## 1AC

### Advantage 1

#### Pyro-processing is key to stop climate change we’re close to the tipping point.

Steve Kirsch, 11-25-2009, M.S. Massachusetts Institute of Technology (MIT), writer for the Huffington Post, CEO Kirsch foundation on climate, founder/head of Center for Energy and Climate Change, National Award from the Caring Institute in Washington DC, written much about the Integral Fast Reactor, Fellow, with the Science Council for Global Initiatives (SCGI), Steve Kirsch’s blog, “Why We Should Build an Integral Fast Reactor Now,” <http://skirsch.wordpress.com/2009/11/25/ifr/>

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To prevent a climate disaster, we must eliminate virtually all coal plant emissions worldwide in 25 years. The best way and, for all practical purposes, the only way to get all countries off of coal is not with coercion; it is to make them want to replace their coal burners by giving them a plug-compatible technology that is less expensive. The IFR can do this. It is plug-compatible with the burners in a coal plant (see Nuclear Power: Going Fast). No other technology can upgrade a coal plant so it is greenhouse gas free while reducing operating costs at the same time. In fact, no other technology can achieve either of these goals. The IFR can achieve both. The bottom line is that without the IFR (or a yet-to-be-invented technology with similar ability to replace the coal burner with a cheaper alternative), it is unlikely that we’ll be able to keep CO2 under 450 ppm. Today, the IFR is the only technology with the potential to displace the coal burner. That is why restarting the IFR is so critical and why Jim Hansen has listed it as one of the top five things we must do to avert a climate disaster.[4] Without eliminating virtually all coal emissions by 2030, the sum total of all of our other climate mitigation efforts will be inconsequential. Hansen often refers to the near complete phase-out of carbon emissions from coal plants worldwide by 2030 as the sine qua non for climate stabilization (see for example, the top of page 6 in his August 4, 2008 trip report). To stay under 450ppm, we would have to install about 13,000 GWe of new carbon-free power over the next 25 years. That number was calculated by Nathan Lewis of Caltech for the Atlantic, but others such as Saul Griffith have independently derived a very similar number and White House Science Advisor John Holdren used 5,600 GWe to 7,200 GWe in his presentation to the Energy Bar Association Annual Meeting on April 23, 2009. That means that if we want to save the planet, we must install more than 1 GWe per day of clean power every single day for the next 25 years. That is a very, very tough goal. It is equivalent to building one large nuclear reactor per day, or 1,500 huge wind turbines per day, or 80,000 37 foot diameter solar dishes covering 100 square miles every day, or some linear combination of these or other carbon free power generation technologies. Note that the required rate is actually higher than this because Hansen and Rajendra Pachauri, the chair of the IPCC, now both agree that 350ppm is a more realistic “not to exceed” number (and we’ve already exceeded it). Today, we are nowhere close to that installation rate with renewables alone. For example, in 2008, the average power delivered by solar worldwide was only 2 GWe (which is to be distinguished from the peak solar capacity of 13.4GWe). That is why every renewable expert at the 2009 Aspen Institute Environment Forum agreed that nuclear must be part of the solution. Al Gore also acknowledges that nuclear must play an important role. Nuclear has always been the world’s largest source of carbon free power. In the US, for example, even though we haven’t built a new nuclear plant in the US for 30 years, nuclear still supplies 70% of our clean power!

#### Electricity demand is rising and solving electricity is the first step to solve climate change because without nuclear power warming is inevitable.

Barry Brook et. al, 2-21-2009, a leading environmental scientist, holding the Sir Hubert Wilkins Chair of Climate Change at the School of Earth and Environmental Sciences, and is also Director of Climate Science at the University of Adelaide’s Environment Institute, published three books, over 200 refereed scientific papers, is a highly cited researcher, received a number of distinguished awards for his research excellence including the Australian Academy of Science Fenner Medal, is an International Award Committee member for the Global Energy Prize, Australian Research Council Future Fellow, ISI Researcher, Ph.D., Macquarie University in Environmental Engineering, Science Council for Global Initiatives, Edgeworth David Medal Royal Society of NSW, Cosmos Bright Sparks Award, Tom Blees is the author of Prescription for the Planet, the president of the Science Council for Global Initiatives, member of the selection committee for the Global Energy Prize, George S. Stanford is a nuclear reactor physicist, part of the team that developed the Integral Fast Reactor, PhD from Stanford University in Physics, Masters from University of Virginia in Engineering, worked at Argonne National Laboratory, Graham R.L. Cowan, "Boron: A Better Energy Carrier than Hydrogen?" in 2001, published "How Fire Can Be Tamed," BraveNewClimate, “Response to an Integral Fast Reactor (IFR) critique,” <http://bravenewclimate.com/2009/02/21/response-to-an-integral-fast-reactor-ifr-critique/>

[TB] Almost 80% of greenhouse gas emissions come from nuclear-capable countries anyway, so even if we just deployed them there we could make tremendous strides, though it would still be wise to create some sort of international oversight organization as I propose in the book. [BWB] This is at best grossly disingenuous (not to mention insulting to call Kirsch stupid). You need to solve the electricity carbon problem to fix the vehicular fuels problem, space heating and embedded energy in building and manufactured goods, and Tom has a solution for MSW [municipal solid waste] also. About half of agricultural emissions can also be solved if you have a zero-carbon energy source. Then you just need to worry about the ruminant methane and carbon from deforestation. But the bottom line is, if you fix electricity, everything else will quicktly start to fall into place. If we don’t stop coal in places like China and India, we’re hosed, irrespective of what we might do in the US and Oz (and even if we could do with without advanced nuclear, which we very likely cannot). I do wonder, what is Jim Green’s plan is for replacing the 484 GW of coal-fired power stations already installed in China, and the further 200 or so plants in the planning or construction pipeline?

#### Nuclear power is the most economic source of base-load power it’s key to solve GHG emissions by displacing pollutants.

Alexander DeVolpi, 2-28-2010, been active in nuclear-arms policy and treaty-verification technology studies for over 25 years, Argonne National Laboratory, Argonne, Illinois (and other national laboratories) involved nearly 40 years of lab, field, and analytical activities in instrumentation, nuclear physics, nuclear engineering, reactor safety, radioisotopes, experiments, verification technology, and arms control, the Defense Nuclear Agency, On-Site Inspection Agency, all the Department of Energy weapons labs, with the Departments of Defense and State, author or coauthor of several books, Ph.D. in physics (and MS in nuclear engineering physics) from Virginia Polytechnic Institute, certificate from the Argonne International Institute of Nuclear Science and Engineering, managing nuclear diagnostics for the Reactor Analysis and Safety Division at Argonne, and becoming technical manager of the arms-control and nonproliferation program, Who’s Who in Frontiers of Science and Technology, American Men and Women of Science, fellow of the American Physical Society, technical consultant in the Federation of American Scientists/Natural Resources Defense Council joint project, ScienceTechnologyHistory, “NUCLEAR EXPERTISE: The Amory Lovins Charade,” <http://sciencetechnologyhistory.wordpress.com/article/nuclear-expertise-the-amory-lovins-1gsyt5k142kc5-20/>

Nuclear power is not only commercially competitive, but extremely safe (no coal miners dying), no air pollution at all, no greenhouse gas emissions (such as carbon-dioxide). Nuclear-plant lifetime is being doubled from 30 to 60 years (which utilities, investors, and ratepayers appreciate). If Lovins had his way 30 years ago, considerably more particulates and gases would have been vented to the local and regional atmosphere from coal-fired plants (aside from the greenhouse gases emitted). Moreover, if Lovins had his way, we would not have conserved the electricity-equivalent in domestic coal, imported and domestic oil, and domestic and imported natural-gas resources and reserves that we have for 30 years. A typical nuclear power plant each year avoids consumption of 3.4 million short tons of coal, or 65.8 billion cubic feet of natural gas, or 14 billion barrels of oil. (The United States has ample uranium resources.) So Lovins was wrong in implying that nuclear had no overriding societal or environmental benefits. Incidentally, it’s no accident that Illinois has the highest concentration of nuclear-power plants in the United States: Argonne National Laboratory can be proud of its half-century nuclear stewardship. (California, by the way, generates more electricity from geothermal, solar, and wind energy sources combined than any other State.) Lovins displayed complex viewgraphs that, he purports, show that nuclear is the costliest of “low-or-non-nuclear resources.” Yet, in the last 30 years, nuclear has displaced half the fossil-fuel combustion in Illinois while still being competitive. Inasmuch as nuclear-power plants emit no byproduct carbon-dioxide to the atmosphere, surely his claim that it is the costliest of low-carbon-emission sources fails the smell test. Most of Lovins’ pricing and cost/benefit comparisons are based on “new delivered electricity” which frames the cost of U.S. domestic nuclear construction in the least favorable light. He declares nuclear power an economic failure. Can someone explain that to my bank account which has benefitted from compounding competitive electric power savings for the past 30 years? His rimy claim certainly fails the ripeness test. On the issue of electrical-grid reliability, Lovins asserts that there is no such thing as a “outage-free” source of electrical power. He must think that nuclear power runs by government fiat. Nuclear is a fixture on the grid because it is more economical to operate as base-load supply, while sources less reliable, intermittent, and more costly (such as wind, solar, and gas) provide supplementary power. During the past 30 years in Illinois, I don’t recall having the electricity supply and cost problems that California has had after it prohibited nuclear-power plants from being built within its borders. By the way, average U.S. nuclear capacity factor was about 92% in 2007. That’s excellent. Lovins pitiful effort to undermine the reliability of nuclear power egregiously fails the smell test.

#### We could start building hundreds of IFR’s by 2015 – cost competitive option.

Steve Kirsch, 2011, M.S. Massachusetts Institute of Technology (MIT), writer for the Huffington Post, CEO Kirsch foundation on climate, founder/head of Center for Energy and Climate Change, National Award from the Caring Institute in Washington DC, written much about the Integral Fast Reactor, Fellow, with the Science Council for Global Initiatives (SCGI), Steve Kirsch’s blog, “The Integral Fast Reactor (IFR) project: Q&A,” <http://skirsch.com/politics/globalwarming/ifrQandA.htm>

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I do not agree that nuclear energy would be "a costly option," especially given a level playing field (external health and environmental costs considered, for instance). Nuclear power is now competitive in many countries, and there is no reason to think that fast reactors, in the long run, will be significantly more expensive. They will require no mining, no milling, no enrichment, and the waste-management expense will be negligible. The raw material for the fuel (used fuel already on hand) is essentially free. Virtually the entire cost will be in infrastructure and operations. It's likely if we made this a national priority, it could move a lot faster (like we did with the Manhattan Project). The argument that it might take a long time is an argument for starting immediately. Nobody, even the critics, have suggested that waiting around makes it happen faster when we finally need to do it. We need to get out from under a "let's just pursue the quick fixes" mentality we have now. The time to do these longer term projects is before they are needed. Are we going to wait for our existing nuclear material to be depleted before it is a crisis? And then, once again, we will be too late. We need forward, visionary thinking in this country. It seems to be in short supply. Here's what Blees wrote in response to my answer above: I couldn't agree more. That said, I'm certain it could be done expeditiously and we could start building these things by the hundreds by 2015 or so. Meanwhile we could start building ABWRs and the other Gen III+ reactors so we could start shutting down coal plants. Nuclear waste is simply not an issue. And in terms of building both Gen III and IFRs in nuclear-capable countries, neither is economics. Or safety. Or proliferation. Those who maintain that we don't have the technology are either ignorant of the facts or lying. Not to put too fine a point on it or anything. That's not something I'd just toss out there, but just between you and me that's the way I see it.

#### Nuclear power is needed before renewables, it’s the jumpstart for new clean energy leadership – scientific consensus.

