# Round 6 CEDA – ASU RV vs. USC KT (Aff)

## 1AC

### Inherency

#### Observation One: Inherency

#### Obama pushing nuclear incentives now.

Pistilli 12 (Melissa, reporting on market-shaking news in the resource and mining investment sector with Resource Investing News since 2008, 10-11-12, “Nuclear Power Prominent in US Presidential Candidates’ Energy Policies” 10/11 <http://uraniuminvestingnews.com/12783/nuclear-power-united-states-energy-policies-romney-obama-election.html>)

The Obama administration’s energy policy supports the expansion of nuclear energy. Under Obama, the government’s 2012 budget allocated $36 billion in loan guarantees for new nuclear reactors and more than $800 million in loan guarantees for nuclear research, an IBISWorld report states. The research report also highlights Obama’s Clean Electricity Standard and its push for more electricity to be produced from zero-carbon sources. “These climate-change policies will lead to a boost in nuclear-energy production,” said IBISWorld. New nuclear reactors approved This year, the US approved construction of reactors for the first time in nearly 30 years; they are expected to come online by 2017. The Southern Company (NYSE:SO) won approval from the US Nuclear Regulatory Commission (NRC) to construct two new reactors at its Vogtle power plant near Waynesboro, Georgia. Currently, another 16 plants across the country have applied to the NRC to build 25 more reactors. Last month, the NRC issued a license that allows General Electric-Hitachi Global Laser Enrichment (GLE) to build and operate the first uranium enrichment plant with classified laser technology, a more cost-effective process than employing centrifuges. The plant “could provide a steady supply of uranium enriched right here in the US to the country’s nuclear reactors,” GLE CEO Chris Monetta said. The US Department of Energy (DOE) “has played a pivotal role in advancing a public-private cost-sharing program that supports the development of smaller reactors,” according to former Environmental Protection Agency administrator and former New Jersey Governor Christine Todd Whitman and Dr. Patrick More, co-founder and former leader of Greenpeace — current co-chairs of the Clean and Safe Energy Coalition. Where will waste go? However, the US nuclear revival has been held up by the fact that the country lacks a long-term plan for dealing with nuclear waste. Currently, most plants keep waste onsite in temporary storage pools, but that is only a short-term solution to a long-term problem. In June 2012, a federal appeals court ruled that the NRC has not provided “reasonable assurance” that it has a long-term waste-management solution — as a result, the NRC will not be approving any new projects for some time. The plan had been to move waste to a repository at Nevada’s Yucca Mountain. The US government has already signed contracts with several utilities, including Southern, for waste disposal at Yucca Mountain. The repository was supposed to open in 1998, but politics and legal issues stalled the project for years. Obama put the project on ice in 2010, appointing the Blue Ribbon Commission on America’s Nuclear Future to develop recommendations for creating a safe, long-term solution to nuclear waste management and storage. The Commission delivered its final report in January of this year, calling for the creation of a federal agency aimed at soliciting and evaluating voluntary proposals from states interested in hosting nuclear disposal areas. The idea is similar to what Romney proposed in October 2011 and would involve states offering disposal sites in exchange for monetary compensation. What next? The freeze on new reactor approvals hasn’t stopped the Obama administration from pushing forward on nuclear energy research and development. In late September, the US Department of Energy announced $13 million in funding for university-led nuclear innovation projects under the Nuclear Energy University Programs (NEUP). “The awards … build upon the Obama Administration’s broader efforts to promote a sustainable nuclear industry in the U.S. and cultivate the next generation of scientists and engineers,” the DOE press release states. The funding was awarded to research groups at the Georgia Institute of Technology, the University of Illinois at Urbana-Champaign and the University of Tennessee.

#### There’s global expansion of nuclear now – Fukushima doesn’t matter.

Marketwire 12 (5/3/12, – Part of the Paragon Report on uranium ore stock future

<http://finance.yahoo.com/news/nuclear-renaissance-back-track-122000381.html>)

NEW YORK, NY--(Marketwire -05/03/12)- Last year the Fukushima disaster in Japan started a downward spiral for companies in the Uranium Industry. Approximately one year later the industry looks to be finally recovering as the Global X Uranium ETF (URA) is up nearly 12 percent year-to-date. "Fukushima put a speed bump on the road to the nuclear renaissance," Ganpat Mani, president of Converdyn, said at a nuclear industry summit. "It's not going to delay the programs around the world." The Paragon Report examines investing opportunities in the Uranium Industry and provides equity research on Cameco Corporation (CCJ - News) and Uranium One, Inc. (UUU.TO - News). Approximately 650 million people in China and India currently are living without electricity. With the high costs of fossil fuel the most viable options for these countries would be nuclear power. Indonesia, Egypt, and Chile are among some of the nations that have plans to build their first nuclear power station, the list of countries operating atomic plants currently stands at 30. According to numbers released by the World Nuclear Association there are 61 reactors that are presently under construction, and plans to build another 162. "In two years, there will be very strong demand on the market, as new reactors start operating, and as new contracts with the existing fleet kick in," Areva SA's Chief Commercial Officer Ruben Lazo said in a previous interview.

#### But, the US is not reversing course on reprocessing.

Saillan 10 (Charles, attorney with the New Mexico Environment Department, Harvard Environmental Law Review, 2010, “DISPOSAL OF SPENT NUCLEAR FUEL IN THE UNITED STATES AND EUROPE: A PERSISTENT ENVIRONMENTAL PROBLEM”, Vol. 34, RSR)

The U.S. government’s position on reprocessing changed in 1974 when India exploded a nuclear weapon in the state of Rajasthan. 150 The weapon’s plutonium was isolated with reprocessing equipment imported for “peaceful purposes.” 151 Rightly concerned about the dangers of nuclear proliferation, President Ford announced that the United States would no longer view reprocessing as a necessary step in the nuclear fuel cycle. He called on other nations to place a three-year moratorium on the export of reprocessing technology. 152 In 1977, President Carter indefinitely deferred domestic efforts at reprocessing and continued the export embargo. 153 Although President Reagan reversed the ban on domestic reprocessing in 1981, 154 the nuclear industry has not taken the opportunity to invest in the technology. In 2006, the George W. Bush Administration proposed a Global Nuclear Energy Partner ship (“GNEP”) for expanded worldwide nuclear power production. 155 As a key component of the GNEP proposal, the United States would provide other nations with a reliable supply of nuclear fuel, and it would take back the spent fuel for reprocessing at a commercial facility in the United States, thus avoiding the spread of reprocessing technology. 156 However, the Obama Administration substantially curtailed GNEP in 2009, and is “no longer pursuing domestic commercial reprocessing.” 157

### Observation 2

#### Observation Two: Plutonium

#### Plutonium-238 is not being produced by any country, supplies are running low, and Congress hasn’t provided funding to restart production – that devastates NASA leadership and credibility and creates a “lost generation” of planetary scientists.

Jones 11 [Richard M., American Institute of Physics; “AIP Supports Resumption of Pu-238 Production”; FYI: The AIP Bulletin of Science Policy News, Number 81 - July 5, 2011;

http://www.aip.org/fyi/2011/081.html]

Pu-238 is a non-weapons grade form of plutonium needed to provide power to spacecraft in areas of space where solar energy is not sufficient. Pu-238 has been the enabling technology for robotic space exploration for two generations, and has led to truly transformative discoveries by such notable satellite missions as Voyager (grand tour from Jupiter, Saturn, Uranus, Neptune), Viking (Mars surface landers in the 1970s), and Galileo (Jupiter), Casinni (Saturn), and New Horizons (Pluto and the Kuiper Belt).¶ There is no viable alternative to power deep space missions, and no U.S. source is currently available. Since U.S. production ceased, our diminishing stockpile of plutonium-238 has largely been purchased from Russia, but any additional purchase is currently being held up in ongoing negotiations.¶ Without Pu-238, NASA cannot carry out future deep space planetary missions. Pu-238 permits the U.S. to envision and then pursue space exploration objectives that would not otherwise be possible. The possibility to study, plan, and pursue such objectives will keep our country on the cutting edge of solar system exploration. Without Pu-238, the creativity of U.S. researchers will be seriously constrained as they study future robotic exploration. And even if Pu-238 production starts immediately, there will still be a five-year delay to have enough Pu-238 for a spacecraft; this delay will push back at least twelve proposed planetary space missions that require Pu-238. A delay could cause missions to reach prohibitively high costs, which could cause job losses – including a lost generation of young U.S. planetary scientists and engineers, diminish U.S. leadership in planetary science, and prevent us from expanding knowledge of the universe.¶ For several years the scientific community has been calling for the restart of production of Pu-238 and now time is running out. The 2009 National Academies report, ‘Radioisotope Power Systems: An Imperative for Maintaining U.S. Leadership in Space Exploration,’ stated that there is an immediate need to fund activities to restart domestic production of Pu-238. Furthermore, the 2011 planetary sciences decadal survey, a community consensus report on priorities for federal support, reaffirmed, “Without a restart of Pu-238 production, it will be impossible for the United States, or any other country, to conduct certain important types of planetary missions after this decade.”

#### Setting the precedent in space is key to US hegemony.

Stone 11 [Christopher, space policy analyst and strategist who lives near Washington DC, 3/14/11, “American Leadership in space : leadership through capability”,

http://www.thespacereview.com/article/1797/1]

First, let me start by saying that I agree with Mr. Friedman’s assertion that “American leadership is a phrase we hear bandied about a lot in political circles in the United States, as well as in many space policy discussions.” I have been at many space forums in my career where I’ve heard the phrase used by speakers of various backgrounds, political ideologies, and nation. Like Mr. Friedman states, “it has many different meanings, most derived from cultural or political biases, some of them contradictory”. This is true: many nations, as well as organizations and individuals worldwide, have different preferences and views as to what American leadership in space is, and/or what it should be. He also concludes that paragraph by stating that American leadership in space could also be viewed as “synonymous with American… hegemony”. I again will agree that some people within the United Stats and elsewhere have this view toward American leadership. However, just because people believe certain viewpoints regarding American leadership does not mean that those views are accurate assessments or definitions of what actions demonstrate US leadership in the space medium.¶ When it comes to space exploration and development, including national security space and commercial, I would disagree somewhat with Mr. Friedman’s assertion that space is “often” overlooked in “foreign relations and geopolitical strategies”. My contention is that while space is indeed overlooked in national grand geopolitical strategies by many in national leadership, space is used as a tool for foreign policy and relations more often than not. In fact, I will say that the US space program has become less of an effort for the advancement of US space power and exploration, and is used more as a foreign policy tool to “shape” the strategic environment to what President Obama referred to in his National Security Strategy as “The World We Seek”. Using space to shape the strategic environment is not a bad thing in and of itself. What concerns me with this form of “shaping” is that we appear to have changed the definition of American leadership as a nation away from the traditional sense of the word. Some seem to want to base our future national foundations in space using the important international collaboration piece as the starting point. Traditional national leadership would start by advancing United States’ space power capabilities and strategies first, then proceed toward shaping the international environment through allied cooperation efforts. The United States’ goal should be leadership through spacefaring capabilities, in all sectors. Achieving and maintaining such leadership through capability will allow for increased space security and opportunities for all and for America to lead the international space community by both technological and political example. The world has recognized America as the leaders in space because it demonstrated technological advancement by the Apollo lunar landings, our deep space exploration probes to the outer planets, and deploying national security space missions. We did not become the recognized leaders in astronautics and space technology because we decided to fund billions into research programs with no firm budgetary commitment or attainable goals. We did it because we made a national level decision to do each of them, stuck with it, and achieved exceptional things in manned and unmanned spaceflight. We have allowed ourselves to drift from this traditional strategic definition of leadership in space exploration, rapidly becoming participants in spaceflight rather than the leader of the global space community. One example is shutting down the space shuttle program without a viable domestic spacecraft chosen and funded to commence operations upon retirement of the fleet. We are paying millions to rely on Russia to ferry our astronauts to an International Space Station that US taxpayers paid the lion’s share of the cost of construction. Why would we, as United States citizens and space advocates, settle for this? The current debate on commercial crew and cargo as the stopgap between shuttle and whatever comes next could and hopefully will provide some new and exciting solutions to this particular issue. However, we need to made a decision sooner rather than later.

#### Heg solves nuclear escalation and global nuclear arms races- other states won’t deter effectively.

Brooks et al. 13 [STEPHEN G. BROOKS is Associate Professor of Government at Dartmouth College.¶ G. JOHN IKENBERRY is Albert G. Milbank Professor of Politics and International Affairs at Princeton University and Global Eminence Scholar at Kyung Hee University in Seoul.¶ WILLIAM C. WOHLFORTH is Daniel Webster Professor of Government at Dartmouth College. “Lean Forward,” EBSCO]

KEEPING THE PEACE¶ Of course, even if it is true that the costs of deep engagement fall far below what advocates of retrenchment claim, they would not be worth bearing unless they yielded greater benefits. In fact, they do. The most obvious benefit of the current strategy is that it reduces the risk of a dangerous conflict. The United States' security commitments deter states with aspirations to regional hegemony from contemplating expansion and dissuade U.S. partners from trying to solve security problems on their own in ways that would end up threatening other states.¶ Skeptics discount this benefit by arguing that U.S. security guarantees aren't necessary to prevent dangerous rivalries from erupting. They maintain that the high costs of territorial conquest and the many tools countries can use to signal their benign intentions are enough to prevent conflict. In other words, major powers could peacefully manage regional multipolarity without the American pacifier.¶ But that outlook is too sanguine. If Washington got out of East Asia, Japan and South Korea would likely expand their military capabilities and go nuclear, which could provoke a destabilizing reaction from China. It's worth noting that during the Cold War, both South Korea and Taiwan tried to obtain nuclear weapons; the only thing that stopped them was the United States, which used its security commitments to restrain their nuclear temptations. Similarly, were the United States to leave the Middle East, the countries currently backed by Washington--notably, Israel, Egypt, and Saudi Arabia--might act in ways that would intensify the region's security dilemmas.¶ There would even be reason to worry about Europe. Although it's hard to imagine the return of great-power military competition in a post-American Europe, it's not difficult to foresee governments there refusing to pay the budgetary costs of higher military outlays and the political costs of increasing EU defense cooperation. The result might be a continent incapable of securing itself from threats on its periphery, unable to join foreign interventions on which U.S. leaders might want European help, and vulnerable to the influence of outside rising powers.¶ Given how easily a U.S. withdrawal from key regions could lead to dangerous competition, advocates of retrenchment tend to put forth another argument: that such rivalries wouldn't actually hurt the United States. To be sure, few doubt that the United States could survive the return of conflict among powers in Asia or the Middle East--but at what cost? Were states in one or both of these regions to start competing against one another, they would likely boost their military budgets, arm client states, and perhaps even start regional proxy wars, all of which should concern the United States, in part because its lead in military capabilities would narrow.¶ Greater regional insecurity could also produce cascades of nuclear proliferation as powers such as Egypt, Saudi Arabia, Japan, South Korea, and Taiwan built nuclear forces of their own. Those countries' regional competitors might then also seek nuclear arsenals. Although nuclear deterrence can promote stability between two states with the kinds of nuclear forces that the Soviet Union and the United States possessed, things get shakier when there are multiple nuclear rivals with less robust arsenals. As the number of nuclear powers increases, the probability of illicit transfers, irrational decisions, accidents, and unforeseen crises goes up.¶ The case for abandoning the United States' global role misses the underlying security logic of the current approach. By reassuring allies and actively managing regional relations, Washington dampens competition in the world’s key areas, thereby preventing the emergence of a hothouse in which countries would grow new military capabilities. For proof that this strategy is working, one need look no further than the defense budgets of the current great powers: on average, since 1991 they have kept their military expenditures as A percentage of GDP to historic lows, and they have not attempted to match the United States' top-end military capabilities. Moreover, all of the world's most modern militaries are U.S. allies, and the United States' military lead over its potential rivals is by many measures growing.¶ On top of all this, the current grand strategy acts as a hedge against the emergence regional hegemons. Some supporters of retrenchment argue that the U.S. military should keep its forces over the horizon and pass the buck to local powers to do the dangerous work of counterbalancing rising regional powers. Washington, they contend, should deploy forces abroad only when a truly credible contender for regional hegemony arises, as in the cases of Germany and Japan during World War II and the Soviet Union during the Cold War. Yet there is already a potential contender for regional hegemony--China--and to balance it, the United States will need to maintain its key alliances in Asia and the military capacity to intervene there. The implication is that the United States should get out of Afghanistan and Iraq, reduce its military presence in Europe, and pivot to Asia. Yet that is exactly what the Obama administration is doing.

