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### T RnD

#### Interpretation: Production incentives are direct monetary support contingent on electricity generation - that’s different than investment incentives

Doris, NREL researcher, 12

(Elizabeth Doris, researcher at the National Renewable Energy Laboratory, “Policy Building Blocks: Helping Policymakers Determine Policy Staging for the Development of Distributed PV Markets,” Paper to be presented at the 2012 World Renewable Energy Forum, 5/13-5/17, <http://www.nrel.gov/docs/fy12osti/54801.pdf>)

3.3 Market Expansion

This stage of policy development targets the development of projects and includes both incentives that attempt to distribute the high first costs of distributed technologies and policies that facilitate project installation. The purpose of this category is to increase the installation of individual projects through monetizing the non-economic benefits of distributed generation for the developer. Because the value of those benefits vary in different contexts, these policies can be politically challenging to put in place and technically challenging to design and implement. There is a large body of literature (encompassing the energy field as well as other fields) that discusses the design and implementation of effective market incentives. Specific policy types include:

• Incentives. In the context of this framework, incentives are defined as direct monetary support for specific project development. Incentives, especially in the current economic environment, can be politically challenging to implement and require detailed design to ensure that they are effectively reaching the intended market at levels that spur development without creating over-subsidization. Because of the complications and expense of these types of policies, they are most used and most cost-effective in environments where the market is prepared for project development. There are three primary types of incentives:

• Investment incentives directly alter the first cost of technologies. These incentives can take the form of grants, rebates, or tax incentives, depending on the market needs. Grants are typically applied to larger scale projects and are paid in advance of development, and so target development that would not take place without advance investment. Rebates are most commonly based on equipment purchases and can be applied at the time of purchase or through a post-purchase mechanism. Tax incentives can be deductions or credits, can be applied to entire installations, and are applied after purchase, annually. Tax incentives target development that does not need direct capital investment, but instead prioritizes reduction in pay-back period.

• Production incentives provide payment for electricity produced from the distributed electricity. These are different from net metering because the aim is not to provide the economic value of electricity sold into the grid, but instead, to monetize the indirect benefits of distributed generation and apply that on a production basis to projects. These incentives do not directly remove the challenge of higher first costs, and so are most effective in situations in which those high first costs can be spread over the course of the project lifetime (e.g., where direct priori investment is not a priority). In the last decade, incentives for distributed generation have tended toward the production type, because it assures the public that the investment is resulting in clean energy development (whereas investment incentives have the potential to be invested in projects that do not materialize).

• Feed-in-Tariffs. This incentive type reduces investment risk by providing fixed payments for projects based on the levelized cost of renewable energy generation. This (among other design characteristics) distinguishes feed-in-tariffs from production-based incentives, which are based on monetizing the value of the electricity to the grid or the value to the electricity purchaser.

#### Energy production requires the generation of electricity

US EIA (Energy Information Administration) - October 19, 2011, Annual Energy Review 2010, http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf

Primary Energy Production: Production of primary energy. The U.S. Energy Information Administration includes the following in U.S. primary energy production: coal production, waste coal supplied, and coal refuse recovery; crude oil and lease condensate production; natural gas plant liquids production; dry natural gas—excluding supplemental gaseous fuels—production; nuclear electricity net generation (converted to Btu using the nuclear heat rates); conventional hydroelectricity net generation (converted to Btu using the fossil-fuels heat rates); geothermal electricity net generation (converted to Btu using the fossil-fuels heat rates), and geothermal heat pump energy and geothermal direct use energy; solar thermal and photovoltaic electricity net generation (converted to Btu using the fossilfuels heat rates), and solar thermal direct use energy; wind electricity net generation (converted to Btu using the fossil-fuels heat rates); wood and wood-derived fuels consumption; biomass waste consumption; and biofuels feedstock.

#### Violation – R&D is not a financial incentive

Doris et al – National Renewable Energy Laboratory (US DOE) – Dec 2009

Elizabeth Doris, Jaquelin Cochran, and Martin Vorum, Energy Efficiency Policy in the United States: Overview of Trends at Different Levels of Government http://www.nrel.gov/docs/fy10osti/46532.pdf

The industrial sector, which accounts for 31% of U.S. primary energy consumption (EIA 2008), spans a wide variety of subsectors, all of which have different energy needs. Thus policies to improve energy efficiency in this sector are designed to allow flexibility across a number of differing industry needs, including:

1. Incentives, both financial (e.g., loans and grants for industries to upgrade equipment) and non-financial (e.g., expedited permitting)

2. Technical assistance, including programs, such as energy audits, that help industries identify and implement energy-efficiency programs

3. Research and development.

The federal government offers all three policy types. It offers tax incentives for the manufacturing and home building subsectors, and loans that require energy savings and emission reductions from participating companies. These incentives are flexible enough to apply to a broad array of industry subsectors. In addition, the federal government offers several general industry programs that provide plant-specific technical assistance to highly energy-intensive industries.

State government programs focus on financial incentives, including tax credits, loans, and grants, to offset costs to industries for adopting efficient technologies. Many states also offer programs that can provide customized support to individual industries as part of broader energy efficiency programs. These programs allow funds to be spent on both incentives and technical assistance.

Local government programs related to energy efficiency are often designed with the goal of attracting industries, and thus jobs, to the locality. These programs primarily rely on non-financial incentives, such as expedited permitting for “green” industries.

#### Vote neg

#### Predictable limits – There are 100s of unproven technologies an aff could investigate – impossible to predict them because they aren’t in the energy production literature

#### Ground – Allows the aff to gain “science good” and spinoff advantages without defending efforts to boost status-quo energy production – avoids all our links – especially bad for the neg because the lit on undeveloped tech is skewed towards the optimists while the rational authors ignore it

### Politics

#### Immigration reform likely --- Senate will quickly move first

Milani, 2/8 (Kate, 2/8/2013, Dow Jones News Service, “WSJ BLOG: White House Expects Broad Immigration Bill,” Factiva))

The White House point woman on immigration, Cecilia Muñoz, predicted a comprehensive overhaul would pass this year, and said she expects the Senate to move quickly on legislation now in the works.The director of the White House's Domestic Policy Council, speaking to David Wessel on WSJ.com's weekly Seib & Wessel video show, said this year is different than past, unsuccessful attempts because a broad swath of constituencies back reform and there is already consensus between the White House and Congress over major policy points. The president would like the Senate move forward with an immigration bill in the next four weeks to six weeks, she said. "The country understands that the system is broken and it needs to be fixed... And frankly the Latino community sent a pretty strong message in the election that I think Republicans are responding to," Ms. Muñoz said. President Barack Obama has released his own set of principles for legislation, and applauded a bipartisan Senate proposal. Both call for for new border-security measures, a tougher employer-verification system and a path to citizenship for the 11 million people now in the country illegally. But the White House rejected a Senate proposal to require that border security measures be in place before people can qualify for citizenship. There are some more minor differences between the White House and Senate, too. For instance, Mr. Obama's principles for immigration would allow gay and lesbian Americans to sponsor their same-sex partners for visas, which many Republicans oppose and the Senate framework doesn't include.

-- Labor Union: Illegal Immigrants Deserve Citizenship

-- Rubio: Only One Savior, and It's Not Me

-- Obama Advisers Meet With Leaders of Business Groups

-- Obama Urges 'Strategic' Thinking on Immigration

-- Obama Courts CEOs, Labor Leaders on Immigration

Since the 2012 election, many Republicans have shown new interest in immigration legislation, though some stop short of endorsing citizenship for all illegal immigrants here now. On Tuesday, House Majority Leader Eric Cantor (R., Va.) came out for the principles behind the Dream Act, which would give a path to citizenship to people brought to the U.S. illegally as children. A short time ago, the White House would have welcomed such high-level GOP support for the Dream Act, but with a broader bill in sight, Ms. Muñoz said it would not be enough today. "We need a comprehensive bill. The Dream Act by itself doesn't fix what's broken in our immigration system," she said. In any case, Ms. Muñoz said the biggest obstacle to overhauling immigration law is not policy-related. "By and large there's a consensus on what the big pieces are of immigration reform," said Ms. Muñoz. "The biggest obstacle is political will and just making sure we get over the finish line."

#### Congress is fully focused on immigration reform – momentum is building for quick passage and it is key to boosting high skilled immigration

Higgins, 2/6 (John K., 2/6/2013, “Immigration Reform Could Open the Door for IT Talent,” <http://www.ecommercetimes.com/story/77241.html>))

A divided Congress may actually unite when it comes to certain immigration reform efforts, and that includes one aspect of importance to the IT industry: paving the way for more highly skilled tech workers to come to the U.S. Proposed legislation could impact the way H-1B visas and green cards are handed out, but the issue may be tied to comprehensive immigration reforms. Compare Email Marketing Systems The E-Commerce Times comparison engine helps you easily compare email marketing software based on price, customer support, email templates, delivery methods, and more. [Compare Now] The new Congress is now tackling a flurry of general proposals for comprehensive immigration reform, but only one specific, narrowly focused piece of legislation has already been introduced in the Senate: a plan to vastly increase the number of non-citizens who can pursue jobs and education in the U.S. technology sector. The bill, titled the "Immigration Innovation Act of 2013," quickly drew support from the IT community. "High-skilled immigration is a critical component in the broad effort to reform the U.S. immigration system, and this legislation effectively establishes a must-do list to enable U.S. companies to attract and retain the best innovators from around the world," said Ken Wasch, president of the Software and Information Industry Association (SIIA). "Our companies strongly support efforts to improve the U.S. research ecosystem, including efforts to permit foreign Ph. D. and Masters graduates from U.S. universities in science, technology, engineering, and mathematics (STEM) to remain in the United States," said Grant Seiffert, president of the Telecommunications Industry Association (TIA), in a letter to the Senate sponsors of the bill. "In addition, we support your efforts to increase the allotment of H-1B visas and to improve STEM education efforts in the United States." Visa Reform and High-Tech Funding The bill, also referred to as "I-Squared," focuses on three areas related to high tech talent: the expansion of "employment based non-immigrant" permits, known as H-1B visas; increased access to temporary residence "green cards" for high-skilled workers, and the utilization of fees from the issuance of visas and green cards to promote American worker retraining and education in STEM-related activities. A closer look at the bill's sections: H-1B Visas: The H-1B program allows U.S. employers to temporarily employ foreign workers in specialty occupations for an initial period of three years, extendable to six years. The Immigration Innovation Act would increase the limit for such visas from 65,000 to 115,000. If the pace of applications exceeds the cap within certain specified periods, the allotment will automatically be increased with an eventual hard cap of 300,000. The bill would facilitate the mobility of skilled foreign workers by removing current impediments and costs related to changing employers. It would also authorize employment for dependent spouses of H-1B visa holders. Green cards: The bill would increase the number of available employment-based green cards by reaching back to include green card allotments that went unused in prior years and exempting certain categories of applicants, such as STEM advanced degree holders, from counting against the annual cap. The act provides green card eligibility to "persons with extraordinary ability," and "outstanding professors and researchers," as well as to dependents of employment-based immigrant visa recipients. Current country of origin allocation limits would be eliminated. STEM funding: The fees payable to the U.S. government for H-1B and green cards would be increased. Fees vary for the H-1B documents, but the bill sets the basic fee at $2,500 per employee for firms with more than 25 workers. Green card fees would be raised to $1,000 per employee. According to an Intel analysis, the bill raises the current fee structure by 40 percent. Portions of the federal fee revenue would be channeled to a grant program to promote STEM education and worker retraining to be administered by state governments. The revenue could amount to $300 million per year, according to Sen. Amy Klobuchar (D-Minn), a co-sponsor of the bill. President Obama touched on the high tech employment issue in his second inauguration speech. "Right now, there are brilliant students from all over the world sitting in classrooms at our top universities. They're earning degrees in the fields of the future, like engineering and computer science. But once they finish school, once they earn that diploma, there's a good chance they'll have to leave our country. Think about that," he said. "If you're a foreign student who wants to pursue a career in science or technology, or a foreign entrepreneur who wants to start a business with the backing of American investors, we should help you do that here." Costs and Benefits for Tech Sector Support for the bill by the IT community underscores the need for skilled talent, as well as the readiness of firms to absorb the cost of visa/green card fees and associated legal charges. The fees could be considered a cost of doing business, or they could be viewed as an investment. "We view it as both. The fees are not insignificant and so they give reassurance to some that H-1Bs will not be used to provide a 'cheap labor' alternative to U.S. workers," David LeDuc, senior director of public policy at SIIA, told the E-Commerce Times The fees and processing costs are already so high that it usually costs companies significantly more to hire H-1Bs than U.S. workers." The fees and charges for obtaining skilled workers must also be balanced against the cost for businesses of operating without essential talent. "When considering H-1B fees, we think it's most important to remember that the current annual limit on the number of H-1B visas, along with the per-country restrictions, mean that companies simply can't hire the workers they need or that hiring is delayed. This imposes significant costs and inefficiencies on business operations, and it's part of why the whole system needs reform," Danielle Coffey, general counsel and vice-president of public policy at TIA, told the E-Commerce Times. Congressional Hurdles and Outlook How the bill fares in Congress may depend on how an overall comprehensive package of immigration reforms is handled. "The Immigration Innovation Act could stand on its own, but in the current political situation it is unlikely that immigration issues will be handled piecemeal," Bob Sakaniwa, associate director of advocacy at the American Immigration Lawyers Association, told the E-Commerce Times. "The better prospect is that it will be included within a comprehensive package and its fate will be tied to what Congress does on the overall immigration reform effort." The history of congressional immigration debates also indicates that the IT issue should be part of a comprehensive reform effort, LeDuc added. "As much as we might like, or it might seem practical to enact various reform initiatives independently, that's not a political reality at this time."The momentum now exists for comprehensive immigration reform, and issues related to highly skilled workers have already made their way into bipartisan legislative language."We know that the attention of Congress will now be fully focused on achieving comprehensive reform and a complete bill in the next few months," Coffey said. "We're hoping that they succeed, and that's where our focus is."

#### Obama’s capital is key

Shifter, 12/27 --- adjunct professor of Latin American politics at Georgetown University’s School of Foreign Service (12/27/2012, Michael, Revista Ideel, “Will Obama Kick the Can Down the Road?” <http://www.thedialogue.org/page.cfm?pageID=32&pubID=3186>)

There is, however, a notable change in Obama’s style compared to the first term. He is far more confident and is proclaiming clear positions on key issues, such as raising tax rates on the most wealthy. Previously, Obama had been quite passive and would ask the Congress to present him with a proposal. Today, buoyed by a decisive win in November and more enthusiastic and expectant Democratic supporters, Obama is more inclined to take the initiative and draw some clear lines. How the “fiscal cliff” question is managed and ultimately resolved will likely shape the tenor and climate for Obama’s second-term agenda. If it leaves a bitter taste, then the rest of Obama’s domestic priorities will be more difficult to achieve. If both parties think they gained something in the bargain, prospects for results in other areas will improve. Not surprisingly, Obama has been explicit that reforming the US’s shameful and broken immigration system will be a top priority in his second term. There is every indication that he intends to use some of his precious political capital – especially in the first year – to push for serious change. The biggest lesson of the last election was that the “Latino vote” was decisive. No one doubts that it will be even more so in future elections. During the campaign, many Republicans -- inexplicably -- frightened immigrants with offensive rhetoric. But the day after the election, there was talk, in both parties, of comprehensive immigration reform. Despite the sudden optimism about immigration reform, there is, of course, no guarantee that it will happen. It will require a lot of negotiation and deal-making. Obama will have to invest a lot of his time and political capital -- twisting some arms, even in his own party. Resistance will not disappear. There is also a chance that something unexpected could happen that would put off consideration of immigration reform. Following the horrific massacre at a Connecticut elementary school on December 14, for example, public pressure understandably mounted for gun control, at least the ban of assault weapons. But a decision to pursue that measure -- though desperately needed -- would take away energy and time from other priorities like immigration.

#### Nuclear incentives are politically unpopular in current climate

Domenici and Miller, 12 (July 2012, Report Co-chaired by Senator Pete Domenici and Dr. Warren F. “Pete” Miller, “Maintaining U.S. Leadership in Global Nuclear Energy Markets; A Report of the Bipartisan Policy Center’s Nuclear Initiative,” <http://assets.nationaljournal.com/pdf/BPC%20Nuclear%20Initiative%20Report_format7-17.FINAL.pdf>))

Most recent nuclear policy discussions have focused on specific financing and deployment challenges for Generation III+ nuclear reactors. In the current fiscal and political climate, efforts to further increase financial incentives for nuclear energy likely must overcome significant hurdles. BPC’s Nuclear Initiative therefore focused on finding insights into comprehensive approaches to improve federal energy policy so that it can more effectively (1) address the spectrum of challenges facing nuclear power in the United States with the aim of preserving the safe use of nuclear energy as a reliable source of domestic low-carbon electricity and (2) support U.S. technological and diplomatic leadership on international nuclear issues.

