)

House Republicans' hard line against higher tax rates for upper-income earners leaves re-elected President Barack Obama with a tough, core decision: Does he pick a fight and risk falling off a "fiscal cliff" or does he rush to compromise and risk alienating liberal Democrats? Or is there another way that will allow both sides to claim victory? Obama has been silent since his victory speech early Wednesday morning, but Capitol Hill Republicans have filled the vacuum with vows to stand resolutely against any effort by the president to fulfill a campaign promise to raise the top two income tax rates to Clinton-era levels. "A 'balanced' approach isn't balanced if it means higher tax rates on the small businesses that are key to getting our economy moving again," House Speaker John Boehner, R-Ohio, said on Wednesday. "Raising tax rates is unacceptable," he declared Thursday on ABC. "Frankly, it couldn't even pass the House. I'm not sure it could pass the Senate." A lot is at stake. A new Congressional Budget Office report on Thursday predicted that the economy would fall into recession if there is a protracted impasse in Washington and the government falls off the fiscal cliff for the entire year. Though most Capitol-watchers think that long deadlock is unlikely, the analysts say such a scenario would cause a spike in the jobless rate to 9.1 percent by next fall. The analysis says that the cliff — a combination of automatic tax increases and spending cuts — would cut the deficit by $503 billion through next September, but that the fiscal austerity also would cause the economy to shrink by 0.5 percent next year and cost millions of jobs. The new study estimates that the nation's gross domestic product would grow by 2.2 percent next year if all Bush-era tax rates were extended and would expand by almost 3 percent if Obama's 2 percentage point payroll tax cut and current jobless benefits for the long-term unemployed were extended as well. All sides say they want a deal — and that now that the election is over everyone can show more flexibility than in the heat of the campaign. Obama is expected to address the issue as early as Friday though he's not expected to immediately offer specifics. His long-held position — repeatedly rejected by Republicans — is that tax rates on family income over $250,000 should jump back up to Clinton-era levels. Republicans say they're willing to consider new tax revenue but only through drafting a new tax code that lowers rates and eliminates some deductions and wasteful tax breaks. And they're insisting on cuts to Medicare, Medicaid and food stamps, known as entitlement programs in Washington-speak. The White House's "opening position is, 'We're willing to do big entitlement cuts. In return we need you to go up on the rate,'" said Democratic lobbyist Steve Elmendorf. "Then they're going to get into a discussion. It'll be a process." The current assumption is that any agreement would be a multi-step process that would begin this year with a down payment on the deficit and on action to stave off more than the tax increases and $109 billion in across-the-board cuts to the Pentagon budget and a variety of domestic programs next year. The initial round is likely to set binding targets on revenue levels and spending cuts, but the details would probably be enacted next year. "What we can do is avert the cliff in a manner that serves as a down payment on — and a catalyst for — major solutions, enacted in 2013, that begin to solve the problem," Boehner said. While some of that heavy work would be left for next year, a raft of tough decisions would have to be made in the next six weeks. They could include the overall amount of deficit savings and achieving agreement on how much would come from revenue increases and how much would be cut from costly health care programs, the Pentagon and the day-to-day operating budgets of domestic Cabinet agencies. Democrats are sure to press for a guarantee that tax reform doesn't end up hurting middle-income taxpayers at the expense of upper-bracket earners. Republicans want to press for corporate tax reform and a guarantee that the top rate paid by individuals and small businesses goes down along the way. While some Democratic partisans want Obama to play tough on taxes and use his leverage to force Republicans to accept higher rates on the wealthy, Republicans warn that such hardball would poison the well even before Obama takes the oath of office and imperil prospects for second-term Obama initiatives including immigration reform.

#### No link – plan is immediate and negotiations haven’t started yet meaning Washington has two months to compromise

#### Plan is uniquely insulated from politics – bipartisan consensus

Shaw 12 (Andrew, member of the Government Affairs team where he focuses primarily on energy issues at the intersection of Canada-U.S. relations, uses his knowledge and experience of Congress and the Executive Branch to advise clients on critical energy and environmental public policy issues, “ A “Chunks” Approach to Climate Policy,” 2012, [[www.politicsandlawblog.com/2012/05/15/a-chunks-approach-to-climate-policy/](http://www.politicsandlawblog.com/2012/05/15/a-chunks-approach-to-climate-policy/)], jam)

While ideally President Obama would seek a “comprehensive” approach to climate change, Zichal acknowledged that the Administration would likely approach this issue in “chunks.” Specifically, Zichal talked about seeking “tools and policies that can garner bipartisan support.” One example provided by Zichal was extending the production tax credit for renewable production, which is set to expire at the end of this year. The “chunks” mention appears to reinforce the notion that President Obama would be unlikely to pursue cap-and-trade, or some variant, in a second-term. Following Zichal’s comments, Senator Lamar Alexander (R-TN) spoke – his remarks suggested that there are other “chunks” where consensus is achievable on energy policy between the Administration and Congress. Specifically, Senator Alexander expressed support for the Advanced Research Projects Agency-Energy (ARPA-E), an agency focused on R&D for breakthrough energy technologies, such as small modular reactors, smart grids, carbon capture and electric car batteries. ARPA-E is modeled after the Defense Advanced Research Projects Agency (DARPA), which, among other achievements, helped in inventing the internet. The American Recovery and Reinvestment Act provided the first appropriations for ARPR-E, which has subsequently used that money to fund over 180 projects focused on emerging energy technologies. In an election year, Republicans and Democrats spend an inordinate amount of time highlighting their differences on energy policy. Yet on ARPA-E, both President Obama and Governor Mitt Romney have expressed support for a continued commitment to the program. Senator Alexander’s comments indicate that an important and achievable “chunk” of climate policy, regardless of the outcome of the election, could be a renewed emphasis on ARPA-E.

#### Not intrinsic – policymakers can do the plan and legislate the fiscal cliff away

#### Obama pc collapses budget negotiations—2011 proves

The Hotline, 9/10/12, Slow and Steady Wins the Race, Lexis

Gaps in Obama's leadership contributed to the collapse of a "grand bargain" on spending and debt last year. with Obama "failing to cultivate congressional relationships that may have helped him break through GOP opposition, author Bob Woodward told ABC. Woodward: "President Clinton, President Reagan. And if you look at them, you can criticize them for lots of things. They by and large worked their will. On this, President Obama did not. Now, some people are going to say he was fighting a brick wall, the Republicans in the House and the Republicans in Congress. Others will say it's the president's job to figure out how to tear down that brick wall. In this case, he did not." Asked if Obama "simply wasn't ready for the job of being president," Woodward responded: "I am not ducking this. I am weighing evidence, and there's evidence that he got on top a lot of things, he did a lot of things. And there's evidence that there are gaps. He did not fix this." Woodward places "particular blame for the failure to reach a deal" with Obama, "writing that the seeds of discord were planted early in his administration." Woodward: "There's this divided-man quality to President Obama always. Initially he meets with the congressional leaders, he says you know, 'We're going to be accommodating, we're going to listen, we're going to talk, we're going to compromise.' But then they -- Republicans ask some questions and challenge him a little bit and he says 'Look I won. I'm in charge here.' And the Republicans feel totally isolated and ostracized. And this was the beginning of a war" (Klein, ABC, 9/10).

#### DOD energy programs don’t link – conservative won’t oppose

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

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

### States CP

#### Not using the DoD regulatory authority means the CP takes 20 years to just start

Makhijani ’12 Arjun Makhijani, electrical and nuclear engineer, President of the Institute for Energy and Environmental Research, has served as an expert witness in Nuclear Regulatory Commission Proceedings, “Is Thorium A Magic Bullet For Our Energy Problems?” interviewed by Ira Flatow, host of Science Friday, NPR, 5/4/2012, <http://www.npr.org/2012/05/04/152026805/is-thorium-a-magic-bullet-for-our-energy-problems>

This isn't going to happen tomorrow, even if you pour money into it. It would take 10 years for the NRC to understand and write regulations for this thing. And it would take 10 years before that to build the reactors, do the experiments and produce the data so you can regulate this thing, because all of our regulation is based on light water reactors.

#### Perm do both means states fund DoD purchasing – otherwise they don’t fiat power gets to the bases

GAO 9, “Defense Infrastructure: DOD Needs to Take Actions to Address Challenges in Meeting Federal

Renewable Energy Goals”, December, http://www.gao.gov/assets/300/299755.html

DOD has also joined with private sector entities, entering into various types of arrangements to develop renewable energy projects. Because these different arrangements with the private sector provide DOD with an alternative to using only up-front appropriations to fund renewable energy projects, we refer to these arrangements as alternative financing approaches. For the purposes of this report, we define an alternative financing approach as any funding arrangement other than projects in which total project costs are funded only through full up- front appropriations. DOD has entered into several different types of these approaches that have resulted in renewable energy projects.

#### Current acquisitions favor old tech – the plan’s signal is key

CNA 10, non-profit research organization that operates the Center for Naval Analyses and the Institute for Public Research, “Powering America’s Economy: Energy Innovation at the Crossroads of National Security Challenges”, July, http://www.cna.org/sites/default/files/research/WEB%2007%2027%2010%20MAB%20Powering%20America%27s%20Economy.pdf

In our final discussion, we consider the end of the innovation pipeline—deployment—and we look at how fine-tuning the incentives might help pull more innovative, new energy technologies through the pipeline. Energy use at installations is governed under a stricter rubric than operational energy: a variety of regulatory and legislative mandates have steered DOD toward lowering energy consumption, increasing use of renewables, and promoting conservation and energy efficiency. However, the adoption of new clean energy technologies is still hampered in key installation acquisition programs. To help achieve its energy goals, DOD often employs two mechanisms: the Energy Conservation Investment Program (ECIP) and Energy Savings Performance Contracts (ESPCs). The ECIP program is backed by Congressional appropriations (through military construction funding), and it is designed to allow installations to purchase technologies that save money through conserving energy [55]. The program is viewed widely as being successful, cited as saving more than two dollars for each dollar invested. ESPCs are contracting vehicles that allow DOD to invest in energy-related improvements without expending funds appropriated by Congress. Through ESPCs, DOD partners with private firms that make the energy improvements; in return, the firms’ investments are paid back through the energy savings. While these programs have improved installation energy use, as they are currently structured, they favor older technologies that are well-established on the commercial market. This is especially the case for ESPCs, which are inherently risk averse. The private sector firms that enter into these contracts only do so if they are guaranteed to make a profit; as such, the energy improvements are done so with tried-and-tested technologies whose payback schedules and energy savings are well-defined. Many of these investments are also made with small profit margins. As such, companies are not willing to take risks on these contracts by using new and perhaps unproven technologies. Altering these programs to reduce the advantages provided to already commercialized products will encourage the acquisition of more innovative technologies on installations. One change could include a guaranteed return on investment (similar to that given on older technologies) for those developers proposing cutting-edge technologies. Another change could include giving first preference to innovations that come from public/private partnerships (incubators, energy hubs, etc.). Given DOD’s size and the fact that installations mirror U.S. infrastructure, the use of innovative technologies on its installations provides a clear demand signal to the developer.

#### Perm do the counterplan –

#### DOD bypasses and solves licensing lag

CSPO 10, Consortium for Science, Policy and Outcomes at ASU, “four policy principles for energy innovation & climate change: a synthesis”, June, http://www.catf.us/resources/publications/files/Synthesis.pdf

Government purchase of new technologies is a powerful way to accelerate innovation through increased demand (Principle 3a). We explore how this principle can be applied by considering how the DoD could purchase new nuclear reactor designs to meet electric power needs for DoD bases and operations. Small modular nuclear power reactors (SMRs), which generate less than 300 MW of power (as compared to more typical reactors built in the 1000 MW range) are often listed as a potentially transformative energy technology. While typical traditional large-scale nuclear power plants can cost five to eight billion dollars, smaller nuclear reactors could be developed at smaller scale, thus not presenting a “bet the company” financial risk. SMRs could potentially be mass manufactured as standardized modules and then delivered to sites, which could significantly reduce costs per unit of installed capacity as compared to today’s large scale conventional reactor designs. It is likely that some advanced reactors designs – including molten salt reactors and reactors utilizing thorium fuels – could be developed as SMRs. Each of these designs offers some combination of inherently safe operation, very little nuclear proliferation risk, relatively small nuclear waste management needs, very abundant domestic fuel resources, and high power densities – all of which are desirable attributes for significant expansion of nuclear energy. Currently, several corporations have been developing small nuclear reactors. Table 2 lists several of these companies and their reactor power capacities, as well as an indication of the other types of reactor innovations that are being incorporated into the designs. Some of these technologies depend on the well-established light water reactor, while others use higher energy neutrons, coolants capable of higher temperature operation, and other innovative approaches. Some of these companies, such as NuScale, intend to be able to connect as many as 24 different nuclear modules together to form one larger nuclear power plant. In addition to the different power ranges described in Table 2, these reactors vary greatly in size, some being only 3 to 6 feet on each side, while the NuScale reactor is 60 feet long and 14 feet in diameter. Further, many of these reactors produce significant amounts of high-temperature heat, which can be harnessed for process heating, gas turbine generators, and other operations. One major obstacle is to rapid commercialization and development are prolonged multi-year licensing times with the Nuclear Regulatory Commission. Currently, the NRC will not consider a reactor for licensing unless there is a power utility already prepared to purchase the device. Recent Senate legislation introduced by Senator Jeff Bingaman (D-NM) has pushed for DOE support in bringing down reactor costs and in helping to license and certify two reactor designs with the NRC. Some additional opportunities to facilitate the NRC licensing process for innovative small modular reactors would be to fund NRC to conduct participatory research to get ahead of potential license applications (this might require ~$100million/year) and potentially revise the current requirement that licensing fees cover nearly all NRC licensing review costs. One option for accelerating SMR development and commercialization, would be for DOD to establish SMR procurement specifications (to include cost) and agree to purchase a sufficient amount of SMR’s to underwrite private sector SMR development. Of note here may be that DARPA recently (3/30/10) issued a “Request for Information (RFI) on Deployable Reactor Technologies for Generating Power and Logistic Fuels”2 that specifies may features that would be highly desirable in an advanced commercial SMR. While other specifications including coproduction of mobility fuel are different than those of a commercial SMR power reactor, it is likely that a core reactor design meeting the DARPA inquiry specifications would be adaptable to commercial applications. While nuclear reactors purchased and used by DOD are potentially exempt from many NRC licensing requirements3, any reactor design resulting from a DOD procurement contract would need to proceed through NRC licensing before it could be commercially offered. Successful use of procured SMR’s for DOD purposes could provide the knowledge and operational experience needed to aid NRC licensing and it might be possible for the SMR contractor to begin licensing at some point in the SMR development process4. Potential purchase of small modular nuclear reactors would be a powerful but proven way in which government procurement of new energy technologies could encourage innovation. Public procurement of other renewable energy technologies could be similarly important.

#### Only military SMR’s will be usable on bases

Andres & Breetz 11 (Richard B., Professor of national Security Strategy at the national War College and a Senior fellow and energy and environmental Security and Policy Chair in the Center for Strategic research, institute for national Strategic Studies, at the national Defense University, Hanna L., doctoral candidate in the Department of Political Science at the Massachusetts institute of technology, "Small Nuclear Reactors for Military Installations: Capabilities, Costs, and Technological Implications," February 2011, [www.ndu.edu/press/lib/pdf/StrForum/SF-262.pdf], jam)

The preceding analysis suggests that DOD should seriously consider taking a leadership role on small reactors. This new technology has the potential to solve two of the most serious energy-related problems faced by the department today. Small reactors could island domestic military bases and nearby communities, thereby protecting them from grid outages. They could also drastically reduce the need for the highly vulnerable fuel convoys used to supply forward operating bases abroad. The technology being proposed for small reactors (much of which was originally developed in U.S. Government labs) is promising. A number of the planned designs are self-contained and highly mobile, and could meet the needs of either domestic or forward bases. Some promise to be virtually impervious to accidents, with design characteristics that might allow them to be used even in active operational environments. These reactors are potentially safer than conventional light water reactors. The argument that this technology could be useful at domestic bases is virtually unassailable. The argument for using this technology in operational units abroad is less conclusive; however, because of its potential to save lives, it warrants serious investigation. Unfortunately, the technology for these reactors is, for the most part, caught between the drawing board and production. Claims regarding the field utility and safety of various reactors are plausible, but authoritative evaluation will require substantial investment and technology demonstration. In the U.S. market, DOD could play an important role in this area. In the event that the U.S. small reactor industry succeeds without DOD support, the types of designs that emerge might not be useful for the department since some of the larger, more efficient designs that have greater appeal to private industry would not fit the department’s needs. Thus, there is significant incentive for DOD to intervene to provide a market, both to help the industry survive and to shape its direction. Since the 1970s, in the United States, only the military has overcome the considerable barriers to building nuclear reactors. This will probably be the case with small reactors as well. If DOD leads as a first mover in this market—initially by providing analysis of costs, staffing, reactor lines, and security, and, when possible, by moving forward with a pilot installation—the new technology will likely survive and be applicable to DOD needs. If DOD does not, it is possible the technology will be unavailable in the future for either U.S. military or commercial use.

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#### No risk or impact to economic decline

Drezner ‘11 Daniel W. Drezner, professor of international politics at the Fletcher School of Law and Diplomacy at Tufts University, “Please come down off the ledge, dear readers,” Foreign Policy, 8/12/11, http://drezner.foreignpolicy.com/posts/2011/08/12/please\_come\_down\_off\_the\_ledge\_dear\_readers

So, when we last left off this debate, things were looking grim. My concern in the last post was that the persistence of hard times would cause governments to take actions that would lead to a collapse of the open global economy, a spike in general riots and disturbances, and eerie echoes of the Great Depression. Let's assume that the global economy persists in sputtering for a while, because that's what happens after major financial shocks. Why won't these other bad things happen? Why isn't it 1931? Let's start with the obvious -- it's not gonna be 1931 because there's some passing familiarity with how 1931 played out. The Chairman of the Federal Reserve has devoted much of his academic career to studying the Great Depression. I'm gonna go out on a limb therefore and assert that if the world plunges into a another severe downturn, it's not gonna be because central bank heads replay the same set of mistakes. The legacy of the Great Depression has also affected public attitudes and institutions that provide much stronger cement for the current system. In terms of [public] attitudes, compare the results of this mid-2007 poll with this mid-2010 poll about which economic system is best. I'll just reproduce the key charts below: The headline of the 2010 results is that there's eroding U.S. support for the global economy, but a few other things stand out. U.S. support has declined, but it's declined from a very high level. In contrast, support for free markets has increased in other major powers, such as Germany and China. On the whole, despite the worst global economic crisis since the Great Depression, public attitudes have not changed all that much. While there might be populist demands to "do something," that something is not a return to autarky or anything so [drastic]. Another big difference is that multilateral economic institutions are much more robust now than they were in 1931. On trade matters, even if the Doha round is dead, the rest of the World Trade Organization's corpus of trade-liberalizing measures are still working quite well. Even beyond the WTO, the complaint about trade is not the deficit of free-trade agreements but the surfeit of them. The IMF's resources have been strengthened as a result of the 2008 financial crisis. The Basle Committee on Banking Supervision has already promulgated a plan to strengthen capital requirements for banks. True, it's a slow, weak-assed plan, but it would be an improvement over the status quo. As for the G-20, I've been pretty skeptical about that group's abilities to collectively address serious macroeconomic problems. That is setting the bar rather high, however. One could argue that the G-20's most useful function is reassurance. Even if there are disagreements, communication can prevent them from growing into anything worse. Finally, a note about the possibility of riots and other general social unrest. The working paper cited in my previous post noted the links between austerity measures and increases in disturbances. However, that paper contains the following important paragraph on page 19: [I]n countries with better institutions, the responsiveness of unrest to budget cuts is generally lower. Where constraints on the executive are minimal, the coefficient on expenditure changes is strongly negative -- more spending buys a lot of social peace. In countries with Polity-2 scores above zero, the coefficient is about half in size, and less significant. As we limit the sample to ever more democratic countries, the size of the coefficient declines. For full democracies with a complete range of civil rights, the coefficient is still negative, but no longer significant. This is good news!! The world has a hell of a lot more democratic governments now than it did in 1931. What happened in London, in other words, might prove to be the exception more than the rule. So yes, the recent economic news might seem grim. Unless political institutions and public attitudes buckle, however, we're unlikely to repeat the mistakes of the 1930's. And, based on the data we've got, that's not going to happen.

#### coal is dying in the status quo – means that we are especially key to recuperate from the job losses

Miller 12 (RL, attorney and environment blogger with Climate Hawks, "The Rage Of A Dying Dinosaur: Coal’s Decline In The U.S.," Jun 23, [http://thinkprogress.org/climate/2012/06/23/504331/the-rage-of-a-dying-dinosaur-coals-decline-in-the-us/], jam)

A dinosaur backed into a corner by a pack of smaller dinosaurs may be mortally wounded, but it’s big and angry enough to do some serious damage in its death throes. The coal industry, long accustomed to being the Tyrannosaurus Rex of American politics, is on the ropes, battered by forces outside its control, but angry enough to damage people while it searches for an escape route. Long term use of coal in the US is declining: “The share of U.S. electricity that comes from coal is forecast to fall below 40% for the year, its lowest level since World War II. Four years ago, it was 50%. By the end of this decade, it is likely to be near 30%.” Coal’s decline is widely attributed to three reasons, which I’ve cleverly named EPA — Environmental Protection Agency, Price, Activists. One is far less important than the other two. Congressional Republicans blame the EPA, but every time I’ve looked at “EPA regulations force this coal plant shutdown” cries, I’ve found a decrepit old plant shut down most months because maintenance costs are too high. EPA regulations are a relatively minor factor in coal plant shutdowns. Most business analysts attribute coal’s fall to price. Coal’s price in the United States has stayed fairly stable, but prices of alternatives have plummeted. Natgas is at $2.50/MBTU – it was $9-10 during Bush years. Utilities are actively planning to replace older coal fired plants to natural gas. Things are so bad for Old King Coal that it’s fighting with two of its usual strong allies. The electric utilities, formerly joined at the hip with coal, are now bailing on coal: many now recognize that expending the political capital to fight for plants built in the middle of last century is not worth it — especially when they can construct combined cycle natural gas facilities with relative regulatory ease while releasing roughly half of the emissions in the meantime. A perfect storm is pulling the coal sector under: For example, “American Electric Power, meanwhile, has been one of the most vocal critics of EPA regs. But at the same time, it has admitted — according to Tierney’s paper — that its coal plants are running much less than intended because it is cheaper to operate the natural gas facilities.” While coal is flatlining or declining everywhere else, it's exploding in China Today, Arch Coal announces layoffs of 750 employees, blaming “current market pressures and a challenging regulatory environment.” To top off matters, electric utilities and the coal barons are picking a fight with the railroads, normally the third member of their power-hungry pack, demanding that anti-trust exemptions be removed from railroads. This will not end well for the tyrannosaurus, one hopes. The business analysts don’t like to acknowledge the third reason why coal in the United States is decreasing: the activists. The Sierra Club’s Beyond Coal program takes credit for shutting down 169 coal plants in the United States since Dick Cheney announced a need to build 200 more plants. It’s important to not let up the pressure to shut down coal plants wherever they may be proposed. Coal’s market-force-led decline may change if the market for natural gas picks up and renewables haven’t yet reached grid parity. The tyrannosaurus may be down, but it’s already planning its next move – a bolt overseas, one that is being aided by Obama’s massive expansion of the Powder River Basin and the six Pacific Northwest terminals on the drawing boards. Act locally to fight coal. Some examples: \* in Asheville, North Carolina, tell Progress Energy to move beyond coal \* in Austin, Texas, attend a volunteer orientation June 30 \* if you care about clean air in the national parks, tell the EPA you want strong haze protection. And while fighting coal, remember the alternative: the sun and wind, both of which have been around longer than the dinosaurs.