#### Every academic discipline confirms the centrality of hegemony as a guarantor of peace.

**Wohlforth 9** [Professor of government @ Dartmouth College. [[William C. Wohlforth](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#back), “Unipolarity, Status Competition, and Great Power War,” World Politics, Volume 61, Number 1, January 2009]

Second, **I question the dominant view that status quo evaluations are relatively independent of the distribution of capabilities**. **If the status of states depends** in some measure **on** their **relative capabilities**, and if states derive utility from status, **then different distributions of capabilities** may **affect** levels of **satisfaction**, just as different income distributions may affect levels of status competition in domestic settings. [6](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f6) **Building on research in psychology and sociology**, **I argue that even capabilities distributions among major powers foster ambiguous status hierarchies, which generate** more **dissatisfaction and clashes** over the status quo. And the more stratified the distribution of capabilities, the less likely such status competition is. **Unipolarity thus generates far fewer** **incentives** than either bipolarity or multipolarity **for direct great power positional competition** over status. Elites in the other major powers continue to prefer higher status, but in a unipolar system they face comparatively weak incentives to translate that preference into costly action. And the absence of such incentives matters because **social status is a positional good—something whose value depends on how much one has in relation to others**.[7](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f7) “**If everyone has high status**,” Randall Schweller notes, “**no one does**.”[8](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f8) While one actor might increase its status, all cannot simultaneously do so. **High status is thus inherently scarce, and competitions for status tend to be zero sum**.[9](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f9) I begin by describing the puzzles facing predominant theories that status competition might solve. **Building on recent research on social identity and status seeking, I** then **show that** under certain conditions **the ways decision makers identify with the states they represent may prompt them to frame issues as positional disputes over status in a social hierarchy**. I develop hypotheses that tailor this scholarship to the domain of great power politics, showing how **the probability of status competition is likely to be linked to polarity**. The rest of the article investigates whether there is sufficient evidence for these hypotheses to warrant further refinement and testing. I pursue this in three ways: by showing that **the theory advanced here is consistent with** what we know about **large-scale patterns of great power conflict through history**; by [End Page 30] demonstrating that the causal mechanisms it identifies did drive relatively secure major powers to military conflict in the past (and therefore that they might do so again if the world were bipolar or multipolar); and by showing that observable evidence concerning the major powers’ identity politics and grand strategies under unipolarity are consistent with the theory’s expectations. Puzzles of Power and War Recent research on the connection between the distribution of capabilities and war has concentrated on a hypothesis long central to systemic theories of power transition or hegemonic stability: that **major war arises out of a power shift in favor of a rising state dissatisfied with a status quo defended by a declining satisfied state**.[10](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f10) Though they have garnered substantial empirical support, these theories have yet to solve two intertwined empirical and theoretical puzzles—each of which might be explained by positional concerns for status. First, if the material costs and benefits of a given status quo are what matters, why would a state be dissatisfied with the very status quo that had abetted its rise? The rise of China today naturally prompts this question, but it is hardly a novel situation. Most of the best known and most consequential power transitions in history featured rising challengers that were prospering mightily under the status quo. In case after case, historians argue that these revisionist powers sought recognition and standing rather than specific alterations to the existing rules and practices that constituted the order of the day. In each paradigmatic case of hegemonic war, the claims of the rising power are hard to reduce to instrumental adjustment of the status quo. In R. Ned Lebow’s reading, for example, Thucydides’ account tells us that the rise of Athens posed unacceptable threats not to the security or welfare of Sparta but rather to its identity as leader of the Greek world, which was an important cause of the Spartan assembly’s vote for war.[11](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f11) The issues that inspired Louis XIV’s and Napoleon’s dissatisfaction with the status quo were many and varied, but most accounts accord [End Page 31] independent importance to the drive for a position of unparalleled primacy. In these and other hegemonic struggles among leading states in post-Westphalian Europe, the rising challenger’s dissatisfaction is often difficult to connect to the material costs and benefits of the status quo, and much contemporary evidence revolves around issues of recognition and status.[12](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f12) Wilhemine Germany is a fateful case in point. As Paul Kennedy has argued, underlying material trends as of 1914 were set to propel Germany’s continued rise indefinitely, so long as Europe remained at peace.[13](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f13) Yet Germany chafed under the very status quo that abetted this rise and its elite focused resentment on its chief trading partner—the great power that presented the least plausible threat to its security: Great Britain. At fantastic cost, it built a battleship fleet with no plausible strategic purpose other than to stake a claim on global power status.[14](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f14) Recent historical studies present strong evidence that, far from fearing attacks from Russia and France, German leaders sought to provoke them, knowing that this would lead to a long, expensive, and sanguinary war that Britain was certain to join.[15](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f15) And of all the motivations swirling round these momentous decisions, no serious historical account fails to register German leaders’ oft-expressed yearning for “a place in the sun.” The second puzzle is bargaining failure. Hegemonic theories tend to model war as a conflict over the status quo without specifying precisely what the status quo is and what flows of benefits it provides to states.[16](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f16) Scholars generally follow Robert Gilpin in positing that the underlying issue concerns a “desire to redraft the rules by which relations among nations work,” “the nature and governance of the system,” and “the distribution of territory among the states in the system.”[17](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f17) If these are the [End Page 32] issues at stake, then systemic theories of hegemonic war and power transition confront the puzzle brought to the fore in a seminal article by James Fearon: what prevents states from striking a bargain that avoids the costs of war? [18](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f18) Why can’t states renegotiate the international order as underlying capabilities distributions shift their relative bargaining power? Fearon proposed that one answer consistent with strict rational choice assumptions is that such bargains are infeasible when the issue at stake is indivisible and cannot readily be portioned out to each side. **Most aspects of a given international order are readily divisible**, however, and, as Fearon stressed, “both the intrinsic complexity and richness of most matters over which states negotiate and the availability of linkages and side-payments suggest that intermediate bargains typically will exist.”[19](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f19) Thus, most scholars have assumed that the indivisibility problem is trivial, focusing on two other rational choice explanations for bargaining failure: uncertainty and the commitment problem.[20](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f20) In the view of many scholars, it is these problems, rather than indivisibility, that likely explain leaders’ inability to avail themselves of such intermediate bargains. Yet **recent research inspired by constructivism shows how issues that are physically divisible can become socially indivisible, depending on how they relate to the identities of decision makers**.[21](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f21) **Once issues** surrounding the status quo **are framed in positional terms as bearing on the disputants’ relative standing, then**, to the extent that they value their standing itself, **they may be unwilling to pursue intermediate bargaining solutions**. **Once linked to status, easily divisible issues** that theoretically provide opportunities for linkages and side payments of various sorts **may** themselves **be** seen as indivisible and thus **unavailable as avenues for** possible intermediate **bargains**. **The historical record surrounding major wars is rich with evidence suggesting that positional concerns over status frustrate bargaining**: expensive, **protracted conflict over** what appear to be **minor issues**; a propensity on the part of **decision makers** to **frame issues in terms of relative rank even when doing so makes bargaining harder**; **decision-makers’** [End Page 33] **inability to accept feasible divisions** of the matter in dispute **even when failing to do so imposes high costs**; demands on the part of states for observable evidence to confirm their estimate of an improved position in the hierarchy; **the inability** of private bargains **to resolve issues**; a frequently observed compulsion for the public attainment of concessions from a higher ranked state; and **stubborn resistance** on the part of states to which such demands are addressed **even when acquiescence entails limited material cost**. The literature on bargaining failure in the context of power shifts remains inconclusive, and it is premature to take any empirical pattern as necessarily probative. Indeed, Robert Powell has recently proposed that indivisibility is not a rationalistic explanation for war after all: fully rational leaders with perfect information should prefer to settle a dispute over an indivisible issue by resorting to a lottery rather than a war certain to destroy some of the goods in dispute. What might prevent such bargaining solutions is not indivisibility itself, he argues, but rather the parties’ inability to commit to abide by any agreement in the future if they expect their relative capabilities to continue to shift.[22](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f22) This is the credible commitment problem to which many theorists are now turning their attention. But how it relates to the information problem that until recently dominated the formal literature remains to be seen.[23](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f23) The larger point is that positional concerns for status may help account for the puzzle of bargaining failure. In the rational choice bargaining literature, war is puzzling because it destroys some of the benefits or flows of benefits in dispute between the bargainers, who would be better off dividing the spoils without war. Yet what happens to these models if what matters for states is less the flows of material benefits themselves than their implications for relative status? The salience of this question depends on the relative importance of positional concern for status among states. Do Great Powers Care about Status? **Mainstream theories generally posit that states come to blows** over an international status quo **only when it has implications for their security** or material well-being. The guiding assumption is that a state’s satisfaction [End Page 34] with its place in the existing order is a function of the material costs and benefits implied by that status.[24](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f24) By that assumption, once a state’s status in an international order ceases to affect its material wellbeing, its relative standing will have no bearing on decisions for war or peace. **But the assumption is undermined by cumulative research in disciplines ranging from neuroscience** and **evolutionary biology** to **economics, anthropology, sociology, and psychology that human beings are powerfully motivated by the desire for favorable social status comparisons**. **This research suggests that the preference for status is a basic disposition rather than merely a strategy for attaining other goals**.[25](http://muse.jhu.edu/journals/world_politics/v061/61.1.wohlforth.html#f25) **People often seek tangibles** not so much because of the welfare or security they bring but because of the social status they confer. Under certain conditions, **the search for status will cause people to behave in ways that directly contradict their material interest in security and**/or **prosperity**. Pg. 33-35//1ac

#### Reprocessing solves Pu-238 shortages.

Packard 12 [Steven, member of the James Randi Educational Foundation, “The U.S. Space Program’s Plutonium-238 Crisis”, Depleted Cranium, 1-6-2012, http://depletedcranium.com/americas-plutonium-238-crisis/]

The plutonium that can be extracted from light water spent fuel contains significant amounts of plutonium-238, but it’s combined with other isotopes of plutonium, making it unusable. Separating out the plutonium-238 would require a complex plutonium enrichment system, which is far less practical than simply preparing the plutonium-238 on its own.¶ To produce plutonium-238, the first thing that is required is neptunium-237. Neptunium-237 is produced as a byproduct of the reprocessing of spent fuel. When a nucleus of uranium-235 absorbs a neutron, it will usually fission. However, in a thermal spectrum reactor, some of the uranium-235 (about 18%) will absorb a neutron and not fission. Instead, the uranium-235 becomes uranium-236. Uranium-236 has a low neutron cross-section, so most of the uranium-236 generated in a reactor will just remain uranium-236, but a small amount of it does absorb a neutron and become uranium-237. Uranium-237 has a very short half-life of only six days, decaying to neptunium-237. Another source of neptunium-237 in spent fuel is the alpha decay or americium-241. Spent fuel contains about .7 grams of np-237 for every one hundred kilograms of fuel. That might not seem like much, but fuel reprocessing operations routinely go through hundreds of tons of fuel. Because Np-237 is the only isotope of neptunium present in spent fuel in any significant quantity, it does not require any enrichment. Instead, simply chemically separating the neptunium out yields nearly 100% neptunium-237.¶ After removing the neptunium-237, it is fabricated into targets which are irradiated with neutrons in a high flux reactor. The targets are then removed and processed to separate out the plutonium-238 that is produced. The plutonium-238 is then fabricated into RTG fuel tablets.¶ The United States ended the practice of spent fuel reprocessing in 1977 when it was banned by the Carter Administration because of “proliferation concerns.” Since then, the ban has been lifted, but as all reprocessing operations were shut down in the 1970’s and little support can be found for restarting the practice, the US still has no capacity to reprocess spent fuel. After 1977, some material from plutonium production reactors continued, which yielded some neptunium-237, but that also ended in 1992, with the end of the cold war.¶ Today, the United States reprocesses no fuel at all and therefore cannot produce any neptunium-237. There may still be some of the material remaining, though it’s doubtful that very much is left. It should still be possible to obtain Np-237, purchasing it from countries with major spent fuel reprocessing programs, such as Russia, France or Japan. However, this depends entirely on the willingness of such nations to provide it and may be expensive, since additional steps beyond normal reprocessing are required to produce the highly concentrated neptunium necessary for plutonium-238 production.

### Observation 3

#### Observation Three: Warming

#### Warming is real and anthropogenic – carbon dioxide increase, polar ice records, melting glaciers, sea level rise all prove.

Prothero 12 (Donald, Lecturer in Geobiology at Cal Tech and Professor of Geology at Occidental College, 3-1-12, “How We Know Global Warming is Real and Human Caused," Skeptic, vol 17 no 2, EBSCO)

Converging Lines of Evidence¶ How do we know that global warming is real and primarily human caused? There are numerous lines of evidence that converge toward this conclusion.¶ 1. Carbon Dioxide Increase.¶ Carbon dioxide in our atmosphere has increased at an unprecedented rate in the past 200 years. Not one data set collected over a long enough span of time shows otherwise. Mann et al. (1999) compiled the past 900 years' worth of temperature data from tree rings, ice cores, corals, and direct measurements in the past few centuries, and the sudden increase of temperature of the past century stands out like a sore thumb. This famous graph is now known as the "hockey stick" because it is long and straight through most of its length, then bends sharply upward at the end like the blade of a hockey stick. Other graphs show that climate was very stable within a narrow range of variation through the past 1000, 2000, or even 10,000 years since the end of the last Ice Age. There were minor warming events during the Climatic Optimum about 7000 years ago, the Medieval Warm Period, and the slight cooling of the Little Ice Age in die 1700s and 1800s. But the magnitude and rapidity of the warming represented by the last 200 years is simply unmatched in all of human history. More revealing, die timing of this warming coincides with the Industrial Revolution, when humans first began massive deforestation and released carbon dioxide into the atmosphere by burning an unprecedented amount of coal, gas, and oil.¶ 2. Melting Polar Ice Caps.¶ The polar icecaps are thinning and breaking up at an alarming rate. In 2000, my former graduate advisor Malcolm McKenna was one of the first humans to fly over the North Pole in summer time and see no ice, just open water. The Arctic ice cap has been frozen solid for at least the past 3 million years (and maybe longer),4 but now the entire ice sheet is breaking up so fast that by 2030 (and possibly sooner) less than half of the Arctic will be ice covered in the summer.5 As one can see from watching the news, this is an ecological disaster for everything that lives up there, from the polar bears to the seals and walruses to the animals they feed upon, to the 4 million people whose world is melting beneath their feet. The Antarctic is thawing even faster. In February-March 2002, the Larsen B ice shelf - over 3000 square km (the size of Rhode Island) and 220 m (700 feet) thick- broke up in just a few months, a story typical of nearly all the ice shelves in Antarctica. The Larsen B shelf had survived all the previous ice ages and interglacial warming episodes over the past 3 million years, and even the warmest periods of the last 10,000 years- yet it and nearly all the other thick ice sheets on the Arctic, Greenland, and Antarctic are vanishing at a rate never before seen in geologic history.¶ 3. Melting Glaciers.¶ Glaciers are all retreating at the highest rates ever documented. Many of those glaciers, along with snow melt, especially in the Himalayas, Andes, Alps, and Sierras, provide most of the freshwater that the populations below the mountains depend upon - yet this fresh water supply is vanishing. Just think about the percentage of world's population in southern Asia (especially India) that depend on Himalayan snowmelt for their fresh water. The implications are staggering. The permafrost that once remained solidly frozen even in the summer has now Üiawed, damaging the Inuit villages on the Arctic coast and threatening all our pipelines to die North Slope of Alaska. This is catastrophic not only for life on the permafrost, but as it thaws, the permafrost releases huge amounts of greenhouse gases which are one of the major contributors to global warming. Not only is the ice vanishing, but we have seen record heat waves over and over again, killing thousands of people, as each year joins the list of the hottest years on record. (2010 just topped that list as the hottest year, surpassing the previous record in 2009, and we shall know about 2011 soon enough). Natural animal and plant populations are being devastated all over the globe as their environments change.6 Many animals respond by moving their ranges to formerly cold climates, so now places that once did not have to worry about disease-bearing mosquitoes are infested as the climate warms and allows them to breed further north.¶ 4. Sea Level Rise.¶ All that melted ice eventually ends up in the ocean, causing sea levels to rise, as it has many times in the geologic past. At present, the sea level is rising about 3-4 mm per year, more than ten times the rate of 0.10.2 mm/year that has occurred over the past 3000 years. Geological data show Üiat ttie sea level was virtually unchanged over the past 10,000 years since the present interglacial began. A few mm here or there doesn't impress people, until you consider that the rate is accelerating and that most scientists predict sea levels will rise 80-130 cm in just the next century. A sea level rise of 1.3 m (almost 4 feet) would drown many of the world's low-elevation cities, such as Venice and New Orleans, and low-lying countries such as the Netherlands or Bangladesh. A number of tiny island nations such as Vanuatu and the Maldives, which barely poke out above the ocean now, are already vanishing beneath the waves. Eventually their entire population will have to move someplace else.7 Even a small sea level rise might not drown all these areas, but they are much more vulnerable to the large waves of a storm surge (as happened with Hurricane Katrina), which could do much more damage than sea level rise alone. If sea level rose by 6 m (20 feet), most of die world's coastal plains and low-lying areas (such as the Louisiana bayous, Florida, and most of the world's river deltas) would be drowned.¶ Most of the world's population lives in lowelevation coastal cities such as New York, Boston, Philadelphia, Baltimore, Washington, D.C., Miami, and Shanghai. All of those cities would be partially or completely under water with such a sea level rise. If all the glacial ice caps melted completely (as they have several times before during past greenhouse episodes in the geologic past), sea level would rise by 65 m (215 feet)! The entire Mississippi Valley would flood, so you could dock an ocean liner in Cairo, Illinois. Such a sea level rise would drown nearly every coastal region under hundreds of feet of water, and inundate New York City, London and Paris. All that would remain would be the tall landmarks such as the Empire State Building, Big Ben, and the Eiffel Tower. You could tie your boats to these pinnacles, but the rest of these drowned cities would lie deep underwater.