#### Immigration reform is key to both hard and soft power

Nye, 12-10 --- Harvard Prof and former US assistant secretary of defense, state and chairman of the US National Intelligence Council (12/10/2013, “Immigration and American Power,” <http://www.project-syndicate.org/commentary/obama-needs-immigration-reform-to-maintain-america-s-strength-by-joseph-s--nye>)

CAMBRIDGE – The United States is a nation of immigrants. Except for a small number of Native Americans, everyone is originally from somewhere else, and even recent immigrants can rise to top economic and political roles. President Franklin Roosevelt once famously addressed the Daughters of the American Revolution – a group that prided itself on the early arrival of its ancestors – as “fellow immigrants.” In recent years, however, US politics has had a strong anti-immigration slant, and the issue played an important role in the Republican Party’s presidential nomination battle in 2012. But Barack Obama’s re-election demonstrated the electoral power of Latino voters, who rejected Republican presidential candidate Mitt Romney by a 3-1 majority, as did Asian-Americans. As a result, several prominent Republican politicians are now urging their party to reconsider its anti-immigration policies, and plans for immigration reform will be on the agenda at the beginning of Obama’s second term. Successful reform will be an important step in preventing the decline of American power.Fears about the impact of immigration on national values and on a coherent sense of American identity are not new. The nineteenth-century “Know Nothing” movement was built on opposition to immigrants, particularly the Irish. Chinese were singled out for exclusion from 1882 onward, and, with the more restrictive Immigration Act of 1924, immigration in general slowed for the next four decades. During the twentieth century, the US recorded its highest percentage of foreign-born residents, 14.7%, in 1910. A century later, according to the 2010 census, 13% of the American population is foreign born. But, despite being a nation of immigrants, more Americans are skeptical about immigration than are sympathetic to it. Various opinion polls show either a plurality or a majority favoring less immigration. The recession exacerbated such views: in 2009, one-half of the US public favored allowing fewer immigrants, up from 39% in 2008. Both the number of immigrants and their origin have caused concerns about immigration’s effects on American culture. Demographers portray a country in 2050 in which non-Hispanic whites will be only a slim majority. Hispanics will comprise 25% of the population, with African- and Asian-Americans making up 14% and 8%, respectively. But mass communications and market forces produce powerful incentives to master the English language and accept a degree of assimilation. Modern media help new immigrants to learn more about their new country beforehand than immigrants did a century ago. Indeed, most of the evidence suggests that the latest immigrants are assimilating at least as quickly as their predecessors. While too rapid a rate of immigration can cause social problems, over the long term, immigration strengthens US power. It is estimated that at least 83 countries and territories currently have fertility rates that are below the level needed to keep their population constant. Whereas most developed countries will experience a shortage of people as the century progresses, America is one of the few that may avoid demographic decline and maintain its share of world population. For example, to maintain its current population size, Japan would have to accept 350,000 newcomers annually for the next 50 years, which is difficult for a culture that has historically been hostile to immigration. In contrast, the Census Bureau projects that the US population will grow by 49% over the next four decades. Today, the US is the world’s third most populous country; 50 years from now it is still likely to be third (after only China and India). This is highly relevant to economic power: whereas nearly all other developed countries will face a growing burden of providing for the older generation, immigration could help to attenuate the policy problem for the US.In addition, though studies suggest that the short-term economic benefits of immigration are relatively small, and that unskilled workers may suffer from competition, skilled immigrants can be important to particular sectors – and to long-term growth. There is a strong correlation between the number of visas for skilled applicants and patents filed in the US. At the beginning of this century, Chinese- and Indian-born engineers were running one-quarter of Silicon Valley’s technology businesses, which accounted for $17.8 billion in sales; and, in 2005, immigrants had helped to start one-quarter of all US technology start-ups during the previous decade. Immigrants or children of immigrants founded roughly 40% of the 2010 Fortune 500 companies. Equally important are immigration’s benefits for America’s soft power. The fact that people want to come to the US enhances its appeal, and immigrants’ upward mobility is attractive to people in other countries. The US is a magnet, and many people can envisage themselves as Americans, in part because so many successful Americans look like them. Moreover, connections between immigrants and their families and friends back home help to convey accurate and positive information about the US. Likewise, because the presence of many cultures creates avenues of connection with other countries, it helps to broaden Americans’ attitudes and views of the world in an era of globalization. Rather than diluting hard and soft power, immigration enhances both. Singapore’s former leader, Lee Kwan Yew, an astute observer of both the US and China, argues that China will not surpass the US as the leading power of the twenty-first century, precisely because the US attracts the best and brightest from the rest of the world and melds them into a diverse culture of creativity. China has a larger population to recruit from domestically, but, in Lee’s view, its Sino-centric culture will make it less creative than the US. That is a view that Americans should take to heart. If Obama succeeds in enacting immigration reform in his second term, he will have gone a long way toward fulfilling his promise to maintain the strength of the US.

#### Decline causes great power wars

Zhang & Shi, Researcher @ The Carnegie Endowment, ’11

[Yuhan Zhang, Researcher at the Carnegie Endowment for International Peace, Lin Shi, Columbia University, Independent consultant for the Eurasia Group, Consultant for the World Bank, “[America’s decline: A harbinger of conflict and rivalry](http://www.eastasiaforum.org/2011/01/22/americas-decline-a-harbinger-of-conflict-and-rivalry/),” January 22nd 2011, <http://www.eastasiaforum.org/2011/01/22/americas-decline-a-harbinger-of-conflict-and-rivalry/>]

Over the past two decades, no other state has had the ability to seriously challenge the US military. Under these circumstances, motivated by both opportunity and fear, many actors have bandwagoned with US hegemony and accepted a subordinate role. Canada, most of Western Europe, India, Japan, South Korea, Australia, Singapore and the Philippines have all joined the US, creating a status quo that has tended to mute great power conflicts. However, [as the hegemony that drew these powers together withers](http://www.cfr.org/publication/23537/belttightening_for_us_foreign_policy.html), so will the pulling power behind the US alliance. The result will be an international order where power is more diffuse, American interests and influence can be more readily challenged, and conflicts or wars may be harder to avoid. As history attests, power decline and redistribution result in military confrontation. For example, in the late 19th century America’s emergence as a regional power saw it launch its first overseas war of conquest towards Spain. By the turn of the 20th century, accompanying the increase in US power and waning of British power, the American Navy had begun to challenge the notion that Britain ‘rules the waves.’ Such a notion would eventually see the US attain the status of sole guardians of the Western Hemisphere’s security to become the order-creating Leviathan shaping the international system with democracy and rule of law. Defining this US-centred system are three key characteristics: enforcement of property rights, constraints on the actions of powerful individuals and groups and some degree of equal opportunities for broad segments of society. As a result of such political stability, free markets, liberal trade and flexible financial mechanisms have appeared. And, with this, many countries have sought opportunities to enter this system, proliferating stable and cooperative relations. However, what will happen to these advances as America’s influence declines? Given that America’s authority, although sullied at times, has benefited people across much of Latin America, Central and Eastern Europe, the Balkans, as well as parts of Africa and, quite extensively, Asia, the answer to this question could affect global society in a profoundly detrimental way. Public imagination and academia have anticipated that a post-hegemonic world would return to the problems of the 1930s: regional blocs, trade conflicts and strategic rivalry. Furthermore, multilateral institutions such as the IMF, the World Bank or the WTO might give way to regional organisations. For example, Europe and East Asia would each step forward to fill the vacuum left by Washington’s withering leadership to pursue their own visions of regional political and economic orders. Free markets would become more politicised — and, well, less free — and major powers would compete for supremacy. Additionally, such power plays have historically possessed a zero-sum element. In the late 1960s and 1970s, US economic power declined relative to the rise of the Japanese and Western European economies, with the US dollar also becoming less attractive. And, as American power eroded, so did international regimes (such as the Bretton Woods System in 1973). A world without American hegemony is one where great power wars re-emerge, the liberal international system is supplanted by an authoritarian one, and trade protectionism devolves into restrictive, anti-globalisation barriers. This, at least, is one possibility we can forecast in a future that will inevitably be devoid of unrivalled US primacy.

### K

#### The aff reproduces neoliberal subjectivity, translating military risk calculations into an opportunity for market expansion – this logic screens out the structural violence caused by nuclear power and creates an invisible war against minorities and the environment

Jacobs 11

(Ron, activist journalist with a pretty legit epistemology, “No More Nukes!”, March 15th, 2011, http://dissidentvoice.org/2011/03/no-more-nukes/)

Nuclear power is the perfect metaphor for the current phase of monopoly capitalism — neoliberalism. It involves a concentration of power (literal and corporate) to effect its goal and depends on the government to provide military security to protect that power from getting into the “wrong hands.” Furthermore, thanks to laws pushed through by the energy industry, if a disaster should happen because of some kind of nuclear accident, the government limits the corporation’s liability for any damage and loss of life that might occur. As the “Declaration of Nuclear Resistance” of the New England anti-nuke group, the Clamshell Alliance, wrote in 1977: Nuclear power is dangerous to all living creatures and to their natural environment. The nuclear industry is designed to concentrate profits and the control of energy resources in the hands of a powerful few, undermining basic principles of human liberty. A nuclear power plant at Seabrook, New Hampshire, could lock our region into a suicidal path.1 This statement, in all its direct simplicity, remains true today. Despite the claims by such former anti-nuclear activists like Stewart Brand, nuclear power is a dangerous form of energy production. It is also incredibly inefficient if one contrasts the construction and security costs and the problems with waste disposal with the relatively brief life of nuclear power plants and the increase in energy costs to the consumer such plants entail in a profit-driven industry. Nuclear power is not green energy, no matter what the industry’s spokespeople or the likes of Stewart Brand say. The daily operation of nuclear power plants change the ecology in their immediate vicinity, heating water near the discharge facilities and releasing various waste elements of the process into the air. If an accident occurs, the ecological devastation is incalculable and continues for generations. In addition, a 1000-MWe nuclear power plant produces about 27 tons of spent nuclear fuel (unreprocessed) every year. The problems associated with the spent fuels disposal and storage are costly and dangerous (for centuries). The environmental and safety reasons barely touched on here are reason enough to oppose nuclear power. So are the costs associated with this form of energy production. It seems likely that other safer alternative forms of power production that don’t involve fossil fuels could be developed and produced for less than the overall costs of nuclear power. Yet, these forms, such as solar and wind, are not given the same emphasis as nuclear energy. Why? Could it be that the energy industry fears the loss of extraordinary profits and centralized control those forms might create? If one does not oppose nuclear energy for health and safety reasons, yet opposes war and the nature of neoliberal capitalism, then the fact that the energy industry’s love affair with nuclear power development is based on corporate efforts to maximize profits and recoup past investments rather than on meeting our real energy needs provides another reason to oppose it. So does the direct relationship between nuclear power plants and nuclear weapons. Where do you think all that depleted uranium (DU) ammunition came from? That’s right, the waste product of nuclear power — the gift that keeps on giving. Pretending that nuclear power is not dangerous, inefficient, and ridiculously expensive is no longer viable. The events in Japan once again make that perfectly clear.

#### The impact is extinction – the environmental byproducts of neoliberalism create gaps in ecosystem services, creating multiple, mutually reinforcing feedback effects – causes climate change, resource collapse, disease spread, and biodiversity collapse

Ehrenfeld ‘5,

(David, Dept. of Ecology, Evolution, and Natural Resources @ Rutgers University, “The Environmental Limits to Globalization”, *Conservation Biology* Vol. 19 No. 2 April 2005)

The known effects of globalization on the environment are numerous and highly significant. Many others are undoubtedly unknown. Given these circumstances, the first question that suggests itself is: Will globalization, as we see it now, remain a permanent state of affairs (Rees 2002; Ehrenfeld 2003a)? The principal environmental side effects of globalization—climate change, resource exhaustion (particularly cheap energy), damage to agroecosystems, and the spread of exotic species, including pathogens (plant, animal, and human)—are sufficient to make this economic system unstable and short-lived. The socioeconomic consequences of globalization are likely to do the same. In my book *The Arrogance of Humanism* (1981), I claimed that our ability to manage global systems, which depends on our being able to predict the results of the things we do, or even to understand the systems we have created, has been greatly exaggerated. Much of our alleged control is science fiction; it doesn’t work because of theoretical limits that we ignore at our peril. We live in a dream world in which reality testing is something we must never, never do, lest we awake. In 1984 Charles Perrow explored the reasons why we have trouble predicting what so many of our own created systems will do, and why they surprise us so unpleasantly while we think we are managing them. In his book *Normal Accidents*, which does not concern globalization, he listed the critical characteristics of some of today’s complex systems. They are highly interlinked, so a change in one part can affect many others, even those that seem quite distant. Results of some processes feed back on themselves in unexpected ways. The controls of the system often interact with each other unpredictably. We have only indirect ways of finding out what is happening inside the system. And we have an incomplete understanding of some of the system’s processes. His example of such a system is a nuclear power plant, and this, he explained, is why system-wide accidents in nuclear plants cannot be predicted or eliminated by system design. I would argue that globalization is a similar system, also subject to catastrophic accidents, many of them environmental—events that we cannot define until after they have occurred, and perhaps not even then. The comparatively few commentators who have predicted the collapse of globalization have generally given social reasons to support their arguments. These deserve some consideration here, if only because the environmental and social consequences of globalization interact so strongly with each other. In 1998, the British political economist John Gray, giving scant attention to environmental factors, nevertheless came to the conclusion that globalization is unstable and will be short-lived. He said, “There is nothing in today’s global market that buffers it against the social strains arising from highly uneven economic development within and between the world’s diverse societies.” The result, Gray states, is that “The combination of [an] unceasing stream of new technologies, unfettered market competition and weak or fractured social institutions” has weakened both sovereign states and multinational corporations in their ability to control important events. Note that Gray claims that not only nations but also multinational corporations, which are widely touted as controlling the world, are being weakened by globalization. This idea may come as a surprise, considering the growth of multinationals in the past few decades, but I believe it is true. Neither governments nor giant corporations are even remotely capable of controlling the environmental or social forces released by globalization, without first controlling globalization itself. Two of the social critics of globalization with the most dire predictions about its doom are themselves masters of the process. The late Sir James Goldsmith, billionaire financier, wrote in 1994, It must surely be a mistake to adopt an economic policy which makes you rich if you eliminate your national workforce and transfer production abroad, and which bankrupts you if you continue to employ your own people.... It is the poor in the rich countries who will subsidize the rich in the poor countries. This will have a serious impact on the social cohesion of nations. Another free-trade billionaire, George Soros, said much the same thing in 1995: “The collapse of the global marketplace would be a traumatic event with unimaginable consequences. Yet I find it easier to imagine than the continuation of the present regime.” How much more powerful these statements are if we factor in the environment! As globalization collapses, what will happen to people, biodiversity, and ecosystems? With respect to people, the gift of prophecy is not required to answer this question. What will happen depends on where you are and how you live. Many citizens of the Third World are still comparatively self-sufficient; an unknown number of these will survive the breakdown of globalization and its attendant chaos. In the developed world, there are also people with resources of self-sufficiency and a growing understanding of the nature of our social and environmental problems, which may help them bridge the years of crisis. Some species are adaptable; some are not. For the non- human residents of Earth, not all news will be bad. Who would have predicted that wild turkeys (Meleagris gallopavo), one of the wiliest and most evasive of woodland birds, extinct in New Jersey 50 years ago, would now be found in every county of this the most densely populated state, and even, occasionally, in adjacent Manhattan? Who would have predicted that black bears (Ursus americanus), also virtually extinct in the state in the mid-twentieth century, would now number in the thousands (Ehrenfeld 2001)? Of course these recoveries are unusual—rare bright spots in a darker landscape. Finally, a few ecological systems may survive in a comparatively undamaged state; most will be stressed to the breaking point, directly or indirectly, by many environmental and social factors interacting unpredictably. Lady Luck, as always, will have much to say. In his book *The Collapse of Complex Societies,* the archaeologist Joseph Tainter (1988) notes that collapse, which has happened to all past empires, inevitably results in human systems of lower complexity and less specialization, less centralized control, lower economic activity, less information flow, lower population levels, less trade, and less redistribution of resources. All of these changes are inimical to globalization. This less-complex, less-globalized condition is probably what human societies will be like when the dust settles. I do not think, however, that we can make such specific predictions about the ultimate state of the environment after globalization, because we have never experienced anything like this exceptionally rapid, global environmental damage before. History and science have little to tell us in this situation. The end of the current economic system and the transition to a postglobalized state is and will be accompanied by a desperate last raid on resources and a chaotic flurry of environmental destruction whose results cannot possibly be told in advance. All one can say is that the surviving species, ecosystems, and resources will be greatly impoverished compared with what we have now, and our descendants will not thank us for having adopted, however briefly, an economic system that consumed their inheritance and damaged their planet so wantonly. Environment is a true bottom line—concern for its condition must trump all purely economic growth strategies if both the developed and developing nations are to survive and prosper. Awareness of the environmental limits that globalized industrial society denies or ignores should not, however, bring us to an extreme position of environmental determinism. Those whose preoccupations with modern civilization’s very real social problems cause them to reject or minimize the environmental constraints discussed here ( Hollander 2003) are guilty of seeing only half the picture. Environmental scientists sometimes fall into the same error. It is tempting to see the salvation of civilization and environment solely in terms of technological improvements in efficiency of energy extraction and use, control of pollution, conservation of water, and regulation of environmentally harmful activities. But such needed developments will not be sufficient—or may not even occur— without corresponding social change, including an end to human population growth and the glorification of consumption, along with the elimination of economic mechanisms that increase the gap between rich and poor. The environmental and social problems inherent in globalization are completely interrelated—any attempt to treat them as separate entities is unlikely to succeed in easing the transition to a postglobalized world. Integrated change that combines environmental awareness, technological innovation, and an altered world view is the only answer to the life-threatening problems exacerbated by globalization (Ehrenfeld 2003b). If such integrated change occurs in time, it will likely happen partly by our own design and partly as an unplanned response to the constraints imposed by social unrest, disease, and the economics of scarcity. With respect to the planned component of change, we are facing, as eloquently described by Rees (2002), “the ultimate challenge to human intelligence and self-awareness, those vital qualities we humans claim as uniquely our own. *Homo sapiens* will either. . .become fully human or wink out ignominiously, a guttering candle in a violent storm of our own making.” If change does not come quickly, our global civilization will join Tainter’s (1988) list as the latest and most dramatic example of collapsed complex societies. Is there anything that could slow globalization quickly, before it collapses disastrously of its own environmental and social weight? It is still not too late to curtail the use of energy, reinvigorate local and regional communities while restoring a culture of concern for each other, reduce nonessential global trade and especially global finance (Daly & Cobb 1989), do more to control introductions of exotic species (including pathogens), and accelerate the growth of sustainable agriculture. Many of the needed technologies are already in place. It is true that some of the damage to our environment—species extinctions, loss of crop and domestic animal varieties, many exotic species introductions, and some climatic change— will be beyond repair. Nevertheless, the opportunity to help our society move past globalization in an orderly way, while there is time, is worth our most creative and passionate efforts. The citizens of the United States and other nations have to understand that our global economic system has placed both our environment and our society in peril, a peril as great as that posed by any war of the twentieth century. This understanding, and the actions that follow, must come not only from enlightened leadership, but also from grassroots consciousness raising. It is still possible to reclaim the planet from a self-destructive economic system that is bringing us all down together, and this can be a task that bridges the divide between conservatives and liberals. The crisis is here, now. What we have to do has become obvious. Globalization can be scaled back to manageable proportions only in the context of an altered world view that rejects materialism even as it restores a sense of communal obligation. In this way, alone, can we achieve real homeland security, not just in the United States, but also in other nations, whose fates have become so thoroughly entwined with ours within the global environment we share.