Steve Kirsch, 11-25-2009, M.S. Massachusetts Institute of Technology (MIT), writer for the Huffington Post, CEO Kirsch foundation on climate, founder/head of Center for Energy and Climate Change, National Award from the Caring Institute in Washington DC, written much about the Integral Fast Reactor, Fellow, with the Science Council for Global Initiatives (SCGI), Steve Kirsch’s blog, “Why We Should Build an Integral Fast Reactor Now,” <http://skirsch.wordpress.com/2009/11/25/ifr/>

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Nuclear can be installed very rapidly; much more rapidly than renewables. For example, about two thirds of the currently operating 440 reactors around the world came online during a 10 year period between 1980 and 1990. So our best chance of meeting the required installation of new power goal and saving the planet is with an aggressive nuclear program. Unlike renewables, nuclear generates base load power, reliably, regardless of weather. Nuclear also uses very little land area. It does not require the installation of new power lines since it can be installed where the power is needed. However, even with a very aggressive plan involving nuclear, it will still be extremely difficult to install clean power fast enough. Unfortunately, even in the US, we have no plan to install the clean power we need fast enough to save the planet. Even if every country were to agree tomorrow to completely eliminate their coal plant emissions by 2030, how do we think they are actually going to achieve that? There is no White House plan that explains this. There is no DOE plan. There is no plan or strategy. The deadlines will come and go and most countries will profusely apologize for not meeting their goals, just like we have with most of the signers of the Kyoto Protocol today. Apologies are nice, but they will not restore the environment. We need a strategy that is believable, practical, and affordable for countries to adopt. The IFR offers our best hope of being a centerpiece in such a strategy because it is the only technology we know of that can provide an economically compelling reason to change. At a speech at MIT on October 23, 2009, President Obama said “And that’s why the world is now engaged in a peaceful competition to determine the technologies that will power the 21st century. … The nation that wins this competition will be the nation that leads the global economy. I am convinced of that. And I want America to be that nation, it’s that simple.” Nuclear is our best clean power technology and the IFR is our best nuclear technology. The Gen IV International Forum (GIF) did a study in 2001-2002 of 19 different reactor designs on 15 different criteria and 24 metrics. The IFR ranked #1 overall. Over 242 experts from around the world participated in the study. It was the most comprehensive evaluation of competitive nuclear designs ever done. Top DOE nuclear management ignored the study because it didn’t endorse the design the Bush administration wanted. The IFR has been sitting on the shelf for 15 years and the DOE currently has no plans to change that. How does the US expect to be a leader in clean energy by ignoring our best nuclear technology? Nobody I’ve talked to has been able to answer that question. We have the technology (it was running for 30 years before we were ordered to tear it down). And we have the money: The Recovery Act has $80 billion dollars.

#### Climate change is real and anthropogenic – fundamental science, atmospheric patterns, greenhouse gas fingerprints, and newest measurements all confirm.

Karl Braganza, 6-14-2011, received his PhD from the School of Mathematics at Monash University, work has centered on understanding and attributing climate variability and change, using numerical modeling, instrumental observations and past climate evidence, currently the Head of Climate Monitoring at the Bureau of Meteorology's National Climate Center, The Conversation, "The Greenhouse Effect is Real: Here’s Why," <http://theconversation.edu.au/the-greenhouse-effect-is-real-heres-why-1515>

The greenhouse effect is fundamental science It would be easy to form the opinion that everything we know about climate change is based upon the observed rise in global temperatures and observed increase in carbon dioxide emissions since the industrial revolution. In other words, one could have the mistaken impression that the entirety of climate science is based upon a single correlation study. In reality, the correlation between global mean temperature and carbon dioxide over the 20th century forms an important, but very small part of the evidence for a human role in climate change. Our assessment of the future risk from the continued buildup of greenhouse gases in the atmosphere is even less informed by 20th century changes in global mean temperature. For example, our understanding of the greenhouse effect – the link between greenhouse gas concentrations and global surface air temperature – is based primarily on our fundamental understanding of mathematics, physics, astronomy and chemistry. Much of this science is textbook material that is at least a century old and does not rely on the recent climate record. For example, it is a scientific fact that Venus, the planet most similar to Earth in our solar system, experiences surface temperatures of nearly 500 degrees Celsius due to its atmosphere being heavily laden with greenhouse gases. Back on Earth, that fundamental understanding of the physics of radiation, combined with our understanding of climate change from the geological record, clearly demonstrates that increasing greenhouse gas concentrations will inevitably drive global warming. Dusting for climate fingerprints The observations we have taken since the start of 20th century have confirmed our fundamental understanding of the climate system. While the climate system is very complex, observations have shown that our formulation of the physics of the atmosphere and oceans is largely correct, and ever improving. Most importantly, the observations have confirmed that human activities, in particular a 40% increase in atmospheric carbon dioxide concentrations since the late 19th century, have had a discernible and significant impact on the climate system already. In the field known as detection and attribution of climate change, scientists use indicators known as fingerprints of climate change. These fingerprints show the entire climate system has changed in ways that are consistent with increasing greenhouse gases and an enhanced greenhouse effect. They also show that recent, long term changes are inconsistent with a range of natural causes. Is it getting hot in here? A warming world is obviously the most profound piece of evidence. Here in Australia, the decade ending in 2010 has easily been the warmest since record keeping began, and continues a trend of each decade being warmer than the previous, that extends back 70 years. Globally, significant warming and other changes have been observed across a range of different indicators and through a number of different recording instruments, and a consistent picture has now emerged. Scientists have observed increases in continental temperatures and increases in the temperature of the lower atmosphere. In the oceans, we have seen increases in sea-surface temperatures as well as increases in deep-ocean heat content. That increased heat has expanded the volume of the oceans and has been recorded as a rise in sea-level. Scientists have also observed decreases in sea-ice, a general retreat of glaciers and decreases in snow cover. Changes in atmospheric pressure and rainfall have also occurred in patterns that we would expect due to increased greenhouse gases. There is also emerging evidence that some, though not all, types of extreme weather have become more frequent around the planet. These changes are again consistent with our expectations for increasing atmospheric carbon dioxide. Patterns of temperature change that are uniquely associated with the enhanced greenhouse effect, and which have been observed in the real world include: greater warming in polar regions than tropical regions greater warming over the continents than the oceans greater warming of night time temperatures than daytime temperatures greater warming in winter compared with summer a pattern of cooling in the high atmosphere (stratosphere) with simultaneous warming in the lower atmosphere (troposphere).

#### Even if there is only a one percent chance fast reactors can work you vote aff because the planet is at stake.

Steve Kirsch, 11-25-2009, M.S. Massachusetts Institute of Technology (MIT), writer for the Huffington Post, CEO Kirsch foundation on climate, founder/head of Center for Energy and Climate Change, National Award from the Caring Institute in Washington DC, written much about the Integral Fast Reactor, Fellow, with the Science Council for Global Initiatives (SCGI), Steve Kirsch’s blog, “Why We Should Build an Integral Fast Reactor Now,” <http://skirsch.wordpress.com/2009/11/25/ifr/>

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Even if you believe all the arguments of the opposition and completely discount the arguments of the Argonne scientists who best know the technology, it doesn’t matter because we do not have an option: we have to make this work now. Renewables alone can’t kill coal in the time allotted. The point is:1) virtually every credible renewable expert agrees we cannot reduce our carbon emissions enough without nuclear, 2) the IFR is our best nuclear, 3) the IFR is the only technology we have with a realistic chance of replacing coal burners in a coal plant with a lower-cost carbon-free alternative. So objections noted, but our planet is at stake and we have got to make this work. We should be joining together and doing things that our most credible scientists tell us we have to do to save our planet, rather than arguing amongst ourselves and debating what the optimum solution is. The time for debate is over. We are so late on deploying clean energy technologies that any new technology that has a realistic potential to make a significant positive impact should be welcomed with open arms by every human being. Urgency “Within the next four decades, human civilization must eliminate its use of fossil fuels and replace them with 10,000 gigawatts of reliable, sustainable power. The only realistic way that this extraordinary challenge can be met is with the rapid and large-scale deployment of nuclear power, on a worldwide basis, led by countries like the US, Russia, the EU, China and India. Generation III nuclear plants will be critical to this expansion over the short term, Generation IV technology is the astoundingly attractive long-term prospect, with the IFR being the flagship Gen IV design. The urgency in getting the IFR commercialised and deployment on an industrial scale cannot be overstated”.

### Advantage 2

#### Decline in domestic nuclear infrastructure has spurred both a brain drain and an inability to attract the best and brightest

Martin, Chairman of the Nuclear Energy Advisory Committee, and Ahearne, Vice-Chairman, 8 (William F. and John, Nuclear Energy: Policies and Technology for the 21st Century, Nuclear Energy Advisory Committee, November 2008, http://www.ne.doe.gov/neac/neacPDFs/NEAC\_Final\_Report\_Web%20Version.pdf, da 9-1-12)

The consequences of a weakened nuclear infrastructure in the United States include reduced domestic capability to support the role of nuclear energy as well as the related problem of the reduced ability to attract and retain the talent at all levels—from technicians to engineers to Ph.D.’s—needed to develop and sustain active U.S. participation in the domestic and global nuclear marketplace. In that vein, NEAC recommends that both university and industry programs in nuclear R&D be strengthened, and that laboratories and facilities in the DOE complex be modernized and made more efficient. These programs should be developed in consultation with relevant government agencies and scientists, DOE national laboratories, private industry, and the academic community.

#### U.S. commitment to pyro-processing restarts the nuclear industry

Stephen Berry & George S. Tolley, 11-29-2010, James Franck Distinguished Service Professor Emeritus at the University of Chicago, Fellow, American Academy of Arts and Sciences, foreign Member, Royal Danish Academy of Sciences, member and Home Secretary, National Academy of Sciences, J. Heyrovsky Honorary Medal for Merit in the Chemical Sciences, Academy of Sciences of the Czech Republic, Alexander von Humboldt-Stiftung Senior Scientist Award, Phi Beta Kappa National Lecturer, George S. Tolley is a professor emeritus in Economics at the University of Chicago, fellow, American Association for the Advancement of Science, honorary editor, Resource and Energy Economics, honorary Ph.D., North Carolina State University, “Nuclear Fuel Reprocessing Future Prospects and Viability,” p. 39, <http://humanities.uchicago.edu/orgs/institute/bigproblems/Team7-1210.pdf>

Increasing government support of advancements in reprocessing in the U.S. would encourage growth and investment in this technology. Therefore, continued government commitment to researching pyroprocessing and other advanced fuel cycle technologies is vital to the nuclear industry, especially if we envision this technology maturing internationally. As unsustainable as our current nuclear waste disposal strategies are, we believe in the current political climate, commercial reprocessing in the United States are not a viable option due to high environmental and technological costs, as well as having significant nuclear proliferation threats. However, in order for the U.S. to employ pyroprocessing in the future, the government must begin now to incentivize the technology for firms and investors. As uranium prices are expected to increase in the future, as well as an increasing concern regarding the management of nuclear waste worldwide, reprocessing may become a promising solution provided investments are made to address current challenges in the field.

#### Nuclear industry growth spurs talent transfer from developing countries – the link only goes one way: brain drain does not hurt developing countries industries

Jacques C. Hymans, January/March 2011, is associate professor of international relations at the University of Southern California, research focuses on nuclear proliferation, and more broadly, on international security affairs, an editorial board member of the Nonproliferation Review, Ph.D. in Government from Harvard University, Postdoctoral Fellow, Harvard University Olin Institute for Strategic Studies, Vol. 20 Issue 1, “Proliferation Implications of Civil Nuclear Cooperation: Theory and a Case Study of Tito's Yugoslavia,” p. 79-80, Ebsco Host

One of the basic points made by the technology transfer literature, and whose importance for the case of nuclear proliferation has been stressed by Montgomery, is that the genuine diffusion of technical capacities is often quite limited. A first reason why is that supplier countries often do not or cannot transfer the crucial tacit knowledge that comes from hands-on expe-rience, and without which the technology’s potential will remain dormant. 24 The relevance of this point for nuclear proliferation has been shown by Liu Yanqiong and Liu Jifeng, whose detailed study of the 1950s Soviet assistance to China’s nuclear weapons project shows that because Soviet technicians were not very forthcoming with their knowledge, the assistance was not nearly as seminal as many have claimed. 25 A second reason why technology transfer is often less than meets the eye is that developing countries often lack sufficient “absorptive capacity”—for instance, their technical bureau-cracy may not be well-organized enough to learn to do anything more than run a turnkey facility. 26 A recent statistical analysis by Montgomery suggests 21 that this factor may be an important limitation on technology transfer in the nuclear weapons area as well. 27 But the technology transfer literature does not limit itself simply to identifying frictions, transaction costs, and other hindrances to the seamless operation of the “give-get” model. It has also stressed that international link-ages forged for the purpose of technology transfer actually create a decidedly two-way street. Beginning in the early 1970s, social scientists attached to the United Nations Conference on Trade and Development (UNCTAD) developed the concept of “reverse transfer of technology.” 28 The clearest case of reverse transfer of technology can be seen in the serious and persistent “brain drain” of developing country scientists and other highly skilled workers to devel-oped countries. In other words, international technical “assistance” programs actually often morph into avenues for the poaching of developing country talent. The implication of these points for proliferation is that the greater the brain drain of nuclear scientific workers out of a developing country, the lower its nuclear weapons capacity becomes. Strangely, the proliferation literature has focused on brain drain only in its most sensationalist aspect—the possibility that a few former Soviet weapons scientists, for instance, might have gone to work for Kim Jong Il or Saddam Hussein. 29 But the brain drain’s most typical pattern is the movement of “brains” from developing countries, or more recently from the post-Soviet area, to the advanced industrialized states. And nuclear scientific workers are no exception to the rule.