#### DA doesn’t turn based islands – sequestration won’t hurt deterrence

Weisgerber 10/8 (Marcus, staff writer at Defense News, "If Cuts Happen, Troops, Major Weapons Are DoD Priorities," 2012, [www.defensenews.com/article/20121008/DEFREG02/310080001/If-Cuts-Happen-Troops-Major-Weapons-DoD-Priorities?odyssey=nav%7Chead], jam)

The Pentagon will move to protect major weapon programs, including those locked into fixed-price procurement deals, should mandatory U.S. government spending cuts go into effect under sequestration in January. The Defense Department would also consider furloughing civilian workers as a last-ditch way to pay for combat operations in Afghanistan, should the Pentagon have to absorb a $50 billion sequestration cut to its 2013 budget, Pentagon Comptroller Robert Hale said. “What we will do if we have to ... is ask the services to review key contracts and try to avoid any renegotiations that are disruptive,” Hale said during an Oct. 3 interview at the Pentagon. DoD might have a “limited ability” to reprogram funds across accounts, Hale noted, but Congress must approve funds shifted that way. “I think for high-priority contracts, we might try to do that,” he said. DoD leaders have consistently maintained that they are not making detailed plans for possible sequestration. Hale’s remarks, however, shed some light on how the Pentagon might proceed if further cuts are necessary. Gordon Adams, an analyst who oversaw defense budgets during the Clinton administration, said the Pentagon would likely send a $15 billion to $20 billion reprogramming request to Congress, should sequestration go into effect. But DoD could be playing with fire if it relies on lawmakers to shift funding, said Todd Harrison, an analyst with the Center for Strategic and Budgetary Assessments. “There’s just a big asterisk there that they are crossing their fingers and hoping that Congress will go along with a reprogramming,” he said. “What if they don’t?” The White House Office of Management and Budget (OMB) has yet to instruct DoD and other federal departments on how to implement the sequestration cuts, which are expected to be divvied evenly across budget coffers, with the exception of military personnel, whom the administration exempted. The possibility of sequestration and uncertainty on how it will play out has left many program managers and defense industry leaders grappling with what to expect and how to respond. Last month, Maj. Gen. John Thompson, who runs the Air Force’s $35 billion KC-46 tanker program, said he was afraid sequestration might force him to cancel the service’s fixed-price aircraft development contract with Boeing and renegotiate at a higher cost. “I don’t want to break my contract, and I’m fearful sequestration may force me to do that,” he said during a Sept. 18 briefing at an Air Force Association-sponsored conference. Hale said it is too early to signal specific programs that might fall into this category. “I understand the worry,” he said. “It’s premature to conclude that we would have to modify a specific contract like KC-46 or even have to renegotiate future parts of it.” If sequestration happens, DoD will implement it “in a way that minimizes the disruption and the devastation,” Hale said. Contractors have been struggling whether to issue layoff notices in advance of the sequestration possibly going into effect. Job layoffs on the eve of a presidential election are a highly sensitive political issue, and on Sept. 28 the Obama administration advised contractors they were unnecessary, prompting Lockheed Martin and BAE Systems to cancel plans for sending out layoff notices.

### Ecofem

#### We should stop treating structures as unmovable wholes—all it takes is one crack to expose the fragility of oppressive institutions. The plan is a radical experiment in democratic politics.

Connolly ’12 William E. Connolly, Krieger-Eisenhower Professor of Political Science at Johns Hopkins University, “Steps toward an Ecology of Late Capitalism,” Theory & Event, Vol. 15, Issue 1, 2012, Muse

A philosophy attending to the acceleration, expansion, irrationalities, interdependencies and fragilities of late capitalism suggests that we do not know with confidence, in advance of experimental action, just how far or fast changes in the systemic character of neoliberal capitalism can be made. The structures often seem solid and intractable, and indeed such a semblance may turn out to be true. Some may seem solid, infinitely absorptive, and intractable when they are in fact punctuated by hidden vulnerabilities, soft spots, uncertainties and potential lines of flight that become apparent as they are subjected to experimental action, upheaval, testing, and strain. Indeed, no ecology of late capitalism, given the variety of forces to which it is connected by a thousand pulleys, vibrations, impingements, dependencies, shocks and thin threads, can specify with supreme confidence the solidity or potential flexibility of the structures it seeks to change. The strength of structural theory, at its best, was in identifying institutional intersections that hold a system together; its conceit, at its worst, was the claim to know in advance how resistant those intersections are to potential change. Without adopting the opposite conceit, it seems important to pursue possible sites of strategic action that might open up room for productive change. Today it seems important to attend to the relation between the need for structural change and identification of multiple sites of potential action. You do not know precisely what you are doing when you participate in such a venture. You combine an experimental temper with the appreciation that living and acting into the future inevitably carries a shifting quotient of uncertainty with it. The following tentative judgments and sites of action may be pertinent.

# Rd 5 vs UMKC JW

## 1AC

See rd 2

## 2AC

### Case

#### Plan creates domestic mfg base

Rosner & Goldberg 11 (Robert, William E. Wrather Distinguished Service Professor, Departments of Astronomy and Astrophysics, and Physics, and the College at the U of Chicago, and Stephen, Energy Policy Institute at Chicago, The Harris School of Public Policy Studies, "Small Modular Reactors - Key to Future Nuclear Power Generation in the U.S.," Nov 2011, [https://epic.sites.uchicago.edu/sites/epic.uchicago.edu/files/uploads/EPICSMRWhitePaperFinalcopy.pdf], jam)

As stated earlier, SMRs have the potential to achieve significant greenhouse gas emission reductions. They could provide alternative baseload power generation to facilitate the retirement of older, smaller, and less efficient coal generation plants that would, otherwise, not be good candidates for retrofitting carbon capture and storage technology. They could be deployed in regions of the U.S. and the world that have less potential for other forms of carbon-free electricity, such as solar or wind energy. There may be technical or market constraints, such as projected electricity demand growth and transmission capacity, which would support SMR deployment but not GW-scale LWRs. From the on-shore manufacturing perspective, a key point is that the manufacturing base needed for SMRs can be developed domestically. Thus, while the large commercial LWR industry is seeking to transplant portions of its supply chain from current foreign sources to the U.S., the SMR industry offers the potential to establish a large domestic manufacturing base building upon already existing U.S. manufacturing infrastructure and capability, including the Naval shipbuilding and underutilized domestic nuclear component and equipment plants. The study team learned that a number of sustainable domestic jobs could be created – that is, the full panoply of design, manufacturing, supplier, and construction activities – if the U.S. can establish itself as a credible and substantial designer and manufacturer of SMRs. While many SMR technologies are being studied around the world, a strong U.S. commercialization program can enable U.S. industry to be first to market SMRs, thereby serving as a fulcrum for export growth as well as a lever in influencing international decisions on deploying both nuclear reactor and nuclear fuel cycle technology. A viable U.S.-centric SMR industry would enable the U.S. to recapture technological leadership in commercial nuclear technology, which has been lost to suppliers in France, Japan, Korea, Russia, and, now rapidly emerging, China. SMR design, licensing, and detailed engineering activities are in an early stage. Licensing and design certification documents are expected to be ready for NRC filing in the 2013 time frame, and detailed engineering is about 10-20% complete. At the time of this analysis, limited cost data were publicly available, and current estimates have a significant amount of uncertainty. The study team estimates that GW-level reactors have roughly two orders of magnitude greater manhours already expended in this early engineering design work as compared with design work carried out for SMRs to date. Finally, the tooling up at a factory dedicated to SMR manufacturing is still in the planning stages and will likely require significant investment for a dedicated plant to manufacture SMRs for an n th-of-a-kind (NOAK) economy.

#### EMP is highly probable – devastates the grid

Timmerman 11 (Kenneth R., expert at Wikistrat, Israeli geostrategic analysis firm, M.A. Brown, “An EMP Attack on America?,” Oct, [frontpagemag.com/2011/kenneth-r-timmerman/an-emp-attack-on-america/], jam)

(October 4, 2011) -- For most of this week, the Department of Energy and the states of Maryland and Florida will be holding emergency response exercises to determine their readiness in the event of a major failure of the national electric power grid. The scenarios to be tested vary from a low-level event that would take out a handful of the transformers that control the grid that conceivably could be repaired within a matter of days, to a "worst case" scenario to simulate a total take-down of the grid, an event many experts believe could take four to six years to recover from. William Forschen, in his novel The Minute After, helps us to imagine what America would be like after a major EMP event. Survivalists have even invented a new acronym to describe it: TEOTWAWKI -- The End of the World As We Know It. No cell phones, no personal or business computers. No gas stations, no natural gas or water service. Cold storage, down; food processing plants, off-line. No trucking, no railroads, no airplanes, no ATMs, no inter-bank transfers. Americans would revert to eating whatever food they could hunt, fish or forage within walking distance of their homes. City-dwellers would flee en masse, or face starvation. Some experts point to the partial meltdowns at the Fukushima nuclear power reactors in Japan after a tsunami took down the power grid in March as an example of what could happen here. Even though the Japanese had help from the US and others that enabled them to bring on line backup generators, spent fuel rods in the cooling ponds of several reactors melted down, narrowly averting a major nuclear disaster. Without that outside help, a collapse of cooling power at US nuclear power plants could cause stored nuclear fuel rods sitting in cooling ponds to melt down, irradiating vast swathes of the country, Dr. Cynthia Ayers, a former National Security Agency analyst, told me recently. Such an event is so catastrophic in nature you would think the federal and state governments had planned for how to handle it long ago. Think again. We are woefully unprepared, even though solutions are cheap and near at hand. This is why Rep. Trent Franks (R-AZ) and several colleagues have proposed legislation known as the SHIELD Act (H.R. 668) that would promulgate standards necessary to protect the grid and require the utilities to install hardware solutions to protect the main components of the grid. There are two main sources of electromagnetic pulse (EMP) that potentially could take down the national electric grid: a major geomagnetic event such as the "solar maximum" flare expected to occur next year, or an attack by a hostile power using a "super-EMP" weapon detonated at high altitude over the US mainland. The US military discovered the EMP effect in 1962 during the Starfish Prime nuclear explosion in the atmosphere over the Pacific. Within instants, the lights went out 900 miles away in Hawaii, without any visible signs of an attack. The military designated a young Air Force 2nd Lieutenant named William Graham to investigate. He determined that EMP was a bi-product of a nuclear blast, and that it had the effect of frying everything made of silicon hundreds -- and possibly thousands -- of miles away from the place of the blast. Flash forward to 2001. Congress established an EMP commission to assess the vulnerability of the United States to an EMP attack or a massive solar flare. And they picked William Graham -- now a distinguished scientist, who had served as President Reagan's science adviser in the White House -- to chair it. The EMP commission issued a public report in 2004 that ought to be required reading for every American. They determined that a single EMP warhead exploded over the center of the US could bring down the power grid all across the country. A major geomagnetic event could have a similar impact. Dr. Graham warned in public testimony that a major EMP event would take us back to a pre-industrial age, when the US population was just a fraction of what it is today. EMPact America, an advocacy group run by Dr. Graham's staff director on the EMP Commission, former CIA strategic weapons analyst Dr. Peter Vincent Pry, will be involved in most of this week's exercises. At a September 23 conference in New York sponsored by the group, national security consultant Peter Huessy said it would cost a mere $60-$100 million to protect the 300 largest transformers running the grid, and another $400 million to $600 million to protect an additional 3,000 transformers. "These are one-time costs for equipment that bolts down, plugs in, and immediately works to protect against all forms of electromagnetic storms and nuclear EMP effects as well," Huessy said. He called it an "insurance policy" that amounted to a one-time payment of just over $3 per person for every American. As yet, until now the utilities, Congress, and the Obama administration have balked at making these improvements. Contrary to most of Washington, Iran and North Korea have understood that the US power grid is extremely vulnerable to attack by an EMP weapon, and have tasked their scientists and military planners to study the strategic impact of an EMP event. North Korea appears to have successfully tested a "Super-EMP" weapon during its 2006 and 2009 nuclear weapons tests, while Iran has tested ballistic missiles in an EMP mode -- that is, detonating them at high altitude, not in a ballistic trajectory -- and deemed those tests a success. Many experts believe the weapons programs of these two countries have been developed as joint ventures, since Iranian scientists traveled to North Korea to assist in North Korea's 2006 and 2009 nuclear weapons test campaigns, and North Korean scientists regularly travel to Iran to take part in Iran's missile tests. Is an EMP attack on America far-fetched? It's hard to say. But an America without power would essentially revert to the early 1800s, when a pre-industrial America was able to sustain a population of fewer than 100 million souls. Such a catastrophe would give flesh to Iranian President Mahmoud Ahmadinejad's dream that a "world without America is conceivable." Similar damage to the national power grid also could be brought about by a geomagnetic solar storm. President Obama's science advisor, John Holdren, warned in a March 10, 2011 oped co-authored with his British counterpart that such a solar maximum event could occur at the peak of the current solar cycle in the next 12-18 months, with catastrophic effects. "Space weather can affect human safety and economies anywhere on our vast wired planet, and blasts of electrically-charged gas traveling from the Sun at up to five million miles an hour can strike with little warning," Holdren wrote. "Their impact could be big â€” on the order of $2 trillion during the first year in the United States alone, with a recovery period of 4 to 10 years."

### Renewables Tradeoff

#### Extend Barber—SMR incentives inevitable

#### Nuke expansion now—assumes Japanese phase-out

Tirone 9/19 (Jonathan, Associated Press, “Nuclear Power Production Set to Grow Even After Japan Phase-Out (Vienna),” http://www.northjersey.com/news/international/170334006\_Nuclear\_Power\_Production\_Set\_to\_Grow\_Even\_After\_Japan\_Phase-Out\_\_Vienna\_.html?page=all, AM\*Agency=IAEA)

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

#### No renewables investment

Ball 12 (Jeffrey, Scholar in Residence at Stanford University's Steyer-Taylor Center for Energy Policy and Finance, [“Tough Love for Renewable Energy,” Foreign Affairs, May/June, http://www.foreignaffairs.com/articles/137519/jeffrey-ball/tough-love-for-renewable-energy?page=6])

Over the past decade, governments around the world threw money at renewable power. Private investors followed, hoping to cash in on what looked like an imminent epic shift in the way the world produced electricity. It all seemed intoxicating and revolutionary: a way to boost jobs, temper fossil-fuel prices, and curb global warming, while minting new fortunes in the process.¶ Much of that enthusiasm has now fizzled. Natural gas prices have plummeted in the United States, the result of technology that has unlocked vast supplies of a fuel that is cleaner than coal. The global recession has nudged global warming far down the political agenda and led cash-strapped countries to yank back renewable-energy subsidies. And some big government bets on renewable power have gone bad, most spectacularly the bet on Solyndra, the California solar-panel maker that received a $535 million loan guarantee from the U.S. Department of Energy before going bankrupt last fall.

#### No link – nuclear corporations aren’t VC

Stepp 11 (Matthew, Senior Policy Analyst with the Information Technology and Innovation Foundation (ITIF) specializing in climate change and clean energy policy, 11 [“An Anti-Innovation Strategy: The Heritage Foundations Deficit Reduction and Energy Proposal” The Energy Collective, April 27, http://theenergycollective.com/mstepp/56497/anti-innovation-strategy-heritage-foundations-deficit-reduction-and-energy-proposal])

Citing the examples of the Internet, computer chips, and GPS, the report claims, "Government programs that become commercial successes were not intended to meet a commercial demand." There are two problems with this. First, this is not a reason to eschew federal funding for future basic research and pre-commercial technology since, as Heritage acknowledges, such investments have resulted in technologies that launched entire new industries, fueled decades of American prosperity, and improved the lives of millions. Second, this claim is not universally true. For example, nuclear power, a technology born out of the government-organized Manhattan Project and supported by the precursors to the DOE, relied on tremendous federal support for its development and deployment, and was explicitly developed for commercial use. Private companies like General Electric and Westinghouse coordinated closely to guarantee that the government would support their high-risk, advanced technology ventures, and the Atomic Energy Commission was set up to ensure the safety and economic viability of the industry.

#### No tradeoff—subsidies fill-in—France proves

Tindale ’11 Stephen Tindale, associate fellow at the CER, “Thorium: How to save Europe’s Nuclear Revival,” Centre for European Reform, June 2011, http://www.cer.org.uk/sites/default/files/publications/attachments/pdf/2011/pb\_thorium\_june11-153.pdf

The money to support research and development of molten salt reactors need not be taken from renewables or other low-carbon energy supply options. There is more than enough money available in the existing subsidies for nuclear fusion. And the argument that governments which support any form of nuclear power overlook or downplay renewables is disproved by the example of France. France gets over three-quarters of its electricity from nuclear power stations. Yet the French government has supported onshore wind farms and is now giving subsides to offshore wind. It is also subsidising an expansion of the district heating system in Paris, to distribute heat from power stations burning energy crops and waste wood which would otherwise be wasted.

#### Doesn’t trade off with other renewables—nuclear replaces inefficient fossil fuel production

Farrell ’12 John Farrell, Institute for Local Self-Reliance (ILSR) senior researcher specializing in energy policy developments that best expand the benefits of local ownership and dispersed generation of renewable energy, “Clean Energy Doesn’t Require A Trade-Off, But A Trade-In Of Our Obsolete Electric Grid,” Think Progress, 2/29/2012, http://thinkprogress.org/climate/2012/02/29/434440/clean-energy-trade-off-trade-in-obsolete-electric-grid/?mobile=nc

In a New York Times SundayReview piece last week – [Drawing the Line at Power Lines](https://www.nytimes.com/2012/02/19/sunday-review/drawing-the-line-at-power-lines.html?_r=2&hp) – Elisabeth Rosenthal suggested that our desire for clean energy will require significant tradeoffs: There are pipelines, trains, trucks and high-voltage transmission lines. None of them are pretty, and all have environmental drawbacks. But if you want to drive your cars, heat your homes and watch TV, you will have to choose among these unpalatable options… Perhaps the answer is simply that in an increasingly crowded powered-on world, we’re all going to have to accept that Governor Cuomo’s so-called energy highway is likely to traverse our backyard. I disagree. The future of American electricity policy is not about tradeoffs, but rather a chance to trade-in an obsolete, centralized paradigm for a local, clean energy future. Utilities would have us believe that new high-voltage transmission lines are necessary to get more wind and solar power. But the truth is that the American electricity industry refuses to embrace the fundamentally different nature of renewable energy: its ubiquity means that Americans can produce energy near where they use it, in an economically competitive manner, and at a community scale. The 20th century electricity system was centrally controlled and centrally-owned, a necessary evil when coal, gas, and nuclear power plants had significant economies of scale and required enormous capital investments. The supply lines for these power plants were equally large, connecting far-off mines, oil and gas fields via rail and pipeline to these remote power plants, and big transmission lines in turn carried the electricity from these power plants to big urban centers. An electricity system primarily powered by wind and solar is fundamentally different. Turbines and panels are always right at the fuel source, whether on a rural farm or an urban rooftop. And because their scale is substantially more amenable to community ownership, renewable energy can be built near to and provide economic benefits to the communities it powers. The fundamental shift means Americans should trade-in an obsolete model of centralized energy generation for one that matches and builds support for the local energy opportunity. Local ownership and its economic benefits should play a significant role. For example, researchers in Germany recently surveyed [local support for expanding wind energy production](http://energyselfreliantstates.org/content/community-ownership-boosts-support-renewables), comparing two towns with nearby wind farms. When the local turbines were absentee-owned, 60 percent of residents were opposed to more local wind power. Opposition dropped by 45 percentage points when the wind farm was locally owned. It’s no different from the fight over the Badger-Coulee transmission line in Western Wisconsin, where locals have raised hell knowing that they will be asked to pay as much as $5 billion for new transmission lines that will earn utilities an 11% (or greater) return with questionable local economic benefit. Locally owned wind power is in short supply, however, because federal and state energy policy make it extremely difficult. Community ownership could be best achieved through cooperatives, schools, or cities, but federal wind incentives are for taxable entities, not these rooted community organizations. Furthermore, federal tax credits require wind power project participants to have “passive income” from investments, ruling out the vast majority of Americans. When community wind projects succeed, like the [South Dakota Wind Partners](http://energyselfreliantstates.org/content/change-federal-incentive-enables-cooperative-own-wind-project), organizers admit that repeated the success is unlikely in light of the legal and financial complexities. Community-scaled wind and solar projects also struggle against an electricity system stacked against small-scale or “distributed” generation. A recent study in Minnesota, for example, suggested that [the state could meet its entire 25% by 2025 renewable energy standard with distributed renewable energy projects](http://www.newrules.org/energy/publications/meeting-minnesotas-renewable-energy-standard-using-existing-transmission-system) connected to existing electric grid infrastructure. Incumbent utilities have focused on transmission instead, likely because new power lines (and not maximizing existing infrastructure) earns them a statutory 11-13% rate of return. This myopic focus on big infrastructure may prove doubly expensive as the cost of solar power falls rapidly. Within 10 years, one-third of Americans could install solar on their own rooftop and get electricity for less than their utility charges, without any additional power lines. But under the current electricity policy, these same Americans will likely be paying a few dollars each month for new utility-conceived high-voltage transmission lines even as they increasingly produce their own local, clean energy. The future of American energy policy is not a tradeoff between new clean energy and new transmission. Rather, it’s an opportunity to trade-in an obsolete, centralized model of development for the alternative – a democratized energy system where Americans can be producers and owners of their energy future.

#### No CCP collapse—the government represses instability

Pei 9 (Minxin, Senior Associate in the China Program at the Carnegie Endowment for International Peace, 3/12. “Will the Chinese Communist Party Survive the Crisis?” Foreign Affairs. http://www.foreignaffairs.com/articles/64862/minxin-pei/will-the-chinese-communist-party-survive-the-crisis)

It might seem reasonable to expect that challenges from the disaffected urban middle class, frustrated college graduates, and unemployed migrants will constitute the principal threat to the party's rule. If those groups were in fact to band together in a powerful coalition, then the world's longest-ruling party would indeed be in deep trouble. But that is not going to happen. Such a revolutionary scenario overlooks two critical forces blocking political change in China and similar authoritarian political systems: the regime's capacity for repression and the unity among the elite. Economic crisis and social unrest may make it tougher for the CCP to govern, but they will not loosen the party's hold on power. A glance at countries such as Zimbabwe, North Korea, Cuba, and Burma shows that a relatively unified elite in control of the military and police can cling to power through brutal force, even in the face of abysmal economic failure. Disunity within the ruling elite, on the other hand, weakens the regime's repressive capacity and usually spells the rulers' doom. The CCP has already demonstrated its remarkable ability to contain and suppress chronic social protest and small-scale dissident movements. The regime maintains the People's Armed Police, a well-trained and well-equipped anti-riot force of 250,000. In addition, China's secret police are among the most capable in the world and are augmented by a vast network of informers. And although the Internet may have made control of information more difficult, Chinese censors can still react quickly and thoroughly to end the dissemination of dangerous news. Since the Tiananmen crackdown, the Chinese government has greatly refined its repressive capabilities. Responding to tens of thousands of riots each year has made Chinese law enforcement the most experienced in the world at crowd control and dispersion. Chinese state security services have applied the tactic of "political decapitation" to great effect, quickly arresting protest leaders and leaving their followers disorganized, demoralized, and impotent. If worsening economic conditions lead to a potentially explosive political situation, the party will stick to these tried-and-true practices to ward off any organized movement against the regime.