#### Scientific consensus goes aff – 97% of the most qualified scientists in the field agree

Anderegg, et al. 10 (William (Department of Biology, Stanford University); James Prall (Electrical and Computer Engineering, University of Toronto); Jacob Harold (William and Flora Hewlett Foundation); and Stephen Schneider (Department of Biology, Stanford University and Woods Institute for the Environment, Stanford University), “Expert credibility in climate change”, PNAS, Vol. 17, No. 27, July 6, 2010, RSR

\*\*Note: ACC = Anthropogenic Climate Change, UE = those unconvinced by evidence and CE = those convinced by evidence.)

The UE group comprises only 2% of the top 50 climate researchers as ranked by expertise (number of climate publications), 3% of researchers of the top 100, and 2.5% of the top 200, excluding researchers present in both groups (Materials and Methods). This result closely agrees with expert surveys, indicating that ≈97% of self-identiﬁed actively publishing climate scientists agree with the tenets of ACC (2). Furthermore, this ﬁnding complements direct polling of the climate researcher community, which yields qualitative and self-reported researcher expertise (2). Our ﬁndings capture the added dimension of the distribution of researcher expertise, quantify agreement among the highest expertise climate researchers, and provide an independent assessment of level of scientiﬁc consensus concerning ACC. In addition to the striking difference in number of expert researchers between CE and UE groups, the distribution of expertise of the UE group is far below that of the CE group (Fig. 1). Mean expertise of the UE group was around half (60 publications) that of the CE group (119 publications; Mann–Whitney U test: W = 57,020; P < 10 −14 ), as was median expertise (UE = 34 publications; CE = 84 publications). Furthermore, researchers with fewer than 20 climate publications comprise ≈80% the UE group, as opposed to less than 10% of the CE group. This indicates that the bulk of UE researchers on the most prominent multisignatory statements about climate change have not published extensively in the peer-reviewed climate literature. We examined a subsample of the 50 most-published (highestexpertise) researchers from each group. Such subsampling facilitates comparison of relative expertise between groups (normalizing differences between absolute numbers). This method reveals large differences in relative expertise between CE and UE groups (Fig. 2). Though the top-published researchers in the CE group have an average of 408 climate publications (median = 344), the top UE researchers average only 89 publications (median = 68; Mann– Whitney U test: W = 2,455; P < 10 −15 ). Thus, this suggests that not all experts are equal, and top CE researchers have much stronger expertise in climate science than those in the top UE group. Finally, our prominence criterion provides an independent and approximate estimate of the relative scientiﬁc signiﬁcance of CE and UE publications. Citation analysis complements publication analysis because it can, in general terms, capture the quality and impact of a researcher’s contribution—a critical component to overall scientiﬁc credibility—as opposed to measuring a researcher’s involvement in a ﬁeld, or expertise (Materials and Methods). The citation analysis conducted here further complements the publication analysis because it does not examine solely climaterelevant publications and thus captures highly prominent researchers who may not be directly involved with the climate ﬁeld. We examined the top four most-cited papers for each CE and UE researcher with 20 or more climate publications and found immense disparity in scientiﬁc prominence between CE and UE communities (Mann–Whitney U test: W = 50,710; P < 10 −6 ; Fig. 3). CE researchers’ top papers were cited an average of 172 times, compared with 105 times for UE researchers. Because a single, highly cited paper does not establish a highly credible reputation but might instead reﬂect the controversial nature of that paper (often called the single-paper effect), we also considered the average the citation count of the second through fourth most-highly cited papers of each researcher. Results were robust when only these papers were considered (CE mean: 133; UE mean: 84; Mann–Whitney U test: W = 50,492; P < 10 −6 ). Results were robust when all 1,372 researchers, including those with fewer than 20 climate publications, were considered (CE mean: 126; UE mean: 59; Mann–Whitney U test: W = 3.5 × 10 5 ; P < 10 −15 ). Number of citations is an imperfect but useful benchmark for a group’s scientiﬁc prominence (Materials and Methods), and we show here that even considering all (e.g., climate and nonclimate) publications, the UE researcher group has substantially lower prominence than the CE group. We provide a large-scale quantitative assessment of the relative level of agreement, expertise, and prominence in the climate researcher community. We show that the expertise and prominence, two integral components of overall expert credibility, of climate researchers convinced by the evidence of ACC vastly overshadows that of the climate change skeptics and contrarians. This divide is even starker when considering the top researchers in each group. Despite media tendencies to present both sides in ACC debates (9), which can contribute to continued public misunderstanding regarding ACC (7, 11, 12, 14), not all climate researchers are equal in scientiﬁc credibility and expertise in the climate system. This extensive analysis of the mainstream versus skeptical/contrarian researchers suggests a strong role for considering expert credibility in the relative weight of and attention to these groups of researchers in future discussions in media, policy, and public forums regarding anthropogenic climate change.

#### We must act quickly with long term technological innovation to avoid the irreversible climate change triggered by 2°C.

Peters, et al. 12(Glen (Center for International Climate and Environmental Research – Oslo); Robbie Andrew (Center for International Climate and Environmental Research – Oslo); Tom Boden (Carbon Dioxide Information Analysis Center (CDIAC), Oak Ridge National Laboratory); Josep Canadell (Global Carbon Project, CSIRO Marine and Atmospheric Research, Canberra, Australia); Philippe Ciais (Laboratoire des Sciences du Climat et de l’Environnement, Gif sur Yvette, France); Corinne Le Quéré (Tyndall Centre for Climate Change Research, University of East Anglia, Norwich, UK); Gregg Marland (Research Institute for Environment, Energy, and Economics, Appalachian State University); Michael R. Raupach (Global Carbon Project, CSIRO Marine and Atmospheric Research, Canberra, Australia); and Charlie Wilson (Tyndall Centre for Climate Change Research, University of East Anglia, Norwich, UK), “The challenge to keep global warming below 2 °C”, Nature Climate Change, 12-2-12, RSR)

It is important to regularly re-assess the relevance of emissions scenarios in light of changing global circumstances3,8. In the past, decadal trends in CO2 emissions have responded slowly to changes in the underlying emission drivers because of inertia and path dependence in technical, social and political systems9. Inertia and path dependence are unlikely to be affected by short-term fluctuations2,3,9 — such as financial crises10 — and it is probable that emissions will continue to rise for a period even after global mitigation has started11. Thermal inertia and vertical mixing in the ocean, also delay the temperature response to CO2 emissions12. Because of inertia, path dependence and changing global circumstances, there is value in comparing observed decadal emission trends with emission scenarios to help inform the prospect of different futures being realized, explore the feasibility of desired changes in the current emission trajectory and help to identify whether new scenarios may be needed. Global CO2 emissions have increased from 6.1±0.3 Pg C in 1990 to 9.5±0.5 Pg C in 2011 (3% over 2010), with average annual growth rates of 1.9% per year in the 1980s, 1.0% per year in the 1990s, and 3.1% per year since 2000. We estimate that emissions in 2012 will be 9.7±0.5 Pg C or 2.6% above 2011 (range of 1.9–3.5%) and 58% greater than 1990 (Supplementary Information and ref. 13). The observed growth rates are at the top end of all four generations of emissions scenarios (Figs 1 and 2). Of the previous illustrative IPCC scenarios, only IS92-E, IS92-F and SRES A1B exceed the observed emissions (Fig. 1) or their rates of growth (Fig. 2), with RCP8.5 lower but within uncertainty bounds of observed emissions. Observed emission trends are in line with SA90-A, IS92-E and IS92-F, SRES A1FI, A1B and A2, and RCP8.5 (Fig. 2). The SRES scenarios A1FI and A2 and RCP8.5 lead to the highest temperature projections among the scenarios, with a mean temperature increase of 4.2–5.0 °C in 2100 (range of 3.5–6.2 °C)14, whereas the SRES A1B scenario has decreasing emissions after 2050 leading to a lower temperature increase of 3.5 °C (range 2.9–4.4°C)14. Earlier research has noted that observed emissions have tracked the upper SRES scenarios15,16 and Fig. 1 confirms this for all four scenario generations. This indicates that the space of possible pathways could be extended above the top-end scenarios to accommodate the possibility of even higher emission rates in the future. The new RCPs are particularly relevant because, in contrast to the earlier scenarios, mitigation efforts consistent with longterm policy objectives are included among the pathways2,. RCP3-PD (peak and decline in concentration) leads to a mean temperature increase of 1.5 °C in 2100 (range of 1.3–1.9 °C)14. RCP3–PD requires net negative emissions (for example, bioenergy with carbon capture and storage) from 2070, but some scenarios suggest it is possible to stay below 2 °C without negative emissions17–19. RCP4.5 and RCP6 — which lie between RCP3–PD and RCP8.5 in the longer term — lead to a mean temperature increase of 2.4 °C (range of 1.0–3.0 °C) and 3.0 °C (range of 2.6–3.7 °C) in 2100, respectively14. For RCP4.5, RCP6 and RCP8.5, temperatures will continue to increase after 2100 due to on-going emissions14 and inertia in the climate system12. Current emissions are tracking slightly above RCP8.5, and given the growing gap between the other RCPs (Fig. 1), significant emission reductions are needed by 2020 to keep 2 °C as a feasible goal18–20. To follow an emission trend that can keep the temperature increase below 2 °C (RCP3-PD) requires sustained global CO2 mitigation rates of around 3% per year, if global emissions peak before 202011,19. A delay in starting mitigation activities will lead to higher mitigation rates11, higher costs21,22, and the target of remaining below 2 °C may become unfeasible18,20. If participation is low, then higher rates of mitigation are needed in individual countries, and this may even increase mitigation costs for all countries22. Many of these rates assume that negative emissions will be possible and affordable later this century11,17,18,20. Reliance on negative emissions has high risks because of potential delays or failure in the development and large-scale deployment of emerging technologies such as carbon capture and storage, particularly those connected to bioenergy17,18. Although current emissions are tracking the higher scenarios, it is still possible to transition towards pathways consistent with keeping temperatures below 2 °C (refs 17,19,20). The historical record shows that some countries have reduced CO2 emissions over 10-year periods, through a combination of (non-climate) policy intervention and economic adjustments to changing resource availability. The oil crisis of 1973 led to new policies on energy supply and energy savings, which produced a decrease in the share of fossil fuels (oil shifted to nuclear) in the energy supply of Belgium, France and Sweden, with emission reductions of 4–5% per year sustained over 10 or more years (Supplementary Figs S17–19). A continuous shift to natural gas — partially substituting coal and oil — led to sustained mitigation rates of 1–2% per year in the UK in the 1970s and again in the 2000s, 2% per year in Denmark in the 1990–2000s, and 1.4% per year since 2005 in the USA (Supplementary Figs S10–12). These examples highlight the practical feasibility of emission reductions through fuel substitution and efficiency improvements, but additional factors such as carbon leakage23 need to be considered. These types of emission reduction can help initiate a transition towards trajectories consistent with keeping temperatures below 2 °C, but further mitigation measures are needed to complete and sustain the reductions. Similar energy transitions could be encouraged and co-ordinated across countries in the next 10 years using available technologies19, but well-targeted technological innovations24 are required to sustain the mitigation rates for longer periods17. To move below the RCP8.5 scenario — avoiding the worst climate impacts — requires early action17,18,21 and sustained mitigation from the largest emitters22 such as China, the United States, the European Union and India. These four regions together account for over half of global CO2 emissions, and have strong and centralized governing bodies capable of co-ordinating such actions. If similar energy transitions are repeated over many decades in a broader range of developed and emerging economies, the current emission trend could be pulled down to make RCP3‑PD, RCP4.5 and RCP6 all feasible futures. A shift to a pathway with the highest likelihood to remain below 2 °C above preindustrial levels (for example, RCP3-PD), requires high levels of technological, social and political innovations, and an increasing need to rely on net negative emissions in the future11,17,18. The timing of mitigation efforts needs to account for delayed responses in both CO2 emissions9 (because of inertia in technical, social and political systems) and also in global temperature12 (because of inertia in the climate system). Unless large and concerted global mitigation efforts are initiated soon, the goal of remaining below 2 °C will very soon become unachievable.

#### Scenario one is biodiversity

#### Warming and CO2 emissions kill biodiversity – newest research shows that ecosystems are on the brink due to human activity.