#### Empirics prove: brain drain creates brain circulation

Jacques C. Hymans, January/March 2011, is associate professor of international relations at the University of Southern California, research focuses on nuclear proliferation, and more broadly, on international security affairs, an editorial board member of the Nonproliferation Review, Ph.D. in Government from Harvard University,Postdoctoral Fellow, Harvard University Olin Institute for Strategic Studies, Vol. 20 Issue 1, “Proliferation Implications of Civil Nuclear Cooperation: Theory and a Case Study of Tito's Yugoslavia,” p. 100-3, Ebsco Host

Many analysts have characterized aboveboard international civil nuclear cooperation—“Atoms for Peace”—as an unmitigated disaster for the cause of nonproliferation. Most of Atoms for Peace’s dwindling band of supporters themselves no longer contest the idea that it has given dozens of developing countries the technical capacity to build nuclear weapons at a time of their 114 Note that despite Tito’s 1974 decision, Gaukhar Mukhatzhanova finds that Solingen’s argument about the impact of liberalizing political coalition interests on regimes’ nuclear intentions generally fits the Yugoslav case pretty well. See Mukhatzhanova, “Nuclear Weapons in the Balkans,” esp. 213–15. choosing. Even such routine practices as the holding of international confer-ences and student exchange programs in the fields of nuclear science and engineering have come under fire. In contrast to these general trends in the literature, this article has offered a more nuanced assessment of the effects of Atoms for Peace. The literature needs to abandon its outdated, oversimplified, techno-centric approach to the supply side of the proliferation equation. When we recognize that “tech-nical” capacity has political foundations, the effects of Atoms for Peace on states’ nuclear weapons capacity appear much different than the literature suggests. In particular, by changing the career opportunities available to the most talented and energetic among the small pool of competent scientific workers in developing country contexts, Atoms for Peace makes their choice for loyalty more complicated, their choice for voice less dangerous, and their choice for exit more feasible. Thus, Atoms for Peace can substantially retard or even reverse the growth of technical capacity to build the bomb, despite the transfer of hardware and know-how that it promotes. The case study of Yugoslavia has substantiated the theorized nonproliferation-promoting effects of Atoms for Peace, even during the pol-icy’s most “na¨ıve” nuclear promotion days of the 1950s and 1960s. As Yu-goslavia represents a hard test for the theory presented here, the findings from this study should be given special heed. We should not be surprised that Atoms for Peace ended up undercutting the Tito regime’s nuclear ambi-tions through such mechanisms as brain drain, since similar findings abound in the broader literature on international technology transfer, with which the proliferation literature needs to engage deeply. This article is not claiming that Atoms for Peace was a silver bullet for nonproliferation in the case of Yugoslavia. Rather, the claim is that over the long run Atoms for Peace intensified and locked in the Yugoslav nuclear program’s poor organizational performance, and accelerated the program’s ultimate collapse. Some readers might be tempted to conclude that since poor organization and management were the root causes of Yugoslavia’s nuclear woes, therefore the effects of Atoms for Peace were superfluous to the outcome. However, it would be wrong to ignore the Atoms for Peace variable simply because it did not singlehandedly prevent a Yugoslav nuclear bomb from coming into being. Recall that up until now, the literature has generally contended that Atoms for Peace helps states leapfrog over their or-ganizational and resource limitations by handing them ready-made solutions to difficult technical problems. So it would already be a significant finding simply to show that Atoms for Peace, even in its heyday in the 1950s and 1960s, actually did not allow them to leapfrog those limitations. But in fact my finding is that Atoms for Peace greatly compounded those limitations, at least in the case of Yugoslavia. My finding turns standard thinking about this question on its head. This finding is not just interestingly counterintu-itive; it also has important implications for United States and international nonproliferation policy. Typical nonproliferation measures, such as export controls and technical safeguards, can hope to achieve little more than to re-strain nuclear programs from moving forward; but I have shown that Atoms for Peace, especially by stimulating the brain drain, ultimately caused the Yu-goslav nuclear program to stumble backward, and made it next to impossible for Belgrade to turn things around. I should also underscore that this article is not claiming that Yugoslavia’s experience with Atoms for Peace necessarily generalizes to every developing country. Some developing countries have been able to leverage civil nuclear cooperation to achieve nuclear weapons more quickly than they otherwise could have. India is often mentioned as a prime example of the danger that Atoms for Peace will unwittingly provide atoms for war. But this article’s focus on Yugoslavia represents a necessary corrective to the literature’s typ-ical focus on proliferation headline-makers like India. Moreover, there are good theoretical reasons to think that the Yugoslav nuclear experience with Atoms for Peace may have been much more typical for developing countries than the Indian experience. First, as noted earlier in the article, the brain drain literature has singled out India as one of the handful of developing countries where the size and quality of the science and technology com-munity are enough to allow it to absorb the hit of a substantial brain drain and yet still benefit through such compensating mechanisms as brain circu-lation, brain diaspora, and brain replacement. 121 Second, the literature on state capacity suggests that the bureaucratic “steel frame” inherited from the British colonial Indian Civil Service, though surely not problem-free, places India far above most other developing countries in terms of its level of state institutionalization. 122 Reflecting these general bureaucratic strengths of the Indian state, the Indian nuclear program was—despite some hiccups—quite well-organized and managed, and this substantially reduced the potential for India’s participation in Atoms for Peace to cause it serious damage. 123 In short, India appears deductively to be a much more exceptional case in the developing world than Yugoslavia, although more in-depth case studies will be necessary before we can say for sure if Yugoslavia’s experience with Atoms for Peace was truly typical or not. 124 121 An anonymous reviewer of this article suggested that we should consider whether, contrary to the general presumption of the proliferation literature, proliferant states often pare back their international civil nuclear cooperation efforts in order to avoid creating complications for their nuclear weapons Proliferation Implications of Civil Nuclear Cooperation 103 It might be that even if Yugoslavia’s experience was typical for its time period, a reenergized Atoms for Peace policy would not have the same nonproliferation-promoting consequences in today’s changed circumstances. But it is also possible to argue that an expanded commitment to overt interna-tional civil nuclear cooperation would have even stronger nonproliferation-promoting consequences in today’s world. After all, the brain drain from the developing world (and post-Communist states) continues to be a major social fact in the contemporary international system. Although the United States demand for the services of developing-world scientists and engineers was already quite high during the 1950s and 1960s, it has become absolutely voracious in recent years. Between 1978 and 2008, the number of U.S. PhD recipients holding temporary visas jumped from 3,475 (11 percent of the total number of doctorates granted by American universities) to 15,246 (31 percent of the total). In the physical sciences, the increase was from 653 (16 percent) to 3,678 (45 percent). In engineering, the increase was from 781 (32 percent) to 4,486 (57 percent). Of these newly minted temporary visa-holding PhDs, in 2008 73.5 percent reported the intention to remain in the United States; this number was generally much higher among those PhDs who had come from developing and post-Communist countries. Meanwhile, the out-migration of the highly skilled is having dramatic consequences on the resource base of sending countries: for instance, 41 percent of all tertiary-educated Caribbeans have emigrated to developed countries; for West Africa the figure is 27 percent; and for East Africa it is 18.4 percent. 125 This mas-sive brain drain is nothing to celebrate; it has caused major social ills in the developing world. But as an empirical matter brain drain is correlated with reduced technological potential, and when it comes to the narrow question of nuclear weapons development, reducing developing countries’ techno-logical potential is not necessarily a bad thing. One could try to turn this argument around and contend that since the brain drain has become so massive, state policies can do little to encourage or discourage it anymore. But in fact the brain drain still depends crucially on facilitative state policies, especially those of the United States and other receiving countries. 126 In the nuclear area in particular, there is no guarantee that those facilitative policies will continue. As noted at the outset of this article, nonproliferation concerns have led the United States to reduce sub-stantially the scope of its international civil nuclear cooperation programs over the past decades, and some nonproliferation advocates want to abolish them altogether.

#### The plan allows high skilled immigrants to vote with their feet, which ends repressive regimes abroad and at home

Ilya Somin, Professor of Law at George Mason University, 2008 (George Mason University School of Law, 73 Mo. L. Rev. 1247 Fall

From the standpoint of promoting foot voting, the distinction between victims of "persecution" and other potential migrants makes little sense. Even potential migrants who have not been personally targeted for persecution on the basis of race, religion or political beliefs may still suffer the ill effects of oppressive or misguided government policies. For example, repression of the right to freedom of speech and political organization affects not only would-be speakers, but also all other citizens of the society in question, who are forced to live under a political process that they have no power to influence. Similarly, "economic" migrants are in many cases fleeing poverty that is in large part caused by the flawed policies of the governments they live under. Development economists recognize that most poor countries could generate rapid economic growth by adopting appropriate policies. n51 In many  [\*1262]  cases, enormous advances in the economic status of the poor could be achieved simply by allowing them to acquire enforceable property rights n52 and by integrating the nation in question more closely with the world economy. n53 All too often, migrants who are fleeing generally adverse economic and political conditions are no less victims of their governments than those who have been targeted for individualized "persecution" of the sort currently recognized as grounds for asylum rights by international law .. Previous scholars have argued for stronger international migration rights on a variety of grounds. n54 This Article highlights an additional and generally ignored advantage of migration rights: the opportunity to strengthen democratic accountability by enabling more people to "vote with their feet" against repressive or dysfunctional governments in their home societies. As in the case of domestic federal systems, international foot voting allows citizens greater choice over the government policies they live under, and may force states to adopt better policies in order to prevent skilled migrants and valuable taxpayers from departing. Unlike many other types of international law, a right to free migration does not significantly undermine the ability of democratic states to adopt diverse approaches to various policy issues. n55 States with free entry and exit rights can still enact a wide range of different policies, so long as they do not inhibit freedom of movement. Indeed, as scholars of domestic federalism have emphasized, freedom of movement might stimulate policy innovation by governments, as they compete for economically valuable migrants. n56  [\*1263]

#### Globalization has produced a politics of diasporic identity. Circulation challenges state nationalism and produces interdependence and empowerment – challenges status quo economic hierarchies.