### REE DA

#### Thorium incentives solve global rare earth shortage

Halper 12 (Mark, Energy editor for Smart Planet, “Solve the energy AND rare earth crisis: join the thorium bank” Smart Planet, 7/24/12 <http://www.smartplanet.com/blog/intelligent-energy/solve-the-energy-and-rare-earth-crisis-join-the-thorium-bank/17845>) wg

Put this idea into the “killing two birds with one stone” category.¶ The “birds” in this case are nothing less than two great economic and environmental challenges facing the West: How to establish carbon-free, sustainable energy independence, and how to cut reliance on China for the rare earth metals vital to products ranging from missiles to mobile phones.¶ The “stone” is literally a stone - okay, a rock - called monazite.¶ As I’ve noted before on SmartPlanet, monazite is a mineral rich in rare earth elements, and also in thorium, the element that could replace uranium and usher in a future of safe, efficient nuclear power that helps cut the fossil fuel cord and that greatly reduces nuclear waste hazards including weapons proliferation.¶ Two problems: Most countries in the West lack policy that supports thorium nuclear. Likewise, countries like the U.S. years ago took measures that handed the rare earth business to China.¶ Co-operative Kennedy. Jim Kennedy speaking in Chicago recently.¶ Another issue: Although mining monazite in say, the U.S., could help free the country from China’s rare earth shackles, the presence of thorium in the rock discourages such initiative. That’s because - with no federal thorium nuclear approval in place - mildly radioactive thorium is a costly rare earth byproduct that someone has to safely store away.**¶** You would think it’s high time to solve this riddle.¶ Jim Kennedy’s Thorium Bank to the rescue!¶ Kennedy, one of the organizers of the recent Thorium Energy Alliance Conference in Chicago, made a compelling case at the conference for Congress to authorize - but not fund - a “cooperative” responsible for not only taking the thorium off the hands of rare earth mining companies, but also for developing thorium uses and markets, including energy.¶ You can watch a video of Kennedy making his case below. In it, he describes how he and fellow TEAC organizer John Kutsch have been lobbying Congress - so far unsuccessfully.¶ Kennedy is a St. Louis consultant who is also president of a company called ThREEM3 that owns rights to the rare earth byproducts from Missouri’s Pea Ridge iron ore mine (which would come from monazite at the mine, I believe).¶ He notes, ”As John and I have been trying to convince Congress…you could create a rare earth cooperative that could receive the thorium-baring monazites, and essentially pull out the rare earths, and then take the thorium liability and hand it over to another entity, something we can just simply call the thorium bank.¶ “And the thorium bank would have a very simple elegant one sentence piece of legislation along with it that says, ‘Congress gives the thorium bank the authority to develop uses and markets for thorium, including energy.’ ”¶ That, he says, would provide “the big tent to develop a thorium energy economy,” and would include Western partners and owners who would participate in the revenue stream and, by the way, create jobs.¶ Kennedy suggests calling the entity the “Thorium Storage and Industrial Products Corporation.”¶ He describes it as, “Something to give the public confidence - a federally chartered facility that’s going to accept every single gram of thorium and all the other actinides that are produced.¶ “That thorium bank would solve the rare earth crisis in the United States in Japan in Korea in Europe. Everyone could participate and own. And own the offtake. Because it would be a co-op. And then you would relegate the risk over to this facility. And this facility would be the big tent where people could come in and either contribute capital or IP.”

#### Market incentivizes recycling – solves shortage

Rhodes 12 (Chris, studied chemistry at Sussex University, earning both a B.Sc and a Doctoral degree, "Peak Minerals: Shortage of Rare Earth Metals Threatens Renewable Energy," Jul 30, [oilprice.com/Alternative-Energy/Renewable-Energy/Peak-Minerals-Shortage-of-Rare-Earth-Metals-Threatens-Renewable-Energy.html], jam)

In the face of resource depletion, recycling looks increasingly attractive. In this stage of development of the throw-away society, now might be the time to begin "mining" its refuse. It has been shown that there are part-per-million (p.p.m.) quantities of platinum in road-side dust, which is similar to the 3 p.p.m. concentration in South African platinum ore. It is suggested that extracting platinum from this dust, which originates in catalytic converters, might prove lucrative and would expand the limited amount of platinum available, which even now does not meet demand for it. Discarded cell-phones too, might be a worthwhile source. For metals such as hafnium and Indium, recycling is the only way to extend the lifetime of critical sectors of the electronics industry. This is true also of gallium, tellurium and selenium, since all of them are past their production peak, which forewarns of imminent potential production shortages and escalating prices. While recycling of base-metals from scrap is a mature part of an industry worth $160 billion per year, current efforts to recover and recycle rare-metals are far less well advanced. However, in view of its present high-price, rhenium is now recovered from scrap bimetallic catalysts used in the oil refining industry. I expect to see an expansion of this top-end of the metals-market since rising demand for rare-metals will confer highly lucrative profits. It might be argued that we will never "run-out" of metals because their atoms remain intact, but the more dispersion that occurs in converting concentrated ores into final products, the more difficult and hence energy intensive it becomes to reclaim those metals in quantity. In a sense the problem is the same as deciding which quality of ore to mine in the first place: we now need to either find richer sources to recycle from or arrange how we use these materials in the first place to facilitate recycling. Ultimately, recycling needs to be deliberately designed into an integrated paradigm of extraction, use and reuse, rather than treating it as an unplanned consequence.

#### Asteroid mining – it’s happening

Diaz 12 (Jesus, Gizmodo Australia, “New asteroid mining company may solve world’s economic problems” 4/23/12 <http://www.gizmodo.com.au/2012/04/new-asteroid-mining-company-may-solve-worlds-economic-problems/>)

Early on Wednesday morning, a group of billionaires and former NASA scientists will announce Planetary Resources, the first asteroid mining company in history. They claim they will “add trillions of dollars to the global GDP” and “help ensure humanity’s prosperity”.¶ The group of investors and scientists on board this enterprise is impressive:¶ …including Google’s Larry Page & Eric Schmidt, Ph.D.; film maker & explorer James Cameron; Chairman of Intentional Software Corporation and Microsoft’s former Chief Software Architect Charles Simonyi, Ph.D.; Founder of Sherpalo and Google Board of Directors founding member K. Ram Shriram; and Chairman of Hillwood and The Perot Group Ross Perot, Jr.¶ Harnessing the resources of asteroids is not a crazy proposition, and the return of investment could be amazing. So much so that they are convinced they can “add trillions of dollars to the global GDP”. More importantly, this may solve many of our material needs as resources on Earth keep dwindling fast.

#### Solves shortage

Mr. V’s Think Pad 10 – Writer of over 65 blogs about space (10/21/10, Mr. V’s Think Pad, “Astronomy: Asteroid Mining,” http://mrvsthinkpad.blogspot.com/2010/10/astronomy-asteriod-mining.html)

Rare earth elements (also known as rare earth metals) are a series of seventeen chemical elements in the periodic table, namely scandium, yttrium, and the fifteen lanthanides. Rare earth elements have only been known since 1794, when yttrium was first discovered in Sweden. The properties in rare earth elements are essential to the development of modern energy conversion and telecommunication technologies. While rare earth elements are abundant, their low concentrations in geologic formation makes mining and processing difficult, expensive and environmentally destructive. As measured in 2006, there were approximately 137,000-tons of commercial grade rare-earth reserves known. Over 90% of these reserves, both light and heavy ores, were in China. As of 2009, 97% of all rare earth production and exportation was from China. At current rates of consumption, current reserves of ores with concentrations of 6% and higher will run out long before petroleum. This will drive prices up exponentially from the present rates of $US500 to $US1000 per pound. One endeavor being made in response to the depletion of these rare earths is use of Remote Sensing Technologies to identify locations on earth where deposits of ores can be found. Transposing full spectrum photo image pixels from satellites and aerial reconnaissance into digital databases allows geologists the ability to manipulate information and search out rare earth resources. Another endeavor is to find rare earth elements in sea water. By bonding them with other chemicals then extracting the bonded molecular compound, researchers have been able to extract measurable quantities of rare earth elements out of ocean salt water. However, the technologies for large scale extraction are not competitive yet competitive with those of terrestrial based mining. A third endeavor being considered is that of mining rare earth elements from asteroids. Present indication are that asteroids have concentrations of rare earth elements in their geology which many times higher than those found on earth. In such high concentrations, mining of asteroids could be profitable in spite of the high cost of launch operations. Sending robots or humans to mine rare earth elements from off asteroids may sound very science fiction and unreal, but consider; the concentration of rare earth elements in asteroids is much higher than anywhere on earth, and also higher than that of the moon. Near earth asteroids orbit much closer to earth than the moon.

#### No impact—Chinese supply is insignificant

Miklian ’11 Jason Miklian, researcher at the Peace Research Institute Oslo, “I Was a Rare Earths Day Trader,” Foreign Policy, 1/21/2011, http://www.foreignpolicy.com/articles/2011/01/21/i\_was\_a\_rare\_earths\_day\_trader?page=full

Cooler heads have weighed in on rare earths, but since the frenzy began they've largely been ignored. Six months before the China-Japan incident, the U.S. Geological Survey issued a report showing that the world has a 1,000-year global supply of proven rare-earth reserves, 63 of them outside China. The U.S. Defense Department released its own assessment in November saying that the national security implications of China's rare-earth lockdown -- a key factor in the initial burst of panic -- had been overblown. Demand for rare earths, meanwhile, is almost totally inelastic, and the market is already adjusting to concerns over a Chinese monopoly. The big buyers in Japan started importing from India and Vietnam three years ago, and Molycorp alone may be delivering more than six times what the United States needs by 2012.

#### LFTRS key to hafnium production

Cannara 12 (Dr. Alexander, Engineering and Environmental Consultant, AAAS, IEEE, Sierra Club, "Thorium – A Safe, Abundant and ‘Fertile’ Power Source," [threeconsulting.com/pdfs/AlexCan-Thor.pdf], jam)

In fluid-fuelled reactors, gasses like Xenon simply evolve for capture at appropriate catch points in the plumbing (e.g., at pump plenums), avoiding related control actions. Other fission poisons are not so easily removed (e.g., Lanthanides and Hafnium), so provision is included to remove these chemically from reactor fluid. This is processing done within a reactor’s hot cell, as opposed to removing fluid fuel from the site for centralized processing, as optionally done with solid fuels. However, the processing schedule is also dependent on Neutron velocity – a moderated core produces Thermal Neutrons which breed fissiles (e.g., in the surrounding fertile blanket) and fission them more quickly. Thus, to avoid excessive fission in the breeding blanket, its load must be processed more often. If the reactor is largely unmoderated, then its Fast or Epi-Thermal Neutron flux will both breed and fission blanket Actinides more slowly, but the hot-cell’s shielding must be much heavier. In any case, fluid-fuelled reactors have little excess reactivity -- just enough fuel is put in at any time (Figure 29). A solid fuel reactor has to put in enough fuel to last until the next refueling.

#### Increased hafnium supply revitalizes aerospace

Lipmann 12 (Anthony, Founder of Lipmann Walton & Co LTD "MMTA Meta Statistics - Hafnium" January 5, 2012 [www.lipmann.co.uk/articles/MMTA\_hafnium.html](http://www.lipmann.co.uk/articles/MMTA_hafnium.html))

Unlike the listed Zirconium producers above, Westinghouse, USA, does not generate Hafnium by-product during Zirconium sponge production \*\* India and China have some Hafnium production for domestic use but do not export \*\*\* Out of total 68mt supply, not more than 30mt is produced via the Van Arkel process which provides the bulk of demand for very pure low Zr-bearing crystal bars of Hf preferred for super alloys \* Nuclear includes power generation for electricity as well as for submarines and aircraft carriers The pie charts for Hafnium show an imbalance between supply and demand which is further exacerbated by its disjointed structure – that is to say that out of the total supply of 68mt only 30mt of production is made by the Van Arkel process to make Hafnium crystal bars. Wah Chang is thought to produce about 20mt and Cezus about 10 mt via Van Arkel. As with Zirconium, Hafnium, which is refined out of Zirconium when nuclear grade pure Zirconium sponge is required, is dependent on the nuclear industry for its route to the market. Without a nuclear industry there would be no Hafnium. Its presence within zircon sand at an average ratio of 1:50 versus Zirconium makes it extremely rare and not worth refining for its own sake. What the supply pie chart tells us is that the recovery of Hafnium as by-product is only generated in parts of the world where Zirconium is produced. France and USA are the leaders in the West, and Russia/Ukraine in the CIS region. No Hafnium was traded East to West before 1991. Hafnium's historic use for control rods within nuclear plant and equipment (for repelling neutrons), is in decline and is satisfied by a supply of Electron Beam ingots which can tolerate up to 2% of Zr impurity. However, following the Fukushima disaster in 2011 further safety requirements in BWR (Boiling Water Reactors), where a hafnium skin is being mooted, may cause greater use of Hafnium in the short term. Hafnium's dominant application in the modern world is not for nuclear but for super alloys; both in aerospace turbine blades (rotating parts) and vanes (stators), as well as their equivalents in larger cast parts required for industrial gas turbines. It is thought that more than 35 mt of Hafnium goes into this sector one way or another via the production of complex nickel base alloys containing approximately 1.5% Hf. The super alloy industry (as mentioned above) prefers the purest form of Hafnium (crystal bar produced by the Van Arkel process) whose supply is limited to 30 mt. While supply and demand of Van Arkel in this field is close to balance, the specific demand for very pure hafnium with low Zr contents of 1%, 0.5% or <0.3%, all commanding various premia, keeps this sector volatile. Other uses of Hafnium not requiring such high grade feed include such widely different applications as special steels on the one hand and Intel™ Pentel chips on the other (who proclaim their Hafnium content in advertisements). In both applications Hafnium's use is to add heat resistance. Use of Hafnium in tips used for plasma cutting is another area that has seen growth reflecting the strength of manufacturing worldwide, especially in China. Hafnium in the form of Tetrachloride (HfCl4) is also seeing steady demand for metallocene catalysts. In summary, it is thought that this market will for the foreseeable future be driven by its application in super alloys for gas turbines. Full aerospace order books as well as predictions that this industry's demand could double within the next two decades will certainly put pressure on existing producers. Whether these producers will be encouraged, as a result, to grow Van Arkel production remains to be seen but, even if actioned, Hafnium's dependence on Zirconium output for source material would still remain a limiting factor.

#### That solves your impact

Thompson 9 (David, President – American Institute of Aeronautics and Astronautics, “The Aerospace Workforce”, Federal News Service, 12-10, Lexis)

Aerospace systems are of considerable importance to U.S. national security, economic prosperity, technological vitality, and global leadership. Aeronautical and space systems protect our citizens, armed forces, and allies abroad. They connect the farthest corners of the world with safe and efficient air transportation and satellite communications, and they monitor the Earth, explore the solar system, and study the wider universe. The U.S. aerospace sector also contributes in major ways to America's economic output and high- technology employment. Aerospace research and development and manufacturing companies generated approximately $240 billion in sales in 2008, or nearly 1.75 percent of our country's gross national product. They currently employ about 650,000 people throughout our country. U.S. government agencies and departments engaged in aerospace research and operations add another 125,000 employees to the sector's workforce, bringing the total to over 775,000 people. Included in this number are more than 200,000 engineers and scientists -- one of the largest concentrations of technical brainpower on Earth.

### Cap K

#### Case outweighs—multiple scenarios for rapid extinction outlined by the 1AC—makes transition to other economies impossible

#### Nuclear is an essential step in energy production—no feasible alternatives

Monbiot ’11 George Monbiot, activist, journalist, intellectual, got a metal spike driven through his foot by a security guard while he was protesting a new road in Britain, tried to carry out a citizen’s arrest of John Bolton for his role in instigating the Iraq War, used to be Whitman’s go-to K answer but then he got too radical, “The double standards of green anti-nuclear opponents,” The Guardian, 3/31/2011, http://www.guardian.co.uk/environment/georgemonbiot/2011/mar/31/double-standards-nuclear

Like most environmentalists, I want renewables to replace fossil fuel, but I realise we make the task even harder if they are also to replace nuclear power. I'm not saying, as many have claimed, that we should drop our concerns about economic growth, consumption, energy efficiency and the conservation of resources. Far from it. What I'm talking about is how we generate the electricity we will need. Given that, like most greens, I would like current transport and heating fuels to be replaced with low-carbon electricity, it's impossible to see, even with maximum possible energy savings, how the electricity supply can do anything other than grow. All the quantified studies I have seen, including those produced by environmental organisations, support this expectation. Ducking the challenge of how it should be produced is not an option. Nor have I changed my politics (and nor for that matter am I an undercover cop, a mass murderer, a eugenicist or, as one marvellous email suggested, "the consort of the devil"). In fact it's surprising how little the politics of energy supply change with the mass-generation technology we choose. Whether or not there is a nuclear component, we are talking about large corporations building infrastructure, generating electricity and feeding it into the grid. My suspicion of big business and my belief that it needs to be held to account remain unchanged.

#### Perm: do both

#### “Anti industrial” alts offer us NOTHING—socialism requires a commitment to material problems like energy shortages and climate destruction—the REAL socialist alternative is nuclear power

Walters 11 – David Walters worked as a union power plant operator for 24 years in California. He is currently a member of Socialist Organizer, US Section of the Fourth International. Permanent Revolution, a journal named after the following quote: “The workers... battle-cry must be: 'The Permanent Revolution.'” — Marx and Engels, 1850, “After Fukushima: is nuclear power finished?” Sun 12, June 2011 @ 18:37 <http://www.permanentrevolution.net/entry/3332>

We have serious issues facing our class, our planet.¶ From economic development of the productive forces in the oppressed neo-colonial world to raise their standard of living, to the phasing out of climate-changing fossil fuel use, we are going to require more, not, less energy, specifically electricity.¶ Most on the left are at best confused by this and at worse, seek a return to some sort of pastoral green, “democratic” pre-industrial utopia. As Marxists we should reject this “we use too much” scenario that has infected the left across the world. We certainly should use energy more wisely, more efficiently and with a sense of conservation. This can happen only when the profit motive is removed and scarcity in basic necessities is a thing of the past. No one should object to this. But these things do not produce one watt of power, especially if you consider what we have to do. These include: • Switching off from fossil fuels completely (they should be used only as chemical feedstock, i.e. as the basic material to make chemicals and lubricants) • Increasing the development of the productive forces especially in the developing world. This means developing whole electrical grids, new, primarily non-fossil fuel, forms of generation and the infrastructure to support this, for the billions without any electrical usage at all • Freeing up the productive forces to eliminate all forms of want as the material basis for a true socialist mode of production. Using nuclear energy is both the cheapest and safest way to do this.¶ George Monbiot in his latest entry on his blog\* challenges the renewable energy advocates with some hard questions. No socialist by any means, Monbiot has brought attention to the issue of energy and what it will take to reduce carbon emissions. He notes, writing on Britain, among other things: “1. Reducing greenhouse gas emissions means increasing electricity production. It is hard to see a way around this. Because low-carbon electricity is the best means of replacing the fossil fuels used for heating and transport, electricity generation will rise, even if we manage to engineer a massive reduction in overall energy consumption.¶ The Zero Carbon Britain report published by the Centre for Alternative Technology envisages a 55% cut in overall energy demand by 2030 – and a near-doubling of electricity production.” How is this electricity going to be produced in a sustained and regular way? We know wind generated power is erratic and variable, a problem only partially solvable by new continental wide electricity grids. We know other forms of low carbon power – tidal, coal with carbon capture and storage, large scale solar – are experimental and even if viable are likely to turn out more expensive than nuclear.¶ We get no answer from so-called socialist Greens on this problem, at least not yet. They simply have not considered the real issues.¶ Monbiot goes on: “3. The only viable low-carbon alternative we have at the moment is nuclear power. This has the advantage of being confined to compact industrial sites, rather than sprawling over the countryside, and of requiring fewer new grid connections (especially if new plants are built next to the old ones). It has the following disadvantages: “a. The current generation of power stations require uranium mining, which destroys habitats and pollutes land and water. Though its global impacts are much smaller than the global impacts of coal, the damage it causes cannot be overlooked.¶ “b. The waste it produces must be stored for long enough to be rendered safe. It is not technically difficult to do this, with vitrification, encasement and deep burial, but governments keep delaying their decisions as a result of public opposition.¶ “Both these issues (as well as concerns about proliferation and security) could be addressed through the replacement of conventional nuclear power with thorium or integral fast reactors but, partly as a result of public resistance to atomic energy, neither technology has yet been developed.¶ (I’ll explore the potential of both approaches in a later column).” I want to address this last point. Monbiot is slowly seeing his way to something that has taken a long time: that nuclear energy is really the only way to go, even in light of the “big three” accidents: Three Mile Island, Chernobyl and Fukushima. These new technologies he mentions, the Liquid Fluoride Thorium Reactor (which doesn’t require any uranium mining, enrichment or long term disposal of spent fuel) and the Integral Fast Reactor, provide the material basis for eliminating all fossil fuels and for a future society without want, wars or exploitation, that is a socialist one.¶ Where Monbiot and I come together is not, obviously, the socialist requirement to get rid of capitalism. It is over the need for more energy, not less. It is over the realisation that renewables cannot do it except in the most utopian of fantasies.¶ The real “Great Divide” is between those among the Greens who run on fear and fantasy, and those socialists that have a materialist understanding of the need to move toward a society based not just on current human needs alone, but on expanding humanity’s ability to power such a society.¶ Only nuclear can do this.

#### Poverty unprecedentedly decreasing due to capitalism

Chandy and Gertz ’11 Laurence Chandy, fellow at the Global Economy and Development Program in the Brookings Institution, and Geoffrey Gertz, research analyst at the Global Economy and Development Program in the Brookings Institution, “With Little Fanfare, Hundreds Of Millions Escaped Poverty,” Jakarta Globe, 7/8/11, http://www.thejakartaglobe.com/opinion/with-little-fanfare-hundreds-of-millions-escaped-poverty/451432

We are in the midst of the fastest period of poverty reduction the world has ever seen. The global poverty rate, which stood at 25 percent in 2005, is ticking downward at one to two percentage points per year, lifting around 70 million people — the population of Turkey or Thailand — out of destitution annually. Advances in human progress on such a scale are unprecedented, yet they remain almost universally unacknowledged. In 2005, the number of people living under the international poverty line of $1.25 per day stood at 1.37 billion — an improvement of half a billion compared with the early 1980s, but a long way from the dream of a world free of poverty. Behind these aggregate figures lies a somber reality. In assessing the fortunes of the developing world during the late 20th century, countries can be roughly divided into two categories: China and the rest. China’s stunning economic reversal — 30 years ago, only 16 percent of its population lived above the poverty line, but by 2005, only 16 percent stood below it — masks others’ failings. Excluding China, the 500 million decrease in global poverty becomes an increase of 100 million. In the world’s poorest region, sub-Saharan Africa, the poverty rate remained above 50 percent throughout the period, which, given the region’s rapid population growth, translated into a near doubling in the number of its poor. Similarly, in South Asia, Latin America and Europe-Central Asia there were more poor people in 2005 than there were a quarter of a century earlier. This depressing track record shapes perspectives on poverty that abound today. Global poverty has come to be seen as a constant, with the poor cut off from the prosperity enjoyed elsewhere. In a new study of global poverty, we upend this narrative, finding that poverty reduction accelerated in the early 2000s at a rate that has been sustained throughout the decade, even during the dark recesses of the financial crisis. Today, we estimate that there are approximately 820 million people living on less than $1.25 a day. This means that the prime target of the Millennium Development Goals — to halve the rate of global poverty by 2015 from its 1990 level — was probably achieved in 2008. Whereas it took 25 years to reduce poverty by half a billion people up to 2005, the same feat was likely achieved in the six years between then and now. Never before have so many people been lifted out of poverty over such a brief period of time. This stunning progress is driven by rapid economic growth across the developing world. During the 1980s and 1990s, per capita growth in developing countries averaged just 1 to 2 percent a year, not nearly fast enough to make per serious dent in poverty levels. Since around 2003, however, growth in the developing world has taken off, averaging 5 percent per capita per year. How and why sustained high economic growth in developing countries took hold are questions likely to be debated by economic historians for many decades. Already one can point to a number of probable sources emerging or accelerating around the turn of the century: an investment boom triggered by rising commodity prices; high growth spillovers originating from large, open emerging economies that utilize cross-border supply chains; diversification into novel export markets from cut flowers to call centers; spread of new technologies, in particular rapid adoption of cellphones; increased public and private investment in infrastructure; the cessation of a number of conflicts and improved political stability; and the abandonment of inferior growth strategies such as import substitution for a focus on macroeconomic health and improved competitiveness. These factors are manifestations of a set of broader trends — the rise of globalization, the spread of capitalism and the improving quality of economic governance — which together have enabled the developing world to begin converging on advanced economy incomes after centuries of divergence. Taking a long view of history, the dramatic fall in poverty witnessed over the preceding six years represents a precursor to a new era. We’re on the cusp of an age of mass development that will see the world transformed from being mostly poor to mostly middle class. Fundamentally, it is a story about billions of people around the world finally having the chance to build better lives for themselves and their children. We should consider ourselves fortunate to be alive at such a remarkable moment.