Barnosky et al 12 (Anthony (Department of Integrative Biology, University of California, Berkeley); Elizabeth Hadly (Department of Biology, Stanford University); Jordi Bascompte (Integrative Ecology Group, Estacion Biologica de Donana, Sevilla, Spain); Eric Berlow (TRU NORTH Labs, Berkeley, California); James H. Brown (Department of Biology, The University of New Mexico); Mikael Fortelius (Department of Geosciences and Geography and Finnish Museum of Natural History); Wayne Getz (Department of Environmental Science, Policy, and Management, University of California, Berkeley); John Harte (Department of Environmental Science, Policy, and Management, University of California, Berkeley); Alan Hastings (Department of Environmental Science and Policy, University of California – Davis); Pablo Marquet (Departamento de Ecologıa, Facultad de Ciencias Biologicas, Pontificia Universidad Catolica de Chile); Neo Martinez (Pacific Ecoinformatics and Computational Ecology Lab); Arne Mooers (Department of Biological Sciences, Simon Fraser University); Peter Roopnarine (California Academy of Sciences); Geerta Vermeij (Department of Geology, University of California – Davis); John W. Williams (Department of Geography, University of Wisconsin); Rosemary Gilespie (Department of Environmental Science, Policy, and Management, University of California, Berkeley); Justin Kitzes (Department of Environmental Science, Policy, and Management, University of California, Berkeley); Charles Marshall (Department of Integrative Biology, University of California, Berkeley); Nicholas Matzke (Department of Integrative Biology, University of California, Berkeley); David Mindell ( Department of Biophysics and Biochemistry, University of California, San Francisco); Eloy Revilla (Department of Conservation Biology, Estacion Biologica de Donana); and Adam B. Smith (Center for Conservation and Sustainable Development, Missouri Botanical Garden), “Approaching a state shift in Earth’s biosphere”, Nature, May 2012, RSR)

As a result of human activities, direct local-scale forcings have accumulated to the extent that indirect, global-scale forcings of biological change have now emerged. Direct forcing includes the conversion of ,43% of Earth’s land to agricultural or urban landscapes, with much of the remaining natural landscapes networked with roads 1,2,34,35 . This exceeds the physical transformation that occurred at the last global-scale critical transition, when ,30% of Earth’s surface went from being covered by glacial ice to being ice free. The indirect global-scale forcings that have emerged from human activities include drastic modification of how energy flows through the global ecosystem. An inordinate amount of energy now is routed through one species, Homo sapiens. Humans commandeer ,20–40% of global net primary productivity 1,2,35 (NPP) and decrease overall NPP through habitat degradation. Increasing NPP regionally through atmospheric and agricultural deposition of nutrients (for example nitrogen and phosphorus) does not make up the shortfall 2 . Second, through the release of energy formerly stored in fossil fuels, humans have substantially increased the energy ultimately available to power the global ecosystem. That addition does not offset entirely the human appropriation of NPP, because the vast majority of that ‘extra’ energy is used to support humans and their domesticates, the sum of which comprises large-animal biomass that is far beyond that typical of pre-industrial times 27 . A decrease in this extra energy budget, which is inevitable if alternatives do not compensate for depleted fossil fuels, is likely to impact human health and economies severely 28 , and also to diminish biodiversity 27 , the latter because even more NPP would have to be appropriated by humans, leaving less for other species 36 . By-products of altering the global energy budget are major modifications to the atmosphere and oceans. Burning fossil fuels has increased atmospheric CO2 concentrations by more than a third (,35%) with respect to pre-industrial levels, with consequent climatic disruptions that include a higher rate of global warming than occurred at the last global-scale state shift 37 . Higher CO2 concentrations have also caused the ocean rapidly to become more acidic, evident as a decrease in pH by ,0.05 in the past two decades 38 . In addition, pollutants from agricultural run-off and urban areas have radically changed how nutrients cycle through large swaths of marine areas 16 . Already observable biotic responses include vast ‘dead zones’ in the near-shore marine realm39 , as well as the replacement of .40% of Earth’s formerly biodiverse land areas with landscapes that contain only a few species of crop plants, domestic animals and humans 3,40 . Worldwide shifts in species ranges, phenology and abundances are concordant with ongoing climate change and habitat transformation 41 . Novel communities are becoming widespread as introduced, invasive and agricultural species integrate into many ecosystems 42 . Not all community modification is leading to species reductions; on local and regional scales, plant diversity has been increasing, owing to anthropogenic introductions 42 , counter to the overall trend of global species loss 5,43 . However, it is unknown whether increased diversity in such locales will persist or will eventually decrease as a result of species interactions that play out over time. Recent and projected 5,44 extinction rates of vertebrates far exceed empirically derived background rates 25 . In addition, many plants, vertebrates and invertebrates have markedly reduced their geographic ranges and abundances to the extent that they are at risk of extinction 43 . Removal of keystone species worldwide, especially large predators at upper trophic levels, has exacerbated changes caused by less direct impacts, leading to increasingly simplified and less stable ecological networks 39,45,46 . Looking towards the year 2100, models forecast that pressures on biota will continue to increase. The co-opting of resources and energy use by humans will continue to increase as the global population reaches 9,500,000,000 people (by 2050), and effects will be greatly exacerbated if per capita resource use also increases. Projections for 2100 range from a population low of 6,200,000,000 (requiring a substantial decline in fertility rates) to 10,100,000,000 (requiring continued decline of fertility in countries that still have fertility above replacement level) to 27,000,000,000 (if fertility remains at 2005–2010 levels; this population size is not thought to be supportable; ref. 31). Rapid climate change shows no signs of slowing. Modelling suggests that for ,30% of Earth, the speed at which plant species will have to migrate to keep pace with projected climate change is greater than their dispersal rate when Earth last shifted from a glacial to an interglacial climate 47 , and that dispersal will be thwarted by highly fragmented landscapes. Climates found at present on 10–48% of the planet are projected to disappear within a century, and climates that contemporary organisms have never experienced are likely to cover 12–39% of Earth 48 . The mean global temperature by 2070 (or possibly a few decades earlier) will be higher than it has been since the human species evolved. The magnitudes of both local-scale direct forcing and emergent globalscaleforcing are much greater than those that characterized the last globalscale state shift, and are not expected to decline any time soon. Therefore, the plausibility of a future planetary state shift seems high, even though considerable uncertainty remains about whether it is inevitable and, if so, how far in the future it may be. The clear potential for a planetary-scale state shift greatly complicates biotic forecasting efforts, because by their nature state shifts contain surprises. Nevertheless, some general expectations can be gleaned from the natural experiments provided by past global-scale state shifts. On the timescale most relevant to biological forecasting today, biotic effects observed in the shift from the last glacial to the present interglacial (Box 1) included many extinctions 30,49–51 ; drastic changes in species distributions, abundances and diversity; and the emergence of novel communities 49,50,52–54 . New patterns of gene flow triggered new evolutionary trajectories 55–58 , but the time since then has not been long enough for evolution to compensate for extinctions. At a minimum, these kinds of effects would be expected from a globalscale state shift forced by present drivers, not only in human-dominated regions but also in remote regions not now heavily occupied by humans (Fig. 1); indeed, such changes are already under way (see above 5,25,39,41–44 ). Given that it takes hundreds of thousands to millions of years for evolution to build diversity back up to pre-crash levels after major extinction episodes 25 , increased rates of extinction are of particular concern, especially because global and regional diversity today is generally lower than it was 20,000 yr ago as a result of the last planetary state shift 37,50,51,54,59 . This large-scale loss of diversity is not overridden by historical increases in plant species richness in many locales, owing to human-transported species homogenizing the world’s biota 42 . Possible too are substantial losses of ecosystem services required to sustain the human population 60 . Still unknown is the extent to which human-caused increases in certain ecosystem services—such as growing food—balances the loss of ‘natural’ ecosystem services, many of which already are trending in dangerous directions as a result of overuse, pollutants and climate change 3,16 . Examples include the collapse of cod and other fisheries 45,61,62 ; loss of millions of square kilometres of conifer forests due to climate-induced bark-beetle outbreaks; 63 loss of carbon sequestration by forest clearing 60 ; and regional losses of agricultural productivity from desertification or detrimental land-use practices 1,35 . Although the ultimate effects of changing biodiversity and species compositions are still unknown, if critical thresholds of diminishing returns in ecosystem services were reached over large areas and at the same time global demands increased (as will happen if the population increases by 2,000,000,000 within about three decades), widespread social unrest, economic instability and loss of human life could result 64 .

#### The risk of keystone species loss leads to extinction – outweighs on reversibility.

Chen 2k (Jim, Professor of Law at University of Minnesota and Dean of Law School at Louisville, “Globalization and Its Losers”:, 9 Minn. J. Global Trade 157’ LexisNexis Legal)

Conscious decisions to allow the extinction of a species or the destruction of an entire ecosystem epitomize the "irreversible and irretrievable commitments of resources" that NEPA is designed to retard.312 The original Endangered Species Act gave such decisions no quarter whatsoever;313 since 1979, such decisions have rested in the hands of a solemnly convened "God Squad."314 In its permanence and gravity, natural extinction provides the baseline by which all other types of extinction should be judged. The Endangered Species Act explicitly acknowledges the "esthetic, ecological, educational, historical, recreational, and scientific value" of endangered species and the biodiversity they represent.315 Allied bodies of international law confirm this view:316 global biological diversity is part of the commonly owned heritage of all humanity and deserves full legal protec- tion.317 Rather remarkably, these broad assertions understate the value of biodiversity and the urgency of its protection. A Sand County Almanac, the eloquent bible of the modern environmental movement, contains only two demonstrable bio- logical errors. It opens with one and closes with another. We can forgive Aldo Leopold's decision to close with that elegant but erroneous epigram, "ontogeny repeats phylogeny."318 What concerns erns us is his opening gambit: "There are some who can live without wild things, and some who cannot."319 Not quite. None of us can live without wild things. Insects are so essential to life as we know it that if they "and other land-dwelling anthropods ... were to disappear, humanity probably could not last more than a few months."320 "Most of the amphibians, reptiles, birds, and mammals," along with "the bulk of the flowering plants and ... the physical structure of most forests and other terrestrial habitats" would disappear in turn.321 "The land would return to" something resembling its Cambrian condition, "covered by mats of recumbent wind-pollinated vegetation, sprinkled with clumps of small trees and bushes here and there, largely devoid of animal life."322 From this perspective, the mere thought of valuing biodiver- sity is absurd, much as any attempt to quantify all of earth's planetary amenities as some trillions of dollars per year is ab- surd. But the frustration inherent in enforcing the Convention on International Trade in Endangered Species (CITES) has shown that conservation cannot work without appeasing Homo economicus, the profit-seeking ape. Efforts to ban the interna- tional ivory trade through CITES have failed to stem the slaugh- ter of African elephants.323 The preservation of biodiversity must therefore begin with a cold, calculating inventory of its benefits. Fortunately, defending biodiversity preservation in human- ity's self-interest is an easy task. As yet unexploited species might give a hungry world a larger larder than the storehouse of twenty plant species that provide nine-tenths of humanity's cur- rent food supply.324 "Waiting in the wings are tens of thousands of unused plant species, many demonstrably superior to those in favor."325 As genetic warehouses, many plants enhance the pro- ductivity of crops already in use. In the United States alone, the lates phylogeny" means that the life history of any individual organism replays the entire evolutionary history of that organism's species. genes of wild plants have accounted for much of "the explosive growth in farm production since the 1930s."326 The contribution is worth $1 billion each year.327 Nature's pharmacy demonstrates even more dramatic gains than nature's farm.328 Aspirin and penicillin, our star analgesic and antibiotic, had humble origins in the meadowsweet plant and in cheese mold.329 Leeches, vampire bats, and pit vipers all contribute anticoagulant drugs that reduce blood pressure, pre- vent heart attacks, and facilitate skin transplants.330 Merck & Co., the multinational pharmaceutical company, is helping Costa Rica assay its rich biota.33' A single commercially viable product derived "from, say, any one species among... 12,000 plants and 300,000 insects ... could handsomely repay Merck's entire investment" of $1 million in 1991 dollars.332 Wild animals, plants, and microorganisms also provide eco- logical services.333 The Supreme Court has lauded the pes- ticidal talents of migratory birds.334 Numerous organisms process the air we breathe, the water we drink, the ground we stroll.335 Other species serve as sentries. Just as canaries warned coal miners of lethal gases, the decline or disappearance of indicator species provides advance warning against deeper environmental threats.336 Species conservation yields the great- est environmental amenity of all: ecosystem protection. Saving discrete species indirectly protects the ecosystems in which they live.337 Some larger animals may not carry great utilitarian value in themselves, but the human urge to protect these charis- matic "flagship species" helps protect their ecosystems.338 In- deed, to save any species, we must protect their ecosystems.339 Defenders of biodiversity can measure the "tangible eco- nomic value" of the pleasure derived from "visiting, photograph- ing, painting, and just looking at wildlife."340 In the United States alone, wildlife observation and feeding in 1991 generated $18.1 billion in consumer spending, $3 billion in tax revenues, and 766,000 jobs.341 Ecotourism gives tropical countries, home to most of the world's species, a valuable alternative to subsis- tence agriculture. Costa Rican rainforests preserved for ecotour- ism "have become many times more profitable per hectare than land cleared for pastures and fields," while the endangered go- rilla has turned ecotourism into "the third most important source of income in Rwanda."342 In a globalized economy where commodities can be cultivated almost anywhere, environmen- tally sensitive locales can maximize their wealth by exploiting the "boutique" uses of their natural bounty. The value of endangered species and the biodiversity they embody is "literally . . . incalculable."343 What, if anything, should the law do to preserve it? There are those that invoke the story of Noah's Ark as a moral basis for biodiversity preser- vation.344 Others regard the entire Judeo-Christian tradition, especially the biblical stories of Creation and the Flood, as the root of the West's deplorable environmental record.345 To avoid getting bogged down in an environmental exegesis of Judeo- Christian "myth and legend," we should let Charles Darwin and evolutionary biology determine the imperatives of our moment in natural "history."346 The loss of biological diversity is quite arguably the gravest problem facing humanity. If we cast the question as the contemporary phenomenon that "our descend- ants [will] most regret," the "loss of genetic and species diversity by the destruction of natural habitats" is worse than even "energy depletion, economic collapse, limited nuclear war, or con- quest by a totalitarian government."347 Natural evolution may in due course renew the earth with a diversity of species approximating that of a world unspoiled by Homo sapiens - in ten mil- lion years, perhaps a hundred million.348

#### **Scenario two is agriculture**

#### Despite CO2 fertilization, massive rise of temperature due to warming causes food shortages —the result is extinction.

Strom 7 (Robert, Professor Emeritus of planetary sciences in the Department of Planetary Sciences at the University of Arizona, studied climate change for 15 years, the former Director of the Space Imagery Center, a NASA Regional Planetary Image Facility, “Hot House”, SpringerLink, p. 211-216)