Chandler Professor of Law, 01

Anupam Chander\*, Professor of Law, University of California at Davis,Chandler, Presentation at the Stanford Yale Junior Faculty Forum, held in 2001, 76 N.Y.U.L. Rev. 1005 October 2001 Lexis

In a world that is increasingly diasporan, full of crisscrossing loyalties, transborder mobility, multinational political states, and transnational communities, neither the statist nor the cosmopolitan paradigm fits. n229 Diasporas require a reconceptualization of the nation-state and the international system. They challenge both the Westphalian cartography of territorially defined sovereigns and the cosmopolitan utopia of a united mankind. The diaspora model begins with the recognition that diasporas exemplify the contemporary condition. Corporations too have become increasingly multinational, with their ownership and operations dispersed through the world. n230 Labor and capital, seeking their highest  [\*1049]  valued use, move with fewer legal and technological barriers across states. Additionally, information has become widely disseminated, its passage sped through the Internet, resulting in the creation of virtual transnational communities. n231 The hallmarks of a globalized world are hybridity, intermingling, and multiple allegiances. But despite this intermingling, most people have not sloughed off their nationalist skin in favor of an evolved cosmopolitanism. Rather, the hybridity resulting from globalization often manifests itself in individuals who subscribe to multiple nationalisms [n232](http://www.lexisnexis.com.floyd.lib.umn.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296151495155&returnToKey=20_T11102761817&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.144948.34542102285" \l "n232) or a transnationalism. Multiple nationalisms and transnationalism become possible because "the nationalist genie, never perfectly contained in the bottle of the territorial state, is now itself diasporic." n233 The diaspora model does not seek to dismantle the nation-state, but rather to rearticulate it as a multinational state permitting the voluntary transnational associations of its people. Furthermore, the model seeks to enfranchise diasporas as recognized legal subjects in the transnational legal process. n234 The lived experience of diasporas demonstrates the possibility of negotiating such divided feelings in a way that allows diasporas to contribute to their homelands and adopted lands simultaneously. n235 Moreover, it demonstrates the possibility of a transnational community built on individual voluntary commitments. Increasingly, we see the emergence of a transnational civic republicanism, with the diaspora taking an active part in shaping the future direction of its homeland. A globalized world requires a new paradigm of the relationship of the citizen to the state. The diaspora model proposes that we view that relationship as complicated and dynamic. The model would permit individuals to construct national and transnational communities of their own choosing. In this way, then, the diaspora model rejects the unitary ideology of statism in favor of an understanding of the state that respects the possibility of plural commitments and loyalties. And instead of requiring us to refashion ourselves, first and foremost, as world citizens, the diaspora model offers an internationalism that respects  [\*1050]  patriotic feelings and individual attachments to country and community - with the hope that such attachments might bind the world closer together. Thus, the diaspora model complicates the international system, replacing the clean demarcations of statism with an acceptance of overlapping sovereignties. n236 As the communitarian philosopher Michael Sandel observes, "the most promising alternative to the sovereign state is not a cosmopolitan community based on the solidarity of humankind but a multiplicity of communities and political bodies - some more extensive than nations and some less - among which sovereignty is diffused." n237 This approach does not mean doing away with states, but rather denying their claim to the exclusive allegiance of their residents. The diaspora model thus offers an intermediate point between the exclusivity of statism and the universality of cosmopolitanism. With some optimism, the model locates in diasporas the possibility of building bridges across the world, between rich and poor countries and between liberal and illiberal societies. Diasporas offer the possibility of uniting the world through a web of personal and community loyalties, while international capital flows and international trade create a web of international economic dependencies. This web of personal loyalties is spun through the dual loyalties of individuals in diaspora. The relationship of individual to state, conceived by Westphalians as a one-to-one relationship and by cosmopolitans as ethically irrelevant, can be reimagined to promote both the ideal of authenticity and the possibility of economic development.

#### Diasporic politics break down xenophobic us/them politics, it decreases conflictChandler Professor of Law, 01

Anupam Chander\*, Professor of Law, University of California at Davis,Chandler, Presentation at the Stanford Yale Junior Faculty Forum, held in 2001, 76 N.Y.U.L. Rev. 1005 October 2001 Lexis

Finally, the intermingling of the people of the world … may well include our neighbors and friends. In a world characterized by ever-increasing globalization, not only of capital and goods but also of people, diasporas seek a link to a past that is removed not only in time but also in space. n465 At times, this link can manifest itself in an atavistic racialism. Diaspora Bonds, on the other hand, demonstrate one possibility where this link to the past may be put in the service of economic development in the present. People sustaining diaspora ties must do so critically, eschewing moral relativism yet respecting difference. In accordance with this critical project, we might ask: Why introduce diaspora as another category of individual identity relevant to the law?  [\*1096]  In a globalized world, mutation, hybridity, and intermixture represent the prevailing norm. Thus, the diaspora model, which allows people to maintain hybridized and hybridizing bonds to homeland and hostland, better approximates how people now imagine their relationship to the state than either the statist or cosmopolitan models. Moreover, while it rejects the statist demand that all persons pledge fealty to one state or the cosmopolitan desire that we forswear any primary fealty to country, the diaspora model is broad enough to accommodate persons who register support only for one state or for no state at all. Rather than seeking to change people, the diaspora model suggests that we revisit our conception of the international order. By recognizing the possibility of a wide array of allegiances, especially to homeland and transnational community, the diaspora model promotes authenticity and allows people to flourish. Second, the diaspora model offers a view of citizenship that reconciles globalization with the desire for a sense of rootedness. It understands the traveling nature of contemporary culture. [n466](http://www.lexisnexis.com.floyd.lib.umn.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296151495155&returnToKey=20_T11102761817&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.144948.34542102285" \l "n466) The diaspora approach embraces globalization, but does not mistake it for a renunciation of nation or state. The diaspora model embraces the multiculturalism of cosmopolitanism while still respecting the very thing that animates such multiculturalism - the individual's search for belonging. Third, accepting diaspora as a legitimate basis for community affirms a connection between rich and poor nations that can support economic development. We find exactly this dynamic in the case of Diaspora Bonds, which enable homeland governments to tap the wealth of their expatriates to fund economic development in the homeland. [n467](http://www.lexisnexis.com.floyd.lib.umn.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296151495155&returnToKey=20_T11102761817&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.144948.34542102285" \l "n467) Admittedly, cosmopolitanism offers a distributive justice approach [n468](http://www.lexisnexis.com.floyd.lib.umn.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296151495155&returnToKey=20_T11102761817&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.144948.34542102285" \l "n468) that is more demanding and systematic than the voluntary homeland-regarding actions of the diaspora. However, the diaspora model is more likely to harness existing forces for economic development than cosmopolitanism is likely to find the altruistic, enlightened persons who embrace its nondiscriminatory principles. [n469](http://www.lexisnexis.com.floyd.lib.umn.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296151495155&returnToKey=20_T11102761817&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.144948.34542102285" \l "n469) Fourth, recognizing diasporan relationships allows us to better understand the contemporary world order. It allows us to grasp the connections between distant events and to place these events into a broader global framework. Recognizing the diaspora helps locate individual  [\*1097]  events in a broader narrative. [n470](http://www.lexisnexis.com.floyd.lib.umn.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296151495155&returnToKey=20_T11102761817&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.144948.34542102285" \l "n470) Of course, we must still bear in mind that diasporan events will differ from each other in important ways. Finally, the intermingling of the people of the world across states and nations may reduce interstate violence and human rights abuse. Diasporas blur the distinction between "us" and "them." It will be harder to demonize another people when one's own compatriots hail from that same place and maintain strong bonds to it. Because diasporas muddy the purity of nations, they offer a possible escape from what Samuel Huntington describes as a post-Cold War "clash of civilizations." n471 While it would be Panglossian to suggest that the diaspora's adopted land will be unlikely to declare war on the diaspora's home country or vice versa, [n472](http://www.lexisnexis.com.floyd.lib.umn.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1296151495155&returnToKey=20_T11102761817&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.144948.34542102285" \l "n472) it may be the case that the diaspora will help the two countries understand each other better, thereby potentially reducing the likelihood of hostilities. Additionally, should war in fact break out, it would be more likely targeted at the foreign government, not its people, since its people may well include our neighbors and friends.

### Plan

Plan: The United States Federal Government should substantially increase commercial loan guarantees for purposes of energy production by development for Integral Fast Reactors in the United States.

### Solvency

#### Loan guarantees are key to establishing pyro-processing.

Stephen Berry & George S. Tolley, 11-29-2010, James Franck Distinguished Service Professor Emeritus at the University of Chicago, Fellow, American Academy of Arts and Sciences, foreign Member, Royal Danish Academy of Sciences, member and Home Secretary, National Academy of Sciences, J. Heyrovsky Honorary Medal for Merit in the Chemical Sciences, Academy of Sciences of the Czech Republic, Alexander von Humboldt-Stiftung Senior Scientist Award, Phi Beta Kappa National Lecturer, George S. Tolley is a professor emeritus in Economics at the University of Chicago, fellow, American Association for the Advancement of Science, honorary editor, Resource and Energy Economics, honorary Ph.D., North Carolina State University, “Nuclear Fuel Reprocessing Future Prospects and Viability,” p. 38, <http://humanities.uchicago.edu/orgs/institute/bigproblems/Team7-1210.pdf>

The construction of an aqueous solvent extraction plant would be out of date, especially when the more promising option of pyroprocessing is on the horizon. In comparison, to current available methods, pyroprocessing produces virtually no waste, can be done on-site, and offers the option of fabricating proliferation resistant fuel from plutonium as well as uranium. The second question in regard to domestic reprocessing is, “how much direct involvement should the government have in the reprocessing business?” Government involvement could be justified on the grounds of the externalities present in nuclear waste disposal. This could take on a variety of forms - government research efforts, subsidizing reprocessing (or offering tax credits and loan guarantees), or even operating a reprocessing center on its own. Through its actions, the government will be able to influence the development and growth of the nuclear reprocessing industry in the United States. These efforts in support of pyroprocessing and other advanced fuel cycle technologies represent a small portion of the Department of Energy budget - only $142,652,000 out of a total of $33,856,453,000 in discretionary funding in FY 2009, or less than half of one percent98. Furthermore, private companies do not have sufficient independent incentives to reduce the long-term health and environmental consequences of nuclear waste disposal. While it is beyond the scope of this paper to present a formal costbenefit analysis of R&D efforts, given the minimal costs and the large potential benefits, the chances of success do not need to be very high to justify continued government expenditures in this area.

#### U.S. commitment to pyro-processing sustains the nuclear industry – prices and management.

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Increasing government support of advancements in reprocessing in the U.S. would encourage growth and investment in this technology. Therefore, continued government commitment to researching pyroprocessing and other advanced fuel cycle technologies is vital to the nuclear industry, especially if we envision this technology maturing internationally. As unsustainable as our current nuclear waste disposal strategies are, we believe in the current political climate, commercial reprocessing in the United States are not a viable option due to high environmental and technological costs, as well as having significant nuclear proliferation threats. However, in order for the U.S. to employ pyroprocessing in the future, the government must begin now to incentivize the technology for firms and investors. As uranium prices are expected to increase in the future, as well as an increasing concern regarding the management of nuclear waste worldwide, reprocessing may become a promising solution provided investments are made to address current challenges in the field.

#### Fast reactors are 100% safe – multiple redundancies eliminating human error and impregnable\*\*

Barry Brook et. al, 2-21-2009, a leading environmental scientist, holding the Sir Hubert Wilkins Chair of Climate Change at the School of Earth and Environmental Sciences, and is also Director of Climate Science at the University of Adelaide’s Environment Institute, published three books, over 200 refereed scientific papers, is a highly cited researcher, received a number of distinguished awards for his research excellence including the Australian Academy of Science Fenner Medal, is an International Award Committee member for the Global Energy Prize, Australian Research Council Future Fellow, ISI Researcher, Ph.D., Macquarie University in Environmental Engineering, Science Council for Global Initiatives, Edgeworth David Medal Royal Society of NSW, Cosmos Bright Sparks Award, Tom Blees is the author of Prescription for the Planet, the president of the Science Council for Global Initiatives, member of the selection committee for the Global Energy Prize, George S. Stanford is a nuclear reactor physicist, part of the team that developed the Integral Fast Reactor, PhD from Stanford University in Physics, Masters from University of Virginia in Engineering, worked at Argonne National Laboratory, Graham R.L. Cowan, "Boron: A Better Energy Carrier than Hydrogen?" in 2001, published "How Fire Can Be Tamed," BraveNewClimate, “Response to an Integral Fast Reactor (IFR) critique,” <http://bravenewclimate.com/2009/02/21/response-to-an-integral-fast-reactor-ifr-critique/>