#### The judge should vote negative to endorse globalization from below

#### The alt develops an alternative ethical orientation towards economics, grounding it in an ethical empathy towards the other – re-orienting our methodological approach to the economy produces a new system of democratic institution and unites transnational movements

Choi, Murphy, and Caro 4

Jung Min, John W, Manuel J, Professor of Sociology SDSU, Professor of Sociology University of Miami, Professor of Sociology Barry University, Globalization with a Human Face, pg. 6-9

Many critics have begun to wonder why hamburgers and jeans can be globalized, but the spread of themes such as peace or justice is thought by many politicians to be impossible to generalize. What many persons are calling for, especially in the Third World, is an alternative approach to globalization. Along with justice, they want to globalize resistance to current historical trends. They want to call a halt, for example, to the economic hardships and rape of the environment that have accompanied the rise of neoliberalism. This new strategy is referred to in many circles as "globalization from below." The point is that current policies have been driven from above from the capitalist centers around the world—and reflect the economic and cultural interests of these powerful classes. Most other persons, accordingly, are viewed as simply a cheap source of labor or a possible market for cheap goods. And because of this role in the world capitalist system, their opportunities are severely restricted. Even if they conform to the cultural mandates of the market, the likelihood of economic advancement is not very great. This sort of mobility is simply not a part of the role persons play on the economic periphery. What actually occurs, indeed, is that the system of controls, which are found in the economic centers, are reproduced on the periphery, but with more immediate devastation. The imposition of consumerism and materialism, for example, undermine the local economy and community supports, thereby increasing strife and reinforcing local elites and their ties to foreign investors. The old oligarchies are thus strengthened, while local institutions become more dependent on outside intervention. The resulting hierarchy, accordingly, is more powerful than ever before. As might be imagined, globalization from below has a very different agenda. Different values guide economic development, in short, while new ways of organizing society are sought. Instead of profit, for example, the general improvement of a community may be of prime importance. Likewise, emphasis may be placed on strengthening civil society, and thus ,advancing democracy, rather than identifying markets and potential investors. In general, globalization from below is driven by local concerns and the masses of persons who have little influence in corporate boardrooms. These are the people--the majority of the world's inhabitants--who are ignored unless their labor is suddenly profitable. At the core of this new globalization is often the call for a postcapitalist logic. Novel ways of looking at, for example, production and consumption are regularly a part of this project, in addition to new definitions of work and personal and group identity. Central to this scenario is that persons can remake themselves entirely, and nothing is exempt from revision. What proponents of globalization from below have done, in effect, is to seize control of their history and invent a new future. They have decided that history can be made, rather than merely experienced, and that there is no inherent *telos* to this process. The past is nothing, therefore, other than a point of departure of a new course of action. In the truest sense of the term, these activists are utopian thinkers. They are not enamored by reality and are convinced that new social arrangements, which have never existed and may be very difficult to create, are possible. As many students chanted during the 1960s, they are demanding the impossible and do not want to settle for more pragmatic substitutes. They are simply asking that persons strive to fulfill their dreams. But these demands are not based on fantasy. Instead, proponents of globalization from below are trying to emphasize an idea advanced by Marx: that is, nothing that humans imagine is foreign to them. Consequently, utopian ideals or practices are simply inventions that have not , yet been realized. Through effort and determination, and the absence foreign subversion, an economic system that is founded on justice might eventually be enacted. Merely because this vision has not been actualized, does not necessarily signal that such an aim contravenes human nature or is hopelessly flawed. The problem may simply be that persons have been unwilling or unable to purge themselves of certain biases or predispositions, and thus have never embarked on the creation of a new reality. Those who champion globalization from below, however, are not politically naive. They understand that powerful interests that benefit from injustice and inequality have intervened in the past to undermine various utopian projects. The proper dream is important, but so is the ability to implement this vision. These new utopians are thus trying to convince the public to restrain those who want to destroy these projects. What they are saying, in short, is that justice should be given the opportunity to thrive. THE RESTORATION OF COMMUNITY Various critics are saying that only the restoration of a strong sense of community can guarantee the success of globalization. What is meant by community, however, is in dispute. After all, even neoliberals lament the current loss of community that has ensued in the world economy. From their perspective, a community of effective traders would strengthen everyone's position at the marketplace. Advocates of globalization from below, as might be expected, have something very different in mind. They are not calling for the general assimilation of persons to a cosmopolitan ideal, which is thought to instill civility and enforce rationality. Persons who want to join the world market, as was noted earlier, are thought to need a good dose of these traits. Nonetheless, there is a high price for entry into this community—cultural or personal uniqueness must be sacrificed to promote effective economic discourse. Such reductionism, however, is simply unacceptable in a large part of the globe that is beginning to appreciate local customs and the resulting diversity. What these new activists want, therefore, is a community predicated on human solidarity. This sort of community, as Emmanuel Levinas describes, is focused on ethics rather than metaphysics." His point is that establishing order does not require the internalization of a single ideal by all persons, but simply their mutual recognition. The recognition of others as different, but connected to a common fate, is a powerful and unifying principle. Persons are basically united through the recognition and appreciation of their uniqueness. As should be noted, this image is encompassing but not abstract. Uniformity, in other words, is replaced by the juxtaposition of diversity as the cement that binds a community together. Like a montage, a community based on human solidarity is engendered at the boundaries of its various and diverse elements. The genius of this rendition of community is that no one is by nature an outsider, and thus deserving of special treatment. Many of the problems that exist today, in fact, result from persons sitting idly while their neighbors are singled out as different and discriminated against or exploited. When persons view themselves to be fundamentally united, on the other hand, such mistreatment is unlikely, because community members protect and encourage one another. Indeed, this sort of obligation is neither selective nor optional among those who belong to a true community. Basically the idea is that if no one is an outsider, there are no persons or groups to exploit. Such a community, moreover, does not require extraordinary actions on the part of its members to end racism, sexism, or economic exploitation. All that is required is persons refuse to turn away and say nothing when such discrimination is witnessed. By refusing to go along with these practices, any system that survives because of discrimination or exploitation will eventually grind to a halt. Clearly, there is an implicit threat behind current trends of globalization. Because globalization as it is currently defined is inevitable, anyone who expects to be treated as rational and civilized must accept some temporary pain. Old cultural ways will simply have to be abandoned, and a transition to the new economic realities. Those who cannot tolerate the mistreatment of fellow community members any longer appear to be a part of this change, however, they are obligated to bare witness to these abuses. And by refusing to be complicit these actions, business as usual cannot continue. A globalization of can be mounted, therefore, that might be able to create a more humane world. In the face of mounting darkness—increasing economic hardship and degradation—why not seriously entertain the possibility that social life can be organized in less alienating ways? With little left to why not pursue alternative visions?

### CP

#### CP Text: The United States Federal Government should offer commercial loan guarantees in compliance with voluntary IAEA safeguards to develop and deploy Power Reactor Innovative Small Module reactors for the purpose of energy production in the United States

#### Conditioning financial incentives for new nuclear facilities on compliance with IAEA safeguards is key to preserving the global inspection regime

Sagan, Professor of Political Science and Co-Director of the Center for International Security and Cooperation at Stanford and Co-Chair of the Global Nuclear Future Initiative at the American Academy of Arts and Sciences, 11

(4/18, The International Security Implications of U.S. Domestic Nuclear Power Decisions, http://cybercemetery.unt.edu/archive/brc/20120621005012/http://brc.gov/sites/default/files/documents/sagan\_brc\_paper\_final.pdf)

In 1967 President Johnson stated: “we in the United States are not asking any country to accept safeguards that we are unwilling to accept ourselves. So I am, today, announcing that when such safeguards are applied under the Treaty, the United States will permit the International Atomic Energy Agency to apply its safeguards to all nuclear activities in the United States—excluding only those with direct national security significance.” Every U.S. president since then has made similar offers to have some American civilian nuclear power facilities placed under IAEA safeguards. These promises have two purposes. First, accepting safeguards shows the world that the U.S. is not pursuing a commercial advantage in nuclear energy, and demonstrates that the U.S. does not view these safeguards as limiting the pursuit of nuclear energy in any way. Second, permitting IAEA inspectors to practice safeguard inspections on certain facilities in the U.S., according to IAEA statements, produces “valuable improvements in inspection procedures and equipment,” which in turn improves inspectors’ ability to deter or detect potential safeguard violations in NNWS. The response to Johnson’s “voluntary safeguards” declaration offers another example of the impact of U.S. leadership in the realm of nuclear energy and nonproliferation. Shortly after Johnson’s declaration, the U.K. agreed to identical safeguards In February 1978, France then agreed, followed in 1985 by the Soviet Union. President George W. Bush, in his 2002 letter to congress concerning the ratification of the Additional Protocol (AP), wrote of the continued policy to accept IAEA safeguards of nuclear facilities, except those with national security implications. Yet a number of non-weapons related U.S. facilities remain off the safeguards list. This includes the new GE-Hitachi SILEX laser enrichment plant in Wilmington, currently kept off the safeguards plant because of concerns that sensitive data may be revealed to the IAEA. As Edwin Lyman writes, “for the U.S. to deny the IAEA access for this reason appears inconsistent with the original rationale for its voluntary offer: namely, that the U.S. was willing to take the same risks that it was asking NNWS to accept. This could provide a precedent for other NWS to exclude the IAEA from advanced fuel cycle facilities by invoking the risk of disclosure of sensitive information.” Expanding the list of U.S. facilities available for IAEA safeguards can therefore simultaneously promote transparency as a model to other states, signal the strong U.S. commitment to nonproliferation, encourage other NWS to follow suit, and improve the effectiveness of future IAEA inspections elsewhere. One promising policy for the U.S. government to follow would be to make acceptance of voluntary IAEA safeguards a condition of U.S. loan guarantees, or other financial support, for any new fuel cycle facility.

#### IAEA inspections are key to controlling global proliferation, preventing nuclear terrorism, and upholding nuclear weapons free zones

Findlay, Professor of International Affairs at Carleton, 12

(UNLEASHING THE NUCLEAR WATCHDOG: Strengthening and reform of the iaea, www.cigionline.org/sites/default/files/IAEA\_final\_0.pdf)

Established in 1957, the IAEA is one of the most respected members of the UN family of organizations. Partly because it is not a specialized UN agency, like the UN Food and Agriculture Organization (FAO) or the UN Educational and Scientific Organization (UNESCO), it has been regarded as better governed, less prone to gratuitous politicization and more technically oriented. Jointly awarded the Nobel Peace Prize in 2005 with its then DG Mohamed ElBaradei, the IAEA is constantly invoked as being vital in tackling one of the greatest continuing threats to international security — nuclear weapons proliferation, whether by states or so-called non-state actors. The IAEA plays an indispensible role in verifying compliance with the 1968 Nuclear Non-Proliferation Treaty (NPT) and a number of nuclear weapon free zone treaties. Its role in setting global standards for nuclear safety and security and in providing multilateral technical assistance to developing states in the nuclear field is unique. The Agency’s international profile has soared through its involvement in the nuclear weapon proliferation cases of Iraq, North Korea and Iran. In addition, it played a significant, although little heralded, role in verifying and facilitating Iraq’s forced divestiture of its nuclear weapons potential after the 1990 Gulf War and in verifying South Africa’s nuclear disarmament. The Agency has reacted well to nuclear crises in the past, taking advantage of each window of opportunity to improve its performance and enhance its role in global nuclear governance. After the discovery that Iraq had come close to a nuclear weapons capability, the IAEA strengthened its verification system, known as nuclear safeguards, not least through its adoption of the Model Additional Protocol (AP). The 1986 Chernobyl accident paradoxically revived the Agency’s fortunes in the area of nuclear safety, leading to a “fundamental expansion of its safety programme” (IAEA, 2008h: 3) and new responsibilities, notably through the negotiation of new international conventions. Following the disclosure of the A.Q. Khan nuclear smuggling network, the Agency expanded its role in detecting and tracking such operations. Since the terrorist attacks of 9/11, the IAEA is also seen as playing a vital role in strengthening nuclear security to help prevent nuclear terrorism. It has finally begun to realize one of its original missions as a nuclear fuel bank, in order to provide some assurance of nuclear fuel supply to member states lacking their own fuel production capabilities.

#### Nuclear terrorism is the most likely impact and escalates to nuclear war

Hellman, Professor of Engineering at Sanford, 08

(Risk Analysis of Nuclear Deterrence, http://www.nuclearrisk.org/paper.pdf)

The threat of nuclear terrorism looms much larger in the public’s mind than the threat of a full-scale nuclear war, yet this article focuses primarily on the latter. An explanation is therefore in order before proceeding. A terrorist attack involving a nuclear weapon would be a catastrophe of immense proportions: “A 10-kiloton bomb detonated at Grand Central Station on a typical work day would likely kill some half a million people, and inflict over a trillion dollars in direct economic damage. America and its way of life would be changed forever.” [Bunn 2003, pages viii-ix]. The likelihood of such an attack is also significant. Former Secretary of Defense William Perry has estimated the chance of a nuclear terrorist incident within the next decade to be roughly 50 percent [Bunn 2007, page 15]. David Albright, a former weapons inspector in Iraq, estimates those odds at less than one percent, but notes, “We would never accept a situation where the chance of a major nuclear accident like Chernobyl would be anywhere near 1% .... A nuclear terrorism attack is a low-probability event, but we can’t live in a world where it’s anything but extremely low-probability.” [Hegland 2005]. In a survey of 85 national security experts, Senator Richard Lugar found a median estimate of 20 percent for the “probability of an attack involving a nuclear explosion occurring somewhere in the world in the next 10 years,” with 79 percent of the respondents believing “it more likely to be carried out by terrorists” than by a government [Lugar 2005, pp. 14-15]. I support increased efforts to reduce the threat of nuclear terrorism, but that is not inconsistent with the approach of this article. Because terrorism is one of the potential trigger mechanisms for a full-scale nuclear war, the risk analyses proposed herein will include estimating the risk of nuclear terrorism as one component of the overall risk. If that risk, the overall risk, or both are found to be unacceptable, then the proposed remedies would be directed to reduce whichever risk(s) warrant attention. Similar remarks apply to a number of other threats (e.g., nuclear war between the U.S. and China over Taiwan).