#### Consequentialism good

Isaac ‘2 Jeffrey Isaac, James H. Rudy Professor of Political Science and director of the Center for the Study of Democracy and Public Life at Indiana University-Bloomington, Dissent, Vol. 49 No. 2, Spring 2002

As writers such as Niccolo Machiavelli, Max Weber, Reinhold Niebuhr, and Hannah Arendt have taught, an unyielding concern with moral goodness undercuts political responsibility. The concern may be morally laudable, reflecting a kind of personal integrity, but it suffers from three fatal flaws: (1) It fails to see that the purity of one's intention does not ensure the achievement of what one intends. Abjuring violence or refusing to make common cause with morally compromised parties may seem like the right thing; but if such tactics entail impotence, then it is hard to view them as serving any moral good beyond the clean conscience of their supporters; (2) it fails to see that in a world of real violence and injustice, moral purity is not simply a form of powerlessness; it is often a form of complicity in injustice. This is why, from the standpoint of politics--as opposed to religion--pacifism is always a potentially immoral stand. In categorically repudiating violence, it refuses in principle to oppose certain violent injustices with any effect; and (3) it fails to see that politics is as much about unintended consequences as it is about intentions; it is the effects of action, rather than the motives of action, that is most significant. Just as the alignment with "good" may engender impotence, it is often the pursuit of "good" that generates evil. This is the lesson of communism in the twentieth century: it is not enough that one's goals be sincere or idealistic; it is equally important, always, to ask about the effects of pursuing these goals and to judge these effects in pragmatic and historically contextualized ways. Moral absolutism inhibits this judgment. It alienates those who are not true believers. It promotes arrogance. And it undermines political effectiveness. WHAT WOULD IT mean for the American left right now to take seriously the centrality of means in politics? First, it would mean taking seriously the specific means employed by the September 11 attackers--terrorism. There is a tendency in some quarters of the left to assimilate the death and destruction of September 11 to more ordinary (and still deplorable) injustices of the world system--the starvation of children in Africa, or the repression of peasants in Mexico, or the continued occupation of the West Bank and Gaza by Israel. But this assimilation is only possible by ignoring the specific modalities of September 11. It is true that in Mexico, Palestine, and elsewhere, too many innocent people suffer, and that is wrong. It may even be true that the experience of suffering is equally terrible in each case. But neither the Mexican nor the Israeli government has ever hijacked civilian airliners and deliberately flown them into crowded office buildings in the middle of cities where innocent civilians work and live, with the intention of killing thousands of people. Al-Qaeda did precisely this. That does not make the other injustices unimportant. It simply makes them different. It makes the September 11 hijackings distinctive, in their defining and malevolent purpose--to kill people and to create terror and havoc. This was not an ordinary injustice. It was an extraordinary injustice. The premise of terrorism is the sheer superfluousness of human life. This premise is inconsistent with civilized living anywhere. It threatens people of every race and class, every ethnicity and religion. Because it threatens everyone, and threatens values central to any decent conception of a good society, it must be fought. And it must be fought in a way commensurate with its malevolence. Ordinary injustice can be remedied. Terrorism can only be stopped. Second, it would mean frankly acknowledging something well understood, often too eagerly embraced, by the twentieth century Marxist left--that it is often politically necessary to employ morally troubling means in the name of morally valid ends. A just or even a better society can only be realized in and through political practice; in our complex and bloody world, it will sometimes be necessary to respond to barbarous tyrants or criminals, with whom moral suasion won't work. In such situations our choice is not between the wrong that confronts us and our ideal vision of a world beyond wrong. It is between the wrong that confronts us and the means--perhaps the dangerous means--we have to employ in order to oppose it. In such situations there is a danger that "realism" can become a rationale for the Machiavellian worship of power. But equally great is the danger of a righteousness that translates, in effect, into a refusal to act in the face of wrong. What is one to do? Proceed with caution. Avoid casting oneself as the incarnation of pure goodness locked in a Manichean struggle with evil. Be wary of violence. Look for alternative means when they are available, and support the development of such means when they are not. And never sacrifice democratic freedoms and open debate. Above all, ask the hard questions about the situation at hand, the means available, and the likely effectiveness of different strategies. Most striking about the campus left's response to September 11 was its refusal to ask these questions. Its appeals to "international law" were naive. It exaggerated the likely negative consequences of a military response, but failed to consider the consequences of failing to act decisively against terrorism. In the best of all imaginable worlds, it might be possible to defeat al-Qaeda without using force and without dealing with corrupt regimes and political forces like the Northern Alliance. But in this world it is not possible. And this, alas, is the only world that exists. To be politically responsible is to engage this world and to consider the choices that it presents. To refuse to do this is to evade responsibility. Such a stance may indicate a sincere refusal of unsavory choices. But it should never be mistaken for a serious political commitment.

#### Growth is sweet—it’s uniquely key to lifting global populations out of unimaginable poverty

Lomborg ’12 Bjørn Lomborg, Adjunct Professor at Copenhagen Business School and head of the Copenhagen Consensus Center, “Environmental Alarmism, Then and Now,” Foreign Affairs, July/August 2012, Vol. 91, Issue 4, pp. 24-40, ebsco

But the Club of Rome did not just distract the world's attention. It actually directed that attention in precisely the wrong direction, identifying economic growth as humanity's core problem. Such a diagnosis can be entertained only by rich, comfortable residents of highly developed countries, who already have easy access to the basic necessities of life. In contrast, when a desperately poor woman in the developing world cannot get enough food for her family, the reason is not that the world cannot produce it but that she cannot afford it. And when her children get sick from breathing in fumes from burning dung, the answer is not for her to use environmentally certified dung but to raise her living standards enough to buy cleaner and more convenient fuels. Poverty, in short, is one of the greatest of all killers, and economic growth is one of the best ways to prevent it. Easily curable diseases still kill 15 million people every year; what would save them is the creation of richer societies that could afford to treat, survey, and prevent new outbreaks. By recommending that the world limit development in order to head off a supposed future collapse, The Limits to Growth led people to question the value of pursuing economic growth. Had its suggestions been followed over subsequent decades, there would have been no "rise of the rest"; no half a billion Chinese, Indians, and others lifted out of grinding poverty; no massive improvements in health, longevity, and quality of life for billions of people across the planet. Even though the Club of Rome's general school of thought has mercifully gone the way of other 1970s-era relics, such as mood rings and pet rocks, the effects linger in popular and elite consciousness. People get more excited about the fate of the Kyoto Protocol than the fate of the Doha Round--even though an expansion of trade would do hundreds or thousands of times as much good as feeble limitations of emissions, and do so more cheaply, quickly, and efficiently for the very people who are most vulnerable. It is past time to acknowledge that economic growth, for lack of a better word, is good, and that what the world needs is more of it, not less.

#### They need a specific alt—failure to specify causes cooption

John K. Wilson, coordinator of the Independent Press Association’s Campus Journalism Project, How the Left can Win Arguments and Influence People, 2000, pp. 110-113

Victory isn't easy for the left, even when it wins. One example in which progressives did almost everything right (but nevertheless was widely attacked) was the 1999 World Trade Organization (WTO) hearings in Seattle. Thanks to the hard work of leftists around the country (and the world), Seattle was overrun by more than 50,000 protesters who were determined to bring public attention to a powerful, secretive trade group. A huge rally organized by labor groups brought tens of thousands marching through Seattle, complete with union workers and environmentalists in sea turtle costumes. Thousands of protesters linked arms and prevented the opening session of the WTO from meeting. Most of the media coverage blamed the protesters for property damage that was planned and caused by anarchists and not stopped by the police. But the protesters did have a powerful effect on the scene, where the bias of the American media was less important to the delegates, many of whom sympathized with some of the protests. President Clinton, the world's leading trend detector, expressed his support for listening to the peaceful protesters, showing that he was more alert to the persuasive power of the anti-WTO forces than most of the media. Seattle and Washington left the left with many lessons. The first was never to let the media choose what the issue would be. Unfortunately, journalists (and their editors) are trained to overlook an important point for the sake of a flashy image and to portray a dramatic confrontation rather than a moral cause. This doesn't excuse the inaccurate reporting, biased attacks, and unquestioning defense of the authorities that filled most of the front pages and TV news about the WTO and IMF demonstrations. The progressives failed to spin the issue beyond their simple anti-WTO message. The reasons for opposing the WTO got some mention, but the idea of an alternative international organization built on genuine "free trade" and the protection of basic human rights never was aired. The left has become so accustomed to being ignored that progressives have wisely refined the attention-grabbing techniques of theatrical protest that can convey a simple message. Unfortunately, the left hasn't developed the difficult techniques of bringing more complex arguments into the public debate, and the result is that progressive views seem shallow and emotional compared with the more extensive coverage of the ideas of the right and the center in the mainstream media. Still, Seattle was both a success and an opportunity lost. The left brought attention to an organization without many redeeming values, but it never was able to launch a serious debate about what the alternative global values should be. Ignoring the massive evidence of police misconduct and brutality, the media served a well-defined role as gatekeepers of the truth. When the media criticized Seattle officials, it was for “permitting” the peaceful protestors to exercise their right to protest instead of shutting down the city, as happened for the rest of the WTO meetings. Still, the inability of the left to unify their ideas as easily as they unified behind the physical protest made it possible for many of the media errors to go unchallenged. Imagine if all the groups united behind the WTO protests had planned to meet after the initial melee and formulated a united response. Imagine if they had declared, We denounce all violence, whether it is the violence of smashing windows; the violence of shooting tear gas, concussion grenades, pepper spray, and rubber bullets at peaceful protestors; or the violence of regimes anywhere in the world where political, human, or labor rights are violated and the environment is harmed. We regret that the police chose to ignore the vandalism on the streets of downtown Seattle and instead attacked nonviolent protestors with tear gas and rubber bullets. As we informed police before the protests began, a group of violent anarchists had announced their intention to try to disrupt our nonviolent protests and discredit our cause. although many peaceful demonstrators defended Seattle’s stores—some of which we had previously protested in front of—against property damage and looting, we could no persuade these well-organized anarchists to stop, and we could not persuade the policy shooting tear gas at us to stop the violence. We remain united in our belief that the policies of the World Trade Organization are harmful to the people of the world and are designed instead to increase the profits of corporations and the politicians who serve them. We will return to downtown Seattle to exercise our constitutional rights to assemble peacefully and express our ideas about the WTO. Saying that the WTO should be abolished is a simply and perhaps desirable goal. But failing to present a comprehensive alternative to international trade left the protesters open to accusations of being naïve or protectionist. The problem for the left was that their efforts were so disorganized that no clear alternative emerged. There was no comprehensive solution offered for the problems posed by the WTO, the World Band, and the IMF. No alternative institutions were proposed to take over the work of helping the world rather than harming it. Progressives need an international approach to free trade that doesn’t seem like protectionism. “America First” is not a progressive perspective, and it fails to help the rest of the world. Without a progressive vision of globalism, the protests against free trade begin to merge with narrow-minded Buchananesque conspiracy theories about the UN or the WTO taking over the world.

#### Growth is key to curbing environmental degradation—collapse makes it inevitable—most recent scholarship proves

Tierney ‘9 John Tierney, columnist for NYT, his reporting has won awards from the American Association for the Advancement of Science, the American Institute of Physics, and the New York Publishers Association, “Use Energy, Get Rich and Save the Planet,” New York Times, 4/20/2009, http://www.nytimes.com/2009/04/21/science/earth/21tier.html

Their equation was I=PAT, which means that environmental impact is equal to population multiplied by affluence multiplied by technology. Protecting the planet seemed to require fewer people, less wealth and simpler technology — the same sort of social transformation and energy revolution that will be advocated at many Earth Day rallies on Wednesday. But among researchers who analyze environmental data, a lot has changed since the 1970s. With the benefit of their hindsight and improved equations, I’ll make a couple of predictions: 1. There will be no green revolution in energy or anything else. No leader or law or treaty will radically change the energy sources for people and industries in the United States or other countries. No recession or depression will make a lasting change in consumers’ passions to use energy, make money and buy new technology — and that, believe it or not, is good news, because... 2. The richer everyone gets, the greener the planet will be in the long run. I realize this second prediction seems hard to believe when you consider the carbon being dumped into the atmosphere today by Americans, and the projections for increasing emissions from India and China as they get richer. Those projections make it easy to assume that affluence and technology inflict more harm on the environment. But while pollution can increase when a country starts industrializing, as people get wealthier they can afford cleaner water and air. They start using sources of energy that are less carbon-intensive — and not just because they’re worried about global warming. The process of “decarbonization” started long before Al Gore was born. The old wealth-is-bad IPAT theory may have made intuitive sense, but it didn’t jibe with the data that has been analyzed since that first Earth Day. By the 1990s, researchers realized that graphs of environmental impact didn’t produce a simple upward-sloping line as countries got richer. The line more often rose, flattened out and then reversed so that it sloped downward, forming the shape of a dome or an inverted U — what’s called a Kuznets curve. (See nytimes.com/tierneylab for an example.) In dozens of studies, researchers identified Kuznets curves for a variety of environmental problems. There are exceptions to the trend, especially in countries with inept governments and poor systems of property rights, but in general, richer is eventually greener. As incomes go up, people often focus first on cleaning up their drinking water, and then later on air pollutants like sulfur dioxide. As their wealth grows, people consume more energy, but they move to more efficient and cleaner sources — from wood to coal and oil, and then to natural gas and nuclear power, progressively emitting less carbon per unit of energy. This global decarbonization trend has been proceeding at a remarkably steady rate since 1850, according to Jesse Ausubel of Rockefeller University and Paul Waggoner of the Connecticut Agricultural Experiment Station. “Once you have lots of high-rises filled with computers operating all the time, the energy delivered has to be very clean and compact,” said Mr. Ausubel, the director of the Program for the Human Environment at Rockefeller. “The long-term trend is toward natural gas and nuclear power, or conceivably solar power. If the energy system is left to its own devices, most of the carbon will be out of it by 2060 or 2070.” But what about all the carbon dioxide being spewed out today by Americans commuting to McMansions? Well, it’s true that American suburbanites do emit more greenhouse gases than most other people in the world (although New Yorkers aren’t much different from other affluent urbanites). But the United States and other Western countries seem to be near the top of a Kuznets curve for carbon emissions and ready to start the happy downward slope. The amount of carbon emitted by the average American has remained fairly flat for the past couple of decades, and per capita carbon emissions have started declining in some countries, like France. Some researchers estimate that the turning point might come when a country’s per capita income reaches $30,000, but it can vary widely, depending on what fuels are available. Meanwhile, more carbon is being taken out of the atmosphere by the expanding forests in America and other affluent countries. Deforestation follows a Kuznets curve, too. In poor countries, forests are cleared to provide fuel and farmland, but as people gain wealth and better agricultural technology, the farm fields start reverting to forestland.

#### Policy changes in energy production can be methodologically liberatory

Connolly ’12 William E. Connolly, Krieger-Eisenhower Professor of Political Science at Johns Hopkins University, “Steps toward an Ecology of Late Capitalism,” Theory & Event, Vol. 15, Issue 1, 2012, Muse

3. Today, perhaps the initial target should be on reconstituting established patterns of consumption by a combination of direct citizen actions in consumption choices, publicity of such actions, and social movements to reconstitute the state/market supported infrastructure of consumption. By the infrastructure of consumption I mean state support for market subsystems such as a national highway system, a system of airports, medical care through private insurance, etc., etc., that enable some modes of consumption in the zones of travel, education, diet, retirement, medical care, energy use, health, and education and render others more difficult or expensive to procure.21 To shift several of these in the correct direction would already reduce extant inequalities. To change the infrastructure is also to affect the types of work and investment available. Social movements that work upon the infrastructure and ethos in tandem can make a real difference directly, encourage more people to extend their critical perspectives, and thereby open more people to a militant politics if and as a new disruptive event emerges. Perhaps a cross-state citizen goal should be to construct a pluralist assemblage by moving back and forth between shifts in role performance, revisions in political ideology, and adjustments in political sensibility, doing so to generate enough collective energy to launch a general strike simultaneously in several countries in the near future. Its aim would be to reduce inequality and to reverse the deadly future created by established patterns of climate change by fomenting significant shifts in patterns of consumption, corporate policies, state law and the priorities of interstate organizations. Again, the dilemma of today is that the fragility of things demands shifting and slowing down intrusions into several aspects of nature as we speed up shifts in identity, role performance, cultural ethos, market regulation, and citizen activism.

## 1AR

### Solvency

#### No workforce crisis

Hosek 8 (James, and Titus Galama, National Defense Research Institute at RAND, PhD Economics @ Chicago “U.S. Competitiveness in Science and Technology,” http://www.rand.org/pubs/monographs/2008/RAND\_MG674.pdf)

We consider two indicators of shortage—unusually low unemployment and high wage growth for scientists and engineers—and we make comparisons relative to past trends within science and engineering and relative to other high-skill occupations. These are only broad indicators. There may be no broad evidence of a shortage, yet a shortage could be present at a micro-level—for instance, at a particular moment a firm can have difficulty finding enough qualified engineers to meet its hiring requirements. If micro-level shortages were widely present and persistent, they would result in lower unemployment and faster wage growth, as firms adjusted their hiring standards and wage offers. The unemployment rate has been the same in S&E occupations as in non-S&E occupations, except during the 1991 recession and the years following the end of the dot.com boom at the end of the 1990s, when the S&E unemployment rate was higher (see Figure 3.17). The greater cyclical sensitivity of S&E unemployment in 1991 and the early 2000s deserves further investigation, but it might be related to the rapid expansion in employment that occurred in information technology (see below). Workers not educated in S&E may have entered occupations classified as “computer science” or “information technology” and been counted as S&E workers, yet were more expendable by firms hit hard by the downturn. Figure 3.18 presents a three-year moving average of the median salary from 1989 to 2004 for workers with at least a bachelor’s degree, with separate trend lines for scientists and engineers, lawyers, doctors and other non-S&E occupations. Doctors, lawyers, and many scientists and engineers have a professional degree or a doctorate in addition to a bachelor’s degree, so it is not surprising that their median salaries are higher than for other non-S&E occupations. But the figure is useful in showing the change in median salary over time, where we find average annual increases of 1.8 percent for doctors and 0.8 percent for lawyers compared with 0.9 percent for scientists and engineers, over 1995 to 2005. Salaries in non-S&E occupations excluding lawyers and medical doctors grew at only 0.3 percent per year. In sum, unemployment and wage growth patterns are thus not unusual and do not point to the presence of a chronic or cyclical shortage in S&E. Indeed, Trivedi (2006) argues that there is an oversupply of PhDs in the life sciences.

#### Expertise

Robitaille 12 (George, Department of Army Civilian, United States Army War College, “Small Modular Reactors: The Army’s Secure Source of Energy?” 21-03-2012, Strategy Research Project)

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

### Based

#### Devastating cyber attacks coming now – China, Iran, and terrorists target the energy grid

Clayton 11/9 (Blake, fellow for energy and national security at CFR, “The New Face of Energy Insecurity” <http://www.nationalinterest.org/commentary/the-new-face-energy-insecurity-7715>)

The future of energy insecurity has arrived. In August, a devastating cyber attack rocked one of the world’s most powerful oil companies, Saudi Aramco, Riyadh’s state-owned giant, rendering thirty thousand of its computers useless. This was no garden-variety breach. In the eyes of U.S. defense secretary Leon Panetta, it was “probably the most destructive attack that the private sector has seen to date.”¶ What makes this kind of attack so worrying is the risk it poses to energy prices and hence the U.S. economy. Stopping oil production in Saudi Arabia could turn into a catastrophic loss of oil supplies. Even a short outage could cause prices to fly off the handle, setting off a scramble as market participants rushed to buy oil in case the shortage dragged on. Because the oil market is global in nature, a production outage anywhere can cause oil prices the world over to soar. U.S. officials should take note: A cyber threat to a company so central to the world energy market as Saudi Aramco poses a significant risk to the economic well-being of the United States.¶ The August attack on Saudi Aramco was only the most recent volley in what Washington has described as “low-grade cyberwar” in the Middle East, in this case likely involving Iran. The Shamoon virus the hackers deployed, judging by its sophistication and signature, was the handiwork of a state-supported effort, according to Secretary Panetta, though some U.S. investigators have disputed that assessment. Security experts surmise that the attack may have involved someone with privileged access to the company’s computer network.¶ Saudi Aramco was not the only casualty. RasGas, a Qatari natural gas company and the second-biggest producer of liquefied natural gas in the world, fell victim to an identical virus a short time after the Saudis. Like Aramco, RasGas announced that despite the attack, which left some of its computers “completely dead,” its energy production was not affected. Experts surmise that the Iranian attacks were likely payback for the apparently Western-backed Stuxnet virus, which struck the country’s Natanz nuclear plant.¶ Oil, gas and petrochemical companies are popular targets for hackers, who have ramped up their assault on these firms over the last two years. McAfee, an Internet-security firm, described in a recent study a barrage of “coordinated covert and targeted cyberattacks,” coming mostly from China, targeting energy companies around the world. The aim of these operations was to get ahold of proprietary data such as oil reserves, bidding strategies and critical infrastructure. The trade secrets that this string of attacks, dubbed Night Dragon by McAfee, sought to capture are big business. Stewart Baker, a former assistant secretary of homeland security, called information about “what oil exploration companies have found and not found” the “most valuable intelligence in the commercial world.”¶ But this summer’s attack on Saudi Aramco differs from these more traditional cyber espionage cases in a critical way: It wasn’t about the data. It was about disabling the company’s operations. Both are serious, but the former poses a systemic risk that, if successful, could make waves far beyond the health (or even survival) of a single company. American consumers could suffer because of an incident involving an oil company that they know little about and is located thousands of miles away.¶ The United States may have narrowly averted a disaster when Aramco was hit. The global oil market responds to any news about Saudi Arabia’s oil production practically instantaneously. Word from Riyadh about a future production increase or preferred trading range for crude oil can cause markets to swoon. Little surprise, considering that the company accounts for around 12 percent of global oil supply. Fortunately, Saudi oil operations were unaffected by the computer outage, at least as far as is known. Had the Shamoon virus prevented the flow of oil to market somewhere along the supply chain, though, the effect on prices would have been much less benign.¶ Virtual warfare against energy companies will not end anytime soon. Hackers are well aware that crippling oil operations offers significant leverage, strategically speaking, as acts of terror: a single successful act has the potential to hurt oil-consuming nations far beyond the Middle East. Small wonder that oil-industry assets around the world—oilfields, loading platforms, pump stations and so on—were long ago identified by Osama bin Laden as targets. Saudi Aramco’s CEO, Khalid al-Falih, reiterated after the August 15 attack that “this was not the first time nor will it be the last illegal attempt to intrude into our systems.” It is conceivable that a future one, if successful, could amount to the “cyber-Pearl Harbor” of which Secretary Panetta has long warned U.S. policy makers.¶ Defending the world’s major energy suppliers against debilitating cyber threats will not be easy, but it is essential. The risk cannot be eliminated; Washington’s ability to protect the corporate infrastructure of a foreign organization like Saudi Aramco is inherently imperfect. But if the United States is serious about its own economic security, this is one battle it cannot afford to sit out.

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#### Our world is composed of a complex assortment of interacting force-fields, each following their own rules and working to their own tempo, continually being driven by their interactions and contradictions with other fields. A human is just one small piece in a play of forces involving solar energy, tectonic plate shifts, ocean currents, asteroid showers, earthquakes, volcanos, species evolutions and extinctions, rainstorms, tornadoes, and hurricanes.

#### Unfortunately, this world is in jeopardy. Anthropogenic climate change poses an unmistakable danger to life of all kinds on Earth. At stake are the very life cycle processes relied upon by humans and nonhumans alike.