[BWB] The laws of physics say that this is not nonsense. For instance, the metal fuel pins’ composition is such that if they begin to overheat, the resulting expansion decreases their density to the point where the fission reaction simply shuts down. This is not speculation — it’s been tested and verified. I quote: “The IFR gains safety advantages through a combination of metal fuel (an alloy of uranium, plutonium, and zirconium), and sodium cooling. By providing a fuel which readily conducts heat from the fuel to the coolant, and which operates at relatively low temperatures, the IFR takes maximum advantage of expansion of the coolant, fuel, and structure during off-normal events which increase temperatures. The expansion of the fuel and structure in an off-normal situation causes the system to shut down even without human operator intervention. In April of 1986, two special tests were performed on the Experimental Breeder Reactor II (EBR-II), in which the main primary cooling pumps were shut off with the reactor at full power (62.5 Megawatts, thermal) – By not allowing the normal shutdown systems to interfere, the reactor power dropped to near zero within about 300 seconds. No damage to the fuel or the reactor resulted. This test demonstrated that even with a loss of all electrical power and the capability to shut down the reactor using the normal systems, the reactor will simply shut down without danger or damage. The same day, this demonstration was followed by another important test. With the reactor again at full power, flow in the secondary cooling system was stopped. This test caused the temperature to increase, since there was nowhere for the reactor heat to go. As the primary (reactor) cooling system became hotter, the fuel, sodium coolant, and structure expanded, and the reactor shut down. This test showed that an IFR type reactor will shut down using inherent features such as thermal expansion, even if the ability to remove heat from the primary cooling system is lost. Events such as the loss of water to the steam system would cause a condition such as the test demonstrated. Another major feature of the IFR concept is that the reactor uses a coolant, sodium, which does not boil during normal operation nor even in overpower transients such as described above. This means that the coolant is not under significant pressure. When coolant is not under pressure, the reactor can be placed in a “pool” of coolant, contained in a double tank, so that there is no real possibility for a loss of coolant. Even if the normal pumps are lost, some coolant flow through the reactor occurs due to natural convection. The features described above allow for greater simplification of a nuclear plant, resulting in cost savings, greater ease in operation, and a safety system that relies on natural phenomenon that cannot be defeated by human error. “ [TB] Arguing that these reactors cannot be safe from meltdowns flies in the face of the laws of physics, which assure that very feature. Regarding terrorist attack, we can secure our airports chemical plants, etc, with not a lot of work, you can design these plants to be virtually impregnable by terrorists (e.g., burying the reactor building). The new Gen III LWRs, though, are so far advanced as to merit their designation as a different generation. The probabilistic risk assessment of the ESBWR is astronomical, one core melt accident every 29 million reactor-years. Since we don’t have enough nuclear waste to load new IFRs quickly enough to meet the 2050 goal of zero emissions, the newest LWRs could be built to fill any gap that renewables and IFRs couldn’t fill and can be expected to perform safely. Their safety features are far beyond our current reactors by orders of magnitude.

#### Ontology focus at the expense of action causes paralysis

McClean 2001 David McClean (philosopher, writer and business consultant, conducted graduate work in philosophy at NYU) 2001 “The cultural left and the limits of social hope” http://www.american-philosophy.org/archives/past\_conference\_programs/pc2001/Discussion%20papers/david\_mcclean.htm

There is a lot of philosophical prose on the general subject of social justice. Some of this is quite good, and some of it is quite bad. What distinguishes the good from the bad is not merely the level of erudition. Displays of high erudition are gratuitously reflected in much of the writing by those, for example, still clinging to Marxian ontology and is often just a useful smokescreen which shrouds a near total disconnect from empirical reality. This kind of political writing likes to make a lot of references to other obscure, jargon-laden essays and tedious books written by other true believers - the crowd that takes the fusion of Marxian and Freudian private fantasies seriously. Nor is it the lack of scholarship that makes this prose bad. Much of it is well "supported" by footnotes referencing a lode of other works, some of which are actually quite good. Rather, what makes this prose bad is its utter lack of relevance to extant and critical policy debates, the passage of actual laws, and the amendment of existing regulations that might actually do some good for someone else. The writers of this bad prose are too interested in our arrival at some social place wherein we will finally emerge from our "inauthentic" state into something called "reality." Most of this stuff, of course, comes from those steeped in the Continental tradition (particularly post-Kant). While that tradition has much to offer and has helped shape my own philosophical sensibilities, it is anything but useful when it comes to truly relevant philosophical analysis, and no self-respecting Pragmatist can really take seriously the strong poetry of formations like "authenticity looming on the ever remote horizons of fetishization." What Pragmatists see instead is the hope that we can fix some of the social ills that face us if we treat policy and reform as more important than Spirit and Utopia.

#### No root cause of war – decades of research votes aff

Cashman 2000 (Greg Cashman, Professor of Political Science at Salisbury State University, 2000 “What Causes war?: An introduction to theories of international conflict” pg. 9)

Two warnings need to be issued at this point. First, while we have been using a single variable explanation of war merely for the sake of simplicity, multivariate explanations of war are likely to be much more powerful. Since social and political behaviors are extremely complex, they are almost never explainable through a single factor. Decades of research have led most analysts to reject monocausal explanations of war. For instance, international relations theorist J. David Singer suggests that we ought to move away from the concept of “causality” since it has become associated with the search for a single cause of war; we should instead redirect our activities toward discovering “explanations”—a term that implies multiple causes of war, but also a certain element of randomness or chance in their occurrence.

#### Extinction outweighs – as long as there is some life there’s only a risk they retain ontological capacity

Hans Jonas (Former Alvin Johnson Prof. Phil. – New School for Social Research and Former Eric Voegelin Visiting Prof. – U. Munich) 1996 “Morality and Mortality: A Search for the Good After Auschwitz”, p. 111-112)

With this look ahead at an ethics for the future, we are touching at the same time upon the question of the future of freedom. The unavoidable discussion of this question seems to give rise to misunderstandings. My dire prognosis that not only our material standard of living but also our democratic freedoms would fall victim to the growing pressure of a worldwide ecological crisis, until finally there would remain only some form of tyranny that would try to save the situation, has led to the accusation that I am defending dictatorship as a solution to our problems. I shall ignore here what is a confusion between warning and recommendation. But I have indeed said that such a tyranny would still be better than total ruin; thus, I have ethically accepted it as an alternative. I must now defend this standpoint, which I continue to support, before the court that I myself have created with the main argument of this essay. For are we not contradicting ourselves in prizing physical survival at the price of freedom? Did we not say that freedom was the condition of our capacity for responsibility—and that this capacity was a reason for the survival of humankind?; By tolerating tyranny as an alternative to physical annihilation are we not violating the principle we established: that the How of existence must not take precedence over its Why? Yet we can make a terrible concession to the primacy of physical survival in the conviction that the ontological capacity for freedom, inseparable as it is from man's being, cannot really be extinguished, only temporarily banished from the public realm. This conviction can be supported by experience we are all familiar with. We have seen that even in the most totalitarian societies the urge for freedom on the part of some individuals cannot be extinguished, and this renews our faith in human beings. Given this faith, we have reason to hope that, as long as there are human beings who survive, the image of God will continue to exist along with them and will wait in concealment for its new hour. With that hope—which in this particular case takes precedence over fear—it is permissible, for the sake of physical survival, to accept if need be a temporary absence of freedom in the external affairs of humanity. This is, I want to emphasize, a worst-case scenario, and it is the foremost task of responsibility at this particular moment in world history to prevent it from happening. This is in fact one of the noblest of duties (and at the same time one concerning self-preservation), on the part of the imperative of responsibility to avert future coercion that would lead to lack of freedom by acting freely in the present, thus preserving as much as possible the ability of future generations to assume responsibility. But more than that is involved. At stake is the preservation of Earth's entire miracle of creation, of which our human existence is a part and before which man reverently bows, even without philosophical "grounding." Here too faith may precede and reason follow; it is faith that longs for this preservation of the Earth (fides quaerens intellectum), and reason comes as best it can to faith's aid with arguments, not knowing or even asking how much depends on its success or failure in determining what action to take. With this confession of faith we come to the end of our essay on ontology.

#### Death is the ultimate form of ontological destruction – its destroys all human possibility – reject it regardless of their value to life arguments

Craig Paterson (Department of Philosophy, Providence College, Rhode Island) 2003 “A Life Not Worth Living?”,Studies in Christian Ethics, http://sce.sagepub.com

Contrary to those accounts, I would argue that it is death per se that is really the objective evil for us, not because it deprives us of a prospective future of overall good judged better than the alternative of non-being. It cannot be about harm to a former person who has ceased to exist, for no person actually suffers from the sub-sequent non-participation. Rather, death in itself is an evil to us because it ontologically destroys the current existent subject — it is the ultimate in metaphysical lightening strikes. 80 The evil of death is truly an ontological evil borne by the person who already exists, independently of calculations about better or worse possible lives. Such an evil need not be consciously experienced in order to be an evil for the kind of being a human person is. Death is an evil because of the change in kind it brings about, a change that is destructive of the type of entity that we essentially are. Anything, whether caused naturally or caused by human intervention (intentional or unintentional) that drastically interferes in the process of maintaining the person in existence is an objective evil for the person. What is crucially at stake here, and is dialectically supportive of the self-evidency of the basic good of human life, is that death is a radical interference with the current life process of the kind of being that we are. In consequence, death itself can be credibly thought of as a ‘primitive evil’ for all persons, regardless of the extent to which they are currently or prospectively capable of participating in a full array of the goods of life. 81 In conclusion, concerning willed human actions, it is justifiable to state that any intentional rejection of human life itself cannot therefore be warranted since it is an expression of an ultimate disvalue for the subject, namely, the destruction of the present person; a radical ontological good that we cannot begin to weigh objectively against the travails of life in a rational manner. To deal with the sources of disvalue (pain, suffering, etc.) we should not seek to irrationally destroy the person, the very source and condition of all human possibility

#### Vote aff to preserve the capacity of individuals to choose

Craig Paterson (Department of Philosophy, Providence College, Rhode Island) 2003 “A Life Not Worth Living?”,Studies in Christian Ethics, http://sce.sagepub.com

In determining whether a life is worth living or not, attention should be focused upon an array of ‘interests’ of the person, and these, for the competent patient at least, are going to vary considerably, since they will be informed by the patient’s underlying dispositions, and, for the incompetent, by a minimal quality threshold. It follows that for competent patients, a broad-ranging assessment of quality of life concerns is the trump card as to whether or not life continues to be worthwhile. Different patients may well decide differently. That is the prerogative of the patient, for the only unpalatable alternative is to force a patient to stay alive. For Harris, life can be judged valuable or not when the person assessing his or her own life determines it to be so. If a person values his or her own life, then that life is valuable, precisely to the extent that he or she values it. Without any real capacity to value, there can be no value. As Harris states, ‘. . . the value of our lives is the value we give to our lives’. It follows that the primary injustice done to a person is to deprive the person of a life he or she may think valuable. Objectivity in the value of human life, for Harris, essentially becomes one of negative classification (ruling certain people out of consideration for value), allied positively to a broad range of ‘critical interests’; interests worthy of pursuing — friendships, family, life goals, etc. — which are subjected to de facto self-assessment for the further determination of meaningful value. Suicide, assisted suicide, and voluntary euthanasia, can therefore be justified, on the grounds that once the competent nature of the person making the decision has been established, the thoroughgoing commensuration between different values, in the form of interests or preferences, is essentially left up to the individual to determine for himself or herself.

#### Calculation is good and doesn’t devalue life

Revesz 2008 Richard L. Revesz (Dean and Lawrence King Professor of Law at New York University School of Law, JD Yale Law School) and Michael A Livermore. (JD NYU School of Law, Executive Director of the Institute for Policy Integrity, and Managing director of the NYU Law Review). Retaking Rationality How Cots-Benefit Analysis Can Better protect the Environment and Our Health. 2008. P. 1-4.