### Thorium DA

#### China is aggressively developing thorium power – perception of progress key to preventing Asian resource wars

Ambrose Evans-Pritchard – The Telegraph – 1/6/13, China blazes trail for 'clean' nuclear power from thorium, <http://www.telegraph.co.uk/finance/comment/ambroseevans_pritchard/9784044/China-blazes-trail-for-clean-nuclear-power-from-thorium.html>

The Chinese are running away with thorium energy, sharpening a global race for the prize of clean, cheap, and safe nuclear power. Good luck to them. They may do us all a favour. Princeling Jiang Mianheng, son of former leader Jiang Zemin, is spearheading a project for China's National Academy of Sciences with a start-up budget of $350m. He has already recruited 140 PhD scientists, working full-time on thorium power at the Shanghai Institute of Nuclear and Applied Physics. He will have 750 staff by 2015. The aim is to break free of the archaic pressurized-water reactors fueled by uranium -- originally designed for US submarines in the 1950s -- opting instead for new generation of thorium reactors that produce far less toxic waste and cannot blow their top like Fukushima. "China is the country to watch," said Baroness Bryony Worthington, head of the All-Parliamentary Group on Thorium Energy, who visited the Shanghai operations recently with a team from Britain's National Nuclear Laboratory. "They are really going for it, and have talented researchers. This could lead to a massive break-through." The thorium story is by now well-known. Enthusiasts think it could be the transforming technology needed to drive the industrial revolutions of Asia -- and to avoid an almighty energy crunch as an extra two billion people climb the ladder to western lifestyles. At the least, it could do for nuclear power what shale fracking has done for natural gas -- but on a bigger scale, for much longer, perhaps more cheaply, and with near zero CO2 emissions. The Chinese are leading the charge, but they are not alone. Norway's Thor Energy began a four-year test last month with Japan's Toshiba-Westinghouse to see whether they could use thorium at Norway's conventional Halden reactor in Oslo. The Japanese are keen to go further, knowing they have to come up with something radically new to regain public trust and save their nuclear industry. Japan's International Institute for Advanced Studies (IIAS) -- now led by thorium enthusiast Takashi Kamei -- is researching molten salt reactors that use liquid fuel. Is this what Premier Shinzo Abe meant when he revealed before Christmas that he planned to relaunch nuclear power in Japan with "entirely different" technology? We will find out. The Chinese aim to beat them to it. Technology for the molten salt process already exists. The Oak Ridge National Laboratory in Tennessee built such a reactor in the 1960s. It was shelved by the Nixon Administration. The Pentagon needed plutonium residue from uranium to build nuclear bombs. The imperatives of the Cold War prevailed. The thorium blueprints gathered dust in the archives until retrieved and published by former Nasa engineer Kirk Sorensen. The US largely ignored him: China did not. Mr Jiang visited the Oak Ridge labs and obtained the designs after reading an article in the American Scientist two years ago extolling thorium. His team concluded that a molten salt reactor -- if done the right way -- may answer China's prayers. Mr Jiang says China's energy shortage is becoming "scary" and will soon pose a threat to national security. It is no secret what he means. Escalating disputes with with India, Vietnam, the Philippines, and above all Japan, are quickly becoming the biggest threat to world peace. It is a resource race compounded by a geo-strategic struggle, with echoes of the 1930s. His mission is to do something about China's Achilles Heel very fast. The Shanghai team plans to build a tiny 2 MW plant using liquid flouride fuel by the end of the decade, before scaling up to commercially viable size over the 2020s. It is also working on a pebble-back reactor. He estimates that China has enough thorium to power its electricity needs for "20,000 years". So does the world. The radioactive mineral is scattered across Britain. The Americans have buried tonnes of it, a hazardous by-product of rare earth metal mining. China is already building 26 conventional reactors by 2015, with a further 51 planned, and 120 in the pipeline, but these have all the known drawbacks, and rely on imported uranium. The beauty of thorium is that you cannot have a Fukushima disaster. Professor Robert Cywinksi from Huddersfield University, who anchor's the UK's thorium research network ThorEA, said the metal must be bombarded with neutrons to drive the process. "There is no chain reaction. Fission dies the moment you switch off the photon beam," he said. His team is working on an accelerator driven subcritical reactor. "Peope are beginning to realize that uranium isn't sustainable. We're going to have to breed new nuclear fuel. If we are going to the trouble of breeding, we could start to use thorium instead, without introducing plutonium into the cycle," he said. Thorium has its flaws. The metallurgy is complex. It is "fertile" but not fissile, and has to be converted in Uranium 233. Claims by the International Atomic Energy Institute in 2005 that it has "intrinsic resistance" to proliferation but have since been qualified. It could be used as feedstock for bombs, though not easily. Yet it leaves far less toxic residue. Most of the mineral is used up in the fission process, while uranium reactors use up just 0.7pc. It can even burn up existing stockpiles of plutonium and hazardous waste. Cambridge scientists published a tantalising study in the Annals of Nuclear Energy in February showing that it is possible to "achieve near complete transuranic waste incineration" by throwing the old residue into the reactor with thorium. In other words, it can help clean up the mess left by a half a century of nuclear weapons and uranium reactors, instead of transporting it at great cost to be encased in concrete and buried for milennia. It is why some `greens' such as Baroness Worthington -- a former Friends of the Earth activist -- are embracing thorium. Though there are other reasons. The thorium molten salt process takes place at atmospheric pressures. It does not require the vast domes of conventional reactors, so costly, and such an eyesore. You could build pint-size plants largely below ground, less obtrusive than a shopping mall, powering a small town the size of Tunbridge Wells or Colchester. There would be shorter transmission lines, less leakage, and less risk of black-outs. The elegance is irresistible. Mr Sorensen says his group Flibe Energy is exploring 250 MW reactors that could be tailor-made to power a single steel plant. Imagine the benefits for China, which drives is collosal steel industry -- 40pc of the world's total -- with high-polluting coking coal, much of it shipped from distant mines in lorries. Mr Sorensen said his molten salt design could not cause a meltdown because it never reaches a high enough temperature to melt the nickel-alloy vessel. If there is an emergency, a plug melts and the salts drain into a pan. "The reactor saves itself," he said. Major players in the nuclear industry have had a vested interest in blocking thorium. They have huge sunk costs in the old technology, and they have bent the ear of cash-strapped ministers. The hesitance of governments is understandable, but the costs are going to hit whatever they do. The overrun fiasco of Areva's Olkilouto reactor in Finland is not pretty either, and the UK's new reactor plans for Hinkley tempt fate as well. China's dash for thorium is now changing the game. Britain has begun to hedge its bets. Chief scientific adviser Sir John Beddington said in September that the benefits of thorium are "often overstated" but conceded "theoretical advantages regarding sustainability, reducing radiotoxicity and reducing proliferation risk". He noted rising global interest. "It may therefore be judicious for the UK to maintain a low level of engagement in thorium fuel cycle research." A bit lame for a country that once pioneered nuclear physics, but better than nothing. Xu Hongjie, the director of the Shanghai project, says the US Energy Department has begun to take a close interest in China's plans and is now seeking "collaberation". He is also talking to the Russians. The Indians are kicking their thorium programme into higher gear. You can view it as a technology race or a joint venture in the common interest. It hardly matters which. If the Chinese can crack thorium, the world will need less oil, coal, and gas than feared. Wind turbines will vanish from our landscape. There will less risk of a global energy crunch, less risk of resource wars, and less risk of a climate tipping point. Who can object to that?

#### US and China are in zero-sum competition for indigenous development of next-gen nuclear technology – resurgence of US domestic market steals away tech and expertise

SCOTT CULLINANE - graduate student at the Institute of World Politics – 9/28/11, America Falling Behind: The Strategic Dimensions of Chinese Commercial Nuclear Energy, http://www.ensec.org/index.php?option=com\_content&view=article&id=319:america-falling-behind-the-strategic-dimensions-of-chinese-commercial-nuclear-energy&catid=118:content&Itemid=376

Due to a confluence of events the United States has recently focused more attention on nuclear weapons policy than it has in previous years; however, the proliferation of commercial nuclear technology and its implications for America’s strategic position have been largely ignored. While the Unites States is currently a participant in the international commercial nuclear energy trade, America’s own domestic construction of nuclear power plants has atrophied severely and the US risks losing its competitive edge in the nuclear energy arena.¶ Simultaneously, the People’s Republic of China (PRC) has made great strides in closing the nuclear energy development gap with America. Through a combination of importing technology, research from within China itself, and a disciplined policy approach the PRC is increasingly able to leverage the export of commercial nuclear power as part of its national strategy. Disturbingly, China does not share America’s commitment to stability, transparency, and responsibility when exporting nuclear technology. This is a growing strategic weakness and risk for the United States. To remain competitive and to be in a position to offset the PRC when required the American government should encourage the domestic use of nuclear power and spur the forces of technological innovation. America: dominant no longer History has recorded well American wartime nuclear developments which culminated in the July 1945 Trinity Test, but what happened near Arco, Idaho six years later has been overlooked. In 1951, scientists for the first time produced usable electricity from an experimental nuclear reactor. Once this barrier was conquered the atom was harnessed to generate electricity and permitted America to move into the field of commercial nuclear power. In the next five years alone the United States signed over 20 nuclear cooperation agreements with various countries. Not only did the US build dozens of power plants domestically during the 1960s and 1970s, the US Export-Import Bank also distributed $7.1 billion dollars in loans and guarantees for the international sale of 49 reactors. American built and designed reactors were exported around the world during those years. Even today, more than 60% of the world’s 440 operating reactors are based on technology developed in the United States. The growth of the US civilian nuclear power sector stagnated after the Three Mile Island incident in 1979 – the most serious accident in American civilian nuclear power history. Three Mile Island shook America’s confidence in nuclear power and provided the anti-nuclear lobby ample fuel to oppose the further construction of any nuclear power plants. In the following decade, 42 planned domestic nuclear power plants were cancelled, and in the 30 years since the Three Mile Island incident the American nuclear power industry has survived only through foreign sales and merging operations with companies in Asia and Europe. Westinghouse sold its nuclear division to Toshiba and General Electric joined with Hitachi. Even the highest levels of the American government came to cast nuclear power aside. President Bill Clinton bragged in his 1993 State of the Union Address that “we are eliminating programs that are no longer needed, such as nuclear power research and development.” America’s slow pace of reactor construction over the past three decades has stymied innovation and caused the nuclear sector and its industrial base to shrivel. While some aspects of America’s nuclear infrastructure still operate effectively, many critical areas have atrophied. For example, one capability that America has entirely lost is the means to cast ultra heavy forgings in the range of 350,000 – 600,000 pounds, which impacts the construction of containment vessels, turbine rotors, and steam generators. In contrast, Japan, China, and Russia all possess an ultra heavy forging capacity and South Korea and India plan to build forges in this range. Likewise, the dominance America enjoyed in uranium enrichment until the 1970s is gone. The current standard centrifuge method for uranium enrichment was not invented in America and today 40% of the enriched uranium US power plants use is processed overseas and imported. Another measure of how much the US nuclear industry has shrunk is evident in the number of companies certified to handle nuclear material. In the 1980s the United States had 400 nuclear suppliers and 900 holders of N-stamp certificates (N-stamps are the international nuclear rating certificates issued by the American Society of Mechanical Engineers). By 2008 that number had reduced itself to 80 suppliers and 200 N-stamp holders. A recent Government Accountability Office report, which examined data from between 1994 and 2009, found the US to have a declining share of the global commercial nuclear trade. However, during that same period over 60 reactors were built worldwide. Nuclear power plants are being built in the world increasingly by non-American companies. The American nuclear industry entered the 1960s in a strong position, yet over the past 30 years other countries have closed the development gap with America. The implications of this change go beyond economics or prestige to include national security. These changes would be less threatening if friendly allies were the ones moving forward with developing a nuclear export industry;however, the quick advancement of the PRC in nuclear energy changes the strategic calculus for America. The shifting strategic landscape¶ While America’s nuclear industry has languished, current changes in the world’s strategic layout no longer allow America the option of maintaining the status quo without being surpassed. The drive for research, development, and scientific progress that grew out of the Cold War propelled America forward, but those priorities have long since been downgraded by the US government. The economic development of formerly impoverished countries means that the US cannot assume continued dominance by default. The rapidly industrializing PRC is seeking its own place among the major powers of the world and is vying for hegemony in Asia; nuclear power is an example of their larger efforts to marshal their scientific and economic forces as instruments of national power.¶ The rise of China is a phrase that connotes images of a backwards country getting rich off of exporting cheap goods at great social and environmental costs. Yet, this understanding of the PRC has lead many in the United States to underestimate China’s capabilities. The Communist Party of China (CPC) has undertaken a comprehensive long-term strategy to transition from a weak state that lags behind the West to a country that is a peer-competitor to the United States. Nuclear technology provides a clear example of this. ¶ In 1978, General Secretary Deng Xiaoping began to move China out of the destructive Mao era with his policies of 'reform and opening.' As part of these changes during the 1980s, the CPC began a concerted and ongoing effort to modernize the PRC and acquire advanced technology including nuclear technology from abroad. This effort was named Program 863 and included both legal methods and espionage. By doing this, the PRC has managed to rapidly catch up to the West on some fronts. In order to eventually surpass the West in scientific development the PRC launched the follow-on Program 973 to build the foundations of basic scientific research within China to meet the nation’s major strategic needs. These steps have brought China to the cusp of the next stage of technological development, a stage known as “indigenous innovation.”¶ ¶ In 2006 the PRC published their science and technology plan out to 2020 and defined indigenous innovation as enhancing original innovation, integrated innovation, and re-innovation based on assimilation and absorption of imported technology in order improve national innovation capability. The Chinese seek to internalize and understand technological developments from around the world so that they can copy the equipment and use it as a point to build off in their own research. This is a step beyond merely copying and reverse engineering a piece of technology. The PRC sees this process of absorbing foreign technology coupled with indigenous innovation as a way of leapfrogging forward in development to gain the upper hand over the West. The PRC’s official statement on energy policy lists nuclear power as one of their target fields. When viewed within this context, the full range of implications from China’s development of nuclear technology becomes evident. The PRC is now competing with the United States in the areas of innovation and high-technology, two fields that have driven American power since World War Two. China’s economic appeal is no longer merely the fact that it has cheap labor, but is expanding its economic power in a purposeful way that directly challenges America’s position in the world.¶ ¶ The CPC uses the market to their advantage to attract nuclear technology and intellectual capital to China. The PRC has incentivized the process and encouraged new domestic nuclear power plant construction with the goal of having 20 nuclear power plants operational by 2020. The Chinese Ministry of Electrical Power has described PRC policy to reach this goal as encouraging joint investment between State Owned Corporations and foreign companies. 13 reactors are already operating in China, 25 more are under construction and even more reactors are in the planning stages. ¶ In line with this economic policy, China has bought nuclear reactors from Westinghouse and Areva and is cooperating with a Russian company to build nuclear power plants in Taiwan. By stipulating that Chinese companies and personnel be involved in the construction process, China is building up its own domestic capabilities and expects to become self-sufficient. China’s State Nuclear Power Technology Corporation has partnered with Westinghouse to build a new and larger reactor based on the existing Westinghouse AP 1000 reactor. This will give the PRC a reactor design of its own to then export. If the CPC is able to combine their control over raw materials, growing technical know-how, and manufacturing base, China will not only be a powerful economy, but be able to leverage this power to service its foreign policy goals as well.

#### That collapses Chinese thorium

Dallas Kachan – Managing Partner, Kachan & Co. (cleantech analysis firm ) – 1/23/12, (letter) United States House and Senate Energy Committees, http://kachan.com/sites/default/files/Kachan\_Letter\_to\_US\_Congress.pdf

Our firm recently published a study on new breakthroughs in nuclear power technology. Titled Emerging Nuclear Innovations: Picking global winners in a race to reinvent nuclear energy and available at our website, the report is the result of six months of international research. Our findings are not encouraging for America’s scientific or commercial nuclear industry leadership. The world is not abandoning nuclear energy because of the Fukushima Daiichi incident in Japan. Most worldwide nuclear authorities we consulted for our study still project net growth in nuclear power. But the Japanese plant failures underscored the need for new, safer types of nuclear power that have been quietly in gestation for years. For instance, plants that don’t rely on uranium, and/or that are much smaller in scale, or that don’t produce weaponizable byproducts. Or that are capable of consuming today’s vast stores of plutonium waste. Or that are based on reactions that can’t possibly melt down or explode in the face of natural disasters or terrorist attack. The new nuclear technologies examined in our report are not the ones the world has come to know and fear. Some of these technologies are even being developed by American companies. But none stand the chance of being trialed or adopted in the U.S. given the country’s current regulatory regime. In contrast, China is rapidly expanding its nuclear posture, and is emerging as a test bed for these new progressive, safe technologies. As detailed in our report, China has capitalized on Western failures and continues to expand its prospects as the global commercial developer of nuclear energy. It has succeeded in positioning itself to negotiate multi billion dollar deals with western allies such as Saudi Arabia and non-­‐allied nations. It is now promoting thorium-­‐based systems, originally developed in the U.S., that offer the promise of operational safety, proliferation security and near zero nuclear waste. Unless the U.S. quickly changes its posture, China will be well positioned to dominate the global market for nuclear energy systems and enjoy greatly enhanced geopolitical influence. I encourage Congress to consider the long-­‐term impact this shift in power would result in and invite you to take actions to reverse this trend. I would be happy to make specific recommendations.