 THE future consequences of global warming are the least known aspect of the problem. They are based on highly complex computer models that rely on inputs that are sometimes not well known or factors that may be completely unforeseen. Most models assume certain scenarios concerning the rise in greenhouse gases. Some assume that we continue to release them at the current rate of increase while others assume that we curtail greenhouse gas release to one degree or another. Furthermore, we are in completely unknown territory. The current greenhouse gas content of the atmosphere has not been as high in at least the past 650,000 years, and the rise in temperature has not been as rapid since civilization began some 10,000 years ago. What lies ahead for us is not completely understood, but it certainly will not be good, and it could be catastrophic. We know that relatively minor climatic events have had strong adverse effects on humanity, and some of these were mentioned in previous chapters. A recent example is the strong El Nin~o event of 1997-1998 that caused weather damage around the world totaling $100 billion: major flooding events in China, massive fires in Borneo and the Amazon jungle, and extreme drought in Mexico and Central America. That event was nothing compared to what lies in store for us in the future if we do nothing to curb global warming. We currently face the greatest threat to humanity since civilization began. This is the crucial, central question, but it is very difficult to answer (Mastrandea and Schneider, 2004). An even more important question is: "At what temperature and environmental conditions is a threshold crossed that leads to an abrupt and catastrophic climate change?'' It is not possible to answer that question now, but we must be aware that in our ignorance it could happen in the not too distant future. At least the question of a critical temperature is possible to estimate from studies in the current science literature. This has been done by the Potsdam Institute for Climate Impact Research, Germany's leading climate change research institute (Hare, 2005). According to this study, global warming impacts multiply and accelerate rapidly as the average global temperature rises. We are certainly beginning to see that now. According to the study, as the average global temperature anomaly rises to 1 °C within the next 25 years (it is already 0.6'C in the Northern Hemisphere), some specialized ecosystems become very stressed, and in some developing countries food production will begin a serious decline, water shortage problems will worsen, and there will be net losses in the gross domestic product (GDP). At least one study finds that because of the time lags between changes in radiative forcing we are in for a 1 °C increase before equilibrating even if the radiative forcing is fixed at today's level (Wetherald et al., 2001). It is apparently when the temperature anomaly reaches 2 °C that serious effects will start to come rapidly and with brute force (International Climate Change Taskforce, 2005). At the current rate of increase this is expected to happen sometime in the middle of this century. At that point there is nothing to do but try to adapt to the changes. Besides the loss of animal and plant species and the rapid exacerbation of our present problems, there are likely to be large numbers of hungry, diseased and starving people, and at least 1.5 billion people facing severe water shortages. GDP losses will be significant and the spread of diseases will be widespread (see below). We are only about 30 years away from the 440 ppm CO2 level where the eventual 2'C global average temperature is probable. When the temperature reaches 3 'C above today's level, the effects appear to become absolutely critical. At the current rate of greenhouse gas emission, that point is expected to be reached in the second half of the century. For example, it is expected that the Amazon rainforest will become irreversibly damaged leading to its collapse, and that the complete destruction of coral reefs will be widespread. As these things are already happening, this picture may be optimistic. As for humans, there will be widespread hunger and starvation with up to 5.5 billion people living in regions with large crop losses and another 3 billion people with serious water shortages. If the Amazon rainforest collapses due to severe drought it would result in decreased uptake of CO2 from the soil and vegetation of about 270 billion tons, resulting in an enormous increase in the atmospheric level of CO2. This, of course, would lead to even hotter temperatures with catastrophic results for civilization. A Regional Climate Change Index has been established that estimates the impact of global warming on various regions of the world (Giorgi, 2006). The index is based on four variables that include changes in surface temperature and precipitation in 2080-2099 compared to the period 1960-1979. All regions of the world are affected significantly, but some regions are much more vulnerable than others. The biggest impacts occur in the Mediterranean and northeastern European regions, followed by high-latitude Northern Hemisphere regions and Central America. Central America is the most affected tropical region followed by southern equatorial Africa and southeast Asia. Other prominent mid-latitude regions very vulnerable to global warming are eastern North America and central Asia. It is entirely obvious that we must start curtailing greenhouse gas emissions now, not 5 or 10 or 20 years from now. Keeping the global average temperature anomaly under 2'C will not be easy according to a recent report (Scientific Expert Group Report on Climate Change, 2007). It will require a rapid worldwide reduction in methane, and global CO2 emissions must level off to a concentration not much greater than the present amount by about 2020. Emissions would then have to decline to about a third of that level by 2100. Delaying action will only insure a grim future for our children and grandchildren. If the current generation does not drastically reduce its greenhouse gas emission, then, unfortunately, our grandchildren will get what we deserve. There are three consequences that have not been discussed in previous chapters but could have devastating impacts on humans: food production, health, and the economy. In a sense, all of these topics are interrelated, because they affect each other. Food Production Agriculture is critical to the survival of civilization. Crops feed not only us but also the domestic animals we use for food. Any disruption in food production means a disruption of the economy, government, and health. The increase in CO2 will result in some growth of crops, and rising temperatures will open new areas to crop production at higher latitudes and over longer growing seasons; however, the overall result will be decreased crop production in most parts of the world. A 1993 study of the effects of a doubling of CO2 (550 ppm) above pre-industrial levels shows that there will be substantial decreases in the world food supply (Rosenzweig et al., 1993). In their research they studied the effects of global warming on four crops (wheat, rice, protein feed, and coarse grain) using four scenarios involving various adaptations of crops to temperature change and CO2 abundance. They found that the amount of world food reduction ranged from 1 to 27%. However, the optimistic value of 1% is almost certainly much too low, because it assumed that the amount of degradation would be offset by more growth from "CO2 fertilization." We now know that this is not the case, as explained below and in Chapter 7. The most probable value is a worldwide food reduction between 16 and 27%. These scenarios are based on temperature and CO2 rises that may be too low, as discussed in Chapter 7. However, even a decrease in world food production of 16% would lead to large-scale starvation in many regions of the world. Large-scale experiments called Free-Air Concentration Enrichment have shown that the effects of higher CO2 levels on crop growth is about 50% less than experiments in enclosure studies (Long et al., 2006). This shows that the projections that conclude that rising CO2 will fully offset the losses due to higher temperatures are wrong. The downside of climate change will far outweigh the benefits of increased CO2 and longer growing seasons. One researcher (Prof. Long) from the University of Illinois put it this way: Growing crops much closer to real conditions has shown that increased levels of carbon dioxide in the atmosphere will have roughly half the beneficial effects previously hoped for in the event of climate change. In addition, ground-level ozone, which is also predicted to rise but has not been extensively studied before, has been shown to result in a loss of photosynthesis and 20 per cent reduction in crop yield. Both these results show that we need to seriously re-examine our predictions for future global food production, as they are likely to be far lower than previously estimated. Also, studies in Britain and Denmark show that only a few days of hot temperatures can severely reduce the yield of major food crops such as wheat, soy beans, rice, and groundnuts if they coincide with the flowering of these crops. This suggests that there are certain thresholds above which crops become very vulnerable to climate change. The European heat wave in the summer of 2003 provided a large-scale experiment on the behavior of crops to increased temperatures. Scientists from several European research institutes and universities found that the growth of plants during the heat wave was reduced by nearly a third (Ciais et al., 2005). In Italy, the growth of corn dropped by about 36% while oak and pine had a growth reduction of 30%. In the affected areas of the mid- west and California the summer heat wave of 2006 resulted in a 35% loss of crops, and in California a 15% decline in dairy production due to the heat-caused death of dairy cattle. It has been projected that a 2 °C rise in local temperature will result in a $92 million loss to agriculture in the Yakima Valley of Washington due to the reduction of the snow pack. A 4'C increase will result in a loss of about $163 million. For the first time, the world's grain harvests have fallen below the consumption level for the past four years according to the Earth Policy Institute (Brown, 2003). Furthermore, the shortfall in grain production increased each year, from 16 million tons in 2000 to 93 million tons in 2003. These studies were done in industrialized nations where agricultural practices are the best in the world. In developing nations the impact will be much more severe. It is here that the impact of global warming on crops and domestic animals will be most felt. In general, the world's most crucial staple food crops could fall by as much as one-third because of resistance to flowering and setting of seeds due to rising temperatures. Crop ecologists believe that many crops grown in the tropics are near, or at, their thermal limits. Already research in the Philippines has linked higher night-time temperatures to a reduction in rice yield. It is estimated that for rice, wheat, and corn, the grain yields are likely to decline by 10% for every local 1 °C increase in temperature. With a decreasing availability of food, malnutrition will become more frequent accompanied by damage to the immune system. This will result in a greater susceptibility to spreading diseases. For an extreme rise in global temperature (> 6 'C), it is likely that worldwide crop failures will lead to mass starvation, and political and economic chaos with all their ramifications for civilization.

#### Reprocessing solves warming in two ways:

#### First, reprocessing is key to a revived U.S. clean energy program that provides leadership to win agreements to cut emissions and solve warming.

Roberts 4 (Paul, Energy Expert and Writer for Harpers, The End of Oil, pg. 325-326)

Politically, a new U.S. energy policy would send a powerful message to the rest of the players in the global energy economy. Just as a carbon tax would signal the markets that a new competition had begun, so a progressive, aggressive American energy policy would give a warning to international businesses, many of which now regard the United States as a lucrative dumping ground for older high-carbon technology. It would signal energy producers — companies and states — that they would need to start making investments for a new energy business, with differing demands and product requirements. Above all, a progressive energy policy would not only show trade partners in Japan and Europe that the United States is serious about climate but would give the United States the leverage it needs to force much-needed changes in the Kyoto treaty. With a carbon program and a serious commitment to improve efficiency and develop clean-energy technologies, says one U.S. climate expert, “the United States could really shape a global climate policy. We could basically say to Europe, ‘Here is an American answer to climate that is far better than Kyoto. Here are the practical steps we’re going to take to reduce emissions, far more effectively than your cockamamie Kyoto protocol.”’ Similarly, the United States would finally have the moral credibility to win promises of cooperation from India and China. As James MacKenzie, the former White House energy analyst who now works on climate issues for the Washington-based World Resources Institute, told me, Chinese climate researchers and policymakers know precisely what China must do to begin to deal with emissions but have thus far been able to use U.S. intransigence as an excuse for their own inaction. “Whenever you bring up the question of what the Chinese should be doing about climate, they just smile. They ask, ‘Why should we in China listen to the United States and take all these steps to protect the climate, when the United States won’t take the same steps itself? With a nudge from the United States, argues Chris Flavin, the renewables optimist at World Watch Institute, China could move away from its “destiny” as a dirty coal energy economy. Indeed, given China’s urgent air quality problems, a growing middle class that will demand environmental quality, and a strategic desire to become a high- tech economy, Flavin says, Beijing is essentially already under great domestic pressure to look beyond coal and is already turning toward alternatives — gas, which is in short supply, but also renewables, especially wind, a resource China has in abundance. Once China’s growing expertise in technology and manufacturing and its cheap labor costs are factored in, Flavin says, it has the basis for a large-scale wind industry — something the right push from the West could set in motion. “As China moves forward,” asks Flavin, “is it really likely to do something that no other country has ever done: run a modern, hightech, postindustrial economy on a hundred-year-old energy source?” Flavin, for one, thinks not. During a visit two years ago to lobby reluctant Chinese government officials to invest in renewable energy, Flavin was pleasantly surprised to find in his hotel parking lot a truck owned by NEG Micon, a Danish company that is one of the world’s largest wind turbine manufacturers. Flavin was elated: “At least one leading renewable-energy company, located halfway around the world, is confident enough of its business prospects in China that it now has its own vehicles in Beijing.”

#### Second, only allowing for reprocessing allows for nuclear power to transition to a carbon free economy fast enough to avoid catastrophic warming – best modeling flows aff.

Chakravorty et al. 12 (Ujjayant (Professor and Canada Research Chair, Alberta School of Business and Department of Economics); Bertrand Magne (OECD Environment Directorate, Paris, France); Michel Moreaux (Emeritus Professor and IDEI Researcher, Toulouse School of Economics, University of Toulouse), “RESOURCE USE UNDER CLIMATE STABILIZATION: CAN NUCLEAR POWER PROVIDE CLEAN ENERGY?”, Journal of Public Economic Theory, Vol. 14, Issue 2, 2012, RSR)

This paper applies a model with price-induced substitution across resources to examine the role of nuclear power in achieving a climate stabilization target, such as that advocated by the Intergovernmental Panel on Climate Change (IPCC). It asks an important policy question: is nuclear power a viable carbon-free energy source for the future? If so, then at what cost? The main insight is that nuclear power can help us switch quickly to carbon free energy, and if historical growth rates of nuclear capacity are preserved, the costs of reaching climate stabilization goals decline signiﬁcantly and may therefore be at the lower end of cost estimates that are reported by many studies. However, it is also clear from our results that nuclear is economical anyway, even without environmental regulation. Regulation only plays a major part when fast breeders are available and that too, in the somewhat distant future, towards the end of the century. To some extent, recent increases in efﬁciency in U.S. nuclear power attest to its economic advantages, even in a market with no environmental regulation (Davis and Wolfram 2011). The climate goal of 550 ppm of carbon can be achieved at a surplus cost of about 800 billion dollars, or about 1.3% of current world GDP, if no nuclear expansion is undertaken. Achieving this goal using nuclear power will result in a tripling of the share of world nuclear electricity generation by mid century with welfare gains of about half a trillion dollars (in discounted terms). The cost of providing energy will decrease by about $1.3 trillion or 2% of current world GDP, compared to the case in which the level of nuclear generation is frozen. These estimates of cost savings from nuclear power are signiﬁcant, and unlike in previous studies, are derived from an economic model with an explicit nuclear fuel cycle. However, nuclear power can be cost-effective for about 50 years or so, beyond which period, other technologies are likely to take over, including renewables, clean coal and next generation nuclear technologies that are much more efﬁcient in recycling waste materials. Ultimately, large-scale adoption of nuclear power will be hindered by the rising cost of uranium and the problem of waste disposal. Only signiﬁcant new developments such as the availability of new generation nuclear technology that is able to recycle nuclear waste may lead to a steady state where nuclear energy plays an important role. 31

#### This is especially true now – we need nuclear power in the interim since renewables are not progressing fast enough.

Harvey 12 (Fiona, Environment Correspondent, “Nuclear power is only solution to climate change, says Jeffrey Sachs”, The Guardian, 5-3-12,

<http://www.guardian.co.uk/environment/2012/may/03/nuclear-power-solution-climate-change>, RSR)

Combating climate change will require an expansion of nuclear power, respected economist Jeffrey Sachs said on Thursday, in remarks that are likely to dismay some sections of the environmental movement. Prof Sachs said atomic energy was needed because it provided a low-carbon source of power, while renewable energy was not making up enough of the world's energy mix and new technologies such as carbon capture and storage were not progressing fast enough. "We won't meet the carbon targets if nuclear is taken off the table," he said. He said coal was likely to continue to be cheaper than renewables and other low-carbon forms of energy, unless the effects of the climate were taken into account.

#### US leadership on nuclear reprocessing leads to a spillover of the technology internationally.

Acton 9 (James, J. associate in the Nonproliferation Program at the Carnegie Endowment for International Peace, Survival, Vol. 51, No. 4, “Nuclear Power, Disarmament and Technological Restraint”, RSR)

Thus, not only does reprocessing clearly not help with facilitating take back, but if advanced nuclear states adopt it as a tool for waste management, it will be virtually impossible for them to argue against others doing likewise. Today, waste management is probably the most important driver for reprocessing. Indeed, the Bush administration’s interest in this technology was born out of a desire to stretch the capacity of Yucca Mountain as far as possible. If the United States and others reprocess they will hand a powerful argument to lobbies within a state – typically the nuclear R&D community – that support the development of reprocessing.

### Plan Text

#### Thus the plan: The United States Federal Government should provide a twenty-percent investment tax credit for the deployment of domestic nuclear fuel recycling.

### Solvency

#### Observation Four: Solvency

#### Tax incentives would solve for reprocessing – makes it commercially more desirable

Lagus 5 (Todd, 2005 WISE Intern, University of Minnesota, WISE, “Reprocessing of Spent Nuclear Fuel: A Policy Analysis” <http://www.wise-intern.org/journal/2005/lagus.pdf>, RSR)

The economic analysis shows that the reprocessing or even the once through nuclear cycle is not yet economically desirable to investors. However, changes in government policies, including environmental regulations already mentioned and economic policies, could improve the competitiveness of both technologies. The University of Chicago nuclear power study analyzes the effects of government involvement in the future of the once through cycle using several different forms of support: loan guarantees, accelerated depreciation, and investment tax credits. Loan guarantees in this case refer to the obligation of the government to repay part of the loan should a utility company not be able to repay. The 2005 Energy Bill, which passed in July 2005, would make advanced nuclear power plants eligible for federal loan guarantees and provide a tax credit for nuclear power production. This would lessen the risks associated with capital costs for investors, and according to the Chicago study, reduce the LCOE for a nuclear reactor by 4 mills/kWh to 6 mills/kWh. The next financial subject, accelerated depreciation, refers to the ability of an investor to utilize the investment tax deductions early on in the lifetime of the payment rather than receive the same deduction each year in a linear fashion. Accelerated depreciation helps investors absorb capital costs, which for nuclear power generation are large. The University of Chicago study calculates a reduction in the LCOE for a 7 year depreciation policy of 3 mills/kWh to 4 mills/kWh. Tax incentives for nuclear power production are the final policies that could make nuclear power and reprocessing more desirable. An investment tax credit of 10 percent would create an LCOE reduction between 6 mills/kWh and 8 mills/kWh, while a 20 percent credit could create cost reductions between 9 mills/kWh and 13 mills/kWh. 39 Production tax credits on a per kWh basis may also be used. Since reprocessing and the once through cycle are not appreciably different for the price, it is sufficient to assume 12 that similar effects for all three of these government policies would occur with policies applied to reprocessing. While it is no secret that monetary incentives would help the nuclear reprocessing investments, there is still the question of whether or not the government should provide economic support to the industry. As with any government funding, it is politically important not to be viewed by other energy generation industries, i.e. gas and coal, as favoring nuclear power over other sources. Given the recent concerns for global warming, tax incentives and loan guarantees for nuclear technologies seem like a realistic option especially in the absence of emission regulations. Accelerated depreciation also is an unobtrusive option that could help the industry by easing capital costs.

#### Government investment key – necessary to mitigate risks from government regulations.

Selyukh 10 (Alina, Staff Writer, “Nuclear waste issue could be solved, if...”, 8-17-10, Reuters,

<http://www.reuters.com/article/2010/08/17/us-nuclear-waste-recycling-idUSTRE67G0NM20100817>, RSR)

Since the U.S. agency declared spent fuel reprocessing too costly, U.S. research into new technologies has slowed. President George W. Bush offered federal backing for nuclear waste management alternatives, but over the years the policy has meandered and had few incentives to lure companies, said Steven Kraft, senior director of used-fuel management at the Nuclear Energy Institute, the industry's trade organization. Being able to burn through rather inexpensive uranium to produce energy, companies are wary of investing millions into recycling technology that may go against the national policy. Still, industry support for the ideas is strong, if not for the procedure itself then for allowing the market -- not the government -- to determine its cost-effectiveness and fate. Duke Energy, which operates seven nuclear plants, would support nuclear recycling if there was a cost-effective national policy, spokeswoman Rita Sipe said. GE Hitachi has proposed a new generation of fast reactors that, they say, could return to the grid up to 99 percent of energy contained in the uranium, compared to recovering 2 or 3 percent from a common light water reactor. But they want federal support for more research and, ultimately, commercialization of the technology, said chief consulting engineer Erik Loewen. That support, in essence, would have to come in a form of subsidies such as cost sharing or loan guarantees, said Jack Spencer, nuclear energy policy research fellow at the Heritage Foundation think tank. "What the industry needs... is something to mitigate government-imposed risks," he said of the regulatory regime.