Governmental decisions are also fundamentally different from personal decisions in that they often affect people in the aggregate. In our individual lives, we come into contact with at least some of the consequences of our decisions. If we fail to consult a map, we pay the price: losing valuable time driving around in circles and listening to the complaints of our passengers. We are constantly confronted with the consequences of the choices that we have made. Not so for governments, however, which exercise authority by making decisions at a distance. Perhaps one of the most challenging aspects of governmental decisions is that they require a special kind of compassion—one that can seem, at first glance, cold and calculating, the antithesis of empathy. The aggregate and complex nature of governmental decisions does not address people as human beings, with concerns and interests, families and emotional relationships, secrets and sorrows. Rather, people are numbers stacked in a column or points on a graph, described not through their individual stories of triumph and despair, but by equations, functions, and dose-response curves. The language of governmental decisionmaking can seem to—and to a certain extent does—ignore what makes individuals unique and morally important. But, although the language of bureaucratic decisionmaking can be dehumanizing, it is also a prerequisite for the kind of compassion that is needed in contemporary society. Elaine Scarry has developed a comparison between individual compassion and statistical compassion.' Individual compassion is familiar—when we see a person suffering, or hear the story of some terrible tragedy, we are moved to take action. Statistical compassion seems foreign—we hear only a string of numbers but must comprehend "the concrete realities embedded there."' Individual compassion derives from our social nature, and may be hardwired directly into the human brain.' Statistical compassion calls on us to use our higher reasoning power to extend our natural compassion to the task of solving more abstract—but no less real—problems. Because compassion is not just about making us feel better—which we could do as easily by forgetting about a problem as by addressing it—we have a responsibility to make the best decisions that we can. This book argues that cost-benefit analysis, properly conducted, can improve environmental and public health policy. Cost-benefit analysis—the translation of human lives and acres of forest into the language of dollars and cents—can seem harsh and impersonal. But such an approach is also necessary to improve the quality of decisions that regulators make. Saving the most lives, and best protecting the quality of our environment and our health—in short, exercising our compassion most effectively—requires us to step back and use our best analytic tools. Sometimes, in order to save a life, we need to treat a person like a number. This is the challenge of statistical compassion. This book is about making good decisions. It focuses on the area of environmental, health and safety regulation. These regulations have been the source of numerous and hard-fought controversies over the past several decades, particularly at the federal level. Reaching the right decisions in the areas of environmental protection, increasing safety, and improving public health is clearly of high importance. Although it is admirable (and fashionable) for people to buy green or avoid products made in sweatshops, efforts taken at the individual level are not enough to address the pressing problems we face—there is a vital role for government in tackling these issues, and sound collective decisions concerning regulation are needed. There is a temptation to rely on gut-level decisionmaking in order to avoid economic analysis, which, to many, is a foreign language on top of seeming cold and unsympathetic. For government to make good decisions, however, it cannot abandon reasoned analysis. Because of the complex nature of governmental decisions, we have no choice but to deploy complex analytic tools in order to make the best choices possible. Failing to use these tools, which amounts to abandoning our duties to one another, is not a legitimate response. Rather, we must exercise statistical compassion by recognizing what numbers of lives saved represent: living and breathing human beings, unique, with rich inner lives and an interlocking web of emotional relationships. The acres of a forest can be tallied up in a chart, but that should not blind us to the beauty of a single stand of trees. We need to use complex tools to make good decisions while simultaneously remembering that we are not engaging in abstract exercises, but that we are having real effects on people and the environment. In our personal lives, it would be unwise not to shop around for the best price when making a major purchase, or to fail to think through our options when making a major life decision. It is equally foolish for government to fail to fully examine alternative policies when making regulatory decisions with life-or-death consequences. This reality has been recognized by four successive presidential administrations. Since 1981, the cost-benefit analysis of major regulations has been required by presidential order. Over the past twenty-five years, however, environmental and other progressive groups have declined to participate in the key governmental proceedings concerning the cost-benefit analysis of federal regulations, instead preferring to criticize the technique from the outside. The resulting asymmetry in political participation has had profound negative consequences, both for the state of federal regulation and for the technique of cost-benefit analysis itself. Ironically, this state of affairs has left progressives open to the charge of rejecting reason, when in fact strong environmental and public health pro-grams are often justified by cost-benefit analysis. It is time for progressive groups, as well as ordinary citizens, to retake the high ground by embracing and reforming cost-benefit analysis. The difference between being unthinking—failing to use the best tools to analyze policy—and unfeeling—making decisions without compassion—is unimportant: Both lead to bad policy. Calamities can result from the failure to use either emotion or reason. Our emotions provide us with the grounding for our principles, our innate interconnectedness, and our sense of obligation to others. We use our powers of reason to build on that emotional foundation, and act effectively to bring about a better world.

#### Uranium mining is a well-documented form of nuclear colonialism – Pyro-processing solves

Danielle Endres, November 2009, research and teaching interests lie in argumentation, rhetorical criticism, environmental communication, social movements, and Native American cultures, directing an oral history project: Nuclear Technology in the American West that is collecting and archiving the stories of people involved in nuclear issues, particularly nuclear waste, in the American West. Third, Danielle is a co-director of a national research project on climate change activism, “From wasteland to waste site: the role of discourse in nuclear power’s environmental injustices,” Local Environment, Ebsco Host

As mentioned above, nuclear colonialism describes how the nuclear production process – including both nuclear weapons production and nuclear power – disproportionately harms indigenous people worldwide.3 The Indigenous Environmental Network (2002) wrote: The nuclear industry has waged an undeclared war against our Indigenous peoples and Pacific Islanders that has poisoned our communities worldwide. For more than 50 years, the legacy of the nuclear chain, from exploration to the dumping of radioactive waste has been proven, through documentation, to be genocide and ethnocide and a deadly enemy of Indigenous peoples. . . United States federal law and nuclear policy has not protected Indigenous peoples, and in fact has been created to allow the nuclear industry to continue operations at the expense of our land, territory, health and traditional ways of life. . . . This disproportionate toxic burden – called environmental racism – has culminated in the current attempts to dump much of the nation’s nuclear waste in the homelands of the Indigenous peoples of the Great Basin region of the United States. Examples of nuclear colonialism in the United States include Uranium mining and milling on reservation lands in the Black Hills and Four Corners regions, nuclear testing on land claimed under the 1863 Treaty of Ruby Valley by theWestern Shoshone, and HLWstorage sites considered on Western Shoshone, Southern Paiute, and Skull Valley Band of Goshute lands (Nelkin 1981, Grinde and Johansen 1995, Kuletz 1998, La Duke 1999, Hoffman 2001). The phenomenon of nuclear colonialism is empirically documented. The book Nuclear Wastelands, edited by Makhijani et al. (1995), reveals that indigenous people in the USA and globally are disproportionately burdened by the production of nuclear weapons. Further, Hooks and Smith (2004, p. 572) demonstrate that US military sites are disproportionately located on or near Native American lands. While these studies focus primarily on military applications of nuclear technologies, there is also evidence to suggest that Uranium mining for nuclear power production and HLW storage also fall within the pattern of nuclear colonialism (Nelkin 1981, Hoffman 2001). Hoffman (2001, p. 462) details the “extraordinary unequal distribution of benefits and burdens at each stage of the [nuclear fuel] cycle” imposed upon Native American nations in the USA, particularly by Uranium mining and HLW disposal. Nuclear colonialism is a type of environmental injustice. In part, nuclear colonialism is environmental racism. According to Bullard (1999, p. 6), “environmental racism combines with public policies and industry practices to provide benefits for whites while shifting costs to people of color”. Yet, nuclear colonialism is also a form of colonialism. Native Americans, unlike other marginalised racial groups in the USA, are members of over 150 distinct sovereign tribal nations and each holds a unique legal relationship with the federal government. As Suagee (2002, p. 227) notes, “Although Indian people have suffered much discriminatory treatment from people who apparently define Indian identity in primarily racial–ethnic terms, the fact that Native American governments are sovereign governments is a significant distinction between them and other kinds of minorities”. Although Native Americans in the USA are sovereign governments, they are still faced with a system of colonialism. Gedicks (1993, p. 13) argues that Native Americans are embedded within a system of resource colonialism under which “native peoples are under assault on every continent because their lands contain a wide variety of valuable resources needed for industrial development”. Nuclear colonialism is a form of resource colonialism that faces Native Americans in the USA and other indigenous peoples worldwide.4

#### Nuclear energy is essential to quality of life issues that disproportionately affect minority communities. Public transportation, water treatment, hospitals, .

American Association of Blacks in Energy 2002 May, 1 pg. 1 “American Association of Blacks in Energy Supports Yucca Mountain Storage Repository” <http://www.nei.org/resourcesandstats/documentlibrary/nuclearwastedisposal/regulatoryinformation/aabenewsrelease5102 >

At its quarterly meeting last month, the Board of Directors of the American Association of Blacks in Energy announced its support for Congressional ratification of Yucca Mountain, Nevada as the logical site for nuclear waste storage. “Careful and diligent monitoring is key to ensuring public health and safety, but that can be better accomplished at one site instead of continuing the current practice of on-site storage. The Yucca Mountain project is an important component in a solid energy policy which ensures energy and environmental equity for all Americans,” said Frank Johnson, chairman of the association. In related action, the organization reaffirmed its support for re-licensing of nuclear facilities. “Nuclear is America’s largest base-load, emission-free electricity. Minority communities are commonly found in urban areas that require large amounts of electricity for public transportation, hospitals, water treatment facilities and other necessities. We believe that nuclear energy provides important benefits”, said Johnson. “Our quality of life depends upon electricity that is reliable and affordable – and nuclear is an important part of the mix,” he said. AABE is a national association of energy professionals founded and dedicated to ensure the input of African Americans and other minorities into the discussion and development of energy policies, regulations, R&D technologies and environmental issues.

#### You should adopt an ontology of pragmatism- we must work with the system that we are handed and cannot simply wish it away

HNSG (Harvard Nuclear Study Group – Albert Carnesale, UCLA Chancellor Emeritus and holds professorial appointments in UCLA’s School of Public Affairs and Henry Samueli School of Engineering and Applied Science, twenty-three year tenure at Harvard University , Pauly Doty, Founder and Director Emeritus of the Center for Science and International Affairs and Mallinckrodt Professor of Biochemistry, and an emeritus member of the BCSIA Board of Directors, Stanley Hoffmann, the Paul and Catherine Buttenweiser University Professor at Harvard University, Samuel Huntington, was an associate professor of government at Columbia University where he was also Deputy Director of The Institute for War and Peace Studies, Joseph Nye, University Distinguished Service Professor, and former Dean of the Kennedy School at Harvard, and Scott Sagan, Caroline S.G. Munro Professor of Political Science at Stanford, co-director of Stanford's Center for International Security and Cooperation, and a Senior Fellow at the Freeman Spogli Institute) 1983 “Living With Nuclear Weapons” p. 18-9

In the nuclear age, the dangers the United States faces are both numerous and enormous. It would be best if all these dangers could be eliminated, but in international relations as in politics, the goal is to relate the desirable to the possible. The impossibility of achieving perfect solutions should not, however, breed discouragement. It should only strengthen determination to persevere. When facing enormous problems, there is a special attraction to the assumption that only radical answers can suffice. Hence, the strong pull of utopian visions of both the extreme left and the extreme right: the ideas that only a world government can solve all our problems or that sheer military muscle is all that America needs. Both prescribe all-purpose solutions, but each ignores the real world. In the real world, packed with huge nuclear arsenals, mere military muscle, unless built and exercised with restraint and skill, will not ensure American security. In the real world of sovereign states, a world government is a dream for the distant future, not a practical goal for current policymakers. The danger of focusing on utopian objectives is that they can take attention away from practical and positive steps that can be taken now. Such actions may only produce incremental progress to war the goal of national security. But incremental steps matter. It would be a tragedy if opportunities for practical progress toward nuclear peace were missed because our goals were set too high, beyond the reach of what is possible. In his book The Fate of the Earth, Jonathan Schell has reminded people about the dangers of nuclear war, but his “solution” is precisely such an impossible goal. “The task,” he wrote, “is nothing less than to reinvent politics: to reinvent the world.” In reality, however, neither politics nor the world were invented by men, nor can either politics or the world be reinvented. Rather, these arrangements evolved through trial and error, through sacrifice and occasional gifted leadership, to an organization of life on earth that has reached unprecedented attainments. The nature of humanity, the complex mosaic of civilizations, the web of relations that unites so many nations cannot be taken apart and reinvented in the future. They can, we hope, continue to evolve. We are left, therefore, with our imperfect selves, imperfect nations, and imperfect realtions among them. And it is upon this imperfect structure that the capability of waging infinitely destructive nuclear war has descended. Humanity has no alternative but to hold this threat at bay and to learn to live with politics, to live in a world we know: a world of nuclear weapons, international rivalries, recurring conflicts, and at least some risk of nuclear crisis. The challenge we face is not to escape to a fictional utopia where such problems do not exist. It is to learn how to live with nuclear weapons in ways that are successively safer and in which the freedoms won by men and women are kept secure and can grow.