Hannah ’12 Lee Hannah, senior researcher in climate change biology at Conservation International, visiting researcher and adjunct professor at the Bren School of Environmental Science & Management at UC-Santa Barbara, has a pretty detailed Wikipedia page, “As Threats to Biodiversity Grow, Can We Save World’s Species?” Yale Environment 360, 4/19/2012, http://e360.yale.edu/feature/as\_threats\_to\_biodiversity\_grow\_can\_we\_save\_worlds\_species/2518/

Now, with 7 billion people on the planet — heading to 10 billion — and with greenhouse gas emissions threatening more rapid temperature rises than the warming that brought the last Ice Age to an end, the many millions of living things on Earth face an unprecedented squeeze. Is a wave of extinctions possible, and if so, what can we do about it? The late climate scientist and biologist Stephen Schneider once described this confluence of events — species struggling to adapt to rapid warming in a world heavily modified by human action — as a “no-brainer for an extinction spasm.” My colleagues Barry Brook and Anthony Barnosky recently put it this way, “We are witnessing a similar collision of human impacts and climatic changes that caused so many large animal extinctions toward the end of the Pleistocene. But today, given the greater magnitude of both climate change and other human pressures, the show promises to be a wide-screen technicolor version of the (by comparison) black-and-white letterbox drama that played out the first time around.” The magnitude of the threat was first quantified in a 2004 Nature study, “Extinction Risk from Climate Change.” This paper suggested that in six diverse regions, 15 to 37 percent of species could be at risk of extinction. If those six regions were typical of the global risk, the study’s authors later calculated, more than a million terrestrial and marine species could face extinction due to human encroachment and climate change — assuming conservatively that 10 million species exist in the world. Headlines around the world trumpeted the 1 million figure. Whether that scenario will unfold is unclear. But signs of what is to come are already all around us: nearly 100 amphibian species in South America vanishing in a disease outbreak linked to climate change, large areas of western North American facing massive die-offs of trees because of warming-driven beetle outbreaks, and increasing loss of coral reefs worldwide because of human activities and coral bleaching events driven by rising ocean temperatures. Most of the world’s biologically unique areas have already lost more than 70 percent of their high-quality habitat. The world community has the power to greatly reduce the prospect of an extinction spasm by lowering greenhouse gas emissions and launching large-scale conservation and forest preservation programs that both slow global warming and provide a sanctuary for countless species. But progress on these fronts is slow, and pressure on the world’s biodiversity remains relentless. An important part of the solution is preserving the ability of species to move across a changing landscape. Before humans, species responded to climate change by migrating, sometimes long distances, to track their preferred climatic conditions. Fully natural landscapes were conducive to these movements, with even slow-dispersing plants shifting the heart of their range on continental scales. The mechanisms of these changes are still being worked out, but we know they happened: Insects once found in Britain are now found only in the Himalayas, and centers of oak distribution have moved from the Mediterranean to Central Europe and from Georgia to Pennsylvania. Recent studies have shown that migration was an important method for species to cope with rapid climate change as far back as 55 million years ago, a period known as the Paleocene-Eocene Thermal Maximum, or PETM. Then, for reasons that are still not entirely clear, vast amounts of greenhouse gases were released into the atmosphere and oceans, leading to an increase in global temperatures of 4 to 9 degrees C (7 to 14 degrees F) in less than 10,000 years. Geological and fossil studies, using techniques such as stable isotope analysis, show major extinctions, the evolution of new animals and plants, and the migration of species on a large scale. Now, however, landscapes are crowded with human uses. Cities, urban sprawl, and agriculture take up huge areas. Freeways and roads create long linear obstructions to natural movement and present a patchwork of obstacles that are a severe challenge to species’ natural modes of shifting to track climate. To unravel these future responses requires understanding of past response, modeling of future response, and insights from changes already underway. To date, marine systems have experienced the most extensive impacts of climate change. From coral bleaching to melting sea ice, marine systems are changing on global and regional scales. Coral bleaching occurs when water temperatures exceed regional norms, causing corals to expel symbiotic micro-organisms from their tissues, ultimately leading to morbidity or death. Bleaching has exterminated some coral species from entire ocean basins. Global extinctions may follow as temperatures continue to rise. Corals face a second threat from acidification as CO2 builds up in the atmosphere and oceans, which prevents corals and many other marine organisms, including clams and oysters, from forming their calcium carbonate shells. Overall, the evidence suggests that the world’s roughly 5 million marine species face as severe threats from climate change as their terrestrial counterparts. On land, tropical biodiversity hotspots in places such as the Amazon and the rainforests of Indonesia and Malaysia are especially at risk. All global climate models now show significant future warming in the tropics, even if more muted than warming at high latitudes. Tropical animals, insects, and plants are tightly packed along climatic gradients from lowlands to mountaintops, and these organisms are sensitive to changes in temperature and rainfall. Already, scores of amphibians in South America have disappeared as a warmer, drier climate has led to outbreaks of disease such as the chytrid fungus. At the same time, large areas of tropical forest are being cleared for timber, ranching, and farming such crops as soybeans and oil palm.

#### Climate change also affects humans unequally. Regions responsible for the least GHG emissions will be at the greatest disadvantage. Sea level rise puts the hundreds of millions of people living on coastal and low-lying regions at risk, while climate shifts magnify food and water shortages. Entire islands are sinking. Action is key.

Byravan and Rajan ’10 Sujatha Byravan and Sudhir Chella Rajan, “The Ethical Implications of Sea-Level Rise Due to Climate Change,” Ethics & International Affairs 24, No. 3, 9/20/2010, only accessible on some exclusive database

As scientific evidence for the adverse effects of human-induced climate change grows stronger, it is becoming increasingly clear that these questions are of urgent practical interest and require concerted international political action. In the course of this century and the next, the earth’s climate will almost surely get warmer as a direct result of the emissions accumulated in the atmosphere from the burning of fossil fuels since the Industrial Revolution. This warming will very likely result in heat waves, heavy precipitation in some areas, extreme droughts in others, increased hurricane intensity, and sea-level rise of about one meter—although recent findings suggest this rise could quite plausibly be greater than that by century’s end.1 Forecasts of how many people will be displaced by 2050 by climate change vary widely, from about 25 million to 1 billion. The difficulty in accurate forecasting lies not only in the uncertainty regarding future climate change impacts and adaptation measures but also in estimating the outcome of the several complex factors driving migration.2 No other form of environmentally induced human migration will likely be as permanent as that caused by climate-induced SLR; and there are special reasons why its victims deserve unique moral consideration. SLR will affect coastal populations in a variety of ways, including inundation, flood and storm damage, erosion, saltwater intrusion, and wetland loss. Together, these will greatly reduce available land for cultivation, water resources, and fodder, causing severe hardship in terms of livelihood and habitat loss. Worst of all, SLR and the associated changes in the coastal zone will add burdens to many who are already poor and vulnerable. The physical changes associated with SLR may themselves take place in abrupt, nonlinear ways as thresholds are crossed. In turn, the least resilient communities— that is, those dependent on subsistence fishing—will be the first to experience ‘‘tipping points’’ in their life systems, so that the only option available to them would be to abandon their homes and search for better prospects elsewhere. As the average sea level continues to rise, coastal inundation, saltwater intrusion, and storm surges will become more intense and people will find it increasingly difficult to stay in their homes and will look for ways to migrate inland. As ever larger numbers pass thresholds in their ability to cope, more societal tipping points will be crossed, resulting in the sudden mass movements of entire villages, towns, and cities in coastal regions.3 On small islands and in countries with heavily populated delta regions, the very existence of the nation-state may become jeopardized, so that the extremely vulnerable will no longer have state protection they can rely on. The extent of vulnerability to sea-level rise in any given country will depend on more than just its terrain and climatic conditions: the fraction of the population living in low-lying regions, the area and proportion of the country inundated, its wealth and economic conditions, and its prevailing political institutions and infrastructure will all be of relevance. Thus, in a large country, such as the United States or China, coastal communities would be able to move inland, given adequate preparation and government response. In the case of small islands in the South Pacific, however, such an option does not exist, since it is expected that most or even the entire land area will sink or become uninhabitable. In such cases as Bangladesh, Egypt, Guyana, and Vietnam, where nearly half or more of the populations live in low-lying deltaic regions that support a major fraction of their economies, SLR will threaten the very functioning of the state. Moreover, it is increasingly clear that for tens to hundreds of millions of people living in low-lying areas and on small islands, no physical defense is realistically possible or can be fully protective. A recent report by the Dutch Delta Committee proposes annual investments of about 1.5 billion Euros for the rest of the century just to protect the Netherlands’ 200-mile coastline, and indicates that 20–50 percent of coastal land worldwide cannot be protected, especially under conditions where SLR takes place rapidly—as a result, say, of a collapse of major ice sheets in Greenland or Antarctica.4 Even if greenhouse gases are removed from the atmosphere through some future technology, we are already committed to a certain degree of warming and sea-level rise because of the thermal inertia of the oceans. In addition, most residents of small island nations and other low-lying coastal regions around the world will not be able to avail themselves of the sorts of conventional adaptation remedies that are conceivable for the victims of drought, reduced crop yields, desertification, and so on. Apart from exceptional cases where adequate engineering solutions can be developed to prevent inundation, coastal erosion, saltwater intrusion, and other challenges associated with rising seas, people living in these vulnerable regions will be forced to flee, generally with no possibility of return to their original homes. Indeed, migration and permanent resettlement will be the only possible ‘‘adaptation’’ strategy available to millions. Existing international law provides no solution for these individuals, for whom, we will argue, the only just remedy is in the form of special rights of free global movement and resettlement in regions and countries on higher ground in advance of disaster.

#### Global warming is a crisis point for the coordinates of contemporary critique. For much of the 20th century, theory tasked itself with breaking down totalizing regimes of ‘truth’ and ‘certainty’—but as these deconstructive practices have lost their critical spirit, our tools have fallen into the hands of political conservatives. A New York Times article relates the following:

(This paragraph is taken from the middle of the evidence cited below)

In these most depressing of times, these are some of the issues I want to press, not to depress the reader but to press ahead, to redirect our meager capacities as fast as possible. To prove my point, I have, not exactly facts, but rather tiny cues, nagging doubts, disturbing telltale signs. What has become of critique, I wonder, when an editorial in the New York Times contains the following quote? Most scientists believe that [global] warming is caused largely by manmade pollutants that require strict regulation. Mr. Luntz [a Republican strategist] seems to acknowledge as much when he says that “the scientiﬁc debate is closing against us.” His advice, however, is to emphasize that the evidence is not complete. “Should the public come to believe that the scientiﬁc issues are settled,” he writes, “their views about global warming will change accordingly. Therefore, you need to continue to make the lack of scientiﬁc certainty a primary issue.” 2

#### Critical thinkers must take notice: the ‘science wars’ are over—now the left’s arguments are fighting the right’s battles. It’s time for critique to change. We must challenge the socioeconomic forces behind rampant fossil fuel emissions directly.

Latour ‘4 Bruno Latour, Professor and vice-president for research at Sciences Po Paris, “Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern,” Critical Inquiry 30, Winter 2004

Wars. So many wars. Wars outside and wars inside. Cultural wars, science wars, and wars against terrorism. Wars against poverty and wars against the poor. Wars against ignorance and wars out of ignorance. My question is simple: Should we be at war, too, we, the scholars, the intellectuals? Is it really our duty to add fresh ruins to ﬁelds of ruins? Is it really the task of the humanities to add deconstruction to destruction? More iconoclasm to iconoclasm? What has become of the critical spirit? Has it run out of steam? Quite simply, my worry is that it might not be aiming at the right target. To remain in the metaphorical atmosphere of the time, military experts constantly revise their strategic doctrines, their contingency plans, the size, direction, and technology of their projectiles, their smart bombs, their missiles; I wonder why we, we alone, would be saved from those sorts of revisions. It does not seem to me that we have been as quick, in academia, to prepare ourselves for new threats, new dangers, new tasks, new targets. Are we not like those mechanical toys that endlessly make the same gesture when everything else has changed around them? Would it not be rather terrible if we were still training young kids—yes, young recruits, young cadets—for wars that are no longer possible, ﬁghting enemies long gone, conquering territories that no longer exist, leaving them ill-equipped in the face of threats we had not anticipated, for which we are so thoroughly unprepared? Generals have always been accused of being on the ready one war late— especially French generals, especially these days. Would it be so surprising, after all, if intellectuals were also one war late, one critique late—especially French intellectuals, especially now? It has been a long time, after all, since intellectuals were in the vanguard. Indeed, it has been a long time since the very notion of the avant-garde—the proletariat, the artistic—passed away, pushed aside by other forces, moved to the rear guard, or maybe lumped with the baggage train. 1 We are still able to go through the motions of a critical avant-garde, but is not the spirit gone? In these most depressing of times, these are some of the issues I want to press, not to depress the reader but to press ahead, to redirect our meager capacities as fast as possible. To prove my point, I have, not exactly facts, but rather tiny cues, nagging doubts, disturbing telltale signs. What has become of critique, I wonder, when an editorial in the New York Times contains the following quote? Most scientists believe that [global] warming is caused largely by manmade pollutants that require strict regulation. Mr. Luntz [a Republican strategist] seems to acknowledge as much when he says that “the scientiﬁc debate is closing against us.” His advice, however, is to emphasize that the evidence is not complete. “Should the public come to believe that the scientiﬁc issues are settled,” he writes, “their views about global warming will change accordingly. Therefore, you need to continue to make the lack of scientiﬁc certainty a primary issue.” 2 Fancy that? An artiﬁcially maintained scientiﬁc controversy to favor a “brownlash,” as Paul and Anne Ehrlich would say. 3 Do you see why I am worried? I myself have spent some time in the past trying to show “‘the lack of scientiﬁc certainty’” inherent in the construction of facts. I too made it a “‘primary issue.’” But I did not exactly aim at fooling the public by obscuring the certainty of a closed argument—or did I? After all, I have been accused of just that sin. Still, I’d like to believe that, on the contrary, I intended to emancipate the public from prematurely naturalized objectiﬁed facts. Was I foolishly mistaken? Have things changed so fast? In which case the danger would no longer be coming from an excessive conﬁdence in ideological arguments posturing as matters of fact—as we have learned to combat so eﬃciently in the past—but from an excessive distrust of good matters of fact disguised as bad ideological biases! While we spent years trying to detect the real prejudices hidden behind the appearance of objective statements, do we now have to reveal the real objective and incontrovertible facts hidden behind the illusion of prejudices? And yet entire Ph.D. programs are still running to make sure that good American kids are learning the hard way that facts are made up, that there is no such thing as natural, unmediated, unbiased access to truth, that we are always prisoners of language, that we always speak from a particular standpoint, and so on, while dangerous extremists are using the very same argument of social construction to destroy hard-won evidence that could save our lives. Was I wrong to participate in the invention of this ﬁeld known as science studies? Is it enough to say that we did not really mean what we said? Why does it burn my tongue to say that global warming is a fact whether you like it or not? Why can’t I simply say that the argument is closed for good? Should I reassure myself by simply saying that bad guys can use any weapon at hand, naturalized facts when it suits them and social construction when it suits them? Should we apologize for having been wrong all along? Or should we rather bring the sword of criticism to criticism itself and do a bit of soul-searching here: what were we really after when we were so intent on showing the social construction of scientiﬁc facts? Nothing guarantees, after all, that we should be right all the time. There is no sure ground even for criticism. 4 Isn’t this what criticism intended to say: that there is no sure ground anywhere? But what does it mean when this lack of sure ground is taken away from us by the worst possible fellows as an argument against the things we cherish?

#### There are a variety of ways to respond to our energy and climate crises. In the 1950s, nuclear planners chose solid uranium/plutonium fuel cycle designs—these reactors, after all, produced plutonium that we could make nuclear bombs from. Unfortunately, safe and efficient liquid-fluoride thorium reactors were passed over, and have since been ignored.

Hargraves and Moir ’10 Robert Hargraves, teaches energy policy at the Institute for Lifelong Education at Dartmouth, PhD in physics from Brown, and Ralph Moir, Sc.D. in nuclear engineering from MIT, published 10 papers on molten-salt reactors during his career at Lawrence Livermore National Laboratory, “Liquid Fluoride Thorium Reactors: An old idea in nuclear power gets reexamined,” American Scientist, Vol. 98, No. 4, July-August 2010, http://www.americanscientist.org/issues/feature/liquid-fluoride-thorium-reactors

What if we could turn back the clock to 1965 and have an energy do-over? In June of that year, the Molten Salt Reactor Experiment (MSRE) achieved criticality for the first time at Oak Ridge National Laboratory (ORNL) in Tennessee. In place of the familiar fuel rods of modern nuclear plants, the MSRE used liquid fuel - hot fluoride salt containing dissolved fissile material in a solution roughly the viscosity of water at operating temperature. The MSRE ran successfully for five years, opening a new window on nuclear technology. Then the window banged closed when the molten-salt research program was terminated. Knowing what we now know about climate change, peak oil, Three Mile Island, Chernobyl, and the Deepwater Horizon oil well gushing in the Gulf of Mexico in the summer of 2010, what if we could have taken a different energy path? Many feel that there is good reason to wish that the liquid-fuel MSRE had been allowed to mature. An increasingly popular vision of the future sees liquid-fuel reactors playing a central role in the energy economy, utilizing relatively abundant thorium instead of uranium, mass producible, free of carbon emissions, inherently safe and generating a trifling amount of waste. Of course we can't turn back the clock. Maddeningly to advocates of liquid-fuel thorium power, it is proving just as hard to simply restart the clock. Historical, technological and regulatory reasons conspire to make it hugely difficult to diverge from our current path of solid-fuel, uraniumbased plants. And yet an alternative future that includes liquid-fuel thorium-based power beckons enticingly. We'll review the history, technology, chemistry and economics of thorium power and weigh the pros and cons of thorium versus uranium. We'll conclude by asking the question we started with: What if? The Choice The idea of a liquid-fuel nuclear reactor is not new. Enrico Fermi, creator in 1942 of the first nuclear reactor in a pile of graphite and uranium blocks at the University of Chicago, started up the world's first liquid-fuel reactor two years later in 1944, using uranium sulfate fuel dissolved in water. In all nuclear chain reactions, fissile material absorbs a neutron, then fission of the atom releases tremendous energy and additional neutrons. The emitted neutrons, traveling at close to 10 percent of the speed of light, would be very unlikely to cause further fission in a reactor like Fermi's Chicago PiIe-I unless they were drastically slowed - moderated - to speeds of a few kilometers per second. In Fermi's device, the blocks of graphite between pellets of uranium fuel slowed the neutrons down. The control system for Fermi's reactor consisted of cadmium-coated rods that upon insertion would capture neutrons, quenching the chain reaction by reducing neutron generation. The same principles of neutron moderation and control of the chain reaction by regulation of the neutron economy continue to be central concepts of nuclear reactor design. In the era immediately following Fermi's breakthrough, a large variety of options needed to be explored. Alvin Weinberg, director of ORNL from 1955 to 1973, where he presided over one of the major research hubs during the development of nuclear power, describes the situation in his memoir, The First Nuclear Era: In the early days we explored all sorts of power reactors, comparing the advantages and disadvantages of each type. The number of possibilities was enormous, since there are many possibilities for each component of a reactor - fuel, coolant, moderator. The fissile material may be U-233, U-235, or Pu-239; the coolant may be: water, heavy water, gas, or liquid metal; the moderator may be: water, heavy water, beryllium, graphite - or, in a fast-neutron reactor, no moderator.... if one calculated all the combinations of fuel, coolant, and moderator, one could identify about a thousand distinct reactors. Thus, at the very beginning of nuclear power, we had to choose which possibilities to pursue, which to ignore. Among the many choices made, perhaps the most important choice for the future trajectory of nuclear power was decided by Admiral Hyman Rickover, the strong-willed Director of Naval Reactors. He decided that the first nuclear submarine, the LfSS Nautilus, would be powered by solid uranium oxide enriched in uranium-235, using water as coolant and moderator. The Nautilus took to sea successfully in 1955. Building on the momentum of research and spending for the Nautilus reactor, a reactor of similar design was installed at the Shippingport Atomic Power Station in Pennsylvania to become the first commercial nuclear power plant when it went online in 1957. Rickover could cite many reasons for choosing to power the Nautilus with the SlW reactor (SlW stands for submarine, 1st generation, Westinghouse). At the time it was the most suitable design for a submarine. It was the likeliest to be ready soonest. And the uranium fuel cycle offered as a byproduct plutonium-239, which was used for the development of thermonuclear ordnance. These reasons have marginal relevance today, but they were critical in defining the nuclear track we have been on ever since the 1950s. The down sides of Rickover 's choice remain with us as well. Solid uranium fuel has inherent challenges. The heat and radiation of the reactor core damage the fuel assemblies, one reason fuel rods are taken out of service after just a few years and after consuming only three to five percent of the energy in the uranium they contain. Buildup of fission products within the fuel rod also undermines the efficiency of the fuel, especially the accumulation of xenon-135, which has a spectacular appetite for neutrons, thus acting as a fission poison by disrupting the neutron economy of the chain reaction. Xenon135 is short-lived (half-life of 9.2 hours) but it figures importantly in the management of the reactor. For example, as it burns off, the elimination of xenon135 causes the chain reaction to accelerate, which requires control rods to be reinserted in a carefully managed cycle until the reactor is stabilized. Mismanagement of this procedure contributed to the instability in the Chernobyl core that led to a runaway reactor and the explosion that followed. Other byproducts of uranium fission include long-lived transuranic materials (elements above uranium in the periodic table), such as plutonium, americium, neptunium and curium. Disposal of these wastes of the uranium era is a problem that is yet to be resolved. Thorium When Fermi built Chicago PiIe-I, uranium was the obvious fuel choice: Uranium-235 was the only fissile material on Earth. Early on, however, it was understood that burning small amounts of uranium-235 in the presence of much larger amounts of uranium-238 in a nuclear reactor would generate transmuted products, including fissile isotopes such as plutonium-239. The pioneers of nuclear power (Weinberg in his memoir calls his cohorts "the old nukes") were transfixed by the vision of using uranium reactors to breed additional fuel in a cycle that would transform the world by delivering limitless, inexpensive energy. By the same alchemistry of transmutation, the nonfissile isotope thorium-232 (the only naturally occurring isotope of thorium) can be converted to fissile uranium-233. A thorium-based fuel cycle brings with it different chemistry, different technology and different problems. It also potentially solves many of the most intractable problems of the uranium fuel cycle that today produces 17 percent of the electric power generated worldwide and 20 percent of the power generated in the U.S. Thorium is present in the Earth's crust at about four times the amount of uranium and it is more easily extracted. When thorium-232 (atomic number 90) absorbs a neutron, the product, thorium-233, undergoes a series of two beta decays - in beta decay an electron is emitted and a neutron becomes a proton - forming uranium-233 (atomic number 91). Uranium-233 is fissile and is very well suited to serve as a reactor fuel. In fact, the advantages of the thorium /uranium fuel cycle compared to the uranium/plutonium cycle have mobilized a community of scientists and engineers who have resurrected the research of the Alvin Weinberg era and are attempting to get thorium-based power into the mainstream of research, policy and ultimately, production. Thorium power is sidelined at the moment in the national research laboratories of the U.S., but it is being pursued intensively in India, which has no uranium but massive thorium reserves. Perhaps the best known research center for thorium is the Reactor Physics Group of the Laboratoire de Physique Subatomique et de Cosmologie in Grenoble, France, which has ample resources to develop thorium power, although their commitment to a commercial thorium solution remains tentative. (French production of electricity from nuclear power, at 80 percent, is the highest in the world, based on a large infrastructure of traditional pressurized water plants and their own national fuel-reprocessing program for recycling uranium fuel.) The key to thorium-based power is detaching from the well-established picture of what a reactor should be. In a nutshell, the liquid fluoride thorium reactor (LFTR, pronounced "lifter") consists of a core and a "blanket," a volume that surrounds the core. The blanket contains a mixture of thorium tetrafluoride in a fluoride salt containing lithium and beryllium, made molten by the heat of the core. The core consists of fissile uranium-233 tetrafluoride also in molten fluoride salts of lithium and beryllium within a graphite structure that serves as a moderator and neutron reflector. The uranium-233 is produced in the blanket when neutrons generated in the core are absorbed by thorium-232 in the surrounding blanket. The thorium-233 that results then beta decays to short-lived protactinium-233, which rapidly beta decays again to fissile uranium-233. This fissile material is chemically separated from the blanket salt and transferred to the core to be burned up as fuel, generating heat through fission and neutrons that produce more uranium233 from thorium in the blanket. Advantages of Liquid Fuel Liquid fuel thorium reactors offer an array of advantages in design, operation, safety, waste management, cost and proliferation resistance over the traditional configuration of nuclear plants. Individually, the advantages are intriguing. Collectively they are compelling. Unlike solid nuclear fuel, liquid fluoride salts are impervious to radiation damage. We mentioned earlier that fuel rods acquire structural damage from the heat and radiation of the nuclear furnace. Replacing them requires expensive shutdown of the plant about every 18 months to swap out a third of the fuel rods while shuffling the remainder. Fresh fuel is not very hazardous, but spent fuel is intensely radioactive and must be handled by remotely operated equipment. After several years of storage underwater to allow highly radio- . active fission products to decay to stability, fuel rods can be safely transferred to dry-cask storage. Liquid fluoride fuel is not subject to the structural stresses of solid fuel and its ionic bonds can tolerate unlimited levels of radiation damage, while eUminating the (rather high) cost of fabricating fuel elements and the (also high) cost of periodic shutdowns to replace them. More important are the ways in which liquid fuel accommodates chemical engineering. Within uranium oxide fuel rods, numerous transuranic products are generated, such as plutonium-239, created by the absorption of a neutron by uranium-238, followed by beta decay. Some of this plutonium is fissioned, contributing as much as one-third of the energy production of uranium reactors. All such transuranic elements could eventually be destroyed in the neutron flux, either by direct fission or transmutation to a fissile element, except that the solid fuel must be removed long before complete burnup is achieved. In liquid fuel, transuranic fission products can remain in the fluid fuel of the core, transmuting by neutron absorption until eventually they nearly all undergo fission. In solid fuel rods, fission products are trapped in the structural lattice of the fuel material. In liquid fuel, reaction products can be relatively easily removed. For example, the gaseous fission poison xenon is easy to remove because it bubbles out of solution as the fuel salt is pumped. Separation of materials by this mechanism is central to the main feature of thorium power, which is formation of fissile uranium-233 in the blanket for export to the core. In the fluoride salt of the thorium blanket, newly formed uranium-233 forms soluble uranium tetrafluoride (UF4). Bubbling fluorine gas through the blanket solution converts the uranium tetrafluoride into gaseous uranium hexafluoride (UF6), while not chemically affecting the lessreactive thorium tetrafluoride. Uranium hexafluoride comes out of solution, is captured, then is reduced back to soluble UF4 by hydrogen gas in a reduction column, and finally is directed to the core to serve as fissile fuel. Other fission products such as molybdenum, neodymium and technetium can be easily removed from liquid fuel by fluorination or plating techniques, greatly prolonging the viability and efficiency of the liquid fuel. Liquid fluoride solutions are familiar chemistry. Millions of metric tons of liquid fluoride salts circulate through hundreds of aluminum chemical plants daily, and all uranium used in today's reactors has to pass in and out of a fluoride form in order to be enriched. The LFTR technology is in many ways a straightforward extension of contemporary nuclear chemical engineering. Waste Not Among the most attractive features of the LFTR design is its waste profile. It makes very little. Recently, the problem of nuclear waste generated during the uranium era has become both more and less urgent. It is more urgent because as of early 2009, the Obama administration has ruled that the Yucca Mountain Repository, the site designated for the permanent geological isolation of existing U.S. nuclear waste, is no longer to be considered an option. Without Yucca Mountain as a strategy for waste disposal, the U.S. has no strategy at all. In May 2009, Secretary of Energy Steven Chu, Nobel laureate in physics, said that Yucca Mountain is off the table. What we're going to be doing is saying, let's step back. We realize that we know a lot more today than we did 25 or 30 years ago. The [Nuclear Regulatory Commission] is saying that the dry-cask storage at current sites would be safe for many decades, so that gives us time to figure out what we should do for a long-term strategy. The waste problem has become somewhat less urgent because many stakeholders believe Secretary Chu is correct that the waste, secured in huge, hardened casks under adequate guard, is in fact not vulnerable to any foreseeable accident or mischief in the near future, buying time to develop a sound plan for its permanent disposal. A sound plan we must have. One component of a long-range plan that would keep the growing problem from getting worse while meeting growing power needs would be to mobilize nuclear technology that creates far less waste that is far less toxic. The liquid fluoride thorium reactor answers that need. Thorium and uranium reactors produce essentially the same fission (breakdown) products, but they produce a quite different spectrum of actinides (the elements above actinium in the periodic table, produced in reactors by neutron absorption and transmutation). The various isotopes of these elements are the main contributors to the very long-term radiotoxicity of nuclear waste. The mass number of thorium-232 is six units less than that of uranium238, thus many more neutron captures are required to transmute thorium to the first transuranic. Figure 6 shows that the radiotoxicity of wastes from a thorium /uranium fuel cycle is far lower than that of the currently employed uranium/plutonium cycle; after 300 years, it is about 10,000 times less toxic. By statute, the U.S. government has sole responsibility for the nuclear waste that has so far been produced and has collected $25 billion in fees from nuclear-power producers over the past 30 years to deal with it. Inaction on the waste front, to borrow the words of the Obama administration, is not an option. Many feel that some of the $25 billion collected so far would be well spent kickstarting research on thorium power to contribute to future power with minimal waste. Safety First It has always been the dream of reactor designers to produce plants with inherent safety - reactor assembly, fuel and power-generation components engineered in such a way that the reactor will, without human intervention, remain stable or shut itself down in response to any accident, electrical outage, abnormal change in load or other mishap. The LFTR design appears, in its present state of research and design, to possess an extremely high degree of inherent safety. The single most volatile aspect of current nuclear reactors is the pressurized water. In boiling light-water, pressurized light-water, and heavywater reactors (accounting for nearly all of the 441 reactors worldwide), water serves as the coolant and neutron moderator. The heat of fission causes water to boil, either directly in the core or in a steam generator, producing steam that drives a turbine. The water is maintained at high pressure to raise its boiling temperature. The explosive pressures involved are contained by a system of highly engineered, highly expensive piping and pressure vessels (called the "pressure boundary"), and the ultimate line of defense is the massive, expensive containment building surrounding the reactor, designed to withstand any explosive calamity and prevent the release of radioactive materials propelled by pressurized steam. A signature safety feature of the LFTR design is that the coolant - liquid fluoride salt - is not under pressure. The fluoride salt does not boil below 1400 degrees Celsius. Neutral pressure reduces the cost and the scale of LFTR plant construction by reducing the scale of the containment requirements, because it obviates the need to contain a pressure explosion. Disruption in a transport line would result in a leak, not an explosion, which would be captured in a noncritical configuration in a catch basin, where it would passively cool and harden. Another safety feature of LFTRs, shared with all of the new generation of LWRs, is its negative temperature coefficient of reactivity. Meltdown, the bogey of the early nuclear era, has been effectively designed out of modern nuclear fuels by engineering them so that power excursions - the industry term for runaway reactors - are self-limiting. For example, if the temperature in a reactor rises beyond the intended regime, signaling a power excursion, the fuel itself responds with thermal expansion, reducing the effective area for neutron absorption - the temperature coefficient of reactivity is negative - thus suppressing the rate of fission and causing the temperature to fall. With appropriate formulations and configurations of nuclear fuel, of which there are now a number from which to choose among solid fuels, runaway reactivity becomes implausible. In the LFTR, thermal expansion of the liquid fuel and the moderator vessel containing it reduces the reactivity of the core. This response permits the desirable property of load following - under conditions of changing electricity demand (load), the reactor requires no intervention to respond with automatic increases or decreases in power production. As a second tier of defense, LFTR designs have a freeze plug at the bottom of the core - a plug of salt, cooled by a fan to keep it at a temperature below the freezing point of the salt. If temperature rises beyond a critical point, the plug melts, and the liquid fuel in the core is immediately evacuated, pouring into a subcriticai geometry in a catch basin. This formidable safety tactic is only possible if the fuel is a liquid. One of the current requirements of the Nuclear Regulatory Commission (NRC) for certification of a new nuclear plant design is that in the event of a complete electricity outage, the reactor remain at least stable for several days if it is not automatically deactivated. As it happens, the freezeplug safety feature is as old as Alvin Weinberg's 1965 Molten Salt Reactor Experiment design, yet it meets the NRCs requirement; at ORNL, the "old nukes" would routinely shut down the reactor by simply cutting the power to the freeze-plug cooling system. This setup is the ultimate in safe poweroutage response. Power isn't needed to shut down the reactor, for example by manipulating control elements. Instead power is needed to prevent the shutdown of the reactor.