#### Government investment necessary – provides appropriate risk mitigation and shortens the timeframe for completion.

IAEA 8 (International Atomic Energy Agency, “Spent Fuel Reprocessing Options”, August 2008, RSR)

With the expected high costs and significant risks involved in constructing new nuclear facilities, e.g., reprocessing facilities, the impact of various ownership options need to be considered. These options include government funding, regulated funding, private funding, and combinations of public and private funding. These different funding approaches may significantly impact the costs of fuel cycle services. Given the very long time frames associated with building reprocessing facilities, there exist risks other than technological or economic, which need to be dealt with. These include evolving government policy, public and political acceptance, and licensing risks. As a result, private investors are unlikely to provide capital unless the initial high risks factors are mitigated through appropriate risk sharing agreements (e.g., loan guarantees, equity protection plans, tax credits, etc.) with government entities.

## 2AC

### T – Energy Production

#### We meet: Nuclear fuel recycling is energy production.

World Nuclear Association 12 [Processing of Used Nuclear Fuel, http://www.world-nuclear.org/info/inf69.html]

Used nuclear fuel has long been reprocessed to extract fissile materials for recycling and to reduce the volume of high-level wastes. ¶ New reprocessing technologies are being developed to be deployed in conjunction with fast neutron reactors which will burn all long-lived actinides. ¶ A significant amount of plutonium recovered from used fuel is currently recycled into MOX fuel; a small amount of recovered uranium is recycled. ¶ A key, nearly unique, characteristic of nuclear energy is that used fuel may be reprocessed to recover fissile and fertile materials in order to provide fresh fuel for existing and future nuclear power plants. Several European countries, Russia and Japan have had a policy to reprocess used nuclear fuel, although government policies in many other countries have not yet addressed the various aspects of reprocessing.¶ Over the last 50 years the principal reason for reprocessing used fuel has been to recover unused uranium and plutonium in the used fuel elements and thereby close the fuel cycle, gaining some 25% more energy from the original uranium in the process and thus contributing to energy security. A secondary reason is to reduce the volume of material to be disposed of as high-level waste to about one fifth. In addition, the level of radioactivity in the waste from reprocessing is much smaller and after about 100 years falls much more rapidly than in used fuel itself.¶

#### Counter interpretation:

#### The aff has to affect both resource extraction and conversion into energy

Australian Government, Department of Climate Change and Energy Efficiency 2011 [“Energy Production and Consumption,” http://www.climatechange.gov.au/government/initiatives/national-greenhouse-energy-reporting/publications/supplementary-guidelines/energy-production-consumption.aspx]

Production of energy: in relation to a facility, means the:

1. extraction or capture of energy from natural sources for final consumption by or from the operation of the facility or for use other than in the operation of the facility
2. manufacture of energy by the conversion of energy from one form to another form for final consumption by or from the operation of the facility, or for use other than in the operation of the facility (regulation 2.23(3) NGER Regulations).

#### We meet the counter-interpretation: recycling involves both the act of reprocessing the used fuel and using it to create new nuclear energy.

#### Our interp good:

A. Predictability – Only our interpretation guarantees link arguments to both extraction and the burning of resources to produce energy. This is crucial link ground for pollution DAs and domestic/foreign energy tradeoff DAs.

B. Limits: Requiring the aff to both extract and convert the energy is necessary to eliminate affs that only extract, like capture carbon or methane or stockpile oil as a strategic military reserve with heg advantages. Also key to prevent affs that only burn fuels like Bataille-style affs that encourage rapid consumption or R&D affs that incentivize new ways to burn the same resources.

#### Their interp bad:

#### They get rid of all uranium extraction affs because extraction from waste is identical to extraction from the ground. This means they get rid of oil and natural gas extraction affs which is literally half the topic.

#### Competing interpretations are bad: Race to the bottom: they’re just trying to limit out one more case

#### Prefer reasonability: as long as we’re reasonably topical, there’s no reason to pull the trigger. Don’t vote on potential abuse.

### Pu-238

#### No Pu-238 now – err aff because our ev is more recent and cites multiple studies.

Colladay et al. 12 [Raymond (Chair Committee on NASA Space Technology Roadmaps and Priorities, Steering Committee); The committee is made up of experts in various panels to study and report on their areas of expertise, The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council are private, nonprofit institutions that provide expert advice on some of the most pressing challenges facing the nation and the world. Known collectively as the National Academies, our organization produces groundbreaking reports that have helped shape sound policies, inform public opinion, and advance the pursuit of science, engineering, and medicine; “NASA Space Technology Roadmaps and Priorities: Restoring NASA's Technological Edge and Paving the Way for a New Era in Space”; 2012; ISBN 978-0-309-25362-8;

http://www.nap.edu/catalog.php?record\_id=13354]

While RPSs have a well-established foundation, there are significant technology issues that must be overcome¶ to maximize the effectiveness of the United States’ dwindling supply of available Pu-238. DOE no longer has the¶ ability to produce Pu-238 (except for very small amounts for research), and the United States has purchased all¶ available Pu-238 from Russia. No other country, including Russia, is currently producing Pu-238, and multiple¶ studies have shown that there is no other available radioisotope material that can meet even a significant fraction¶ of NASA’s RPS needs. Supported by recent NRC studies (NRC, 2010, 2011), NASA and DOE have been attempting¶ to restart production of a limited annual quantity of Pu-238 for the past few years, but Congress has not yet¶ provided funding to the DOE and/or NASA for this purpose.3¶ NASA and DOE have been developing advanced RPSs that would use Stirling engines to replace thermoelectric¶ converters. Because the energy conversion efficiency of the Stirling engine under development is about 5 times that¶ of thermoelectric converters, Stirling engines require significantly smaller quantities of Pu-238 to achieve similar¶ power levels. Given the scarcity of Pu-238 (which will persist for years even after Pu-238 production is approved¶ and funded), the much higher efficiency of Stirling engines is necessary if RPSs are to be available for NASA’s planned science and exploration missions. As discussed in Chapter 3, establishing a reliable, recurring source of¶ Pu-238 and maturing Stirling engine technology are both critically important to provide power for NASA’s future¶ science and exploration missions that cannot rely on solar power.¶ Radioisotope technology using Stirling engines is currently assessed to be at TRL 6. Although some components¶ have been demonstrated at higher TRLs, a flight test is needed to advance beyond TRL 6. Using the ISS to¶ demonstrate this technology is not an option due to restrictions regarding operation of nuclear power systems in¶ LEO. RPS technology is somewhat unique to NASA, as interplanetary space missions are the only driving need¶ that has been identified to justify restarting Pu-238 production. NASA and DOE have the unique capabilities and¶ facilities necessary to develop RPSs. By statute, DOE must be responsible for the nuclear aspects of RPS technology¶ development. NASA Glenn Research Center has led the development of Stirling engines and the Jet Propulsion¶ Laboratory leads NASA efforts in RPS development and spacecraft integration.

#### Weaponization is inevitable – only aff solves the impact by challenging now.

Dolman et. al ’06 (Everett C. Dolman, Professor of Comparative Military Studies at the US Air Force’s School of Advanced Air and Space Studies, Peter Hays, senior policy analyst with the Science Applications International Corporation, Karl Mueller, political scientist with the RAND Corporation, specializing in air and space strategy and other defense policy issues, 3/10/06, “Toward a Grand U.S. Strategy in Space,” George C. Marshall Institute, pg 24-25)

Nonetheless, we have a different system today and, as Karl has pointed out, it may be that if the United States were to unilaterally militarize space – and I am not advocating that necessarily, but it is an option – that it could in fact prevent an arms race. The trillions of dollars that would have to be spent to dislodge the United States from space, if it were to quickly seize control of the low-earth orbit, might be seen as not worthwhile to another state. However, if we wait fifteen or twenty years until a state is able to challenge the United States in space, then we will have a space race. By putting weapons in space to enhance its military capabilities the United States today is saying to the world that in this period of American hegemony, it is not going to wait for problems to develop overseas until they bubble over into its area of interest, and then massively and forcefully fix that problem. No. The American way of war today, based on precision and on space capabilities, is to engage early using less force, using more precise force and more deadly force in a specific area, but with far less collateral damage. That is the new American way of war and we really cannot get out of it. This is the fight that we are going to be taking into the world today and space is a tremendous part of that. Space weaponization, space militarization, is going to become the issue of the first the twenty-five years of this century, as for the last half of the 20th century the nuclear paradigm was the great issue in military power and studies.

### Tax Credit CP

#### Perm do both

#### Perm solves best – combination of financing techniques is best for certainty

Kane, Senior Vice President of Nuclear Energy Institute, 5 (John, United States House of Representatives, Committee on Energy and Commerce, Subcommittee on Energy and Air Quality, Testimony for the Record, 16 February 2005, http://www.nei.org/publicpolicy/congressionaltestimony/testimonykaneextended, da 11-1-12)

We believe that companies can achieve the best results by pursuing a combination of options, including loan guarantees, investment tax credits, production tax credits and accelerated depreciation. The specific combination of financing tools and techniques will vary from company to company, and from project to project. But companies need a variety of options to move forward toward placing new plant orders.¶ Dr. Ivan Maldonado, an associate professor of mechanical, industrial and nuclear engineering at the University of Cincinnati, wrote Jan. 30 in The Cincinnati Enquirer that “Congress should include the tax incentive in a comprehensive energy bill that’s awaiting final action.” Maldonado wrote that a tax credit (similar to credits for renewables) “would block our backsliding into even greater oil dependency, provide needed electricity capacity, and help slow and eventually reverse the buildup of greenhouse gases.”¶ The financing challenges for the industry apply to the first few plants in any series of new capital-intensive baseload power plants. As first-of-a-kind capital costs decline, and as investors gain confidence that the licensing process works as intended, companies can finance subsequent plants without federal investment.

#### Certainty key to commercialization and aff solvency.

Berry and Tolley, ‘10

[Stephen and George, Professors of Energy Policy and Economics at the University of Chicago, “Nuclear Fuel Reprocessing Future Prospects and Viability”, University of Chicago Humanities, 11-29-2010, http://humanities.uchicago.edu/orgs/institute/bigproblems/Team7-1210.pdf]

The U.S. efforts to exploit nuclear power commercially originated as a result of the Atomic Energy Act of 1954 and specifically the creation of the Atomic Energy Commission (AEC) 58 . In 1957, the Price-Anderson Act limited utilities’ liabilities regarding nuclear accidents and helped promulgate interest in the commercial use of nuclear energy. 59 This act served an important role in relaying the government’s credible commitment to the nuclear industry. Initially, the U.S. nuclear industry was subject to the interaction of three groups; the nuclear/electric industry, the AEC, and the Congressional Joint Committee on Atomic Energy (JCAE). 60 In this respect, polices regarding the nuclear industry were centralized and left to the discretion of the regulators and the regulated industries themselves. This political environment fostered the expansion of the nuclear industry and investment in the technology. However, control over commercial nuclear policy became highly fragmented: By the time the JCAE was officially disbanded in early 1977, more **than a dozen committees** in the House and Senate had gained some oversight over nuclear energy policy. Once the decentralization of authority had occurred, proposals to create a single House energy committee with concentrated authority were defeated. This proliferation of oversight is far more typical of the American political system than the centralized JCAE had been. 61 Further, during this period there was a significant rise in the number of anti-nuclear activists namely the Union of Concerned Scientist and the National Resource Defense Council. 62 These groups were able to utilize this **fragmented political environment** to undermine government commitment to the industry. The revived arrangement for nuclear industry oversight can be characterized by a subcommittee structure “**open to competing interests**, as well as vulnerable to changes in the composition of interest groups”. 63 Moreover, the nuclear industry was subject to an increased volume of rules and regulations as the anti-nuclear activist groups employed the independent judiciary branch for their interests. The change in the political structure confronting the nuclear industry undermined the feasibility of credible commitment of government toward the industry. Subsequently, this helped lead to the decline of the commercial nuclear industry in the U.S in addition to the Three Mile Island (TMI) accident. This situation contrasts the environment of the French nuclear industry. The American combination of fragmented power, little reliance on bureaucratic expertise, an independent judiciary, and opposing interest groups greatly undermines the ability of the U.S. government to credibly commit to the nuclear power industry. In France, despite substantial anti-nuclear interest groups, the impermeability of the institutional setup—no division of power, weak judiciary, and reliance on bureaucratic expertise— effectively prevents activists from influencing policy outcomes. 64 The French exploration into commercial nuclear energy and subsequent promotion of nuclear energy was the result of “a perceived shortage of enriched uranium, a need for weapons-grade materials, and the desire for energy independence from foreign states.” 65 In contrast to the U.S., the political environment in regards to nuclear energy in France has remained stable over the course of the last fifty years. In 1955, three government organizations banded together to promote nuclear power; namely: Electricité de France (EDF—the state—owned utility empowered by the Ministère de l’Industrie et des Finances), the Commissariat à l’Energie Atomique (CEA—with a promotional mission parallel to America’s AEC), and Production d’Electricité d’Origine Nucléaire (PEON—an advisory group to the CEA comprised of CEA, EDF, state, and industry representatives). 66 The nuclear industry maintains a high degree of central planning and state integration. 67 This political environment has provided the means for credible government commitment to the industry. Though there has been strong anti-nuclear rhetoric domestically in France the well insulated governmental setup towards nuclear energy has prevented these groups access to any policy-making forum. Further, these groups are afforded less influential power toward the industry due to a weaker judiciary than is present in the U.S. 68 Therefore, the uncertainty surrounding the commitment of the government toward the nuclear industry in France is far less than in the U.S. The French political structure “can carry out a long-term policy while ignoring the fluctuations of public opinion.” 69 This lack of “uncertainty” is important when we consider the effect that it has on transaction costs for the utilities attempting to employ nuclear facilities and investors realizing a return on their outlays. The U.S. political structure has led to an increase in transaction costs for its domestic nuclear industry, while the French structure is able to mitigate similar types of increases. As a result of the political structure, transaction costs for the nuclear industry are higher in the U.S. than they are in France. In opening the policy forum to anti-nuclear interest groups, the U.S. nuclear industry experienced procedural delays and increased compliance costs for nuclear facilities. From 1954 to 1979, the average lead times, including the time from order through commercial operation, increased from 2 to 6 years in France and from 3 to nearly 13 years in the United States. 70 Further, French programs typically presented greater stability in lead times as well as fewer delays than in the United States. 71 The nuclear industry in the U.S has seen an increase in uncertainty for their transaction costs in order to protect their large sunk costs. This has resulted in an increased perception of risk on the part of investors and subsequently increased the cost of capital for the technology: “lengthening the regulatory process increases the capital costs of the plant by pushing the revenue received from operation further into the future and by adding to the total interest payments on construction loans.” 72 **This political institutional framework provides an understanding of** the challenges which confront nuclear reprocessing in the U.S.

#### Investment tax credits are key to solve –

#### Key to solve waste – investment is key to the development of new technologies like IFR’s to solve 100% of the waste problem – That’s Bastin

#### Permanence is key – temporary incentives for recycling have failed in the past due to the fear of going against national policy, so only a permanent change in tax structures can spur reprocessing – that’s Selyukh

#### Permanence is key – the industry is afraid of evolving government policy – that’s IAEA.

#### Tax credits are key – forces government to share the risks – that’s IAEA.

#### Plan is key to cost reduction – 20% investment tax credits reduce costs by 9 to 13 mills/kWh – our evidence is in the context of reprocessing – that’s Lagus.