## 2AC

#### Ontology doesn’t come first or indict our scholarship

Owen 2002 (David Owen, reader of political theory at the University of Southampton, Millennium, Volume 31, Number 3, pg. 655-657)

Commenting on the ‘philosophical turn’ in IR, Wæver remarks that ‘[a] frenzy for words like “epistemology” and “ontology” often signals this philosophical turn’, although he goes on to comment that these terms are often used loosely.4 However, loosely deployed or not, it is clear that debates concerning ontology and epistemology play a central role in the contemporary IR theory wars. In one respect, this is unsurprising since it is a characteristic feature of the social sciences that periods of disciplinary disorientation involve recourse to reflection on the philosophical commitments of different theoretical approaches, and there is no doubt that such reflection can play a valuable role in making explicit the commitments that characterise (and help individuate) diverse theoretical positions. Yet, such a philosophical turn is not without its dangers and I will briefly mention three before turning to consider a confusion that has, I will suggest, helped to promote the IR theory wars by motivating this philosophical turn. The first danger with the philosophical turn is that it has an inbuilt tendency to prioritise issues of ontology and epistemology over explanatory and/or interpretive power as if the latter two were merely a simple function of the former. But while the explanatory and/or interpretive power of a theoretical account is not wholly independent of its ontological and/or epistemological commitments (otherwise criticism of these features would not be a criticism that had any value), it is by no means clear that it is, in contrast, wholly dependent on these philosophical commitments. Thus, for example, one need not be sympathetic to rational choice theory to recognise that it can provide powerful accounts of certain kinds of problems, such as the tragedy of the commons in which dilemmas of collective action are foregrounded. It may, of course, be the case that the advocates of rational choice theory cannot give a good account of why this type of theory is powerful in accounting for this class of problems (i.e., how it is that the relevant actors come to exhibit features in these circumstances that approximate the assumptions of rational choice theory) and, if this is the case, it is a philosophical weakness—but this does not undermine the point that, for a certain class of problems, rational choice theory may provide the best account available to us. In other words, while the critical judgement of theoretical accounts in terms of their ontological and/or epistemological sophistication is one kind of critical judgement, it is not the only or even necessarily the most important kind. The second danger run by the philosophical turn is that because prioritisation of ontology and epistemology promotes theory-construction from philosophical first principles, it cultivates a theory-driven rather than problem-driven approach to IR. Paraphrasing Ian Shapiro, the point can be put like this: since it is the case that there is always a plurality of possible true descriptions of a given action, event or phenomenon, the challenge is to decide which is the most apt in terms of getting a perspicuous grip on the action, event or phenomenon in question given the purposes of the inquiry; yet, from this standpoint, ‘theory-driven work is part of a reductionist program’ in that it ‘dictates always opting for the description that calls for the explanation that flows from the preferred model or theory’.5 The justification offered for this strategy rests on the mistaken belief that it is necessary for social science because general explanations are required to characterise the classes of phenomena studied in similar terms. However, as Shapiro points out, this is to misunderstand the enterprise of science since ‘whether there are general explanations for classes of phenomena is a question for social-scientific inquiry, not to be prejudged before conducting that inquiry’.6 Moreover, this strategy easily slips into the promotion of the pursuit of generality over that of empirical validity. The third danger is that the preceding two combine to encourage the formation of a particular image of disciplinary debate in IR—what might be called (only slightly tongue in cheek) ‘the Highlander view’—namely, an image of warring theoretical approaches with each, despite occasional temporary tactical alliances, dedicated to the strategic achievement of sovereignty over the disciplinary field. It encourages this view because the turn to, and prioritisation of, ontology and epistemology stimulates the idea that there can only be one theoretical approach which gets things right, namely, the theoretical approach that gets its ontology and epistemology right. This image feeds back into IR exacerbating the first and second dangers, and so a potentially vicious circle arises.

#### Do both- rejecting our ontology doesn’t require rejecting the plan- Japan proves

Dreyfus 2006 (Hubert Dreyfus, Professor of Philosophy at UC Berkeley, "Nihilism, Art, Technology, and Politics,” The Cambridge Companion to Heidegger: Second Edition)

Heidegger, however, sees that "it would be foolish to attack technology blindly. It would be shortsighted to condemn it as the work of the devil. We depend on technical devices; they even challenge us to ever greater advances."(DOT 53, G 24) Instead, Heidegger suggests that there is a way we can keep our technological devices and yet remain true to ourselves as receivers of clearings: We can affirm the unavoidable use of technical devices, and also deny them the right to dominate us, and so to warp, confuse, and lay waste our nature. (DOT 54, G 24-25) To understand how this might be possible, we need an illustration of Heidegger's important distinction between technology and the technological understanding of being. Again we can turn to Japan. In contemporary Japan traditional, nontechnological practices still exist alongside the most advanced high-tech production and consumption. The TV set and the household gods share the same shelf – the styrofoam cup co-exists with the porcelain tea cup. We thus see that the Japanese at least, can enjoy technology without taking over the technological understanding of being. For us to be able to make a similar dissociation, Heidegger holds, we must rethink the history of being in the West. Then we will see that although a technological understanding of being is our destiny, it is not our fate. That is, although our understanding of things and ourselves as resources to be ordered, enhanced, and used efficiently has been building up since Plato, we are not stuck with that understanding. Although the technological understanding of being governs the way things have to show up for us, we can hope for a transformation of our current cultural clearing. Only those who think of Heidegger as opposing technology will be surprised at his next point. Once we see that technology is our latest understanding of being, we will be grateful for it. This clearing is the cause of our distress, yet if it were not given to us to encounter things and ourselves as resources, nothing would show up as anything at all, and no possibilities for action would make sense. And once we realize -- in our practices, of course, not just as matter of reflection -- that we receive our technological understanding of being, we have stepped out of the technological understanding of being, for we then see that what is most important in our lives is not subject to efficient enhancement -- indeed, the drive to control everything is precisely what we do not control. This transformation in our sense of reality -- this overcoming of thinking in terms of values and calculation -- is precisely what Heideggerian thinking seeks to bring about. Heidegger seeks to make us see that our practices are needed as the place where an understanding of being can establish itself, so we can overcome our restricted modern clearing by acknowledging our essential receptivity to understandings of being.

#### Alt impossible- human nature

Riis 2011 (Søren Riis, Carlsberg Research Fellow and Assistant Professor of Philosophy and Science Studies at Roskilde University, February 8, 2011, “Towards the origin of modern technology: reconfiguring Martin Heidegger’s thinking,” EBSCO)

Moreover, Heidegger maintains: ‘‘Readiness-to-hand is the way in which entities as they are ‘in themselves’ are defined ontologico-categorially.’’47 According to Heidegger’s fundamental phenomenology, which he unfolds in detail in Being and Time and reaffirms a decisive part of in ‘‘The Question Concerning Technology,’’ nature is ‘‘primally’’ revealed in its ‘‘usability’’ and ‘‘serviceability-for-;’’ that is to say, ‘‘nature’’ is a resource long before the actual rise of modern and ancient technology, namely simultaneously with the very origin of human beings. That something is primordially revealed in its ‘‘usability’’ and ‘‘serviceability-for-’’ does not imply that it is actually used or serves accordingly, but that it is revealed as standing ready to be utilized in the corresponding context. As such, it is revealed as ‘‘standing-reserve.’’ This, for example, also corresponds to the empirical fact that prehistoric humans settled close to woods and rivers. In these areas they always had stockpiles of timber, power for transportation, and easy access to drinking water. Based on ‘‘The Question Concerning Technology’’ and completed through references to Being and Time, we now have an interpretation of the origin of the essence of modern technology, which traces back the characteristic revealing of das Gestell to the beginning of humankind.48 This does not imply that prehistoric technology is identical with contemporary technology; rather the third genealogy of the rule of das Gestell suggests that when ‘‘we still more primally’’ try to consider the origin of the challenging revealing characterizing the rule of das Gestell, we in fact rediscover that it is connected to being human. The rule of das Gestell has challenged humans as long as they have existed. In this sense, humans first and foremost exist under the rule of das Gestell.49 This also entails a revision and precision of Heidegger’s renowned formula characterizing the world-connectedness of human existence: being-in-the-world. Based on the comparison of ‘‘The Question Concerning Technology’’ and Being and Time, human existence is better described as being-under-the-spell-of-das-Gestell. Trying to understand the various more-or-less explicit accounts of the origin of the rule of das Gestell in ‘‘The Question Concerning Technology’’ and the resulting ambiguity is not just an exercise, nor only a way to criticize Heidegger. Rather, it is a way to better understand the nuances and layers in Heidegger’s thinking concerning technology and to warn against a short-sighted ‘‘saving’’ from an alleged danger. If the challenging revealing of nature, which characterizes the rule of das Gestell is taken seriously, then we cannot avoid it just by revolutionizing our technology, instead, we must revise our very human existence.

#### Management solves extinction

Levy 1999 (Dr Neil Levy, fellow of the Centre for Applied Philosophy and Public Ethics at Charles Sturt University, 1999“Discourses of the Environment” p. 215)

If the ‘technological fix’ is unlikely to be more successful than strategies of limitation of our uses of resources, we are nevertheless unable to simply leave the environment as it is. There is a real and pressing need for more, and more accurate, technical and scientific information about the non-human world. For we are faced with a situation in which the processes we have already set in train will continue to impact upon that world, and therefore us, for centuries. It is therefore necessary, not only to stop cutting down the rain forests, but to develop real, concrete proposals for action, to reverse, or at least limit, the effects of our previous interventions. Moreover, there is another reason why our behaviour towards the non-human cannot simply be a matter of leaving it as it is, at least in so far as our goals are not only environmental but also involve social justice. For if we simply preserve what remains to us of wilderness, of the countryside and of park land, we also preserve patterns of very unequal access to their resources and their consolations (Soper 1995: 207). In fact, we risk exacerbating these inequalities. It is no us, but the poor of Brazil, who will bear the brunt of the misery which would result form a strictly enforced policy of leaving the Amazonian rain forest untouched, in the absence of alternative means of providing for their livelihood. It is the development of policies to provide such ecologically sustainable alternative which we require, as well as the development of technical means for replacing our current greenhouse gas-emitting sources of energy. Such policies and proposals for concrete action must be formiulated by ecologists, environmentalist, people with expertise concerning the functioning of ecosystems and the impacts which our actions have upon them. Such proposals are, therefore, very much the province for Foucault’s specific intellectual, the one who works ‘within specific sectors, at the precise points where their won conditions of life or work situate them’ (Foucault 1980g: 126). For who could be more fittingly described as ‘the strategists of life and death’ than these environmentalists? After the end of the Cold War, it is in this sphere, more than any other, that man’s ‘politics places his existence as a living being in question’ (Foucault 1976: 143). For it is in facing the consequences of our intervention in the non-human world that the fate of our species, and of those with whone we share this planet, will be decided.

#### Nuke technocracy solves

Nordhaus and Shellenberger 2011 (Ted Nordhaus, chairman of the Breakthrough Instiute, and Michael Shellenberger, president of the Breakthrough Insitute, MA cultural anthropology from University of California, Santa Cruz, February 25, 2011, 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.