#### Asian conflict escalates to nuclear war

Jonathan S. Landay (staff) March 10 2000 “Top administration officials warn stakes for U.S. are high in Asian conflicts:, Knight Ridder Washington Bureau, lexisnexis

WASHINGTON \_ The 3,700-mile arc that begins at the heavily fortified border between North and South Korea and ends on the glacier where Indian and Pakistani troops skirmish almost every day has earned the dubious title of most dangerous part of the world**.** Few if any experts think China and Taiwan, North Korea and South Korea, or India and Pakistan are spoiling to fight. But even a minor miscalculation by any of them could destabilize Asia, jolt the global economy and even start a nuclear war. India, Pakistan and China all have nuclear weapons, and North Korea may have a few, too. Asia lacks the kinds of organizations, negotiations and diplomatic relationships that helped keep an uneasy peace for five decades in Cold War Europe. "Nowhere else on Earth are the stakes as high and relationships so fragile," said Bates Gill, director of northeast Asian policy studies at the Brookings Institution, a Washington think tank. "We see the convergence of great power interest overlaid with lingering confrontations with no institutionalized security mechanism in place. There are elements for potential disaster." In an effort to cool the region's tempers, President Clinton, Defense Secretary William S. Cohen and National Security Adviser Samuel R. Berger all will hopscotch Asia's capitals this month. For America, the stakes could hardly be higher. There are 100,000 U.S. troops in Asia committed to defending Taiwan, Japan and South Korea, and the United States would instantly become embroiled if Beijing moved against Taiwan or North Korea attacked South Korea. While Washington has no defense commitments to either India or Pakistan, a conflict between the two could end the global taboo against using nuclear weapons and demolish the already shaky international nonproliferation regime. In addition, globalization has made a stable Asia \_ with its massive markets, cheap labor, exports and resources \_ indispensable to the U.S. economy. Numerous U.S. firms and millions of American jobs depend on trade with Asia that totaled $600 billion last year, according to the Commerce Department.

### Uranium

#### Every assumption behind IFRs is wrong – no uranium shortages

Cochran et al. 2010 – PhD. and consultant to the Natural Resources Defense Council where he began working in 1973. Prior to retiring in 2011, he was a senior scientist and held the Wade Greene Chair for Nuclear Policy at NRDC, and was director of its Nuclear Program until 2007. He has served as a consultant to numerous government and non-government agencies on energy, nuclear nonproliferation, nuclear reactor and nuclear waste matters (February, Thomas B., Harold A. Feiveson, Walt Patterson, Gennadi Pshakin, M.V. Ramana, Mycle Schneider, Tatsujiro Suzuki, Frank von Hippel, “Fast Breeder Reactor Programs: History and Status” <http://fissilematerials.org/library/rr08.pdf>)

Why commercialization of breeder reactors failed The rationale for pursuing breeder reactors — sometimes explicit and sometimes implicit — was based on the following key assumptions: 1. Uranium is scarce and high-grade deposits would quickly become depleted if fission power were deployed on a large scale; 2. Breeder reactors would quickly become economically competitive with the light-water reactors that dominate nuclear power today; 3. Breeder reactors could be as safe and reliable as light-water reactors; and, 4. The proliferation risks posed by breeders and their “closed” fuel cycle, in which plutonium would be recycled, could be managed. Each of these assumptions has proven to be wrong. Uranium is cheap and abundant. Breeder reactors were seen as a solution for the uranium scarcity problem because, by converting uranium-238 into chainreacting plutonium, they can potentially increase one-hundred-fold the amount of fission energy that can be extracted from a kilogram (kg) of uranium and make it economically feasible to mine much lower grades of uranium ore. 4 In 2007, uranium requirements for the global fleet of nuclear power reactors were 67,000 metric tons — approximately 180 tons per gigawatt of generating capacity per year. The International Atomic Energy Agency (IAEA) projects that global nuclear capacity will increase and that uranium requirements will increase correspondingly to between 94,000 and 122,000 tons a year in 2030. 5 In 2008, the biennial report put out by the OECD Nuclear Energy Agency, Uranium 2007: Resources, Production and Demand — also known as “the Red Book” — found that, despite inflation, global known conventional resources of uranium recoverable for less than $130/kg had increased from about 4.7 to about 5.5 million tons. The Red Book also reported estimates from 27 countries that, with further exploration, an additional 7.6 million tons of uranium would be discovered in the same cost range. 6 At $130/kg, the cost of uranium would contribute 0.3 U.S. cents to the cost of a kilowatt-hour of nuclear electricity. In the long run, worldwide, the amount of uranium recoverable at low cost is virtually certain to be far greater than the numbers reported in the Red Book. If plausible estimates of geological abundance are used, the amount of uranium still to be discovered at recovery costs up to $130/kg would be 50–126 million tons. 7 This corresponds to 500 to 1000 times the projected demand in 2030. It will be seen from figure 1.2 that the price of uranium on the spot market went significantly above $130/kg during the late 1970s and then again after 2005. Except for these two periods when there was disequilibrium between supply and demand, prices have been less than $50 per kg. The 1970s price peak was due 6 to the expectation of an enormous expansion in nuclear power capacity. This expectation was not realized but large stockpiles of uranium were built up and then sold off during the subsequent decades resulting in the closure of many uranium mines. The sale by Russia to the U.S. of low-enriched uranium blended down from 500 tons of weapon-grade uranium from excess Cold War weapons at a rate sufficient to fuel half of the U.S. nuclear capacity extended the period of low demand for freshly mined uranium. 8 The stockpiles of natural uranium have been largely used up, however, and the blend-down of the Russian weapon-grade uranium will be completed in 2013. The most recent uranium price peak therefore reflected, at least in part, the expectation, compounded by speculation, that there might be uranium shortages before uranium-mining capacity increases again to the level required to support growing demand. In any case, unlike the situation with oil or gas-fueled power plants, the cost of uranium fuel can double without having a significant impact on the cost of nuclear power. As noted above, at $130/kg, the cost of uranium contributes only 0.3 cents to the cost of a kilowatt-hour (kWh), which is about 5 percent of the cost of electricity produced by a new light-water reactor. 9

#### Status quo solves – seawater extraction

Prigg, Science and Technology Editor, 8/21/12

[Mark, Science and Technology Editor for Daily Mail Online, “Are oceans the future of nuclear power? Scientists move closer to extracting uranium from seawater,” Daily Mail Online, <http://www.dailymail.co.uk/sciencetech/article-2191571/Do-oceans-hold-future-nuclear-power-Scientists-closer-extracting-uranium-seawater.html>]

Extracting uranium from seawater is closer to becoming an economic reality which could guarantee the future of nuclear power, scientists said today. The world's oceans hold at least four billion tons of the precious metal. But for the past four decades, the goal of mining seawater for uranium has remained a dream because of the technical difficulties and high cost. Today, a report presented to a scientific meeting showed that fast progress is being made towards turning the oceans into a uranium reservoir. Improvements to the extraction technology have almost halved production costs from around 560 dollars (£355) per pound of uranium to 300 dollars (£190). Dr. Robin Rogers, from the University of Alabama, told the annual meeting of the American Chemical Society in Philadelphia: 'Estimates indicate that the oceans are a mother lode of uranium, with far more uranium dissolved in seawater than in all the known terrestrial deposits that can be mined. 'The difficulty has always been that the concentration is just very, very low, making the cost of extraction high. 'But we are gaining on that challenge.' The standard extraction technique, developed in Japan, uses mats of braided plastic fibres embedded with compounds that capture uranium atoms. Each mat is 50 to 100 yards long and suspended 100 to 200 yards under the water. After being brought back to the surface, the mats are rinsed with a mild acid solution to recover the uranium. They are then dunked in the water again in a process that can be repeated several times. The new work involves making cheaper and more efficient versions of the mats and the compounds that latch onto uranium. A team led by Dr. Rogers is exploring the use of waste shrimp shells from the seafood industry to produce a biodegradable mat material. Dr. Erich Schneider, from the University of Texas, another speaker at the American Chemical Society symposium, said the aim was to establish seawater uranium as an 'economic backstop' that will sustain the nuclear power industry. Nuclear power plants are built to operate for 60 years or longer and involve a huge investment, he told the meeting. Before committing themselves to building nuclear plants, energy companies had to be sure they can source reasonably priced uranium for many decades to come. 'This uncertainty around whether there's enough terrestrial uranium is impacting the decision-making in the industry, because it's hard to make long-term research and development or deployment decisions in the face of big uncertainties about the resource,' said Dr. Schneider. 'So if we can tap into uranium from seawater, we can remove that uncertainty.' Seawater extraction of uranium may also have environmental advantages, the meeting heard. Traditional uranium mining produced contaminated wastewater and posed health risks for miners.

### Prolif

#### PRISM increase prolif risks – multiply reprocessing sites

Wauchope 2012 - taught science before switching to nursing. She has several post-graduate qualifications, in health informatics, medical terminology and clinical coding (June 12, Noel, “Answering Barry Brook on Australia's nuclear power future” http://www.onlineopinion.com.au/view.asp?article=13726&page=0)

Weapons proliferation Barry Brook seems to have missed this point. At present, people worry about the risks of plutonium or weapons grade uranium being obtained from nuclear waste storage facilities, or from uranium enrichment plants. These are relatively few in number, world-wide, and they are distant from the nuclear reactors, which are much greater in number. They are also very large, expensive, and detectable facilities. But fast neutron reactors require a reprocessing plant nearby. Why? Because their fuel, either uranium 238 or thorium are not fissile materials - they can't sustain a nuclear reaction, but need to have plutonium or uranium 235, which are fissile, to make the chain reaction happen.. They need a nearby facility from which to get these fissile materials. In Barry Brook's scenario, there would be many reactors, including many small reactors, each with its reprocessing plant close by, providing weapons grade materials - plutonum and uranium 235,. The Thorium reactors themselves produce Protactinium-233 - from which uranium 233 a bomb grade material can be made. So, these new, supposedly safer reactors, in fact multiply the risks of weapons proliferation. Wastes Brook claims that there are "waste" benefits from Integral Fast Reactors. The nuclear wastes may be less, in volume, but they are still produced, and still last a long time. The enthusiasts for thorium reactors boast about the wastes from these reactors beng very toxic for "only 300 years" ! Just the mere 300 years? The lifetimes of these toxic wastes include Cesium-137 and strontium-190, hundreds of years, just like today's reactors. Cesium-135 and iodine-129, millions of years half-life. Technetium-99, 200,000 years. Protactinium-233 has a half-life of 32760 years, and is highly radioactive - it has to be reprocessed and stored as uranium 233. Security This would turn out to be a nightmare, all the more so with small thorium reactors. The on site reprocessing. would necessitate the accounting of plutonium Now how do assess how we control every reactor that can make bomb material? Plutonium is not the only problem. Because of the chemistry of the molten salt reactor, Protactinium-233 results from the decay of thorium-233 as part of the chain of events used to produce uranium-233 by neutron irradiation of thorium-232 . – it's a security problem as well as a waste problem and weapons proliferation risk.

#### They can’t solve – political motivations are an alt cause

Gronlund, et. Al, Director, Nuclear Safety Project, Union of Concerned Scientists Global Security Program, 2007

[December 2007, Lisbeth Gronlund, Co-Director and Senior Scientist of the Union of Concerned Scientists Global Security Program (UCSGSP), David Lochbaum, Director of the Nuclear Safety Project in the UCSGSP, Edwin Lyman, Senior Staff Scientist in the UCSGSP, “Nuclear Power in a Warming World: Assessing the Risks, Addressing the Challenges,” http://www.ucsusa.org/assets/documents/nuclear\_power/nuclear-power-in-a-warming-world.pdf]

An expansion of nuclear power could—but need not—make it more likely that more nations will acquire nuclear weapons. In any event, it is only one factor of many that will affect this outcome. Many states that do not now have nuclear weapons already have the technical ability to produce them, should they decide to do so. In other countries without such a capability, nuclear power facilities could aid a nuclear weapons program—in some cases significantly. However, the political incentives for a nation to acquire nuclear weapons are the most significant factor, and there is little the United States or international community can do to prevent a determined nation from eventually acquiring such weapons. The nuclear facilities that present the greatest proliferation risk are those that can be used to produce the materials needed to make nuclear weapons— plutonium and highly enriched uranium (HEU). Reprocessing plants extract plutonium from used reactor fuel, while uranium enrichment facilities that make low-enriched uranium for reactor fuel can be used to make HEU.

### Nuclear Waste

#### Reprocessing doesn’t solve the waste problem

UCS 2009 (March 4, “Global Nuclear Energy Partnership Programmatic Environmental Impact Statement” <http://www.ucsusa.org/nuclear_power/nuclear_power_risk/nuclear_proliferation_and_terrorism/gnep-peis.html>)

Nuclear Waste Issue Not Remedied The GNEP plan for reprocessing is not necessary to support nuclear power expansion and, in fact, would be counterproductive by saddling nuclear power with additional waste streams that require secure disposal. Even the most avid reprocessing proponents admit that reprocessing does not eliminate the need for a geologic disposal facility (such as Yucca Mountain) because it generates high-level radioactive wastes that require long-term isolation from the environment. Also, according to the GNEP PEIS, reprocessing will not reduce the volume of nuclear waste generated, but will significantly increase the volume of low-level waste and generate large quantities of long-lived transuranic wastes. UCS believes that spent nuclear fuel can instead be safely stored in dry casks at existing reactor sites for decades. However, a geological repository ultimately will be necessary to ensure the isolation of long-lived radioactive materials from the environment. For a repository to be viable, it must meet strict technical safety criteria and have broad political support, especially from the region where it is located.

#### Doesn’t solve waste

Beyond Nuclear 2013 (January, “PANDORA’S FALSE PROMISES INTEGRAL FAST REACTOR: FACTS AND MYTHS ” <http://www.beyondnuclear.org/storage/documents/BN_Final_FullFactsheet_IFR_Jan2013.pdf>)

WASTE REDUCTION • Although the IFR will produce less radioactive waste than a traditional Light Water Reactor, it still produces waste, about 1,700 pounds of waste per year for a plant of about 1,000 megawatts. These wastes will remain dangerous for at least 200 years, still requiring a management plan. 20 • The notion that the IFR is useful to “consume” radioactive waste is vastly overblown. In 1996, the National Academy of Sciences published a detailed and comprehensive study, Nuclear Wastes: Technologies for Separations and Transmutation 21 that concluded that efforts using the IFR to “consume” radioactive waste and reduce the global inventory of transuranic isotopes would “have high costs and marginal beneﬁts that would take hundreds of years.” 22

### Solvency

#### PRISM reactors make accidents likely

Beyond Nuclear 2013 (January, “PANDORA’S FALSE PROMISES INTEGRAL FAST REACTOR: FACTS AND MYTHS ” <http://www.beyondnuclear.org/storage/documents/BN_Final_FullFactsheet_IFR_Jan2013.pdf>)

THE RISKS OF SODIUM • Sodium reacts violently with water and burns if exposed to air. 6 • Sodium-cooled fast reactors can suffer from sodium leaks and ﬁres, failures of cooling equipment handling liquid sodium, and catastrophic super-criticality accidents. 7 • Any leak “results in a reaction that can rupture the tubes and lead to a major sodium-water ﬁre.” 8 • The Department of Energy noted in 2002 that “There have been small sodium leaks (and small ﬁres) at essentially every sodium-cooled reactor plant built; in some cases, several of them.” 9 SAFETY CHALLENGES • A fast reactor is vulnerable to a “core disassembly accident”. Collapsing the fuel into a reduced volume increases the rate at which the chain reaction occurs. If this were to happen quickly enough, the pressure in the fuel would rise fast enough to lead to an explosion. This could fracture the protective barriers around the core, including the containment building, and release large fractions of the radioactive material in the reactor into the surroundings. Such a “core disassembly accident” has therefore been an important concern among the fast reactor design community ever since the ﬁrst fast neutron reactors were constructed. 10 • Blanket statements that the IFR is unable to melt down are not credible. How a reactor behaves under accident conditions is extremely complex and the modeling results have to be critically evaluated to check whether the assertions of safety by designer really do hold good. In the case of the Indian fast breeder reactor, this was not the case. 11 • According to the Union of Concerned Scientists, when looking at so-called Generation IV reactors (which include the IFR, the Small Modular Reactor and the Thorium Fueled Reactor), “there is no basis for assuming that any of the ﬁve designs now under study would be signiﬁcantly safer than today’s nuclear power plants.” 12 • The IFR has “little or no operating experience, so detailed computer models would be needed to accurately predict their vulnerability to catastrophic accidents. However, this project is still in its infancy, so developing and extensively validating computer models for each design will be a formidable task.” 13 • An event that causes the core of an IFR to become more compact—such as a core meltdown — could substantially raise reactivity, resulting in a rapid power increase that could vaporize the fuel and blow the core apart. 14 • “The necessity of keeping air from coming into contact with the sodium coolant makes refueling and repairing fast reactors much more difﬁcult and time-consuming than for watercooled reactors.” 15 • Princeton physicist, M.V. Ramana argues against the use of the IFR to address climate change because these types of reactors “have never been built” and because they involve “an associated new type of reprocessing technology called pyro-processing. Both breeders and reprocessing plants have been notoriously problematic.” 16 • Fast reactors have a history of failure. One such, at Dounreay, Scotland, was abandoned two decades ago with the heavily contaminated site now expected to cost more than $5 billion to decommission. 17 On December 8th, 1995, 700 kg of molten sodium leaked from the secondary cooling circuit of the Monju breeder reactor in Japan, resulting in a ﬁre. The sodium spill itself came very close to breaching Monju, a catastrophe which would have spilled plutonium into the environment. 18 France’s Superphénix, the world’s only commercial-sized breeder reactor, was a ﬁnancial and production disaster, operating only half of the time that it was connected to the grid and generating less than 7% of its capacity over its abbreviated lifetime due to multiple safety incidents and accidents. • Fast reactor designs have a stronger coolant void effect. The larger the magnitude of the destabilising (sic) coolant void effect (measured by the “cool-ant void coefﬁcient” – positive quantities implying that the reaction rate increases with the temperature of the coolant), the more likely that an accident that begins via a heating of the coolant can spread to large parts of the core. But fast reactors are not the only type of reactors where a positive coolant void coefﬁcient could play a role in an accident. Indeed, the best known event where the reactor demonstrated such behaviour (sic) was during the 1986 Chernobyl accident. 19 • As John G. Fuller’s famous book title put it, “We Almost Lost Detroit” on October 5, 1966, when the Enrico Fermi Unit 1 plutonium breeder reactor – initially proposed to generate plutonium for the U.S. nuclear weapons arsenal – experienced a partial core meltdown. Incredibly, Fermi 1 suffered a sodium ﬁre, as well as a large tritium spill, within the past several years – more than 35 years after the reactor had been permanently shut down.