#### Plan is key to investment – industry executives are waiting for a tax credit to invest

Kane, Senior Vice President of Nuclear Energy Institute, 5 (John, United States House of Representatives, Committee on Energy and Commerce, Subcommittee on Energy and Air Quality, Testimony for the Record, 16 February 2005, http://www.nei.org/publicpolicy/congressionaltestimony/testimonykaneextended, da 11-1-12)

The industry has taken enormous strides during the past few years to explore alternatives for new nuclear plants. Investment in new nuclear generation is a key priority for the industry. We believe that it is wise energy policy to support public-private partnerships in jumpstarting the construction of new nuclear plants.¶ The H.R. 6 conference report included several important tax provisions supporting investment in new nuclear facilities; the industry would welcome the same provisions in the bill you are currently crafting. However, we realize that the jurisdiction for these measures lies with the tax-writing committees. ¶ We would urge that you examine the inclusion of such measures as an investment tax credit, accelerated depreciation, production tax credits (similar to those detailed in Section 45) or a combination of these investments tailored to the needs of those interested in building new plants. We ask you to consider how these measures may augment a company’s strategy to build new nuclear plants, in view of varying competitive structures within energy companies’ states, geographic areas or service territories.

### Navy + Nano CP

#### Perm do both

#### Status quo defines space as the crucial barometer for hegemony. That’s 1AC Stone. Deep space exploration and security missions space our foreign policy and relations with other countries. It acts as a buffer against rising powers like China and Russia. Rather than merely being a participant, the US has to a leader in this area.

#### We’ll isolate more internal links – first, competitiveness.

Stevens 10(J.P, Vice President, Space Systems, Aerospace Industries Association, “Maintain U.S. global leadership in space”, <http://www.aia-aerospace.org/issues_policies/space/maintain/>/sb)

U.S. space efforts — civil, commercialand national security **—** drive our nation’s competitiveness, economic growth and innovation. To maintain U.S. preeminence in this sector and to allow space to act as a technological driver for current and future industries, our leadership must recognize space as a national priority and robustly fund its programs. Space technologies and applications are essential in our everyday lives. Banking trarnsactions, business and personal communications as well as emergency responders, airliners and automobiles depend on communications and GPS satellites. Weather and remote sensing satellites provide lifesaving warnings and recurring global measurements of our changing Earth. National security and military operations are deeply dependent upon space assets. The key to continuing U.S. preeminence is a cohesive coordination body and a national space strategy. Absent this, the myriad government agencies overseeing these critical systems may make decisions based upon narrow agency requirements. The U.S. space industrial base consists of unique workforce skills and production techniques. The ability of industry to meet the needs of U.S. space programs depends on a healthy industrial base. U.S. leadership in space cannot be taken for granted. Other nations are learning the value of space systems; the arena is increasingly contested, congested and competitive. Strong government leadership at the highest level is critical to maintaining our lead in space and must be supported by a healthy and innovative industrial sector.

#### Second, tech leadership + the industrial base.

Institute for Defense Analyses 08 ( Leadership, Management, and Organization for National Security Space, Report to Congress of the Independent Assessment Panel on the Organization and Management of National Security Space, http://www.armyspace.army.mil/ASJ/Images/National\_Security\_Space\_Study\_Final\_Sept\_16.pdf//sb)

Space capabilities underpin U.S. economic, scientific, and military leadership. The space enterprise is embedded in the fabric of our nation’s economy, providing technological leadership and sustainment of the industrial base. To cite but one example, the Global Positioning System (GPS) is the world standard for precision navigation and timing. Global awareness provided from space provides the ability to effectively plan for and respond to such critical national security requirements as intelligence on the military capabilities of potential adversaries, intelligence on Weapons of Mass Destruction (WMD) program proliferation, homeland security, and missile warning and defense. Military strategy, operations, and tactics are predicated upon the availability of space capabilities. The military use of space-based capabilities is becoming increasingly sophisticated, and their use in Operation Enduring Freedom and Operation Iraqi Freedom is pervasive.

#### Third, military capabilities.

Johnson-Freese 11 (Dr. Joan Johnson-Freese, Professor of National Security Affairs at the Naval War College. Previously, she was on the faculty at the Asia Pacific Center for Security Studies; the Air War College in Montgomery, AL; and Director of the Center for Space Policy & Law at the University of Central Florida. “China in Space: Not Time for Bright, Shiny Objects”, 7/1/11, defense.aol.com/2011/07/01/chinas-in-space-not-time-for-bright-shiny-objects/) AK

Railing against that reality while planning to deploy a global fleet of new SM-3, Block II missiles is feckless and will fall on deaf geostrategic ears. Finally, cutting edge space technology has been the hinge of American military power for the past two decades but is its greatest uncertainty moving forward. The successful raid on Osama Bin Laden's compound in Abbotabad, Pakistan was in some ways analogous to General Norman Schwartzkopf's "Hail Mary" maneuver, marching his troops across the Iraqi desert in 1990 - a risky move possible because of our high tech advantage over a low tech enemy that carried a big payoff. Just as Schwartzkopf's troops could "see" their way across the desert with GPS and communicate with each other via satellites, the intelligence community and Seal Team Six used communication satellites, GPS, signals intelligence and satellite imagery to find and take out America's Most Wanted Fugitive. Space assets have been critical in providing the United States with an edge when it needed it, and that edge must be protected. In the forthcoming article "Space, China's Strategic Frontier," in the Journal of Strategic Studies, Eric Hagt and Matt Durnin present a convincing case that China is crossing a threshold, moving from being able to use space for limited strategic purposes to having the capabilities to use space in tactical operations as they happen. That threat to America's edge must be a priority. Too much time and resources have been spent worrying about whether China was clandestinely developing a Death Star powered by dilithium crystals as a shashoujian, or "assassin's mace," that had to be countered by orbiting Rods from God as part of US space control. And now there is a move afoot to resurrect Reagan-era space-based missile defense interceptors as part of a technical calculation where X + Y = deterrence, though deterrence is as much or more a psychological calculation as it is a technical one. Further, the Chinese (and others) are not as worried about the US technical capabilities associated with space control and missile defense as they are about a political climate in the United States that is obsessed with missile defense and our own bright shiny objects. Meanwhile, that obsession has given China the time it needed for the careful development of space systems to give it operational military space capabilities akin to our own. Satellites are a globalized industry, within which China plays a growing and maturing role, and space - like it or not - is not exclusive US territory, so we cannot prevent China from developing or launching the same kinds of spacecraft that have proved so valuable to the US military. China has also learned from the US experience that too much dependency on these valuable high-tech assets creates a risk in itself and, determined not to get into that situation, have factored redundancy and back-up capabilities into future plans. So what can the United States do? It can stay ahead, as it has done in the past. This is not a case of US decline - a drum beat loudly and consistently of late - but of other countries developing. Certainly, given the undesirable effects shown in countries that have not developed, a developing China is a better alternative than an imploding China. But it requires the United States to focus more on its space assets in terms of both upgrading the technology where needed, providing redundancy for the capabilities they provide, and robust research and development far more and better than our track record to date. The New York Times called the 2005 cancellation of the projected $5 billion-plus Future Imagery Architecture (FIA) program, intended to provide the next generation of optical and radar spy satellites - described as technologically "audacious" in complexity -- "perhaps the most spectacular and expensive failure in the 50-year history of spy satellite projects." Since then, political and bureaucratic debates over whether to again stretch for new technology, use satellites of a proven design, or rely more on commercial satellites have largely prevailed over purposeful action. Mismanagement and underinvestment in replacement satellites for the Global Positioning System (GPS) have threatened that system as well. This is simply unacceptable. A May 2011 GAO study on Space Acquisition states that while efforts to address two decades of problems in nearly every military space acquisition program have been "good" there is still a substantial amount to do. And given the increasing capabilities of the Chinese, it is imperative that we not just be "good," but "the best." Space systems supporting force enhancement must be kept cutting edge, well-coordinated and able to get information to the warfighters better and faster than anyone else. The administration, Congress and the Pentagon must focus their efforts in a bi-partisan, non-sensationalist manner toward maintaining the military space edge that has repeatedly proven invaluable in operations. The time to be distracted by bright, shiny objects has passed.

#### Plan leads to colonization.

Campbell et. al 9 [Michael, M.D. Campbell and Associates, Jeffrey King, M.D. Campbell and Associates, Henry Wise, consultant, Bruce Handley, M.D. Campbell and Associates, M. David Campbell, Environmental Resources Management, “The Role of Nuclear Power in Space Exploration and the Associated Environmental Issues: An Overview”, http://www.searchanddiscovery.com/documents/2009/80053campbell/ndx\_campbell.pdf, 11/19/2009]

A space exploration mission requires power at many stages, such as the initial launch of the ¶ space vehicle and subsequent maneuvering, to run the instrumentation and communication ¶ systems, warming or cooling of vital systems, lighting, various experiments, and many more ¶ uses, especially in manned missions. To date, chemical rocket thrusters have been used ¶ exclusively for launching spacecraft into orbit and beyond. It would be tempting to believe that ¶ all power after launch could be supplied by solar energy. However, in many cases, missions will ¶ take place in areas too far from sufficient sun light, areas where large solar panels will not be ¶ appropriate. ¶ Limitations of solar power have logically lead to the development of alternative sources of power ¶ and heating. One alternative involves the use of nuclear power systems (NPSs). These rely on the ¶ use of radioisotopes and are generally referred to as radioisotope thermoelectric generators ¶ (RTGs), thermoelectric generators (TEGs), and radioisotope heat er units (RHUs). These units ¶ have been employed on both U.S. and Soviet/Russian spacecrafts for m ore than 40 years. Space ¶ exploration would not have been possible without the use of RTGs to provide electrical power ¶ and to maintain the temperatures of various components within their operational ranges (Bennett, ¶ 2006). ¶ RTGs evolved out of a simple experiment in physics. In 1812, a German scientist (named T. J . ¶ Seebeck) discovered that when two dissimilar wires are connected at two junctions, and if one ¶ junction is kept hot while the other is co ld, an electric current will flow in the circuit between ¶ them from hot to cold. Such a pair of junctions is called a thermoelectric couple. The required ¶ heat can be supplied by one of a number of radioactive isotopes. The device that converts heat to electricity has no moving parts and is, therefore, very reliable and continues for as long as the ¶ radioisotope source produces a useful level of heat. The heat production is, of course, continually ¶ decaying but radioisotopes are customized to fit the intended use of the electricity and for the ¶ planned mission duration. ¶ The IAEA report (2005a) suggests that nu clear reactors can provide almost limitless power for ¶ almost any duration. However, they are not practicable for applications below 10 kW. RTGs are ¶ best used for continuous supply of low levels (up to 5 kW) of power or in combinations up to ¶ many times this value. For this reason, especially for long interplanetary missions, the use of ¶ radioisotopes for communications and the powering of experiments are preferred. For short ¶ durations of up to a few hours, chemical fuels can provide energy of up to 60,000 kW, but for ¶ mission durations of a month use is limited to a kilowatt or less. Although solar power is an ¶ advanced form of nuclear power, this source of energy diffuses with distance from the Sun and ¶ does not provide the often needed rapid surges of large amounts of energy.

#### Extinction is inevitable if we don’t get off the rock—multiple scenarios.

Austen 11 [Ben, contributing editor of Harper’s Magazine, “After Earth: Why, Where, How, and When We Might Leave Our Home Planet,” popular science, http://www.popsci.com/science/article/2011-02/after-earth-why-where-how-and-when-we-might-leave-our-home-planet?page=3]

Earth won’t always be fit for occupation. We know that in two billion years or so, an expanding sun will boil away our oceans, leaving our home in the universe uninhabitable—unless, that is, we haven’t already been wiped out by the Andromeda galaxy, which is on a multibillion-year collision course with our Milky Way. Moreover, at least a third of the thousand mile-wide asteroids that hurtle across our orbital path will eventually crash into us, at a rate of about one every 300,000 years. Why? Indeed, in 1989 a far smaller asteroid, the impact of which would still have been equivalent in force to 1,000 nuclear bombs, crossed our orbit just six hours after Earth had passed. A recent report by the Lifeboat Foundation, whose hundreds of researchers track a dozen different existential risks to humanity, likens that one-in-300,000 chance of a catastrophic strike to a game of Russian roulette: “If we keep pulling the trigger long enough we’ll blow our head off, and there’s no guarantee it won’t be the next pull.” Many of the threats that might lead us to consider off-Earth living arrangements are actually man-made, and not necessarily in the distant future. The amount we consume each year already far outstrips what our planet can sustain, and the World Wildlife Fund estimates that by 2030 we will be consuming two planets’ worth of natural resources annually. The Center for Research on the Epidemiology of Disasters, an international humanitarian organization, reports that the onslaught of droughts, earthquakes, epic rains and floods over the past decade is triple the number from the 1980s and nearly 54 times that of 1901, when this data was first collected. Some scenarios have climate change leading to severe water shortages, the submersion of coastal areas, and widespread famine. Additionally, the world could end by way of deadly pathogen, nuclear war or, as the Lifeboat Foundation warns, the “misuse of increasingly powerful technologies.” Given the risks humans pose to the planet, we might also someday leave Earth simply to conserve it, with our planet becoming a kind of nature sanctuary that we visit now and again, as we might Yosemite. None of the threats we face are especially far-fetched. Climate change is already a major factor in human affairs, for instance, and our planet has undergone at least one previous mass extinction as a result of asteroid impact. “The dinosaurs died out because they were too stupid to build an adequate spacefaring civilization,” says Tihamer Toth-Fejel, a research engineer at the Advanced Information Systems division of defense contractor General Dynamics and one of 85 members of the Lifeboat Foundation’s space-settlement board. “So far, the difference between us and them is barely measurable.” The Alliance to Rescue Civilization, a project started by New York University chemist Robert Shapiro, contends that the inevitability of any of several cataclysmic events means that we must prepare a copy of our civilization and move it into outer space and out of harm’s way—a backup of our cultural achievements and traditions. In 2005, then–NASA administrator Michael Griffin described the aims of the national space program in similar terms. “If we humans want to survive for hundreds of thousands or millions of years, we must ultimately populate other planets,” he said. “One day, I don’t know when that day is, but there will be more human beings who live off the Earth than on it.”

### Prolif DA

#### World of the aff is safer than the SQUO. On site storage vulnerable to terrorist theft – fewer security measures due to assumed radioactive safeguards.