#### Transition causes extinction

Barnhizer 2006 David, Prof of Law, Cleveland State U, ‘Waking from Sustainability's "Impossible Dream”,’ Geo Int’l Envtl L Rev, pg. l/n

The scale of social needs, including the need for expanded productive activity, has grown so large that it cannot be shut off at all, and certainly not abruptly. It cannot even be ratcheted down in any significant fashion without producing serious harms to human societies and hundreds of millions of people. Even if it were possible to shift back to systems of local self-sufficiency, the consequences of the transition process would be catastrophic for many people and even deadly to the point of continual conflict, resource wars, increased poverty, and strife. What are needed are concrete, workable, and pragmatic strategies that produce effective and intelligently designed economic activity in specific contexts and, while seeking efficiency and conservation, place economic and social justice high on a list of priorities. 60 The imperative of economic growth applies not only to the needs and expectations of people in economically developed societies but also to people living in nations that are currently economically underdeveloped. Opportunities must be created, jobs must be generated in huge numbers, and economic resources expanded to address the tragedies of poverty and inequality. Unfortunately, natural systems must be exploited to achieve this; we cannot return to Eden. The question is not how to achieve a static state but how to achieve what is needed to advance social justice while avoiding and mitigating the most destructive consequences of our behavior. Many developing country groups involved in efforts to protect the environment and resist the impacts of free trade on their communities have been concerned with the harmful effects of economic change. Part of the concern is the increased scale of economic activity. Some concerns relate to who benefits and who loses in the changing context imposed by globalization. These concerns are legitimate and understandable. So are the other deep currents running beneath their political positions, including those of resistance to change of any kind and a [\*621] rejection of the market approach to economic activities. In the system described inaccurately as free market capitalism, economic activity not only breaks down existing systems, it creates new systems and--as Joseph Schumpeter observed--continually repeats the process through cycles of "creative destruction." 61 This pattern of creative destruction unfolds as necessarily and relentlessly as does the birth-maturation-death-rebirth cycle of the natural environment. This occurs even in a self-sufficient or autarkic market system capable of managing all variables within its closed dominion. But when the system breaks out of its closed environment, the ability of a single national actor to control the system's dynamics erodes and ultimately disappears in the face of differential conditions, needs, priorities, and agendas. Globalization's ability to produce wealth for a particular group simultaneously produces harms to different people and interests and generates unfair resource redistribution within existing cultures. This is an unavoidable consequence of globalization. 62 The problem is that globalization has altered the rules of operation of political, economic, and social activities, and in doing so multiplied greatly our ability to create benefit and harm. 63 While some understandably want the unsettling and often chaotic effects of globalization to go away, it can only be dealt with, not reversed. The system in which we live and work is no longer closed. There are few contexts not connected to the dynamics of some aspect of the extended economic and social systems resulting from globalization. This means the wide ranging and incompatible variables of a global economic, human rights, and social fairness system are resulting in conflicts and unanticipated interpenetrations that no one fully understands, anticipates, or controls. 64 Local [\*622] self-sufficiency is the loser in this process. It can remain a nostalgic dream but rarely a reality. Except for isolated cultures and niche activities, there is very little chance that anyone will be unaffected by this transformational process. Change is the constant, and it will take several generations before we return to a period of relative stasis. Even then it will only be a respite before the pattern once again intensifies.

#### VTL inevitable their instrumental approach causes infanticide- Holland proves

Penner 2005 Melinda Penner (Director of Operations – STR, Stand To Reason) 2005 “End of Life Ethics: A Primer”, Stand to Reason, http://www.str.org/site/News2?page=NewsArticle&id=5223

Intrinsic value is very different. Things with intrinsic value are valued for their own sake. They don’t have to achieve any other goal to be valuable. They are goods in themselves. Beauty, pleasure, and virtue are likely examples. Family and friendship are examples. Something that’s intrinsically valuable might also be instrumentally valuable, but even if it loses its instrumental value, its intrinsic value remains. Intrinsic value is what people mean when they use the phrase "the sanctity of life." Now when someone argues that someone doesn’t have "quality of life" they are arguing that life is only valuable as long as it obtains something else with quality, and when it can’t accomplish this, it’s not worth anything anymore. It's only instrumentally valuable. The problem with this view is that it is entirely subjective and changeable with regards to what might give value to life. Value becomes a completely personal matter, and, as we all know, our personal interests change over time. There is no grounding for objective human value and human rights if it’s not intrinsic value. Our legal system is built on the notion that humans have intrinsic value. The Declaration of Independence: "We hold these truths to be self-evident, that all men are created equal, that each person is endowed by his Creator with certain unalienable rights...." If human beings only have instrumental value, then slavery can be justified because there is nothing objectively valuable that requires our respect. There is nothing other than intrinsic value that can ground the unalienable equal rights we recognize because there is nothing about all human beings that is universal and equal. Intrinsic human value is what binds our social contract of rights. So if human life is intrinsically valuable, then it remains valuable even when our capacities are limited. Human life is valuable even with tremendous limitations. Human life remains valuable because its value is not derived from being able to talk, or walk, or feed yourself, or even reason at a certain level. Human beings don’t have value only in virtue of states of being (e.g., happiness) they can experience. The "quality of life" view is a poison pill because once we swallow it, we’re led down a logical slippery slope. The exact same principle can be used to take the life of human beings in all kinds of limited conditions because I wouldn't want to live that way. Would you want to live the life of a baby with Down’s Syndrome? No? Then kill her. Would you want to live the life of an infant with cerebral palsy? No? Then kill him. Would you want to live the life of a baby born with a cleft lip? No? Then kill her. (In fact, they did.) Once we accept this principle, it justifies killing every infant born with a condition that we deem a life we don’t want to live. There’s no reason not to kill every handicapped person who can’t speak for himself — because I wouldn’t want to live that way. This, in fact, is what has happened in Holland with the Groningen Protocol. Dutch doctors euthanize severely ill newborns and their society has accepted it.

#### Predictions inevitable and good

Friedman 2008 George Friedman (founder of Stratfor) May 2008 “The Love of One’s Own and the Importance of Place” Stratfor

Forecasting is built into the human condition. Each action a human being takes is intended to have a certain outcome. The right to assume that outcome derives from a certain knowledge of how things work. Sometimes, the action has unexpected and unintended consequences. The knowledge of how things work is imperfect. But there is a huge gulf between the uncertainty of a prediction and the impossibility of a prediction. When I get up and turn on the hot water, it is with the expectation that the hot water will be there. It isn’t always there and I may not have a full understanding of why it will be there, but in general, it is there and I can predict that. A life is made up of a fabric of such expectations and predictions. There is no action taken that is not done with the expectation, reasonable or not, erroneous or not, of some predictable consequence. The search for predictability suffuses all of the human condition. Students choose careers by trying to predict what would please them when they are 30 years older, what would be useful and therefore make them money and so on. Businesses forecast what can be sold and to whom. We forecast the weather, the winners of elections, the consequences of war and so on. There is no level on which human beings live that they don’t make forecasts and, therefore, on which they don’t act as if the world were to some degree predictable.

#### Method can’t be evaluated in a vacuum- to do so is useless

Bunge 1983 Mario Bunge, Treatise on basic Philosophy Vol 6: Epistemology and Methodology II: Understanding the world, 1983 p. 207

Tenth, the methodics of any science includes not only its peculiar techniques but also the scientific method (Ch. 7, Section 2.2). A collection of techniques, e.g. for producing high pressures or high vacua, or for measuring the effects of reinforcement on the learning of philosophy does not constitute a science: methods are means not ends, and they cannot be applied or evaluated apart from a problematics and an aim. Merely exploiting a given technique for obtaining or processing data without any ulterior purposes is not doing science but just keeping busy and possibly salaried**.**

#### Cross apply--No root cause of war – decades of research votes aff

Cashman 2000 Greg Cashman (Professor of Political Science at Salisbury State University) 2000 “What Causes war?: An introduction to theories of international conflict” pg. 9

Two warnings need to be issued at this point. First, while we have been using a single variable explanation of war merely for the sake of simplicity, multivariate explanations of war are likely to be much more powerful. Since social and political behaviors are extremely complex, they are almost never explainable through a single factor. Decades of research have led most analysts to reject monocausal explanations of war. For instance, international relations theorist J. David Singer suggests that we ought to move away from the concept of “causality” since it has become associated with the search for a single cause of war; we should instead redirect our activities toward discovering “explanations”—a term that implies multiple causes of war, but also a certain element of randomness or chance in their occurrence.

### CP-lead cooled reactor

#### A lead-cooled reactor is a high fissile material risk and also easily freezes solid.

Dylan Ryan, 2011, Masters in Mechanical Engineering, specialization in technical aided engineering & materials, and a PhD in engineering energy systems from Stanford University, 15 years’ experience in natural convection and heat transfer, daryanenergyblog , “The Molten Salt Reactor concept,” <http://daryanenergyblog.wordpress.com/ca/part-8-msr-lftr/>

Ironically, another “poor choice” of candidate is the IAEA’s proposed Generation IV reactor the modular lead cooled fast reactor. This reactor is remarkably similar to the BM-40A used on the Soviet Alfa class submarines of the cold war. The Alfa class was one of the best submarines the soviets ever built, small, capable of going much deeper than any Western boat, highly maneuverable and blisteringly fast – so fast and maneuverable that they could actually out run and out turn a number of allied torpedoes of the era! However, the US navy Admirals slept quietly in their beds over the Alfa as it has two drawbacks, they were noisy (thus easily tracked) and it got this performance from its Lead-cooled reactor. The Lead had to be kept heated at above 125 °C or the core froze solid. In practical terms this meant keeping the reactor running 24/7 which made maintenance a nightmare. Of 7 Alfa class boats, 4 had problems with their cores freezing solid, in one case while the boat was at sea! For most of the boats this meant decommissioning and after it happened to the final boat in service, K-123, it seems that even the Soviet navy ran out of patience with the Lead-cooled reactor as they cut it out of the sub and replaced it with a standard PWR type. While the developers of the LCFR claim to have solved this “freezing” core problem, the experience of the Russian navy suggests that this is not the sort of reactor we want to be putting in the hands of amateurs. Also, as it relies on running on highly enriched uranium, there are a number of potential proliferation issues which means we don’t want to be handing them out willy nilly… not without them drawing terrorists to them like moths to a flame!

### Warming

#### Nuclear energy is key to solve climate issues – ocean and soil acidity, collapse of agriculture, infrastructure.

Charles Forsberg, 10-6-2011, is the Executive Director for the MIT Nuclear Fuel Cycle Study, Director and principle investigator for the MIT Fluoride Salt-Cooled High-Temperature Reactor Project, and the Idaho National Laboratory University Lead for Hybrid Energy Systems, Bulletin of the Atomic Scientists, “What alternatives to nuclear energy?,” <http://www.thebulletin.org/web-edition/roundtables/nuclear-energy-different-other-energy-sources#rt8911>

For those opposed to nuclear energy, the belief is that there are alternative energy sources -- a faith in alternatives, ironically, as strong as some of the early advocates for nuclear power in the 1950s. But no such options exist in a world that will soon have 10 billion people (see Forsberg, "Mutually Assured Energy Independence"). That fundamental reality dictates the need for nuclear energy. Climate change, fossil fuels, and famine. We have fossil fuels; however, the burning of fossil fuels releases carbon dioxide into the atmosphere with the potential for large changes in (1) climate and (2) pH (acidity) of water and soil. Both threaten agricultural productivity, because the changing climate moves agriculture to less productive soils. A consistent climate is critical in the formation of fertile soils -- a several-thousand-year process. Climate change also may entail rebuilding much of man’s infrastructure, which is designed for specific climate and sea-level conditions. Betting on fossil fuels is a high-risk strategy for world agriculture and food supplies. While carbon dioxide sequestration will work in a few locations, it's unlikely to be a universal solution.

### Solvency

#### Pyroprocessing has been extensively researched and developed now – all we need is commercial investment.

Michael F. Simpson & Jack D. Law, February 2010, Princeton University with a Ph.D. in chemical engineering, currently a member of the research staff at INL, previously, he served as the manager of the Advanced Safeguards department, worked extensively with researchers and leaders from Korea Atomic Energy Research Institute, is a technical advisor to both Departments of State and Energy, PhD. MIT with an emphasis in chemical engineering, professor emeritus at the Vanderbilt University School of Engineering Department of Civil and Environmental Engineering, works at the INL, Idaho National Laboratory, “Nuclear Fuel Reprocessing,” p. 19, <http://www.inl.gov/technicalpublications/Documents/4460757.pdf>

Pyroprocessing utilizes molten salt electrolytes as the media rather than acidic aqueous solutions and organic solvents42. These electrolytes are principally used to support electrochemical separations such as uranium electrorefining and electrolytic reduction of oxide fuel. The process includes vacuum furnaces that accomplish salt/metal separations and melt metal deposits into ingots for either waste disposal or fuel fabrication. Ceramic and metal waste streams are generated that immobilize fission products and, optionally, plutonium and minor actinides into high level waste forms. For eventual commercial implementation, it is expected that plutonium and minor actinides will be recycled and used for fast reactor fuel fabrication. While this technology has yet to reach the commercialization stage, it has been the subject of extensive, government funded research and development worldwide in addition to the EBR II spent fuel treatment work in the U.S. For example, the Republic of Korea is currently pursuing a strategy of developing pyroprocessing technology for treatment of spent fuel from their commercial light water reactors to minimize volume of high level waste and possibly extract fissile actinides for eventual fabrication of fast reactor fuel43 44. Russia has already demonstrated production of MOX based on pyroprocessing and plans to develop a closed fuel cycle using the technology by 2020.