#### PRISM reactors fail and open the door to nuclear terrorism

Wauchope 2012 - taught science before switching to nursing. She has several post-graduate qualifications, in health informatics, medical terminology and clinical coding (July 15, Noel, “In dispraise of Integral Fast Nuclear Reactors” <http://www.independentaustralia.net/2012/environment/in-dispraise-of-integral-fast-nuclear-reactors/>)

Beyond all that, there is the safety factor, mentioned briefly before. The metal fuel gets hot and, unlike oxide based fuels, when it heats, it swells. If the fuel expands too much, it can crack the surrounding cladding — and that presents a big problem. And just as safety impinges on costs, so does security. These small nuclear reactors have to be guarded, and so does the plutonium and enriched uranium fuel being transported to the reactor. And so do the eventual radioactive wastes produced by the IFRs. Security alone would be a huge expense — and more so because it would involve guarding not just a few big reactors, but a large number of small ones. Next, there is the issue of weapons’ danger. The IFR’s make wastes that are not suitable for “traditional” atomic bombs. However, in these days of terrorism fears we have all heard of those ‘simple’ Improvised Explosive Devices (IEDs), which are much more fashionable and cheap to make. Because the IFR’s still produce dangerous, toxic, radioactive wastes — it is still possible for terrorists to use this to make some sort of “dirty bomb”, using ordinary explosives to send the radioactive particles flying about. As these fast reactors need to get the processed plutonium and/or enriched uranium, these materials have to be procured from somewhere. The nuclear lobby portrays this as a benefit to the world, by using up the existing plutonium and so on. Now, I don’t know whether they say this out of naiveté or hypocrisy, but the obvious reality is that the old-fashioned Generation 3 and 4 reactors will have to be kept going – or uranium enrichment and reprocessing will have to keep going – to turn out more plutonium, which must then travel to the new IFRs. Of course, all this flies in the face of President Obama’s move to limit nuclear weapons proliferation, the New START treaty with Russia, which depends on confining the spread of uranium enrichment and weapons grade plutonium. As far as Australia goes, I thought that we were supposed to be cooperating with the USA. The there’s that final problem of the wastes. David Biello from the Scientific American comments: ‘Ultimately, however, the core problem may be that such new reactors don’t eliminate the nuclear waste that has piled up, so much as transmute it. Even with a fleet of such fast reactors, nations would nonetheless require an ultimate home for radioactive waste, one reason that a 2010 M.I.T. report on spent nuclear fuel dismissed such fast reactors.’

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## Waste

### Nuclear Waste 1NC

#### Reprocessing doesn’t solve the waste problem

UCS 2009 (March 4, “Global Nuclear Energy Partnership Programmatic Environmental Impact Statement” <http://www.ucsusa.org/nuclear_power/nuclear_power_risk/nuclear_proliferation_and_terrorism/gnep-peis.html>)

Nuclear Waste Issue Not Remedied The GNEP plan for reprocessing is not necessary to support nuclear power expansion and, in fact, would be counterproductive by saddling nuclear power with additional waste streams that require secure disposal. Even the most avid reprocessing proponents admit that reprocessing does not eliminate the need for a geologic disposal facility (such as Yucca Mountain) because it generates high-level radioactive wastes that require long-term isolation from the environment. Also, according to the GNEP PEIS, reprocessing will not reduce the volume of nuclear waste generated, but will significantly increase the volume of low-level waste and generate large quantities of long-lived transuranic wastes. UCS believes that spent nuclear fuel can instead be safely stored in dry casks at existing reactor sites for decades. However, a geological repository ultimately will be necessary to ensure the isolation of long-lived radioactive materials from the environment. For a repository to be viable, it must meet strict technical safety criteria and have broad political support, especially from the region where it is located.

#### Doesn’t solve waste

Beyond Nuclear 2013 (January, “PANDORA’S FALSE PROMISES INTEGRAL FAST REACTOR: FACTS AND MYTHS ” <http://www.beyondnuclear.org/storage/documents/BN_Final_FullFactsheet_IFR_Jan2013.pdf>)

WASTE REDUCTION • Although the IFR will produce less radioactive waste than a traditional Light Water Reactor, it still produces waste, about 1,700 pounds of waste per year for a plant of about 1,000 megawatts. These wastes will remain dangerous for at least 200 years, still requiring a management plan. 20 • The notion that the IFR is useful to “consume” radioactive waste is vastly overblown. In 1996, the National Academy of Sciences published a detailed and comprehensive study, Nuclear Wastes: Technologies for Separations and Transmutation 21 that concluded that efforts using the IFR to “consume” radioactive waste and reduce the global inventory of transuranic isotopes would “have high costs and marginal beneﬁts that would take hundreds of years.” 22

#### No impact to waste – Fukushima proves

Strupczewski, Institute of Atomic Energy, 03

[1/28/03, A., Institute of Atomic Energy, Swierk, Poland, Applied Energy, “Accident risks in nuclear-power plants,” vol. 75, ScienceDirect]

\*\*\*NPP = nuclear-power plant

\*\*\*TMI = Three Mile Island

\*\*\*OECD = Organisation for Economic Co-operation and Development

1. Safety goals for nuclear power The general safety objective for nuclear-power plants (NPPs) is to protect the individual, society and the environment by establishing and maintaining in NPPs effective measures against radiological hazards. To reach this objective, safety goals for nuclear power were established from the very beginning of its development, and made more demanding as the technology matured. The initial qualitative targets were that no individual should bear a significant additional risk due to nuclear-power plant operation and the societal risks from power-plant operation should not be a significant addition to other societal risks [1]. They were followed by quantitative requirements, which according to US rules set the design targets so that the calculated plant core-damage frequency (CDF) should be less than 10-4 events per reactor year (R–Y) [2], and the calculated large release frequency (LRF) less than 10-6/R–Y for sequences resulting in a greater than 0.25 Sv whole-body dose over 24 h at one-half mile from the reactor. These requirements for NPP design corresponded to the cancer risk to the people in the critical population group equal to 10-10/R–Y [3]. Presently the safety objectives developed by the US and European utilities for the new generation of NPPs include a maximum permissible CDF equal to 10-5/R–Y [4]. It must also be demonstrated that early containment failure is avoided for all risk-significant scenarios. The cumulative LRF must be less than 10-6/R–Y. In parallel with the development of these targets, the nuclear industry and regulators in the countries leading in nuclear safety have developed the contemporary nuclear safety philosophy, which resulted in reducing risks in NPPs far below those risks typical for other power-industry branches. It places the principle ‘safety first’ as its cornerstone and includes several principles that are today the basis of NPP design and operation in all western countries. 2. Nuclear-power plant safety indicators The progress in the safety level of NPPs is reflected in the probabilistic safety analyses (PSAs), initiated in the US in 1975 by the Rasmussen Study and systematically developed to become standard tools used for safety analysis of every NPP. The importance of PSA in the evaluation of NPP safety is due to the fact that there has been only one severe core damage accident in water-moderated reactors, namely the Three Mile Island accident in the USA in 1978, so there are no historical statistical data as for coal-mine accidents, oil-transport accidents, gas explosions or dam breaks. Minor incidents that do happen in NPPs, although they are eagerly publicized by the media, usually are far below the level at which any hazard to the plant or the public would be involved. Moreover, in view of fast improvements of NPP technology, the analysis of the safety of the plants to be built cannot be based on historical experience with the plants put into operation 20 or even 10 years ago, but must reflect the actual safety features of the upgraded new designs. PSA makes it possible to study the new design features and evaluate which of the safety improvements will bring the required safety upgrading. The main condition for preventing massive releases of radioactivity is to maintain the reactor containment integrity, first of all in the early stage of the accident, then in the later stages when the releases of radioactivity would be less but still significant. In the middle of the 1990s, several mechanisms were considered as possible contributors to an early containment failure. Over the last decade, the intensive research and development of the technical means of coping with severe accidents have resulted in our being able to treat these issues as resolved. The results of several reactor-safety studies performed in Western countries show that the safety of the modern NPPs is very high. For example the German risk-study phase B [5] indicated that the frequency of core melt in Biblis B NPP was 10-4/(R– Y) and that of large radioactive releases 2.6x10-5/(R–Y). After taking into account operator actions preventing the reactor’s pressure-vessel melt-through under high pressure, the frequency of the core melt frequency was reduced to 2.6x10-6/(R–Y). Subsequent analyses performed for KONVOI plants [6] gave similar results, with absolute numbers lower due to improvements in the KONVOI type plants as compared to the Biblis B. Core-damage frequency without bleed and feed in KONVOI plants was 1.4x10-6/R–Y, and after considering the effects of operator actions in those plants, the CDF was reduced to 3.5x10-7/R–Y. These results can be considered as typical for modern PWRs. The project for the European Pressurized-Water Reactor (EPR) assumes that the design will limit the maximum possible releases so that the following safety objectives will be reached: 1. No need for short-term (about 24 h) off-site countermeasures 2. No need for population evacuation beyond 2–3 km 3. For long-term countermeasures, limited restriction of the consumption of agricultural products for a limited period (about 1 year) in a limited area is acceptable [7]. This is the level of safety of NPPs expected as a reference base in the future. Specific designs, which have been already licensed for construction, include reactors with passive safety-features AP 600 or Advanced BWR [8], for which the CDF is below 2x10-7/R–Y. The releases of radioactivity are at least ten times smaller and the health risks are negligible. 3. Radiological effects of nuclear-power plant accidents The level of safety of modern NPPs is surprisingly far from the mass-media picture of consequences of a nuclear accident. Actually, the only accidents with radioactive releases in NPPs were those in TMI and in Chernobyl. In TMI there was a reactor-core melt, but the integrity of the remaining barriers (reactor pressure vessel and containment) was maintained and the releases were so limited that the average effective dose to the public was 0.015 mSv [9]. The corresponding cancer risk was below 10-6 per lifetime, less than the risk due to NORMAL yearly emissions from a coal-fired power plant at that time [10], and no health effects have ever been identified. In Chernobyl, the quantities of released fission products were significant, from 100% of noble gases down to about 4% of solid fission-products. The doses in the early phase after the accident were high. In the rescue team, 28 men died in consequence of exposure to radiation and several more of those who were treated for radiation sickness died from illnesses that may have been associated with their exposure. However, as confirmed in the UNSCEAR report of 2000, there has been no statistically significant increase in the incidence of leukaemia or any other form of cancer among workers or the public (except for child thyroid cancer), nor of deformities of babies born to members of the public [11]. An increase in the incidence of occult thyroid cancer was predicted to occur after 10 years, but actually it was found already in the first year after the accident [11]. This shows that the screening effect can be largely responsible for this observed increase. Generally the occult thyroid cancer is not fatal and can be successfully treated. Although some 2000 cases of thyroid cancer are attributed to the accident, less than 10 fatal cases have been observed. Much greater damage to health has been caused by well meaning but misguided attempts to protect and help people living near Chernobyl at the time of the accident. The evacuation of hundreds of thousands of them is now seen as an over reaction, which in many cases did more harm than good. The first reaction was to move people out. Only later, was it realized that many of them had not needed to be moved. The relocation of people destroyed communities, broke up families, and led to unemployment, depression, hypochondria and stress-related illnesses. Among the relocated populations, there has been a massive increase in stress-related illnesses, such as heart disease and obesity, unrelated to radiation. A major factor causing distress has been uncertainty about risks and in particular belief that all radiation doses can lead to cancer, as stated in the Linear No Threshold hypothesis presently used for the purpose of radiological protection. The recent report of UNPD and UNICEF [12] confirms the above statements and acknowledges that the people living in the contaminated areas receive low doses of radiation, being less than those occurring naturally in many other parts of the world. This is illustrated in Fig. 1 taken from [13] comparing lifetime doses to people around Chernobyl with the doses in European countries including Finland and Sweden, in which the population enjoys very good health and low cancer rates in spite of the high radiation background. According to Russian sources, medical monitoring of the clean-up staff has shown no increase of cancer rate and no relationship between the dose and the mortality. The overall mortality rate among the clean-up staff was statistically lower than the mortality rate of the control group from the public [14]. The UNSCEAR report also confirms that no radiation illnesses (with the exception of child thyroid diseases) have been found in the exposed population [11]. Thus, although it should be acknowledged that the effects of the Chernobyl accident are important, it should be also stressed that most of them are due to excessive fear motivated and politically expedient decisions, not to the radiation doses themselves. The NPPs planned to be built are completely different from RBMKs. The negative temperature reactivity coefficient ensures that, in accident conditions, their power will decrease, not increase as in Chernobyl, the containment (which did not exist in Chernobyl) would remain intact even after severe accidents and the accidentmanagement procedures and safety-upgrading measures implemented in the NPPs would prevent such large releases of radioactivity as was the case in Chernobyl. Thus, the radiological results of Chernobyl cannot be treated as representative of nuclear accidents in NPPs. The estimates of probable releases are made for each NPP separately within PSA studies and generally show that the hazards are much smaller than for other energy sources. 4. Comparison of nuclear-power risks with accident risks due to other energy sources The risks of electricity generation should be evaluated considering the whole cycle, from fuel mining to plant construction, to waste management and site recultivation. While in the case of the nuclear-fuel cycle, the accident risks are mostly connected with the power plant, in other fuel cycles the dominant contribution can be made by other fuel stages. For example, in the case of coal mining, the fatality ratio in the US is about 0.1 death/million tons or 3.5 death/GW(e).a [15]. In very large regions of the world, the situation can be much worse. In China, the average value for the country was about 4.6 deaths per MT in 1997 [16] and the number of mining fatalities per unit of energy produced from coal was 17 deaths/GW(e).a. In addition to that, the accident death rate in coal-fired power plants was about 2 deaths/GW(e).a [17] and in coal transport sector 8.5 deaths/GW(e).a [17]. These numbers add up to the accidental mortality in China coal power system being equal 27.5 deaths/GW(e).a. The number of fatalities due to severe accidents (involving more than 5 fatalities each) for the coal chain in OECD countries is 0.13 per GW(e) [19]. In non-OECD Fig countries, it is much higher. The everyday occupational hazards for the coal chain will be taken as 1.27 fatalities/GW(e).a according to [18], that is for European countries. It is seen, that the small accidents involve more fatalities than the large ones, so both numbers must be taken into account. The differences of the safety of hydropower in OECD and non-OECD countries are most pronounced. While the fatality ratio for OECD countries is only 0.004, it is 2.187 for non-OECD countries [15]. The data on dam safety show that differences in technology and safety practices influence very much the risk of power generation from a given facility. These differences are taken into account while discussing risks of the conventional power industry and nobody discussing the safety of a dam to be erected in the twenty-first century would base its safety indicators on accidents of dams built in say 1920. In a recent ExternE report on hydropower, the authors do not include any risk due to damfailures in the overall health risks due to hydropower [18], because they maintain that the dams built in Norway provide ‘‘negligibly small risk’’. Similarly, the progress in coal-mining safety is taken into account while estimating the number of fatalities per GW(e).a. Of course this is a correct approach. However, if we take into account the progress in dam construction before and after 1930, then the differences in NPP technology existing between RBMK reactors and LWR NPPs should be also considered. Similarly, if introducing strict regulations requiring qualified engineering supervision had a strong effect on dam safety, it is evident that the whole concept of safety culture implemented in Western NPPs has also a significant influence on nuclear-reactor safety. As the differences in design between modern PWRs and the Chernobyl RBMK are much more significant that any differences in dams erected in Norway versus those built in the USA, Italy, France etc., then following the logic accepted by EC ExternE study, the hazards due to Chernobyl should not be considered as the basis for evaluating the safety of future NPPs.