#### We affirm: The United States federal government should substantially increase market-fixed production cost incentives for Liquid Fuel Thorium Small Modular Reactors.

#### Flexible incentives would prompt a thorium renaissance

Rosner and Goldberg ‘11 (Robert (William E. Wrather Distinguished Service Professor in the Departments of Astronomy and Astrophysics and Physics) and Stephen (Special Assistant to the Director at the Argonne National Laboratory) , *Energy Policy Institute at Chicago*, “Small Modular Reactors – Key to Future Nuclear Power Generation in the U.S.”, Technical Paper, Revision 1, November 2011)

Production Cost Incentive: A production cost incentive is a performance-based incentive. With a production cost incentive, the government incentive would be triggered only when the project successfully operates. The project sponsors would assume full responsibility for the upfront capital cost and would assume the full risk for project construction. The production cost incentive would establish a target price, a so-called “market-based benchmark.” Any savings in energy generation costs over the target price would accrue to the generator. Thus, a production cost incentive would provide a strong motivation for cost control and learning improvements, since any gains greater than target levels would enhance project net cash flow. Initial SMR deployments, without the benefits of learning, will have significantly higher costs than fully commercialized SMR plants and thus would benefit from production cost incentives. Because any production cost differential would decline rapidly due to the combined effect of module manufacturing rates and learning experience, the financial incentive could be set at a declining rate, and the level would be determined on a plant-by-plant basis, based on the achievement of cost reduction targets.43 The key design parameters for the incentive include the following: 1. The magnitude of the deployment incentive should decline with the number of SMR modules and should phase out after the fleet of LEAD and FOAK plants has been deployed. 2. The incentive should be market-based rather than cost-based; the incentive should take into account not only the cost of SMRs but also the cost of competing technologies and be set accordingly. 3. The deployment incentive could take several forms, including a direct payment to offset a portion of production costs or a production tax credit. The Energy Policy Act of 2005 authorized a production tax credit of $18/MWh (1.8¢/kWh) for up to 6,000 MW of new nuclear power plant capacity. To qualify, a project must commence operations by 2021. Treasury Department guidelines further required that a qualifying project initiate construction, defined as the pouring of safety- related concrete, by 2014. Currently, two GW-scale projects totaling 4,600 MW are in early construction; consequently, as much as 1,400 MW in credits is available for other nuclear projects, including SMRs. The budgetary cost of providing the production cost incentive depends on the learning rate and the market price of electricity generated from the SMR project. Higher learning rates and higher market prices would decrease the magnitude of the incentive; lower rates and lower market prices would increase the need for production incentives. Using two scenarios (with market prices based on the cost of natural gas combined-cycle generation) yields the following range of estimates of the size of production incentives required for the FOAK plants described earlier. For a 10% learning rate, 􏰂 Based on a market price of $60/MWh44 (6¢/kWh), the LEAD plant and the subsequent eight FOAK plants would need, on average, a production credit of $13.60/MWh (1.4¢/kWh), 24% less than the $18 credit currently available to renewable and GW-scale nuclear technologies. (The actual credit would be on a sliding scale, with the credit for the LEAD plant at approximately $31/MWh, or 3.1¢/kWh, declining to a credit of about $6/MWh, or 0.6¢/kWh, by the time of deployment of FOAK-8). The total cost of the credit would be about $600 million per year (once all plants were built and operating). If the market price were about $70/MWh (7¢/kWh), the LEAD and only four subsequent FOAK plants would require a production incentive. In this case, the average incentive would be $8.40/MWh (0.8¢/kWh), with a total cost of about $200 million per year. Higher learning rates would drive down the size of the production incentive. For example, at a 12% learning rate, 􏰂 At a market price of $60/MWh (6¢/kWh), the LEAD and the subsequent five FOAK plants would require a production incentive, with an average incentive level of about $15/MWh (1.5¢/kWh). Total annual cost (after all plants are in full operation) would be about $450 million per year. 􏰂 At a market price of $70/MWh (7¢/kWh), the LEAD and three FOAK plants would require a production incentive averaging $9.00/MWh (0.9¢/kWh, half of the current statutory incentive), with a total annual cost of about $170 million per year. The range of costs for the production incentive illustrates the sensitivity of the incentive level to the learning rate and the market price of electricity. Thus, efforts to achieve higher learning rates, including fully optimized engineering designs for the SMRs and the manufacturing plant, as well as specially targeted market introduction opportunities that enable SMRs to sell electricity for higher priced and higher value applications, can have a critical impact on the requirements for production incentives. The potential size of the incentive should be subject to further analysis as higher quality cost estimates become available.

#### This would trigger key reductions in carbon emissions—that’s essential to slow and reverse anthropogenic climate change

Hargraves and Moir ’11 Robert Hargraves, teaches energy policy at the Institute for Lifelong Education at Dartmouth, PhD in physics from Brown, and Ralph Moir, Sc.D. in nuclear engineering from MIT, published 10 papers on molten-salt reactors during his career at Lawrence Livermore National Laboratory, “Liquid Fuel Nuclear Reactors,” Physics & Society, January 2011, http://www.aps.org/units/fps/newsletters/201101/hargraves.cfm

Burning coal for power is the largest source of atmospheric CO2, which drives global warming. We seek alternatives such as burying CO2 or substituting wind, solar, and nuclear power. A source of energy cheaper than coal would dissuade nations from burning coal while affording them a ready supply of electric power. Can a LFTR produce energy cheaper than is currently achievable by burning coal? Our target cost for energy cheaper than from coal is $0.03/kWh at a capital cost of $2/watt of generating capacity. Coal costs $40 per ton, contributing $0.02/kWh to electrical energy costs. Thorium is plentiful and inexpensive; one ton worth $300,000 can power a 1,000 megawatt LFTR for a year. Fuel costs for thorium would be only $0.00004/kWh. The 2009 update of MIT’s Future of Nuclear Power shows that the capital cost of new coal plants is $2.30/watt, compared to LWRs at $4/watt. The median of five cost studies of large molten salt reactors from 1962 to 2002 is $1.98/watt, in 2009 dollars. Costs for scaled-down 100 MW reactors can be similarly low for a number of reasons, six of which we summarize briefly: Pressure. The LFTR operates at atmospheric pressure, obviating the need for a large containment dome. At atmospheric pressure there is no danger of an explosion. Safety. Rather than creating safety with multiple defense-in-depth systems, LFTR’s intrinsic safety keeps such costs low. A molten salt reactor cannot melt down because the normal operating state of the core is already molten. The salts are solid at room temperature, so if a reactor vessel, pump, or pipe ruptured they would spill out and solidify. If the temperature rises, stability is intrinsic due to salt expansion. In an emergency an actively cooled solid plug of salt in a drain pipe melts and the fuel flows to a critically safe dump tank. The Oak Ridge MSRE researchers turned the reactor off this way on weekends. Heat. The high heat capacity of molten salt exceeds that of the water in PWRs or liquid sodium in fast reactors, allowing compact geometries and heat transfer loops utilizing high-nickel metals. Energy conversion efficiency. High temperatures enable 45% efficient thermal/electrical power conversion using a closed-cycle turbine, compared to 33% typical of existing power plants using traditional Rankine steam cycles. Cooling requirements are nearly halved, reducing costs and making air-cooled LFTRs practical where water is scarce. Mass production. Commercialization of technology lowers costs as the number of units produced increases due to improvements in labor efficiency, materials, manufacturing technology, and quality. Doubling the number of units produced reduces cost by a percentage termed the learning ratio, which is often about 20%. In The Economic Future of Nuclear Power, University of Chicago economists estimate it at 10% for nuclear power reactors. Reactors of 100 MW size could be factory-produced daily in the way that Boeing Aircraft produces one airplane per day. At a learning ratio of 10%, costs drop 65% in three years. Ongoing research. New structural materials include silicon-impregnated carbon fiber with chemical vapor infiltrated carbon surfaces. Such compact thin-plate heat exchangers promise reduced size and cost. Operating at 950°C can increase thermal/electrical conversion efficiency beyond 50% and also improve water dissociation to create hydrogen for manufacture of synthetic fuels such that can substitute for gasoline or diesel oil, another use for LFTR technology. In summary, LFTR capital cost targets of $2/watt are supported by simple fluid fuel handling, high thermal capacity heat exchange fluids, smaller components, low pressure core, high temperature power conversion, simple intrinsic safety, factory production, the learning curve, and technologies already under development. A $2/watt capital cost contributes $0.02/kWh to the power cost. With plentiful thorium fuel, LFTRs may indeed generate electricity at less than $0.03/kWh, underselling power generated by burning coal. Producing one LFTR of 100 MW size per day could phase out all coal burning power plants worldwide in 38 years, ending 10 billion tons per year of CO2 emissions from coal plants.

#### Talking about state policies that improve the ways we produce energy and contest climate change has a radical potential. The 1AC affirms a militant pluralist assemblage tasked with exploring new strategies for reducing inequality and changing human interaction with our so-called ‘environment.’

Connolly ’12 William E. Connolly, Krieger-Eisenhower Professor of Political Science at Johns Hopkins University, “Steps toward an Ecology of Late Capitalism,” Theory & Event, Vol. 15, Issue 1, 2012, Muse

3. Today, perhaps the initial target should be on reconstituting established patterns of consumption by a combination of direct citizen actions in consumption choices, publicity of such actions, and social movements to reconstitute the state/market supported infrastructure of consumption. By the infrastructure of consumption I mean state support for market subsystems such as a national highway system, a system of airports, medical care through private insurance, etc., etc., that enable some modes of consumption in the zones of travel, education, diet, retirement, medical care, energy use, health, and education and render others more difficult or expensive to procure.21 To shift several of these in the correct direction would already reduce extant inequalities. To change the infrastructure is also to affect the types of work and investment available. Social movements that work upon the infrastructure and ethos in tandem can make a real difference directly, encourage more people to extend their critical perspectives, and thereby open more people to a militant politics if and as a new disruptive event emerges. Perhaps a cross-state citizen goal should be to construct a pluralist assemblage by moving back and forth between shifts in role performance, revisions in political ideology, and adjustments in political sensibility, doing so to generate enough collective energy to launch a general strike simultaneously in several countries in the near future. Its aim would be to reduce inequality and to reverse the deadly future created by established patterns of climate change by fomenting significant shifts in patterns of consumption, corporate policies, state law and the priorities of interstate organizations. Again, the dilemma of today is that the fragility of things demands shifting and slowing down intrusions into several aspects of nature as we speed up shifts in identity, role performance, cultural ethos, market regulation, and citizen activism.

#### We should stop treating structures as unmovable wholes—all it takes is one crack to expose the fragility of oppressive institutions. The plan is a radical experiment in democratic politics.

Connolly ’12 William E. Connolly, Krieger-Eisenhower Professor of Political Science at Johns Hopkins University, “Steps toward an Ecology of Late Capitalism,” Theory & Event, Vol. 15, Issue 1, 2012, Muse

A philosophy attending to the acceleration, expansion, irrationalities, interdependencies and fragilities of late capitalism suggests that we do not know with confidence, in advance of experimental action, just how far or fast changes in the systemic character of neoliberal capitalism can be made. The structures often seem solid and intractable, and indeed such a semblance may turn out to be true. Some may seem solid, infinitely absorptive, and intractable when they are in fact punctuated by hidden vulnerabilities, soft spots, uncertainties and potential lines of flight that become apparent as they are subjected to experimental action, upheaval, testing, and strain. Indeed, no ecology of late capitalism, given the variety of forces to which it is connected by a thousand pulleys, vibrations, impingements, dependencies, shocks and thin threads, can specify with supreme confidence the solidity or potential flexibility of the structures it seeks to change. The strength of structural theory, at its best, was in identifying institutional intersections that hold a system together; its conceit, at its worst, was the claim to know in advance how resistant those intersections are to potential change. Without adopting the opposite conceit, it seems important to pursue possible sites of strategic action that might open up room for productive change. Today it seems important to attend to the relation between the need for structural change and identification of multiple sites of potential action. You do not know precisely what you are doing when you participate in such a venture. You combine an experimental temper with the appreciation that living and acting into the future inevitably carries a shifting quotient of uncertainty with it. The following tentative judgments and sites of action may be pertinent.

#### Praxis can be hard, but planning action is essential for achieving our critical goals. The world is not reducible solely to discourse—subjectivity is also positioned within material circumstances that influence thought—this demands particular strategies for change

Bryant ’12 Levi Bryant, teaches philosophy at Collin College, “RSI, Discursivity, Critique, and Politics,” Larval Subjects, 7/18/2012, http://larvalsubjects.wordpress.com/2012/07/18/rsi-discursivity-critique-and-politics/

If I get worked up about these issues, then this is because I think they’ve created serious lacuna in our political theory and practice. Suppose I focus on norms, for example. Great, I’ve developed a theory of norms and how they contribute to the social fabric. Yet while Kant claims that “ought implies can”, I’m not so sure. You’ve shown that something is unjust or that this would be the reasonable way to proceed. But at the real-material level people are caught in sticky networks that suck them into life in particular ways. They ought, for example, to drive an electric car, but what if it’s not available where they are or what if they can’t afford it? Well they should do whatever they can to get it? But what of their other obligations such as eating, sheltering themselves, taking care of their children, paying their medical bills, etc? It would be so nice if we just had mistaken beliefs or failed to recognize the right norms. Things would be so easy then. But there’s life, there’s the power of things. Sometimes the issues aren’t ones of ideology– and yes, of course, I recognize that ideology is probably involved in making electric cars expensive and hard to obtain, but not for them always –sometimes they’re simply issues of the power of things. And if we treat things as blank screens we’ll have difficulty seeing this and we’ll miss out on other opportunities for engagement. Long ago I used to keep track of my blog. I had a map that showed me where all my visits were coming from about the world. I noticed that the interior portions of the United States were largely dark with no visits and that the coasts and cities had a high volume of traffic. Given that my blog talks about all sorts of things ranging from weather patterns to beavers to mantis shrimps to octopi (I get all these random visits from folks searching for these things), it followed that the absence of traffic from these regions of the country couldn’t be explained in terms of a lack of interest in French and continental philosophy (yes, I recognize that there are also cultural reasons folks from these reasons might shy away from such things). What then was it? I think the answer must be that there’s a lack easy and inexpensive internet access from these portions of the country. Notice also that these regions of the country are also the most conservative regions of the country. Could there be a relation between lack of access and conservatism? I am not suggesting that lack of access is the cause of conservatism and fundamentalism. Clearly there’s a whole history in these regions and an entire set of institutions that exercise a particular inertia. I’m saying that if the only voices you hear are those in your immediate community, how much opportunity is there to think and imagine otherwise? You’re only exposed to the orthodoxy of your community and their sanctions. I am also not saying that if you give people the internet they’ll suddenly become radical leftists. Minimally, however, they’ll have a vector of deterritorialization that allows them to escape the constraints of their local social field. All of this begs the question of who critique is for. If it can’t get to the audience that you want to change, what’s it actually doing? Who’s it addressed to? Sometimes you get the sense that the practice of radical political philosophy and critical theory is a bit like the Underpants Gnomes depicted in South Park: The Underpants Gnomes have a plan for success: collect underwear —>; ? [question mark] —->; profit. This is like our critical theorists: debunk/decipher —>; ? [question mark] —->; revolution! The problem is the question mark. We’re never quite sure what’s supposed to come between collecting the underwear and profit, between debunking and revolution. This suggests an additional form of political engagement. Sometimes the more radical gesture is not to debunk and critique, but to find ways to lay fiber optic cables, roads, plumbing, etc. How, for example, can a people rise up and overturn their fundamentalist dictators if they’re suffering from typhoid and cholera as a result of bad plumbing and waste disposal? How can people overturn capitalism when they have to support families and need places to live and have no alternative? Perhaps, at this point, we need a little less critique and a little more analysis of the things that are keeping people in place, the sticky networks or regimes of attraction. Perhaps we need a little more carpentry. This has real theoretical consequences. For example, we can imagine someone writing about sovereignty, believing they’re making a blow against nationalism by critiquing Schmitt and by discussing Agamben, all the while ignoring media of communication or paths of relation between geographically diverse people as if these things were irrelevant to nationalism occurring. Ever read Anderson on print culture and nationalism? Such a person should. Yet they seem to believe nationalism is merely an incorporeal belief that requires no discussion of material channels or media. They thereby deny themselves of all sorts of modes of intervention, hitching everything on psychology, attachment, and identification. Well done!

#### A responsible politics must learn to appreciate the contours and crannies permeating existence. Singular, unitary, and whole accounts of being are inevitably unsettled in confrontations with alterity; they respond with hatred, reactivity, and violence. A responsible politics must cultivate a sense of *becoming*. Evaluate this debate in terms of competing responses to difference.