Bunn 9 (Matthew, Associate Professor at Harvard University's John F. Kennedy School of Government, “Reducing the greatest risks of nuclear theft & terrorism”, Daedalus, American Academy of Arts and Sciences, Fall, RSR)

A building with nuclear material that terrorists could readily make into a nuclear bomb needs more security than a building with lower-quality material that would be very difficult for adversaries to use to make a bomb. But this sensible “graded safeguards” approach, used in national regulations and international recommendations around the world, must avoid slipping into what might be called “cliffed safeguards,” in which security falls off catastrophically if nuclear material is beyond some arbitrary threshold that has little relation to real risk. For example, under current Nuclear Regulatory Commission (nrc) rules in the United States, nuclear material that would normally require security measures costing millions of dollars a year requires none of that if it is radioactive enough to cause a radiation dose of one Sievert per hour at one meter– a level considered radioactive enough to make the material “self-protecting.” But studies at the national laboratories have shown that at this level of radiation, thieves who carried the material out to a waiting truck with their bare hands would not even receive a big enough dose of radiation to make them feel sick. In a world of suicidal terrorists, these rules–and similar, though less extreme, international rules– urgently need to be revised. More broadly, in-depth assessments of how different chemical, physical, isotopic, and radiological properties of a material affect the odds that adversaries would succeed in making a bomb from it should be used to determine how much security can be relaxed for particular types of material while keeping overall risks low. In making these assessments, it is important to remember that heu at enrichment levels far below the 90 percent U-235 level considered “weapons grade” can still readily be used in a bomb, at the cost of using somewhat more material. So past policies that have focused cooperative security upgrades only on sites whose heu is at least 80 percent U-235 should certainly be revised. Similarly, while weapons designers prefer weapons-grade plutonium, produced specifically to contain 90 percent or more Pu-239, the “reactor grade” plutonium produced in the spent fuel from typical power reactors can also be used to make fearsome explosives, despite the extra neutrons, heat, and radiation generated by the less desirable plutonium isotopes it contains. Indeed, repeated government studies have concluded that any state or group capable of making a bomb from weapons-grade plutonium would also be able to make a bomb from reactor-grade plutonium. 6

#### Reprocessing would remove the waste problem – the waste we currently store can be reused

Bastin 8 (Clinton, Former Chemical Engineer at the Atomic Energy Commission, 21st Century Science and Technology, “We Need to Reprocess Spent Nuclear Fuel, And Can Do It Safely, At Reasonable Cost”, 2008, [http://www.21stcenturysciencetech.com/Articles%202008/ Summer\_2008/Reprocessing.pdf](http://www.21stcenturysciencetech.com/Articles%202008/Summer_2008/Reprocessing.pdf), RSR)

The concept of used nuclear fuel as “nuclear waste” is a fiction created by the opponents of nuclear energy. Used nuclear fuel isn’t waste at all, but a renewable resource that can be reprocessed into new nuclear fuel and valuable isotopes. When we entered the nuclear age, the great promise of nuclear energy wasitsrenewability, making it an inexpensive and efficient way to produce electricity. It was assumed that the nations making use of nuclear energy would reprocess their spent fuel, completing the nuclear fuel cycle by recycling the nuclear fuel after it was burned in a reactor, to extract the 95 to 99 percent of unused uranium in it that can be turned into new fuel. This means that if the United States buries its 70,000 metric tons of spent nuclear fuel, we would be wasting 66,000 metric tons of uranium-28, which could be used to make new fuel. In addition, we would be wasting about 1,200 metric tons of fissile uranium-25 and plutonium-29, which can also be burned as fuel. Because of the high energy density in the nucleus, this relatively small amount of U.S. spent fuel (it would fit in one small house) is equivalent in energy to about 20 percent of the U.S. oil reserves. About 96 percent of the spent fuel the United States is now storing can be turned into new fuel. The 4 percent of the socalled waste that remains—2,500 metric tons—consists of highly radioactive materials, but these are also usable. There are about 80 tons each of cesium-17 and strontium-90 that could be separated out for use in medical applications, such as sterilization of medical supplies. Using isotope separation techniques, and fast-neutron bombardment for transmutation (technologies that the United States pioneered but now refuses to develop), we could separate out all sorts of isotopes, like americium, which is used in smoke detectors, or isotopes used in medical testing and treatment. Right now, the United Statesmust import 90 percent of its medical isotopes, used in 40,000 medical procedures daily. The diagram shows a closed nuclear fuel cycle. At present, the United States has no reprocessing, and stores spent fuel in pools or dry storage at nuclear plants. Existing nuclear reactors use only about 1 percent of the total energy value in uranium resources; fast reactors with fuel recycle would use essentially 100 percent, burning up all of the uranium and actinides, the long-lived fission products. In a properly managed and safeguarded system, the plutonium produced in fast reactors would remain in its spent fuel until needed for recycle.Thus, there need be no excess buildup of accessible plutonium. The plutonium could also be fabricated directly into new reactor fuel assemblies to be burned in nuclear plants.

#### No proliferation – global reprocessing now denies and US safeguards too strong.

Lee, 2010 Wise Intern at the American Nuclear Society, ‘12

[Nathan, WISE, “Sustainability Of U.S. Nuclear Energy: Waste Management And¶ The Question Of Reprocessing”, 2012,

<http://www.wise-intern.org/journal/2010/NathanLeeWISE2010.pdf>, RCM]

No matter how much some nuclear energy proponents might play down the dual purpose of nuclear technologies, as long as the fundamental driving force remains the splitting of the atom, so too will the risk of proliferating those technologies for use in an atom-splitting bomb. Seeking a proliferation-proof nuclear energy policy is futile; instead, a smart policy should aim to maximize proliferation resistance under the given circumstances.¶ In the case of reprocessing used nuclear fuel, the principal concern is over the isolation of plutonium in the product stream, which could then be converted for use in a bomb. Unprocessed used nuclear fuel is sufficiently secure against physical enemy intrusion due to the multiplicity of highly radioactive components it contains. Since plutonium itself is not highly radioactive, it becomes much easier to approach after separation. Although newer reprocessing technologies leave different radioactive contaminants in the product stream to offset the loss in proliferation resistance, none of them remain significantly “self-protecting” by the International Atomic Energy Agency (IAEA) standards (Fig. 10).¶ There are several avenues by which plutonium proliferation could occur. A terrorist group or rogue state could steal the plutonium from the product stream of another country’s reprocessing plant or could acquire the technology itself on the black market to isolate plutonium themselves. Another risk involves a state legally operating a reprocessing facility but illegally diverting plutonium from the product stream or operating a clandestine plant in parallel. Any of these scenarios could occur for all the reprocessing technologies considered. While the risk levels for one-pass Pu recycling and full actinide recycling would vary based on total material flow, amount of transport required, technology safeguards, and additional factors, the fundamental issue of plutonium isolation is the same.¶ President Carter’s decision to ban reprocessing in the U.S. was ostensibly motivated by this issue. It was supposed to deter other nuclear countries from reprocessing as well, thereby bolstering global nonproliferation. However, they did not follow suit; several countries now operate reprocessing facilities. Consequently, the proliferation ramifications of implementing reprocessing in the United States in the 21st century are no longer the same as perceived in the early stages of the nuclear industry. Not only has the international deterrent argument been largely discredited, but the marginal impact in the global proliferation risk from initiating reprocessing in the U.S. would be much less substantial now that there already exists an established international reprocessing market. Furthermore, by entering this market, some argue that the U.S. might actually slow the dissemination of reprocessing technology by providing the service to other countries that wish to reprocess their used nuclear fuel, making domestic development less economical.38¶ However U.S. reprocessing would affect the global interplay, by far the most critical factor for deciding whether to reprocess domestically would be our own ability to prevent direct proliferation. In this arena, the U.S. has proven over the last sixty years that it can effectively manage and safeguard large plutonium stockpiles and dangerous technologies.39 Moreover, improvements are already underway in utilizing real-time monitoring of material flows to detect and prevent proliferation attempts.40

### Tech K

#### Our interpretation is that debate should be a question of the aff plan versus a competitive policy option or the status quo.

#### This is key to ground and predictability – infinite number of possible kritik alternatives or things the negative could reject explodes the research burden. That’s a voting issue.

#### Abandoning politics causes war, slavery, and authoritarianism

Boggs 2k (CAROL BOGGS, PF POLITICAL SCIENCE – SOUTHERN CALIFORNIA, 00, THE END OF POLITICS, 250-1)

But it is a very deceptive and misleading minimalism. While Oakeshott debunks political mechanisms and rational planning, as either useless or dangerous, the actually existing power structure-replete with its own centralized state apparatus, institutional hierarchies, conscious designs, and indeed, rational plans-remains fully intact, insulated from the minimalist critique. In other words, ideologies and plans are perfectly acceptable for elites who preside over established governing systems, but not for ordinary citizens or groups anxious to challenge the status quo. Such one-sided minimalism gives carte blanche to elites who naturally desire as much space to maneuver as possible. The flight from “abstract principles” rules out ethical attacks on injustices that may pervade the status quo (slavery or imperialist wars, for example) insofar as those injustices might be seen as too deeply embedded in the social and institutional matrix of the time to be the target of oppositional political action. If politics is reduced to nothing other than a process of everyday muddling-through, then people are condemned to accept the harsh realities of an exploitative and authoritarian system, with no choice but to yield to the dictates of “conventional wisdom”. Systematic attempts to ameliorate oppressive conditions would, in Oakeshott’s view, turn into a political nightmare. A belief that totalitarianism might results from extreme attempts to put society in order is one thing; to argue that all politicized efforts to change the world are necessary doomed either to impotence or totalitarianism requires a completely different (and indefensible) set of premises. Oakeshott’s minimalism poses yet another, but still related, range of problems: the shrinkage of politics hardly suggests that corporate colonization, social hierarchies, or centralized state and military institutions will magically disappear from people’s lives. Far from it: the public space vacated by ordinary citizens, well informed and ready to fight for their interests, simply gives elites more room to consolidate their own power and privilege. Beyond that, the fragmentation and chaos of a Hobbesian civil society, not too far removed from the excessive individualism, social Darwinism and urban violence of the American landscape could open the door to a modern Leviathan intent on restoring order and unity in the face of social disintegration. Viewed in this light, the contemporary drift towards antipolitics might set the stage for a reassertion of politics in more authoritarian and reactionary guise-or it could simply end up reinforcing the dominant state-corporate system. In either case, the state would probably become what Hobbes anticipated: the embodiment of those universal, collective interests that had vanished from civil society.16 And either outcome would run counter to the facile antirationalism of Oakeshott’s Burkean muddling-through theories.

#### **Case outweighs. Waste is there packed on-site right now and its going to blow up. It’s also vulnerable to prolif and terrorist attacks that culminate extinction. Also, they can’t solve Yucca long term which also blows up. Rejecting capitalism doesn’t address the underlying problems of waste storage.**

#### **Perm: do both—the plan’s approach to the current energy crisis presents a unique opportunity to reform capitalism**

Peters 12 (Michael A Peters 2012, [Michael A. Peters is professor of education at the University of Waikato in New Zealand and professor emeritus at the University of Illinois at Urbana-Champaign. ]10 June 2012, “Greening the Knowledge Economy: A Critique of Neoliberalism,” Truthout, http://truth-out.org/news/item/9642-greening-the-knowledge-economy-a-critique-of-neoliberalism)

Ecopolitics must come to terms with the scramble for resources that increasingly dominates the competitive motivations and long-range resource planning of the major industrial world powers. There are a myriad of new threats to the environment that have been successfully spelled out by eco-philosophers and that have already begun to impact upon the world in all their facets. First, there is the depletion of non-renewable resources - in particular, oil, gas, timber and minerals. Second, and in related fashion, is the crisis of energy itself, upon which the rapidly industrializing countries and the developed world depend. Third, the rise of China and India, with their prodigious appetites, which will match the United States within a few decades in rapacious demand for more of everything that triggers resource scrambles and the heavy investment in resource-rich regions such as Africa. Fourth, global climate change will have the greatest impact upon the world's poorest countries, multiplying the risk of conflict and resource wars. With these trends and possible scenarios, only a better understanding of the environment can save us and the planet. A better understanding of the earth's environmental system is essential if scientists **working in concert with communities, ecology** groups **across the board, green politicians, policymakers and business leaders** are to promote green exchange and to ascertain whether green capitalism strategies that aim at long-term sustainability are possible. The energy crisis may be a blessing in disguise for the United States. Jeremy Rifkin (2002) envisions a new economy powered by hydrogen that will fundamentally change the nature of our market, political and social institutions as we approach the end of the fossil-fuel era, with inescapable consequences for industrial society. New hydrogen fuel-cells are now being pioneered - which, together with the design principles of smart information technologies, can provide new distributed forms of energy use. While Thomas Friedman (2008) has also argued the crisis can lead to reinvestment in infrastructure and alternative energy sources in the cause of nation-building, his work and intentions have been called into question.[2] Education has a fundamental role to play in the new energy economy, both in terms of changing worldviews and the promotion of a green economy, and also in terms of research and development's contribution to energy efficiency, battery storage and new forms of renewable energy

#### Rejecting tech will spark transition wars, re-entrenching cycles of exploitation

Gubrud 97 [Mark Avrum (Center for Superconductivity Research); “Nanotechnology and International Security”; Foresight Nanotechnology Institute; <http://www.foresight.org/Conferences/MNT05/Papers/Gubrud/>

With molecular manufacturing, international trade in both raw materials and finished goods can be replaced by decentralized production for local consumption, using locally available materials. The decline of international trade will undermine a powerful source of common interest. Further, artificial intelligence will displace skilled as well as unskilled labor. A world system based on wage labor, transnational capitalism and global markets will necessarily give way. We imagine that a golden age is possible, but we don't know how to organize one. As global capitalism retreats, it will leave behind a world dominated by politics, and possibly feudal concentrations of wealth and power. Economic insecurity, and fears for the material and moral future of humankind may lead to the rise of demagogic and intemperate national leaders. With almost two hundred sovereign nations, each struggling to create a new economic and social order, perhaps the most predictable outcome is chaos: shifting alignments, displaced populations, power struggles, ethnic conflicts inflamed by demagogues, class conflicts, land disputes, etc. Small and underdeveloped nations will be more than ever dependent on the major powers for access to technology, and more than ever vulnerable to sophisticated forms of control or subversion, or to outright domination. Competition among the leading technological powers for the political loyalty of clients might imply reversion to some form of nationalistic imperialism.

#### State focused nuclear power solutions are good

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.

## 1AR

### Advantage CP

#### Space viruses won’t cause extinction

Britt, Senior Space Writer, 2001 (Robert Roy, “Survival of the Elitist: BIoterrorism May Spur Space Colonies,” October 30, http://www.space.com/scienceastronomy/generalscience/)

Are we doomed? Many scientists argue that there is no need to worry about the mortality of civilization right now. Eric Croddy is an expert on chemical and biological weapons at the Monterey Institute of International Studies. Croddy said the threat of a virus wiping out the entire human species is simply not real. Even the most horrific virus outbreak in history, the 1918 Spanish Flu epidemic that killed between 20 million and 40 million people, including hundreds of thousands in the United States, eventually stopped. Experts say new strains of the influenza virus emerge every few decades and catch the human immune system unprepared, but prevention measures and ever-evolving medical treatments overcome the outbreaks. "I'd be much more concerned about an asteroid hitting the planet," Croddy said. Croddy accused Hawking of speaking more from a religious, apocalyptic view than from anything based on the facts of science. "What he said is more biblical than scientific," Croddy said. Besides, he added, "Earth's not such a bad place." Most space-colonization enthusiasts share this planet with Croddy, as well as his view of it. But whether stated or not, the desire to ensure survival has always permeated their plans.

### Prolif DA

#### Dry cask storage still vulnerable to attack – would release radiation 200x that of an atom bomb.

Kamps, specializes in high-level waste management and transportation at Beyond Nuclear, ‘11

[Kevin, “Irradiated Nuclear Fuel Risks at New Nuclear Darlington Neglected in OPG’s EIS”, Beyond Nuclear, 2-21-2011, RSR]

At least as early as June 1998, it was known that dry casks were vulnerable to attacks, such as by TOW anti-tank missiles. This was revealed by a test conducted upon a German CASTOR storage/transport cask at the U.S. Army’s Aberdeen Proving Ground in Aberdeen, Maryland, U.S.A. 65 This revelation was of deep security significance, for each and every fully loaded irradiated nuclear fuel dry cask in the United States contains over 200 times the longlasting radioactivity released by the Hiroshima atomic bomb. Thus, dry casks containing 24 pressurized water reactor (PWR) irradiated nuclear fuel assemblies contain about 240 times the long-lasting radioactivity released at Hiroshima. Casks containing 32 PWR assemblies hold 320 times the long-lasting radioactivity released at Hiroshima. 66 Thus, a successful explosive and incendiary attack upon fully loaded dry casks could unleash a disastrous amount of radioactivity onto the winds and waters, to harm humans and the environment downwind and downstream out to great distances, depending on how far it is blown by the wind or carried by the water. In considering the security risks associated with irradiated nuclear fuel – including in this NND proceeding -- adequate attention must be paid to the risks posed by remotely fired weaponry, especially high explosives and shaped charges designed to penetrate much thicker armor than is present on irradiated nuclear fuel storage containers.

#### On site storage vulnerable to terrorist theft – facilities are scattered, meaning easier target.

Goldschmidt, Nonresident Senior Associate at the Carnegie Endowment for International Peace, and former Deputy Director General of the International Atomic Energy Agency, Head of the Department of Safeguards, ‘10

[P., “Multilateral Nuclear Fuel Supply Guarantees and Spent Fuel Management: What Are the Priorities?”, Daedalus, Winter, RSR]

By far the easiest and least cost-intensive solution is to store the spent fuel for as long as possible at the NPPs. This is the solution that has been implemented by most nuclear electrical utilities in the world, but it raises the concern of having SF containing plutonium in facilities scattered all over the world and potentially made vulnerable to theft, diversion, or misuse. As is well known, SF assemblies contain plutonium that can be recovered through reprocessing and, depending on its quality, used to manufacture nuclear weapons or explosive devices. It is highly unlikely that SF under IAEA safeguards could be diverted in any significant quantity from a NPP without being detected. However, once a state has accumulated SF assemblies and mastered reprocessing it could, as the DPRK did in January 2003, withdraw from the NPT and recover the plutonium for military purposes.