## Solvency

### 2NC Accidents

#### Safety concerns turn case – untested materials increase costs and make IFRs unreliable

Wauchope 2012 - taught science before switching to nursing. She has several post-graduate qualifications, in health informatics, medical terminology and clinical coding (June 12, Noel, “Answering Barry Brook on Australia's nuclear power future” http://www.onlineopinion.com.au/view.asp?article=13726&page=0)

Safety Let's examine the facts on the Integral Fast Reactors: It's true that with these liquid fuel reactors, because it's molten fuel, there won't be a meltdown. But the volatile fission products evaporate from the molten salt. You have to trap them. They are put into another chamber – they make steam, very hot gases,to run a turbine that will generate electricity, Liquid sodium is used to cool them. It's the sodium circuits that have given lots of problems - ". sodium reacts explosively with either air or water, necessitating elaborate safety controls in places where it must get close to water in order to create steam to turn a turbine to make electricity, such as steam generators. As a result of numerous fires from leaking systems, operating sodium-cooled fast reactors to date have been shut down more than they have run". - David Biello, writing in Scientific American This safety aspect impinges on costs and reliability. Very tough materials are required – running at very high temps. It's the cost and durability of these materials that have not been not tested – in relation to the heat exchangors – rather than the reactor itself.

#### Accidents jack solvency – have a ripple effect on the nuclear industry

Kelly-Detwiler 2013 – 23 years writing about energy (January 15, Peter, “New Centralized Nuclear Plants: Still an Investment Worth Making?” <http://www.forbes.com/sites/peterdetwiler/2013/01/15/new-centralized-nuclear-plants-still-an-investment-worth-making/>)

Just a few years ago, the US nuclear renaissance seemed at hand. It probably shouldn’t have been. Cost overruns from Finland to France to the US were already becoming manifest, government guarantees were in doubt, and shale gas drillers were beginning to punch holes into the ground with abandon. Then came Fukushima. The latter proved a somewhat astonishing reminder of forgotten lessons about nuclear power risks, unique to that technology: A failure of one power plant in an isolated location can create a contagion in countries far away, and even where somewhat different variants of that technology are in use. Just as Three Mile Island put the kaibosh on nuclear power in the US for decades, Fukushima appears to have done the same for Japan and Germany, at a minimum. It certainly did not help public opinion, and at a minimum, the effect of Fukushima will likely be to increase permitting and associated regulatory costs.

### 2NC Causes Terrorism

#### Reprocessing increases the risk of nuclear terrorism

UCS 2009 (March 4, “Global Nuclear Energy Partnership Programmatic Environmental Impact Statement” <http://www.ucsusa.org/nuclear_power/nuclear_power_risk/nuclear_proliferation_and_terrorism/gnep-peis.html>)

Risk of Nuclear Terrorism/Proliferation Less than 20 pounds of plutonium is needed to make a nuclear weapon. The current U.S. practice of maintaining plutonium in large, heavy, and highly radioactive spent fuel assemblies makes it nearly impossible to steal. Reprocessing would change that. A recent Government Accountability Office (GAO) report specifically noted that advanced technologies for reprocessing spent nuclear fuel would pose a "greater risk of proliferation in comparison with direct disposal" in underground storage. The recently released draft nonproliferation impact assessment of GNEP stated "removal of fission products and separation of actinides greatly reduces barriers to theft, misuse, or further processing, even without separation of pure plutonium. Fast reactor fuels have higher concentration of weapons usable materials." A recent study by the DOE’s own national laboratories has found that modifications to conventional reprocessing to enhance "proliferation resistance" have been shown to be largely ineffective.

### 2NC Long Timeframe

#### Long timeframe – that’s Wauchope – designs aren’t ready until 2030 and that’s even more magnified for small designs – they’re not ready for construction and generation IV reactors in general are premature

#### Their best evidence says it takes ten years and that assumes building immediately – plan just issues immediate loan guarantees

“If so, the PRISM plant would take five years to license, five years to build,”

#### IFRs take too long – theoretical designs mean they won’t be ready until at least 2030

Wauchope 2012 - taught science before switching to nursing. She has several post-graduate qualifications, in health informatics, medical terminology and clinical coding (June 12, Noel, “Answering Barry Brook on Australia's nuclear power future” http://www.onlineopinion.com.au/view.asp?article=13726&page=0)

Just as we learn that a new solar farm at Broken Hill will be operational in 2015, we might ponder on the hurdles that Barry Brook's nuclear reactors will be needing to overcome, before a bunch of them might be operational by 2050. Solar and wind energy projects are going apace in the world right now. And that's where private investment is going, too, not into nuclear power. I would say that hurdle No 1 would be in persuading people to invest in nuclear power - and that's a big hurdle. Hurdle 1a would be in getting the government to subsidise nuclear power, as is happening to some degree, but not very successfully, in democracies such as Britain and USA. India is a whole different story - with repression of anti nuclear activists there, India's status as a democracy is looking wobbly. Even assuming that, somehow or other, Australia does decide for these nuclear reactors, then there are a series of hurdles. New federal and state legislation would be needed. Local acceptance would need to be gained. Detailed designs would have to be submitted to government, covering all sorts of aspects - Site characteristics: population, meteorology, geology, hydrology, plant accident scenarios, qualifications to operate the plant, radiological discharges to air, water, safety analysis.emergency response plans. All that sort of stuff before any work is begun on the proposed sites. As far as the new Integral Fast Reactors are concerned - at present there are none in operation. So, who knows how long it would take to get even one built in Australia? Generation 1V reactors (Gen IV) are a set of theoretical nuclear reactor designs currently being researched. Most of these designs are generally not expected to be available for commercial construction before 2030. Small modular reactors are also still in the design stage.

### LG Fail

#### This card ends the debate---loan guarantees don’t work

Lovins 10 AMORY B. LOVINS is Chair and Chief Scientist of Rocky Mountain Institute "Nuclear Socialism" Weekly Standard, VOL. 16, NO. 06 Oct 25 www.weeklystandard.com/articles/nuclear-socialism\_508830.html?page=1

With such juicy incentives, why won’t private investors finance reactors? In 2005-08, with the strongest subsidies, capital markets, and nuclear politics in history, why couldn’t 34 proposed reactors raise any private capital? Because there’s no business case. As a recent study by Citibank U.K. is titled “New Nuclear—the Economics Say No.” That’s why central planners bought all 61 reactors now under construction worldwide. None were free-market transactions. Subsidies can’t reverse bleak fundamentals. A defibrillated corpse will jump but won’t revive.

American taxpayers already reimburse nuclear power developers for legal and regulatory delays. A unique law caps liability for accidents at a present value only one-third that of BP’s $20 billion trust fund for oil-spill costs; any bigger damages fall on citizens. Yet the competitive risks facing new reactors are uninsured, high, and escalating.

Since 2000, as nuclear power’s cost projections have more than tripled, its share of global electricity generation has fallen from 17 percent to 13 percent. That of cogeneration (making electricity together with useful heat in factories or buildings) and renewables (excluding big hydropower projects) rose from 13 percent to 18 percent.

These bite-sized, modular, quickly built projects—with financial risks, costs, and subsidies generally below nuclear’s and declining​—now dominate global power investments. Last year, renewables (wind, water, solar, geothermal), excluding large hydroelectric dams, attracted $131 billion of private capital and added 52 billion watts. Global nuclear output fell for the past three years, capacity for two.

### 2NC Not Competitive

#### IFRs are far off and super expensive – renewables sap investment

Wauchope 2012 - taught science before switching to nursing. She has several post-graduate qualifications, in health informatics, medical terminology and clinical coding (June 12, Noel, “Answering Barry Brook on Australia's nuclear power future” http://www.onlineopinion.com.au/view.asp?article=13726&page=0)

Barry Brook claims that there would be "cost benefits" for Australia to adopt these generation 1V nuclear reactors. This is a bald statement. As far as I can tell, nobody at present is able to estimate the costs. Particularly when it comes to the small reactors. One thing is accepted: the only way that these could ever be commercially viable would be if they were to be manufactured and sold in large numbers. The likelihood of this happening, of a mass production and sale of small reactors is dubious. For fast neutron reactors, large or small, Barry Brook himself admits that there are currently none in commercial operation. David Biello comments: Fast-neutron reactors would not improve the economics of nuclear power based on past experience, …. As far back as 1956, Adm. Hyman Rickover, who oversaw both the Navy's nuclear-propulsion efforts as well as the dawn of the civilian nuclear power industry, cited such sodium-cooled fast-neutron reactors as "expensive to build, complex to operate, susceptible to prolonged shutdown as a result of even minor malfunctions, and difficult and time-consuming to repair." That judgment remains despite six decades and $100 billion of global effort, according to physicist Michael Dittmar of the Swiss Federal Institute of Technology in Zurich who wrote, "ideas about near-future commercial fission breeder reactors are nothing but wishful thinking. Investment When trying to get a grip on the nuclear issue, a memorable quote from All The President's Men applies here provides a helpful tip "Follow the money". The nuclear industry has a world-wide problem in that it can get private investment only where the government subsidises it, and also takes on the costs of nuclear disasters and permanent radioactive waste disposal. This is made even more difficult now by the strong swing towards investment in renewable energy. Total investment in renewable energy, from both private and public sources, reached $211 billion in 2010, and continues to climb.

### 2NC LWRs Solve Better

#### Current nuclear solves – IFRs aren’t cost competitive

McCutcheon 2010 (September 1, Chuck, “Can Nuclear Waste Spark an Energy Solution?” <http://news.nationalgeographic.com/news/2010/08/100831-can-nuclear-waste-spark-an-energy-solution/>)

Which side is right? It’s difficult to say without further study, said Albert Machiels, a senior technical executive for the Electric Power Research Institute in Palo Alto, California, the electric utility industry’s leading think tank. He notes that current nuclear reactors, as costly as they are, operate at more than 90 percent capacity—making them the most efficient electricity generators in the power fleet. It would take years of investment to bring the price of PRISM or any IFR technology down to a level where it can compete in the market with the older, proven nuclear power technology. “This is a technology that is very promising on paper,” Machiels said, “but is not going to happen without significant research.”

## China DA

### Solves Case – Piggybacking IL

#### Chinese thorium development causes thorium adoption in the US

K. Steiner-Dicks – Nuclear Energy Insider – 1/9/13, 2013: Re-thinking nuclear energy's potential, http://analysis.nuclearenergyinsider.com/new-build/2013-re-thinking-nuclear-energys-potential

China is looking for a new energy solution since it is in desperate need of clean, reliable home grown electricity. Home grown due to political tensions from neighbours, such as Vietnam, Japan and the Philippines, which leaves the growing residential and commercial population vulnerable to energy imports and looming black outs. If China has the talent and the deep pockets to pay the thorium research bill, then perhaps this could be their moment to find the answers to the uncertainties still hovering over thorium for use in commercial reactors. It is also this level of determination to find a solution that could help the US Department of Energy reconsider its position on thorium-based reactors so that it too has a piece of a potentially lucrative market that itself first researched and developed into a reactor at Tennessee’s Oak Ridge National Laboratory in the form of a molten salt-based reactor. News reports have surfaced that the US is already interested in collaborating with the Chinese thorium project. So it looks like the thorium rector race has at least started and not just for the Chinese and the Americans, but the Norwegians, the Japanese, the British and the Russians. Each nation has a vetted interest, but for very different reasons ranging from power security, boosted commercial export revenues, environmental safety, or just plain old political prowess.

#### The US is uniquely positioned to adopt thorium once China proves it’s commercializable

Evans-Pritchard 10, Ambrose Evans-Pritchard is the International Business Editor of telegraph, “Obama could kill fossil fuels overnight with a nuclear dash for thorium” 8-29-2010, <http://www.telegraph.co.uk/finance/comment/7970619/Obama-could-kill-fossil-fuels-overnight-with-a-nuclear-dash-for-thorium.html>,)

You might have thought that thorium reactors were the answer to every dream but when CERN went to the European Commission for development funds in 1999-2000, they were rebuffed. Brussels turned to its technical experts, who happened to be French because the French dominate the EU’s nuclear industry. "They didn’t want competition because they had made a huge investment in the old technology," he said. Another decade was lost. It was a sad triumph of vested interests over scientific progress. "We have very little time to waste because the world is running out of fossil fuels. Renewables can’t replace them. Nuclear fusion is not going work for a century, if ever," he said. The Norwegian group Aker Solutions has bought Dr Rubbia’s patent for an accelerator-driven sub-critical reactor, and is working on his design for a thorium version at its UK operation. Victoria Ashley, the project manager, said it could lead to a network of pint-sized 600MW reactors that are lodged underground, can supply small grids, and do not require a safety citadel. It will take £2bn to build the first one, and Aker needs £100mn for the next test phase. The UK has shown little appetite for what it regards as a "huge paradigm shift to a new technology". Too much work and sunk cost has already gone into the next generation of reactors, which have another 60 years of life. So Aker is looking for tie-ups with countries such as the US, Russia, or China. The Indians have their own projects - none yet built - dating from days when they switched to thorium because their weapons programme prompted a uranium ban. America should have fewer inhibitions than Europe in creating a leapfrog technology. The US allowed its nuclear industry to stagnate after Three Mile Island in 1979. Anti-nuclear neorosis is at last ebbing. The White House has approved $8bn in loan guarantees for new reactors, yet America has been strangely passive. Where is the superb confidence that put a man on the moon? A few US pioneers are exploring a truly radical shift to a liquid fuel based on molten-fluoride salts, an idea once pursued by US physicist Alvin Weinberg at Oak Ridge National Lab in Tennessee in the 1960s. The original documents were retrieved by Mr Sorensen. Moving away from solid fuel may overcome some of thorium’s "idiosyncracies". "You have to use the right machine. You don’t use diesel in a petrol car: you build a diesel engine," said Mr Sorensen. Thorium-fluoride reactors can operate at atmospheric temperature. "The plants would be much smaller and less expensive. You wouldn’t need those huge containment domes because there’s no pressurized water in the reactor. It’s close-fitting," he said. Nuclear power could become routine and unthreatening. But first there is the barrier of establishment prejudice. When Hungarian scientists led by Leo Szilard tried to alert Washington in late 1939 that the Nazis were working on an atomic bomb, they were brushed off with disbelief. Albert Einstein interceded through the Belgian queen mother, eventually getting a personal envoy into the Oval Office. Roosevelt initially fobbed him off. He listened more closely at a second meeting over breakfast the next day, then made up his mind within minutes. "This needs action," he told his military aide. It was the birth of the Manhattan Project. As a result, the US had an atomic weapon early enough to deter Stalin from going too far in Europe. The global energy crunch needs equal "action". If it works, Manhattan II could restore American optimism and strategic leadership at a stroke: if not, it is a boost for US science and surely a more fruitful way to pull the US out of perma-slump than scattershot stimulus. Even better, team up with China and do it together, for all our sakes.

### Solves Case – Waste

#### Solves waste

RICHARD MARTIN – author of "SuperFuel,” editor for Wired, editorial director for Pike Research – 2/1/11, China Takes Lead in Race for Clean Nuclear Power, <http://www.wired.com/wiredscience/2011/02/china-thorium-power/>

While nearly all current nuclear reactors run on uranium, the radioactive element thorium is recognized as a safer, cleaner and more abundant alternative fuel. Thorium is particularly well-suited for use in molten-salt reactors, or MSRs. Nuclear reactions take place inside a fluid core rather than solid fuel rods, and there’s no risk of meltdown. In addition to their safety, MSRs can consume various nuclear-fuel types, including existing stocks of nuclear waste. Their byproducts are unsuitable for making weapons of any type. They can also operate as breeders, producing more fuel than they consume.