Connolly ’11 William E. Connolly, Krieger-Eisenhower Professor of Political Science at Johns Hopkins University, A World of Becoming, 2011, p. 5-8

A force-field, roughly speaking, is any energized pattern in slow or rapid motion periodically displaying a capacity to morph, such as a climate system, biological evolution, a political economy, or human thinking. As we shall explore in chapter 1, different force-fields display differential capacities of agency. We inhabit a world of becoming composed of heterogeneous force-fields; and we also participate in two registers of temporal experience, each of which can help us to get bearings in such a world. It is when the story of multiple force-fields of different types, in and beyond the human estate, is linked to the exploration of two registers of temporal experience in the human estate that things get interesting. Nonetheless, the themes of this book may carry little weight for anyone who finds nothing of interest in the Barton Fink scene or in a moment from their own past that resonates somehow with the scene I have painted from mine. You may give singular priority to the demands of punctual time while I seek to maintain a tense balance between the incorrigible demands and pleasures of operational perception set in punctual time (the kids’ attention to that spinning bottle as it drew to a halt) and the need to dwell periodically in protean moments that exceed the operational demands of action. You may initially connect the temper I commend to ‘‘optimism’’ or ‘‘romanticism’’ rather than to the pessimism, coolness, realism, or abiding sense of the negative that you respect. I don’t see it that way, though. My sense is that those who jump to such a conclusion have too limited an arsenal of ontological alternatives available. To appreciate two registers of experience in a world of becoming can also help us come to terms with tragic possibility. Such an appreciation encourages us to embrace the world as we act and intervene resolutely in it, even though it is replete with neither divine providence nor ready susceptibility to human mastery. Indeed, I don’t read the absence of providence or mastery as a ‘‘lack,’’ finding the use of that term by some to express a hangover of previous views inadequately overcome in the view officially adopted. I also know that shared experiences of grief or loss can help to consolidate connections with others, and that collective anger, resentment, and indignation are often indispensable spurs to critical action. So there is no sense here that ‘‘thinking it is so makes it so’’ or that ‘‘optimism is always healthy.’’ These orientations are attached to a different take on existence than that advanced here, though there are people who confuse the two. I do suspect that when inordinate drives for individual self-sufficiency, unity, community, consensus, or divine redemption are severely disappointed, things can become dangerous. These disappointed drives—I am sure there are others as well—readily cross over into entrenched dispositions to take revenge on the most fundamental terms of human existence, as a person, a constituency, or a putative nation grasps those terms. If and when that happens, an exclusionary, punitive, scandal-ridden, bitter politics is apt to result, regardless of how the carriers represent themselves to others. Here actions speak louder than words. A world of becoming has considerable evidence on its side, as we shall see; and affirmation of this condition without existential resentment provides one way to act resolutely in the world while warding off individual and collective drives to existential resentment. There are others, as we shall also see. Given the human predicament (explored in chapter 4), no theological or nontheological perspective at this level carries iron-clad guarantees. A crack or fissure running through every final perspective is part of the human predicament as I construe it. On my rendering, the course of time is neither governed solely by a pattern of efficient causation—where each event is determined to occur by some prior event in linear temporal order—nor expressive of an inherent purpose revolving around the human animal as such. Neither/nor. To put it in different terms, time is neither mechanical nor organic, and its human apprehension is neither susceptible to the method of ‘‘individualism’’ nor that of ‘‘holism.’’ We participate, rather, in a world of becoming in a universe set on multiple zones of temporality, with each temporal force-field periodically encountering others as outside forces, and the whole universe open to an uncertain degree. From this perspective, tragic possibility—not inevitability but possibility—is real: tragic possibility as seen from the vantage point of your time or country or species; tragic possibility sometimes actualized through the combination of hubris and an unlikely conjunction of events. Or by some other combination. I even suspect that differential degrees of agency in other force-fields, with which we enter into encounters of many types, increases the risk of that possibility. The universe is not only open; there is an ‘‘outside’’ to every temporal force-field. We are not only limited as agents, but part of our limitation comes from the different degrees of agency in other force-fields with which we interact. The operation of multiple tiers of becoming in a world without a higher purpose amplifies the need to act with dispatch, and sometimes with militancy, in particular situations of stress. The fact that we are not consummate agents in such a world, combined with the human tendency to hubris, means that we must work to cultivate wisdom under these very circumstances. These two dictates, engendering each other while remaining in tension, constitute the problematic of political action in a world of becoming. William James, Henri Bergson, Friedrich Nietzsche, Alfred North Whitehead, and Gilles Deleuze all advance different versions of time as becoming. Perhaps Merleau-Ponty and Marcel Proust do too, with qualifications. I draw from several of them the idea that it takes both philosophical speculation linked to scientific experiment and dwelling in uncanny experiences of duration to vindicate such an adventure. Both. Luckily, as we shall see, some strains of complexity theory in the natural sciences also support the theme of time as becoming as they compose new experiments and rework classical conceptions of causality. Moreover, in everyday life fugitive glimmers of becoming are available to more people more of the time, as we experience the acceleration of many zones of life, the enhanced visibility of natural disasters across the globe, the numerous pressures to minoritize the entire world along several dimensions at a more rapid pace, the globalization of capital and contingency together, the previously unexpected ingress of capital into climate change, the growing number of film experiments with the uncanniness of time, and the enlarged human grasp of the intelligence and differential degrees of agency in other plant and animal species. Such experiences and experiments together call into question early modern conceptions of time. Many respond to such experiences by intensifying religious and secular drives to protect an established image, as either linear and progressive or infused with divine providence. I suspect, however, that such responses— unless their proponents actively engage the comparative contestability of them without deep existential resentment—can amplify the dangers and destructiveness facing our time. Or, at least, they need to be put into more active competition with a conception that speaks to an array of contemporary experiences otherwise pushed into the shadows. To amplify the experience of becoming is one affirmative way to belong to time today. Active exploration and support of such a perspective can make a positive contribution to the late-modern period by drawing more people toward such a perspective or by showing others how much work they need to do to vindicate their own perspective. I belong to a growing contingent who think that a perspective defined by active examination of becoming can make positive contributions to explorations of spirituality, economics, political action, poetic experience, and ethics.

#### The intellectual exploration behind the 1AC is not just another positivist or technoscientific epistemology—the aff employs thorium power and climate science not as matters of fact, but matters of concern, cultivating an ethic of care for difference

Latour ‘4 Bruno Latour, Professor and vice-president for research at Sciences Po Paris, “Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern,” Critical Inquiry 30, Winter 2004

Do you see why I am worried? Threats might have changed so much that we might still be directing all our arsenal east or west while the enemy has now moved to a very diﬀerent place. After all, masses of atomic missiles are transformed into a huge pile of junk once the question becomes how to defend against militants armed with box cutters or dirty bombs. Why would it not be the same with our critical arsenal, with the neutron bombs of deconstruction, with the missiles of discourse analysis? Or maybe it is that critique has been miniaturized like computers have. I have always fancied that what took great eﬀort, occupied huge rooms, cost a lot of sweat and money, for people like Nietzsche and Benjamin, can be had for nothing, much like the supercomputers of the 1950s, which used to ﬁll large halls and expend a vast amount of electricity and heat, but now are accessible for a dime and no bigger than a ﬁngernail. As the recent advertisement of a Hollywood ﬁlm proclaimed, “Everything is suspect . . . Everyone is for sale . . . And nothing is what it seems.” What’s happening to me, you may wonder? Is this a case of midlife crisis? No, alas, I passed middle age quite a long time ago. Is this a patrician spite for the popularization of critique? As if critique should be reserved for the elite and remain diﬃcult and strenuous, like mountain climbing or yachting, and is no longer worth the trouble if everyone can do it for a nickel? What would be so bad with critique for the people? We have been complaining so much about the gullible masses, swallowing naturalized facts, it would be really unfair to now discredit the same masses for their, what should I call it, gullible criticism? Or could this be a case of radicalism gone mad, as when a revolution swallows its progeny? Or, rather, have we behaved like mad scientists who have let the virus of critique out of the conﬁnes of their laboratories and cannot do anything now to limit its deleterious effects; it mutates now, gnawing everything up, even the vessels in which it is contained? Or is it an another case of the famed power of capitalism for recycling everything aimed at its destruction? As Luc Boltanski and Eve Chiapello say, the new spirit of capitalism has put to good use the artistic critique that was supposed to destroy it. 9 If the dense and moralist cigar-smoking reactionary bourgeois can transform him- or herself into a free- ﬂoating agnostic bohemian, moving opinions, capital, and networks from one end of the planet to the other without attachment, why would he or she not be able to absorb the most sophisticated tools of deconstruction, social construction, discourse analysis, postmodernism, postology? In spite of my tone, I am not trying to reverse course, to become reactionary, to regret what I have done, to swear that I will never be a constructivist any more. I simply want to do what every good military oﬃcer, at regular periods, would do: retest the linkages between the new threats he or she has to face and the equipment and training he or she should have in order to meet them—and, if necessary, to revise from scratch the whole paraphernalia. This does not mean for us any more than it does for the oﬃcer that we were wrong, but simply that history changes quickly and that there is no greater intellectual crime than to address with the equipment of an older period the challenges of the present one. Whatever the case, our critical equipment deserves as much critical scrutiny as the Pentagon budget. My argument is that a certain form of critical spirit has sent us down the wrong path, encouraging us to ﬁght the wrong enemies and, worst of all, to be considered as friends by the wrong sort of allies because of a little mistake in the deﬁnition of its main target. The question was never to get away from facts but closer to them, not ﬁghting empiricism but, on the contrary, renewing empiricism. What I am going to argue is that the critical mind, if it is to renew itself and be relevant again, is to be found in the cultivation of a stubbornly realist attitude—to speak like William James—but a realism dealing with what I will call matters of concern, not matters of fact. The mistake we made, the mistake I made, was to believe that there was no eﬃcient way to criticize matters of fact except by moving away from them and directing one’s attention toward the conditions that made them possible. But this meant accepting much too uncritically what matters of fact were. This was remaining too faithful to the unfortunate solution inherited from the philosophy of Immanuel Kant. Critique has not been critical enough in spite of all its sore-scratching. Reality is not deﬁned by matters of fact. Matters of fact are not all that is given in experience. Matters of fact are only very partial and, I would argue, very polemical, very political renderings of matters of concern and only a subset of what could also be called states of aﬀairs. It is this second empiricism, this return to the realist attitude, that I’d like to oﬀer as the next task for the critically minded. To indicate the direction of the argument, I want to show that while the Enlightenment proﬁted largely from the disposition of a very powerful descriptive tool, that of matters of fact, which were excellent for debunking quite a lot of beliefs, powers, and illusions, it found itself totally disarmed once matters of fact, in turn, were eaten up by the same debunking impetus. After that, the lights of the Enlightenment were slowly turned oﬀ, and some sort of darkness appears to have fallen on campuses. My question is thus: Can we devise another powerful descriptive tool that deals this time with matters of concern and whose import then will no longer be to debunk but to protect and to care, as Donna Haraway would put it? Is it really possible to transform the critical urge in the ethos of someone who adds reality to matters of fact and not subtract reality? To put it another way, what’s the diﬀerence between deconstruction and constructivism? “So far,” you could object, “the prospect doesn’t look very good, and you, Monsieur Latour, seem the person the least able to deliver on this promise because you spent your life debunking what the other more polite critics had at least respected until then, namely matters of fact and science itself. You can dust your hands with ﬂour as much as you wish, the black fur of the critical wolf will always betray you; your deconstructing teeth have been sharpened on too many of our innocent labs—I mean lambs!—for us to believe you.” Well, see, that’s just the problem: I have written about a dozen books to inspire respect for, some people have said to uncritically glorify, the objects of science and technology, of art, religion, and, more recently, law, showing every time in great detail the complete implausibility of their being socially explained, and yet the only noise readers hear is the snapping of the wolf’s teeth. Is it really impossible to solve the question, to write not matter-of-factually but, how should I say it, in a matter-of-concern way? 10

#### Encounter our aff as a becoming-revolutionary. Political dichotomies lapse into the worst violence; politics must include caution alongside experimentation.

Tampio ‘9 Nicholas Tampio, Fordham University, “Assemblages and the Multitude: Deleuze, Hardt, Negri, and the Postmodern Left,” European Journal of Political Theory 8 (3), 2009, 383-400, Sage

In his 1990 interview with Negri, Deleuze refutes the Leninist assumptions embedded in Negri’s political imagination. First, ‘there’s no longer any image of proletarians around of which it’s just a matter of becoming conscious’.49 Deleuze’s point is not that the proletariat as a class has vanished, nor that the left should ignore workers’ struggles, but that the concept of the proletariat determines too many issues in advance. In a rare occurrence of the term ‘proletariat’ in A Thousand Plateaus, Deleuze and Guattari remark that ‘as long as the working class defines itself by an acquired status’ it ‘does not leave the plan(e) of capital’.50 For Deleuze, the concept of proletariat works within a dichotomy – capitalism or communism – that the left should elude. The challenge for the left is to envision ‘landscapes, characters, and behavior that are different from those to which traditional history, even of the Marxist variety, has made us accustomed’.51 Second, Deleuze demystifies the concept of revolution. Historical revolutions, Deleuze observes, almost always end up badly: the English Revolution led to Cromwell, the French Revolution gave us Napoleon, and the Bolshevik Revolution bolstered Stalin. Deleuze, like Kant, thinks that revolutions are dangerous and almost never change people’s minds in a positive way.52 Men’s only hope,’ Deleuze explains, ‘lies in a revolutionary becoming’.53 ‘Becoming revolutionary’ is a much more cautious form of political change than Lenin’s ‘experience of revolution’. Becoming revolutionary entails surveying the political landscape, attaining a certain degree of political power, **inside** or **outside** of the state, testing out new laws, policies, and rhetorics, and preserving the admirable elements of the society in which one lives.54 ‘As a rule immanent to experimentation’, Deleuze explains, ‘injections of caution’.55 The best available option for the left in capitalist societies is to invent axioms and theorems that can steer economic forces in positive directions.56 Third, Deleuze does not think that communism, as a social condition after sovereignty, is desirable or viable. Deleuze responds to Negri, and the MarxistLeninist tradition in general, in the discussion of the state and the war machine in A Thousand Plateaus. A state is defined by ‘the perpetuation or conservation of organs of power’; it is the sovereign power that undertakes large-scale projects, constitutes surpluses, and accomplishes public functions.57 A war machine, by contrast, ‘exists only in its own metamorphoses’, as a scientific, technological, industrial, commercial, religious, or philosophical force that flees or punctures the containment of the state.58 Negri, we have seen, interprets Deleuze’s political project of simply siding with the war machines against the state. For Deleuze, however, states and war machines coexist and compete ‘in a perpetual field of interaction’.59 The great political question, for Deleuze, is how to draw the line between the state and the war machine, to strike the optimum balance between chaos and order, to take advantage of the life-affirming forces of metamorphosis without risking one’s individual or collective life.60 For Deleuze, eliminating sovereignty, the political form of interiority, is suicidal, akin to injecting heroin to become a body without organs. It is far better to use a ‘very fine file’ to open up the political body to new possibilities than to wield a sledgehammer to obliterate its contours.61 In the next section, we examine in more detail Deleuze’s positive contribution to contemporary political thought. Now, we can observe how Deleuze’s critique of Leninist political thought continues to strike a nerve. Peter Hallward has recently argued that Deleuze prefers to investigate the mechanics of disembodiment and de-materialization than to promote concrete political change.62 Hallward justifies his claim that Deleuze is an ‘extra-worldly’ philosopher by highlighting affinities between Deleuze’s philosophy and Neoplatonism, mysticism, pantheism, and theophanism. According to these traditions, the ethical task is to transcend oneself, not necessarily to reach a higher realm of being, but to access a greater creative force, whether one calls it God or a conceptual equivalent (energy, life, pure potential, the plane of immanence, etc.). Politics, for these philosophies, is beside the point. According to Hallward, Deleuze’s work offers an ‘immaterial and evanescent grip’ on the mechanisms of capitalist exploitation.63 The politics of the future, instead, depends on ‘more resilient forms of cohesion’, ‘more principled forms of commitment’, and ‘more integrated forms of coordination’. 64 For Hallward, the contemporary left should turn to Lenin, not Deleuze, to theorize political subjectivity. Deleuze would protest Hallward’s reading of his philosophy as well as the framing of the problem of left-wing thought. Hallward accentuates the moment in Deleuze’s thought in which he presses us to loosen the limitations that close us off from the virtual, but Hallward minimizes the complementary moment in Deleuze’s thought in which he invites us to embrace what has been created. In Nietzsche and Philosophy, Deleuze utilizes Nietzsche’s image of the dicethrow to depict these two moments: ‘The dice which are thrown once are the affirmation of chance, the combination which they form on falling is the affirmation of necessity’. 65 Hallward furthermore accuses Deleuze of favoring contemplation over action based upon his conception of philosophy as the ‘creation of concepts’. Paul Patton raises a simple, but powerful objection to this line of argument: ‘Philosophy is not politics’.66 In A Thousand Plateaus, Deleuze consistently juxtaposes two sets of principles, the first pressing us to open our individual and social bodies to new ideas and experiences, the second to incorporate those ideas and experiences into our personal and political identities. A Thousand Plateaus insists that politics is about transforming the material world: ‘molecular escapes and movements would be nothing if they did not return to the molar organizations to reshuffle their segments, their binary distributions of sexes, classes, and parties’.67 For Deleuze, philosophy may be about exploring the higher and lower reaches of this world – what he calls the virtual – but politics is about bringing these insights to bear on the actual world. Deleuze and Guattari had leftist critics such as Hardt, Negri, Zizek, and Hallward in mind when A Thousand Plateaus declares: ‘We’re tired of trees.’68 Hardt and Negri claim that the multitude is not a dogmatic concept because it does not have a transcendent organ. The problem with trees, however, is not that they have a head, but that they have a trunk. The trunk, in this case, is the postulate that a left political body should organize the proletariat, to enact a revolution, to surpass sovereignty. Deleuze and Guattari’s critique of arborescent leftism resonates with John Stuart Mill’s and Alexis de Tocqueville’s fears in On Liberty and Democracy in America about the ‘tyranny of the majority’. ‘A king’, Tocqueville observes, ‘has only a material power that acts on actions and cannot reach wills; but the majority is vested with a force, at once material and moral, that acts on the will as much as on actions’.69 Deleuze, like Mill and Tocqueville, would not be comforted by Hardt and Negri’s claim that they renounce Lenin’s belief that the proletariat must be led by a vanguard. A vanguard may strike the body, but a multitude ‘draws a formidable circle around thought’.70 For Deleuze, the left needs a new conceptual armory that is not tied to the Marxist-Leninist image of politics.

## 2AC

### Case

#### No mining or supply issues—we already have more than enough stored

Cannara ’11 Alexander Cannara, received his BSEE degree from Lehigh University, and received MSEE, DEE and MS Statistics degrees from Stanford, returned to Stanford for a PhD in Mathematical Methods in Educational Research and a Master of Science in Statistics, during which time he designed analog and digital instrumentation, applying for a patent on one design, has taught courses in engineering, programming and networking at Stanford, University of San Francisco, International Technological University, Golden Gate and Silicon Valley University, and has worked both for the government and in the corporate arena with such organizations as Ballantine Laboratories, RMC Research, Zilog, Gibbons & Associates, Mitsubishi Semiconductor, AMD, 3Com, Network General, Vitesse, PacketMotion and Xambala, “IEER/PSR Thorium “Fact Sheet” Rebuttal,” response to the 2009 Makhijani and Boyd piece on thorium, posted 3/23/2011 by Kirk Sorenson on Energy From Thorium, http://energyfromthorium.com/ieer-rebuttal/

Thorium is found with rare-earth mineral deposits, and global demand for rare-earth mining will inevitably bring up thorium deposits. At the present time, we in the US have the strange policy of considering this natural material as a “radioactive waste” that must be disposed at considerable cost. Other countries like China have taken a longer view on the issue and simply stockpile the thorium that they recover during rare-earth mining for future use in thorium reactors. In addition, the United States has an already-mined supply of 3200 metric tonnes of thorium in Nevada that will meet energy needs for many decades. The issues surrounding thorium mining are immaterial to its discussion as a nuclear energy source because thorium will be mined under any circumstance, but if we use it as a nuclear fuel we can save time and effort by avoiding the expense of trying to throw it away.

#### We solve demand/adoption issues

Rosner & Goldberg 11 (Robert, William E. Wrather Distinguished Service Professor, Departments of Astronomy and Astrophysics, and Physics, and the College at the U of Chicago, and Stephen, Energy Policy Institute at Chicago, The Harris School of Public Policy Studies, "Small Modular Reactors - Key to Future Nuclear Power Generation in the U.S.," Nov 2011, [https://epic.sites.uchicago.edu/sites/epic.uchicago.edu/files/uploads/EPICSMRWhitePaperFinalcopy.pdf], jam)

As stated earlier, SMRs have the potential to achieve significant greenhouse gas emission reductions. They could provide alternative baseload power generation to facilitate the retirement of older, smaller, and less efficient coal generation plants that would, otherwise, not be good candidates for retrofitting carbon capture and storage technology. They could be deployed in regions of the U.S. and the world that have less potential for other forms of carbon-free electricity, such as solar or wind energy. There may be technical or market constraints, such as projected electricity demand growth and transmission capacity, which would support SMR deployment but not GW-scale LWRs. From the on-shore manufacturing perspective, a key point is that the manufacturing base needed for SMRs can be developed domestically. Thus, while the large commercial LWR industry is seeking to transplant portions of its supply chain from current foreign sources to the U.S., the SMR industry offers the potential to establish a large domestic manufacturing base building upon already existing U.S. manufacturing infrastructure and capability, including the Naval shipbuilding and underutilized domestic nuclear component and equipment plants. The study team learned that a number of sustainable domestic jobs could be created – that is, the full panoply of design, manufacturing, supplier, and construction activities – if the U.S. can establish itself as a credible and substantial designer and manufacturer of SMRs. While many SMR technologies are being studied around the world, a strong U.S. commercialization program can enable U.S. industry to be first to market SMRs, thereby serving as a fulcrum for export growth as well as a lever in influencing international decisions on deploying both nuclear reactor and nuclear fuel cycle technology. A viable U.S.-centric SMR industry would enable the U.S. to recapture technological leadership in commercial nuclear technology, which has been lost to suppliers in France, Japan, Korea, Russia, and, now rapidly emerging, China. SMR design, licensing, and detailed engineering activities are in an early stage. Licensing and design certification documents are expected to be ready for NRC filing in the 2013 time frame, and detailed engineering is about 10-20% complete. At the time of this analysis, limited cost data were publicly available, and current estimates have a significant amount of uncertainty. The study team estimates that GW-level reactors have roughly two orders of magnitude greater manhours already expended in this early engineering design work as compared with design work carried out for SMRs to date. Finally, the tooling up at a factory dedicated to SMR manufacturing is still in the planning stages and will likely require significant investment for a dedicated plant to manufacture SMRs for an n th-of-a-kind (NOAK) economy.

#### Thorium solves waste and prolif problems – this ev is answering Makhijani in person

Martin 12 (Richard, author of "SuperFuel: Thorium, The Green Energy Source for the future, and he's a contributing editor for Wired and editorial director for Pike Research, May 4, "Is Thorium a Magic Bullet for Our Energy Problems?" [www.npr.org/2012/05/04/152026805/is-thorium-a-magic-bullet-for-our-energy-problems], jam)

MARTIN: However - you're welcome. However, some of those conclusions are just wrong. So when we talk about the waste, one of the things that skeptics of the liquid fuel thorium reactor ignore is the fact that because the core is a liquid, you can continually process waste, even from existing conventional reactors into forms that are much smaller in terms of volume, and the radioactivity drops off much, much quicker. We're talking about a few hundred years as opposed to tens of thousands of years. So to say that thorium reactors, like any other reactor, will create waste that needs to be handled and stored, et cetera, is true, but the volume, we're talking tenths of a percent of the comparable volume from a conventional reactor. And not only that, but we've got all that waste from our existing nuclear reactor fleet, just sitting around, and we've got no plan for it. And so we're talking about building a reactor that can process that into forms that are much, much easier to deal with. And so that's the waste issue. The proliferation issue is complicated. And the point that Dr. Makhijani, in the paper that I've read, brings up but then kind of dismisses is that in order to build a bomb with uranium-233, you somehow have to obtain it out of the reactor. And because this is a self-contained, liquid fuel system, it's - there's no point at which you can divert material. There's no material sitting in a warehouse somewhere, getting ready to be put in the reactor and so on. And to be able to obtain that material, you would have to somehow breach the reactor, shut it down, separate out the fissionable material and get away with it. And as I say in "SuperFuel," the book, good luck with that. But the other point is that even if you did manage to do that, the uranium-233 is contaminated with yet another isotope, U-232, which is one of the nastiest substances in the universe, and it makes handling and processing and separating out the U-233 virtually impossible, even for a sophisticated nuclear power lab, much less for a rogue nation, or terrorist group or someone of that ilk. So to say that in principle you could obtain material with which you could make a bomb from a liquid-fueled thorium reactor is true. In the real world, the chances of that are, you know, very, very slim - so much as to be negligible.

#### Protactinium is solved by original MSR designs – U-232 contamination and Pa-233 diversion shuts down reactor

Stone 12 (Cavan, Doctor of Philosophy (PhD), Physics at Dartmouth College, Energy and Computer Technology Analyst at Ethan Allen Institute's Energy Education Project, MIT Lincoln Laboratory / Kwajalein Range Services, Circuit City, Harvard-Smithsonian Center for Astrophysics, comment on the post, "Back to thorium – the thorium cycle and non-proliferation," Sep 2, [www.fas.org/blogs/sciencewonk/2012/08/back-to-thorium-the-thorium-cycle-and-non-proliferation/], jam)

Hi Martin, To touch on your protactinium comment, preventing this method of proliferation has already been addressed in the original Oak Ridge documents. 1st it is important to realize that Thorium MSR reactors are not a single design but a class of designs with various options to tailor to specific applications. That being said, these are the two design options that would make protactinium diversion impractical. First, protactinium separation is an option, NOT a requirement for MSR designs. It’s nice to have for neutron economy but you can easily run designs without it. Furthermore a little bit of U-232 goes a long way in frustrating weapon construction efforts. Without the needed chemical separation equipment on site, an adversary would have to either covertly divert the Pa or import on a closely monitored site a large amount of equipment needed with the purity required under the time constraints. Second, and even more crucial, is in at-risk countries, running designs with Iso-breeding. You can run designs tuned such that nearly every bit of Pa-233 is needed to keep the reactor running, converting that Th-232 into Pa-233. If an adversary where to divert even just a little Pa-233, the breeding reaction and thus the reactor itself would automatically shut down, quite loudly announcing the diversion effort. The only way around this is to feed into the reactor the very fissile material our hypothetical proliferator is trying to extract. Finally a note about where I think the goal posts lie. Given a hypothetical, non-existent adversary with unlimited resources any anti-proliferation system will fail and any technology nuclear AND non-nuclear can be converted into a weapon. Absolute safety is impossible and people get into there car everyday in spite of the risk of an accident. Now, if you review the literature, I am confident you’ll find that the science behind Thorium MSRs clearly demonstrates a highly significant reduction in proliferation risk relative to our present situation and the amount of effort required to make a weapon out of Thorium MSRs very clearly dwarfs the present methods countries like Iran and North Korea are using to make weapons in spite of the dedicated efforts of the world community to prevent them from doing so. My prime criticism of proliferation-based MSR opponents is that they let a non-existent perfect be an enemy of the magnitudes better. This especially true when after reviewing the literature, it is quite apparent that Thorium MSRs can eliminate the number one reason for modern era wars in the first place, intense competition over limited and diminishing natural resources.

### Civ K

#### Prefer plurality over unitary theory—our world of fragility and complexity can’t be explained by singular totalizing frameworks—it always leaps outside and beyond these explanations. Mixing critique is the best strategy because it allows for greater theoretical agility—the alt alone is an anthropocentric denial of the activity of objects

Bryant ’12 Levi Bryant, teaches philosophy at Collin College, “RSI, Discursivity, Critique, and Politics,” Larval Subjects, 7/18/2012, http://larvalsubjects.wordpress.com/2012/07/18/rsi-discursivity-critique-and-politics/

What we need– or what I want –is something like the Lacanian Borromean Knot. Here the Imaginary would be the way in which one entity encounters another entity. For example, the way in which mantis shrimps encounter the world about them or the way in which people of another culture encounter the world around them. Each machine or object (the two are synonyms for me), encounters the world around it in a particular way. Each discipline encounters the world around it in a particular way and is blind to other aspects of the world. There are as many phenomenologies and transcendental structures of cognition as there are types of machines. There’s even a transcendental aesthetic, analytic, and dialectic for flowers. The symbolic would be the way in which entities capable of language signify the world through narratives, signifiers, signs, texts, etc. Who knows whether this is restricted to humans? As I’ve increasingly argued, I believe aliens live among us. They go by names like “corporation”, “army”, “government”, “institution”, etc. These beings, I believe, are irreducible to humans (the influence of Niklas Luhmann on me), and perhaps have their own symbolics. Just as we don’t know the language of dolphins, we don’t know the languages of these entities. They have their own symbolic. And perhaps likewise with bees, dolphins, octopi, and birds. Finally, the real is the dimension of irreducibility of a think to how it is perceived by another being (imaginary), or symbolized by another entity. It is the irreducible difference that a road has to affect us, for example, despite being created by us. The important caveat is 1) that there is no one borromean knot or RSI, and that 2) all three orders don’t need to be present for there to be being at work. The orders can become unglued, and in many instances some of the orders aren’t present at all. For example, I suspect that the order of the symbolic isn’t operative for bacteria (though the symbolic is at work for us when we talk about bacteria), though the order of the real and imaginary is at work for bacteria. How we work with bacteria in the symbolic, of course, does not undermine the real of bacteria or their ability to contribute differences irreducible to knowledge, signification, or belief. What’s important is that we practice something like what Bogost has call “alien phenomenology”, thinking the experiential world of nonhumans and others, and refusing to privilege one point of view on the universe.

#### Alt cedes the political—turns the K—our advocacy solves

Connolly ’12 William E. Connolly, Krieger-Eisenhower Professor of Political Science at Johns Hopkins University, “Steps toward an Ecology of Late Capitalism,” Theory & Event, Vol. 15, Issue 1, 2012, Muse

6. The democratic state, while it certainly cannot alone tame capital or reconstitute the ethos of consumption, must play a significant role in reconstituting our lived relations to climate, weather, resource use, ocean currents, tectonic instability, glacier flows, species diversity, work, local life, consumption, and investment, as it responds favorably to pressures to forge a new ethos. A New, new democratic Left will thus experimentally enact new intersections between role performance and political activity, outgrow its old disgust with the very idea of the state, and remain alert to the dangers states can pose. It will do so because, as already suggested, the fragile ecology of late capital requires state interventions of several sorts. A refusal to participate in the state today cedes too much hegemony to neoliberal markets, either explicitly or by implication. Some drives to fascism, remember, emerged the last time around in capitalist states after a total market meltdown. Most of those movements failed. But a couple became consolidated through a series of resonances (vibrations) back and forth between industrialists, state officials, and vigilante groups in neighborhoods, clubs, churches, the police, the media and pubs. You do not fight the danger of a new kind of neofascism by withdrawing from either micropolitics or state politics. You do so through a multi-sited politics designed to shift systemic interactions and to infuse a new ethos into the fabric of everyday life. Changes in ethos can sometimes open doors to new possibilities of state and interstate action, so that an advance in one domain seeds that in the other. And vice versa. A positive dynamic of mutual amplification might be generated here. Could a series of significant shifts in the routines of state and global capitalism even press the fractured system to a point where it hovers on the edge of capitalism itself? We don’t know. That is one reason it is important to focus on interim goals. Another is that in a world of becoming, replete with periodic and surprising shifts in the course of events, you cannot project far beyond an interim period. Another yet is that activism needs to project concrete, interim possibilities to gain support and propel itself forward. That being said, it does seem unlikely to me, at least, that a positive interim future includes either socialist productivism or the world projected by proponents of deep ecology.23

#### Sovereignty might get a bad rap but it isn’t nearly as bad as they make it out to be. Discourses of the law’s violent underside obscures its potential to get stuff done. We don’t always have to resist—we can see the state as strategic.

Jacques Derrida, Directeur d’Etudes at the Ecole des Hautes Etudes en Sciences Sociales in Paris, and Professor of Philosophy, French and Comparative Literature at the University of California, Irvine, 2004, For What Tomorrow? A Dialogue With Elisabeth Roudinesco, p. 91-92

J.D.: A moment ago you spoke of regicide as the necessity of an ex­ception, in sum. Well, yes, one can refer provisionally to Carl Schmitt (whatever one may think of him, his arguments are always useful for prob­lematizing the “political” or the “juridical”; I examined this question in Pol­itics of Friendship). He says in effect that a sovereign is defined by his capacity to decide the exception. Sovereign is he who effectively decides the exception. The revolutionaries decided that at that moment that it was nec­essary to suspend justice and—in order to establish the law [droit] and to give the Revolution its rights—to suspend the rule of law [l’Etat de droit]. Schmitt also gives this definition of sovereignty: to have the right to sus­pend the law, or the rule of law, the constitutional state. Without this cate­gory of exception, we cannot understand the concept of sovereignty. Today, the great question is indeed, everywhere, that of sovereignty. Omnipresent in our discourses and in our axioms, under its own name or another, liter­ally or figuratively, this concept has a theological origin: the true sovereign is God. The concept of this authority or of this power was transferred to the monarch, said to have a “divine right.” Sovereignty was then delegated to the people, in the form of democracy, or to the nation, with the same the­ological attributes as those attributed to the king and to God. Today, wher­ever the word “sovereignty” is spoken, this heritage remains undeniable, whatever internal differentiation one may recognize in it. How do we deal with this? Here we return to the question of heritage with which we began. It is necessary to deconstruct the concept of sover­eignty, never to forget its theological filiation and to be ready to call this fil­iation into question wherever we discern its effects. This supposes an in­flexible critique of the logic of the state and of the nation-state. And yet—hence the enormous responsibility of the citizen and of the heir in general, in certain situations—the state, in its actual form, can resist cer­tain forces that I consider the most threatening. What I here call “responsibility” is what dictates the decision to be sometimes for the sovereign state and sometimes against it, for its deconstruction (“theoretical and practical,” as one used to say) according to the singularity of the contexts and the stakes. There is no relativism in this, no renunciation of the injunction to “think” and to deconstruct the heritage. This aporia is in truth the very condition of decision and responsibility—if there is any. I am thinking for example of the incoherent but organized coalition of international capitalist forces that, in the name of neoliberalism or the market,31 are taking hold of the world in conditions such as the “state” form; this is what can still resist the most. For the moment. But it is neces­sary to reinvent the conditions of resistance. Once again, I would say that according to the situations, I am an antisovereignist or a sovereignist—and I vindicate the right to be antisovereignist at certain times and a sovereignist at others. No one can make me respond to this question as though it were a matter of pressing a button on some old-fashioned machine. There are cases in which I would support a logic of the state, but I ask to examine each situation before making any statement. It is also necessary to recognize that by requiring someone to be not unconditionally sovereignist but rather soyvereignist only under certain conditions, one is already calling into question the principle of sovereignty. Deconstruction begins there. It demands a dif­ficult dissociation, almost impossible but indispensable, between uncondi­tionality (justice without power) and sovereignty (right, power, or potency). Deconstruction is on the side of unconditionaliry, even when it seems im­possible, and not sovereignty, even when it seems possible.

#### It isn’t helpful to think of the state as supreme and cunning to justify disengagement—it’s more important to identify methods of challenging oppression, including considerations of “non-revolutionary” alternatives.

Gilles Deleuze, “Toward Freedom” published in The Deleuze Reader, ed. Constantin V. Boundas, 1993, p.255-256

The mistake would be to say: there is a globalizing State, the master of its plans and extending its traps; and then, a force of resistance which will adopt the form of the State even if it entails betraying us, or else which fall into local spontaneous or partial struggles, even if it entails being suffocated and beaten every time. The most centralized State is not at all the master of its plans, it is also an experimenter, it performs injections, it is unable to look into the future: the economists of the State declare themselves incapable of predicting the increase in a monetary mass. American politics is forced to proceed by empirical injections, not at all by apodictic programs. What a sad and sham game is played by those who speak of a supremely cunning master, in order to present the image of themselves as rigorous, incorruptible, and "pessimist" thinkers. It is along the different lines of complex assemblages that the powers that be carry out their experiments, but along them also arise experimenters of another kind, thwarting predictions, tracing out active lines of flight, looking for the combination of these lines, increasing their speed or slowing it down, creating the plane of consistence fragment by fragment, with a war-machine that would weigh the dangers that it encountered at each step. What characterizes our situation is both beyond and on this side of the State. Beyond national States, the development of a world market, the power of multinational companies, the outline of a "planetary" organization, the extension of capitalism to the whole social body, clearly forms a great abstract machine which overcodes the monetary, industrial, and technological fluxes. At the same time the means of exploitation, control, and surveillance become more and more subtle and diffuse, in a certain sense molecular (the workers of the rich countries necessarily take part in the plundering of third world, men take part in the exploitation of women, etc.) But the abstract machine, with its dysfunctions, is no more fallible than national States which are not able to regulate them on their own territory and from one territory to another. The state no longer has at its disposal the political, institutional, or even financial means which would enable it to fend off the social repercussions of the machine; it is doubtful whether it can eternally rely on the old forms like the police, armies, bureaucracies, even trade union bureaucracies, collective installations, schools, families. Enormous land slides are happening on this side of the state, following lines of gradient or flight, affecting principally: (1) the marking of territories; (2) mechanisms of economic subjugation (new characteristics of unemployment, of inflation); (3) the basic regulatory frameworks (crisis of the school, of trade unions, of the army, of women…); (4) the nature of the demands which become qualitative as much as quantitative ("quality of life" rather than the "standard of living"). All this constitutes what can be called a right to desire. It is not surprising that all kinds of minority questions—linguistic, ethnic, regional, about sex, or youth—resurge not only as archaisms, but in up-to-date revolutionary form which call once more into question in an entirely immanent manner both the global economy of the machine and the assemblages of national States. Instead of gambling on the eternal impossibility of the revolution and on the fascist return of a war-machine in general, why not think that a new type of revolution is in the course of becoming possible, and that all kinds of mutating, living machines conduct wars, are combined and trace out a plane of consistence which undermines the plane of organization of the world and the States? For, once again, the world and its States are no more masters of their plan than revolutionaries are condemned to the deformation of theirs. Everything is played in uncertain games, "front to front, back to back, back to front…." The question of the revolution is a bad question because, insofar as it is asked, there are so many people who do not become, and this is exactly why it is done, to impede the question of the revolutionary-becoming of people, at every level, in every place.

#### The K of technology misses the boat—the segregation of “nature” from “machine” is anthropocentric metaphysics

Haraway 91—Donna Haraway [Awesome philosopher with a PhD in biology], "A Cyborg Manifesto Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in Simians, Cyborgs and Women: The Reinvention of Nature (New York; Routledge, 1991), pp.149-181. <http://www.egs.edu/faculty/haraway/haraway-a-cyborg-manifesto.html>

The second leaky distinction is between animal-human (organism) and machine. Pre-cybernetic machines could be haunted; there was always the spectre of the ghost in the machine. This dualism structured the dialogue between materialism and idealism that was settled by a dialectical progeny, called spirit or history, according to taste. But basically machines were not self-moving, self-designing, autonomous. They could not achieve man's dream, only mock it. They were not man, an author to himself, but only a caricature of that masculinist reproductive dream. To think they were otherwise was paranoid. Now we are not so sure. Late twentieth-century machines have made thoroughly ambiguous the difference between natural and artificial, mind and body, self-developing and externally designed, and many other distinctions that used to apply to organisms and machines. Our machines are disturbingly lively, and we ourselves frighteningly inert.

#### The opposition between legal violence and local resistance is a false one—the attempt to purge politics of violence is the height of ethical irresponsiblity

Thomson ‘5 Alex Thomson, lecturer in English at the University of Glasgow, 2005, Deconstruction and Democracy, p. 171-73

What Derrida proposes is not the end of revolution, however, but an extension and revision of the concept: What I am saying is anything but conservative and anti-revolutionary. For beyond Benjamin’s explicit purpose I shall propose the interpreta­tion according to which the very violence of the foundation or position of law must envelop the violence of conservation and cannot break with it. It belongs to the structure of fundamental violence that it calls for the repetition of itself and founds what ought to be conserved, conservable, promised to heritage and tradition, to be shared. [FoL 38 / 93—4] Benjamin’s opposition of a ‘law-making’ to a ‘law-conserving’ violence depends on the revolutionary situation — his example is the general strike —in which a new founding of the law is at stake [FoL 34—5 / 84—5]. However, for Derrida, we cannot know whether or not we are in the middle of a law-founding moment; precisely because such a moment can never be said to be ‘present’. The event and the effects of a decision can only be revealed in retrospect: ‘those who say “our time”, while thinking “our present in light of a future anterior present do not know very well, by definition, what they are saying’. Instead, as I have shown in relation to the decision, for Derrida ‘the whole history of law’ is that of its continual refoundation and reformulation: but crucially, ‘This moment always takes place and never takes place in a presence’ [FoL 36 / 89]. Like the decision, which calls for its own reaffirmation, for another decision, but which becomes law as soon as it has been done, so the violent foundation of the law calls for confirmation and conservation which is also violence. On the one hand, the violence of the suspension of all laws, on the other hand the violent suspension of that sus­pension in the rule of law: ‘Deconstruction is also the idea of— and the idea adopted by necessity of — this difirantielle contamination’ [FoL 39 / 95]. Politics is the mixture of these two forms of decision, two forms of violence which cannot be opposed in the manner Benjamin wishes (rigorously) or in terms of Greek and Judaic origins. This suggests a complete revision of the concept of revolution. By analogy with Schmitt, we might say that the moment of revolution or of violent overthrow is the possibility of a pure and present politicization. The danger of such an analysis is that it will tend to a glorification of violence for its own sake. But for Derrida there can be no question of such a politics. His own overturning of the logic of the revolu­tionary could in some ways be considered more radical, if it didn’t subvert the traditional concept of the ‘radical’ as well. Instead of the moment of revolution becoming the defining moment of the political, every moment, every decision is to be considered revolutionary. The revolutionary moment of the exception, the suspension of all rules, can no longer be imagined to be something that could or would take place, and therefore no longer something to call for or aim at. Revolutionary politicization can no longer be thought of as something that could be made present, it is not of the order of possibility. Instead the revolutionary is the order of the perhaps. But this ‘perhaps’ is not found in the exceptional moment, but makes an exception of every moment and every decision. If there is a politics of Derrida’s work it lies here, in his insistence on the revolutionary act of interpretation, of foundation of the law, of negotiation and calculation. This is where we must work most patiently to show that his messianism without messiah, which he is at pains to distinguish from that of Benjamin, is a messianism without content, without expectation of any thing coming: no revolution, no God, nothing.7 But by relocating the mes­sianic to the structure of event-hood itself, to the everyday negotiation with the law, with responsibility and duty, Derrida radicalizes the possibility of thinking politically. If the political is the moment of absolute uncertainty, but such uncertainty that we do not know where it is to be found, then the political is both the most common and the least common experience. The possibility of change, of something else happening, of justice, of more equal distribution of wealth or power is witnessed to and attested to by every event; although this possibility is indissociable from the threat of less justice, less equality, less democracy. The challenge of deconstruction is to find ways of thinking and acting which are adequate to this not-knowing, to the radical condition of the perhaps. Alexander Garcia Duttmann suggests to Derrida that this is the case: ‘on the one hand, we could be talking in the name of reformism, because each decision calls for another one. We face an ongoing process of reform after reform after reform. But at the same time we could radicalise that thought into something like a permanent revolution.’ Derrida confirms his proposal, echoing the passage from ‘Psyche: Inventions of the Other’ with which I concluded my introduction: ‘When I referred a moment ago to messianicity without messianism, I was describing a revolutionary experience. ..... But when I insisted on the fact that we must nevertheless prepare the revolution, it was because we must not simply be open to what­ever comes. The revolution, however unpredictable it may be, can and must be prepared for in the most cautious slow and labourious [sic] way.’8 Such a thought of depoliticization will always be open to two accusations. The first is that it is too theological, too messianic, too abstract, or not concrete enough. Yet clearly from Derrida’s point of view, any theory which presumes to label, identify or name a present politics, a determinate concept of the political, is being more messianic, in seeking to make some particular future arrive, to make something in particular happen. The other potential accusation would be that this is not radical at all, since it is not radical according to traditional political paths and codes. Certainly, if the degree of radicality of a theory were to be measured in term of the incomprehension and misunderstanding that have accrued to it then we would quite easily be able to prove that Derrida’s revolutionary politics is more radical than tradi­tional concepts of revolution. As Geoffrey Bennington comments: ‘the need to compromise, negotiate, with the most concrete detail of current arrange­ments of right: this is what defines deconstruction as radically political’.9 Deconstruction is an affirmation of what happens, and of the revolutionary reinvention at work in every political decision, and so clearly cannot be simply opposed to politics as it already exists. As I argued in the discussion of radical democracy in Chapter 3, this means thinking politics within the state as much as against the state; and as I emphasized in Chapter 6, deconstruction demands an intensive engagement with the law, both within and beyond the state.

#### Structures like civilization are not closed totalities—a holistic, ecological approach is essential to dealing with the infinite externalities which compose social existence—the alt disavows its own fragility and contingency

Connolly ’12 William E. Connolly, Krieger-Eisenhower Professor of Political Science at Johns Hopkins University, “Steps toward an Ecology of Late Capitalism,” Theory & Event, Vol. 15, Issue 1, 2012, Muse

I focus here, however, on a related issue. Many critics of neoliberalism criticize it as they also downplay the self-regulatory powers of economic markets. For instance they may say, correctly in my view, that markets don’t work that way nearly as much as their defenders say. I agree that economic markets can be very unstable because of, say, elite collusion, self-amplifying bubbles, the actions of other states, and several of these in conjunction. But I further treat economic markets as merely one type of imperfect self-regulating system in a cosmos composed of innumerable, interacting open systems with differential capacities of self-regulation set on different scales of time, agency, creativity, viscosity and speed. These open systems periodically interact in ways that can support, amplify, or destabilize one another. It is partly because economic markets operate in a world of multiple self-regulating systems of several types that they are more volatile than the advocates of neoliberalism pretend. The theme of a cosmos of open, interacting force-fields may press against some assumptions in neoliberalism, socialist productivism, Keynesianism and classical Marxism alike, though there are important variations here. So we can only speak of tendencies. Where the latter types may diverge from the theory projected here is either in the assumption that cultural theory can concentrate its attention on the internal dynamics of social, state and economic formations without close reference to movements of natural systems of multiple sorts, or in a tendency to think that capitalism constitutes an absorbent system that automatically returns the shocks and dissenting pressures applied to it as enhanced drives to its own expansion and intensification, or in a tendency to treat nonhuman force-fields as reducible to simple law-like patterns without significant powers of metamorphosis. When you come to terms more closely with interacting, self-regulatory, nonhuman systems with differential capacities of metamorphosis you can also come to terms more thoughtfully with the volatile ecology of late modern capitalism and the contemporary fragility of things. You may thus call into question assumptions about temporal progress tied to the complementary ideas of human mastery and/or a predesign of being. From the perspective advanced here these two visions are complementary in that while proponents of each tend to oppose the other, they both act as if the nonhuman world is predisposed to us, either in being designed for us or in being more susceptible to mastery than it is. Challenging the anthropocentric hubris in these two images you will now extend, as the case requires, the reach of politico-economic inquiry to specific non-economic, non-discursive systems that penetrate and impinge upon econo-cultural life. You thus allow the shocks that these impingements periodically pose to open up new patterns of thinking, interpretation and political activism.9 Those theorists who complain all the time about the “externalities” that have messed up their models by fomenting this or that untoward event, before returning to the purity of those models, suffer from a debilitating disease: they act as if their models would work if only the world did not contain so many “outside” factors that are, in fact, imbricated in a thousand ways with the practices they study. A subset of theorists on the Left who tend to construe capitalism as a closed system that automatically recaptures and absorbs bumps in its own operations present a mirror image of that picture. Both parties may underplay, though in different keys and degrees, the role of noise and loose remainders within the markets they study, the ways capitalism alters non-human force-fields, and the independent power of nonhuman forces acting upon capitalism.