#### More ev

Hargraves and Moir 10, Robert Hargraves is a professor of energy policy at Dartmouth, Ph.D. in physics from Brown. Ralph Moir worked at the Lawrence Livermore National laboratory and received his Doctorate in Science in nuclear engineering from MIT, “Liquid Fluoride Thorium Reactors An old idea in nuclear power gets reexamined”, July-August, 2010, http://www.coalitionforenergysolutions.org/2010\_07hargraves2.pdf)

Waste Not Among the most attractive features of the LFTR design is its waste profile. It makes very little. Recently, the problem of nuclear waste generated during the uranium era has become both more and less urgent. It is more urgent because as of early 2009, the Obama administration has ruled that the Yucca Mountain Repository, the site designated for the permanent geological isolation of existing U.S. nuclear waste, is no longer to be considered an option. Without Yucca Mountain as a strategy for waste disposal, the U.S. has no strategy at all. In May 2009, Secretary of Energy Steven Chu, Nobel laureate in physics, said that Yucca Mountain is off the table. What we’re going to be doing is saying, let’s step back. We realize that we know a lot more today than we did 25 or 30 years ago. The [Nuclear Regulatory Commission] is saying that the dry-cask storage at current sites would be safe for many decades, so that gives us time to figure out what we should do for a long-term strategy. The waste problem has become somewhat less urgent because many stakeholders believe Secretary Chu is correct that the waste, secured in huge, hardened casks under adequate guard, is in fact not vulnerable to any foreseeable accident or mischief in the near future, buying time to develop a sound plan for its permanent disposal. A sound plan we must have. One component of a long-range plan that would keep the growing problem from getting worse while meeting growing power needs would be to mobilize nuclear technology that creates far less waste that is far less toxic. The liquid fluoride thorium reactor answers that need. Thorium and uranium reactors produce essentially the same fission (breakdown) products, but they produce a quite different spectrum of actinides (the elements above actinium in the periodic table, produced in reactors by neutron absorption and transmutation). The various isotopes of these elements are the main contributors to the very long-term radiotoxicity of nuclear waste. The mass number of thorium-232 is six units less than that of uranium- 238, thus many more neutron captures are required to transmute thorium to the first transuranic. Figure 6 shows that the radiotoxicity of wastes from a thorium/uranium fuel cycle is far lower than that of the currently employed uranium/plutonium cycle— after 300 years, it is about 10,000 times less toxic. By statute, the U.S. government has sole responsibility for the nuclear waste that has so far been produced and has collected $25 billion in fees from nuclear-power producers over the past 30 years to deal with it. Inaction on the waste front, to borrow the words of the Obama administration, is not an option. Many feel that some of the $25 billion collected so far would be well spent kickstarting research on thorium power to contribute to future power with minimal waste

### Solves Case – Prolif

#### A global transition to thorium creates a supply-side check on proliferation – the best thing we can do is let China develop and export it

(export link is in 1nc Kachan card)

Hargraves and Moir 10, Robert Hargraves is a professor of energy policy at Dartmouth, Ph.D. in physics from Brown. Ralph Moir worked at the Lawrence Livermore National laboratory and received his Doctorate in Science in nuclear engineering from MIT, “Liquid Fluoride Thorium Reactors An old idea in nuclear power gets reexamined”, July-August, 2010, http://www.coalitionforenergysolutions.org/2010\_07hargraves2.pdf)

Nonproliferation Cost competitiveness is a weighty consideration for nuclear power development, but it exists on a somewhat different level from the life-and-death considerations of waste management, safety and nonproliferation. Escalating the role of nuclear power in the world must be anchored to decisively eliminating the illicit diversion of nuclear materials. When the idea of thorium power was first revived in recent years, the focus of discussion was its inherent proliferation resistance (see the September–October 2003 issue of American Scientist; Mujid S. Kazimi, “Thorium Fuel for Nuclear Energy”). The uranium-233 produced from thorium-232 is necessarily accompanied by uranium-232, a proliferation prophylactic. Uranium-232 has a relatively short half-life of 73.6 years, burning itself out by producing decay products that include strong emitters of highenergy gamma radiation. The gamma emissions are easily detectable and highly destructive to ordnance components, circuitry and especially personnel. Uranium-232 is chemically identical to and essentially inseparable from uranium-233. The neutron economy of LFTR designs also contributes to securing its inventory of nuclear materials. In the LFTR core, neutron absorption by uranium-233 produces slightly more than two neutrons per fission—one to drive a subsequent fission and another to drive the conversion of thorium- 232 to uranium-233 in the blanket solution. Over a wide range of energies, uranium-233 emits an average of 2.4 neutrons for each one absorbed. However, taking into account the overall fission rate per capture, capture by other nuclei and so on, a welldesigned LFTR reactor should be able to direct about 1.08 neutrons per fission to thorium transmutation. This delicate poise doesn’t create excess, just enough to generate fuel indefinitely. If meaningful quantities of uranium-233 are misdirected for nonpeaceful purposes, the reactor will report the diversion by winding down because of insufficient fissile product produced in the blanket. Only a determined, well-funded effort on the scale of a national program could overcome the obstacles to illicit use of uranium-232/233 produced in a LFTR reactor. Such an effort would certainly find that it was less problematic to pursue the enrichment of natural uranium or the generation of plutonium. In a world where widespread adoption of LFTR technology undermines the entire, hugely expensive enterprise of uranium enrichment—the necessary first step on the way to plutonium production—bad actors could find their choices narrowing down to unusable uranium and unobtainable plutonium.

### Link – SMRs

#### US SMR leadership dictates reactor choice to the rest of the world

Rosner and Goldberg 11 – William E. Wrather Distinguished Service Professor in the Departments of Astronomy and Astrophysics and Physics at the University of Chicago, and Special Assistant to the Director at the Argonne National Laboratory (Robert and Stephen, November. “Small Modular Reactors – Key to Future Nuclear Power Generation in the U.S.” <https://epic.sites.uchicago.edu/sites/epic.uchicago.edu/files/uploads/EPICSMRWhitePaperFinalcopy.pdf>)

As stated earlier, SMRs have the potential to achieve significant greenhouse gas emission reductions. They could provide alternative baseload power generation to facilitate the retirement of older, smaller, and less efficient coal generation plants that would, otherwise, not be good candidates for retrofitting carbon capture and storage technology. They could be deployed in regions of the U.S. and the world that have less potential for other forms of carbon-free electricity, such as solar or wind energy. There may be technical or market constraints, such as projected electricity demand growth and transmission capacity, which would support SMR deployment but not GW-scale LWRs. From the on-shore manufacturing perspective, a key point is that the manufacturing base needed for SMRs can be developed domestically. Thus, while the large commercial LWR industry is seeking to transplant portions of its supply chain from current foreign sources to the U.S., the SMR industry offers the potential to establish a large domestic manufacturing base building upon already existing U.S. manufacturing infrastructure and capability, including the Naval shipbuilding and underutilized domestic nuclear component and equipment plants. The study team learned that a number of sustainable domestic jobs could be created – that is, the full panoply of design, manufacturing, supplier, and construction activities – if the U.S. can establish itself as a credible and substantial designer and manufacturer of SMRs. While many SMR technologies are being studied around the world, a strong U.S. commercialization program can enable U.S. industry to be first to market SMRs, thereby serving as a fulcrum for export growth as well as a lever in influencing international decisions on deploying both nuclear reactor and nuclear fuel cycle technology. A viable U.S.-centric SMR industry would enable the U.S. to recapture technological leadership in commercial nuclear technology, which has been lost to suppliers in France, Japan, Korea, Russia, and, now rapidly emerging, China.

### AT: Causes Prolif

#### Theoretically possible to technically impossible – no material diversion

Richard Martin - author of "SuperFuel,” editor for Wired, editorial director for Pike Research - 5/4/12, Is Thorium A Magic Bullet For Our Energy Problems?, NPR, <http://www.npr.org/2012/05/04/152026805/is-thorium-a-magic-bullet-for-our-energy-problems>

And so we're talking about building a reactor that can process that into forms that are much, much easier to deal with. And so that's the waste issue. The proliferation issue is complicated. And the point that Dr. Makhijani, in the paper that I've read, brings up but then kind of dismisses is that in order to build a bomb with uranium-233, you somehow have to obtain it out of the reactor. And because this is a self-contained, liquid fuel system, it's - there's no point at which you can divert material. There's no material sitting in a warehouse somewhere, getting ready to be put in the reactor and so on. And to be able to obtain that material, you would have to somehow breach the reactor, shut it down, separate out the fissionable material and get away with it. And as I say in "SuperFuel," the book, good luck with that. But the other point is that even if you did manage to do that, the uranium-233 is contaminated with yet another isotope, U-232, which is one of the nastiest substances in the universe, and it makes handling and processing and separating out the U-233 virtually impossible, even for a sophisticated nuclear power lab, much less for a rogue nation, or terrorist group or someone of that ilk. So to say that in principle you could obtain material with which you could make a bomb from a liquid-fueled thorium reactor is true. In the real world, the chances of that are, you know, very, very slim - so much as to be negligible.

### AT: Timeframe

#### It’s just a question of talent and investment – China is committed in the squo

K. Steiner-Dicks – Nuclear Energy Insider – 1/9/13, 2013: Re-thinking nuclear energy's potential, http://analysis.nuclearenergyinsider.com/new-build/2013-re-thinking-nuclear-energys-potential

According to a news report out this week by The Daily Telegraph, Jiang Mianheng, son of former Chinese President Jiang Zemin, is spearheading a thorium power project for the Chinese National Academy of Sciences with a start-up budget of US$350m. “He has already recruited 140 PhD scientists, working full-time on thorium power at the Shanghai Institute of Applied Physics. He will have 750 staff by 2015,” said the report. People such as Bryony Worthington, head of the UK’s All-Parliamentary Group on Thorium Energy, who have recently visited the Shanghai research facility, say that China is determined to make a breakthrough and they have the talent to make a more than decent attempt to achieve it. In some ways China’s dogged determination of achieving a scientific breakthrough can be likened to the summer days of 1969 when US President Johnson (and the initial vision of the late President John F. Kennedy) and NASA engineers got Neil Armstrong to safely walk the moon’s surface. China is looking for a new energy solution since it is in desperate need of clean, reliable home grown electricity. Home grown due to political tensions from neighbours, such as Vietnam, Japan and the Philippines, which leaves the growing residential and commercial population vulnerable to energy imports and looming black outs. If China has the talent and the deep pockets to pay the thorium research bill, then perhaps this could be their moment to find the answers to the uncertainties still hovering over thorium for use in commercial reactors.

#### China is the global leader on thorium research – they’ll succeed

RICHARD MARTIN – author of "SuperFuel,” editor for Wired, editorial director for Pike Research – 2/1/11, China Takes Lead in Race for Clean Nuclear Power, <http://www.wired.com/wiredscience/2011/02/china-thorium-power/>

China’s new program is the largest national thorium-MSR initiative to date. The People’s Republic had already announced plans to build dozens of new nuclear reactors over the next 20 years, increasing its nuclear power supply 20-fold and weaning itself off coal, of which it’s now one of the world’s largest consumers. Designing a thorium-based molten-salt reactor could place China at the forefront of the race to build environmentally safe, cost-effective and politically palatable reactors.

#### Uranium-fueled reactors can’t solve domestic resource shortages – china imports most of its uranium

First Post – 3/13/12, China to step up uranium imports; plans to buy mines abroad, http://www.firstpost.com/fwire/china-to-step-up-uranium-imports-plans-to-buy-mines-abroad-242580.html

China plans to import more uranium this year and is busy scouting to buy uranium mines abroad especially in Canada as it gears up to resume its nuclear power projects in a big way after a year-long halt to review security measures following Fukoshima nuclear disaster. The prospect that nuclear projects will be started again this year is not the only reason behind China’s prediction that it will import more uranium in 2012, state-run China Daily reported. Another reason is the likelihood that “a few overseas mines will start production this year,” it quoted Xiao Xinjian, industry expert at the Energy Research Institute, affiliated with the National Development and Reform Commission, as saying. China at present buys 95 percent of the uranium from Kazakhstan, Uzbekistan, Namibia and Australia. Canada has “agreed to cooperate” more uranium trade during Canadian Prime Minster Stephen Harper’s recent visit to China, it said. China’s Guangdong Nuclear Power Group Co has offered to buy 261.9 million shares from Kalahari Minerals Plc, global resource company owning uranium and gold reserves in Namibia. The deal, which concerns 98 percent of the ownership of Kalahari Minerals, was approved in February. China can produce 850 tons of uranium a year, an amount expected to increase to 2,500 tons in the future, Ux Consulting, a researcher on uranium said. China imported 17,136 tons of uranium in 2010 which was three times the quantity of the previous year, according to the nation’s customs agency. According to the World Nuclear Association (WNA), China’s annual consumption of uranium will reach 20,000 tons by 2020, about one third of global output in 2009. According to last year estimates, China produces around 750 tons of uranium per year. The demand-supply gap of uranium is expected to exceed 10,000 tons by 2015 and reach nearly 30,000 tons by 2030, according to Yan Qiang, a researcher with Chinese Academy of Geological Sciences.

# 1NR

## 1NR IAEA CP

### AT: Perm do the CP

#### a) Incentives must establish sufficient conditions for receiving reward

Summerfield, Managing Editor at MediaTec Publishing, 07

(What Incentives Aren't, Talent Management Magazine, <http://98.129.115.244/articles/view/what-incentives-arent/1>)

When discussing incentives systems, talent managers need to make sure the proper meaning of the term is conveyed because occasionally it is misapplied. The confusion isn’t surprising — after all, “incentive” is quite broad, and sometimes people use the word to describe programs that don’t really fit into that category. The following are categories within the overall compensation-and-benefits rubric that are not employee incentives in the narrow, talent management-related sense but might be considered as such in the more general understanding of the word. Benefits Things such as health insurance and pension plans are definitely perquisites, but they aren’t really incentives. These programs are tied to the mere fact of employment, not performance targets. (Certainly, a salesperson isn’t going to get more health coverage for exceeding a quarterly quota.) Rather, these programs are exactly what the name implies: benefits. Typically, benefits are aimed more at recruiting and retaining top-notch employees than at motivating them to achieve and surpass objectives. Fringe Benefits These are closely related to benefits but aren’t quite the same — they could be called the icing on the benefits cake. Fringe benefits usually have more to do with what employees want than what they need, and they can range from an exciting and prestigious office location to a break room mini-fridge that’s constantly stocked with soda. In spite of the slight dissimilarities between fringe benefits and benefits, they are not incentives for the same reason: They have more to do with attracting and keeping workers than encouraging them. Development Programs that help employees build up their knowledge and skill sets can be incentives in an indirect sense. In particular, individuals might work harder to qualify for a high-potential development program. But speaking generally, development is not an incentive, as its main purpose is to equip personnel with proficiencies they need to perform in their job. Motivation is secondary, if it’s considered at all. Pay Compensation is a tricky one because, in a sense, it’s the ultimate incentive — the paycheck is the reason employees show up to work in the first place. Most people cannot work for free and wouldn’t be inclined to anyway. That said, where talent management is concerned, pay is based on work in the broader context. In other words, income is designed to induce employees to do their jobs and nothing more. What Incentives Are Defining something in the negative (as in, what it’s not) can be illustrative, but it’s not explicitly explanatory. So, then, what does “incentives” refer to in the compensation-and-benefits sphere? Specifically, an incentive is any monetary or nonmonetary reward that aims to encourage a very narrowly defined performance or behavioral objective. It can be applied at the individual, group, department or even enterprise level, but it must be tied to some sort of measurable target. It’s purely motivational in nature. Some of you might be thinking, “Well, what about bonuses? Those are incentives, right?” That depends. An end-of-the-year bonus for the holidays wouldn’t count as an incentive. Neither would an across-the-board bonus handed out to employees for exceeding profit forecasts after the fact. On the other hand, salespeople who work hard to exceed their quarterly quota to receive a cash reward are pursuing incentives. The point is that incentives can’t be arbitrary or routine, and the proposition must precede the achievement (e.g., “If you do X, then you’ll get Y in return.”)

#### b) That means the permutation severs out of the proposition of the plan because meeting the conditions they specified in the plan no longer guarantees reward – it’s insufficient

Bisceglia 10

(Journalism Intern at Housatonic Community College and Editor in Chief of Horizons, Tips on arguing: necessary and sufficient conditions, www.examiner.com/article/tips-on-arguing-necessary-and-sufficient-conditions)

Although the terms “necessary and sufficient” are often used together, they are really two separate things: necessary conditions, and sufficient conditions. Each has a very different function. Necessary conditions are required for an effect to take place. However, they do not guarantee that the effect will occur. In logic, they can be phrased as “without x, there can be no y.” For example, a temperature of 32 degrees or below is a necessary condition for snow, because anything warmer will bring rain. But a cold day doesn’t always bring snow. It could just as easily be cold and sunny. Sufficient conditions, on the other hand, do guarantee that an effect will occur. They can be phrased as “if x, then y.”

#### 2) They sever “for the purpose of” – loan guarantee only contingent on building plants

Plan: The United States Federal Government should substantially increase commercial loan guarantees to develop and deploy Power Reactor Innovative Small Module reactors for the purpose of energy production in the United States.

#### 3) The perm severs resolved which means a firm course of action - American Heritage Dictionary, 2000

v. tr. To make a firm decision about.

4) The perm severs should which means a binding obligation - American Heritage Dictionary, 2000

should aux.v. Past tense of shall

Used to express obligation or duty: You should send her a note.

### AT: Condition CP’s Bad

#### 1) The counterplan promotes development of negotiation skills by focusing debate around maximization of gains from incentive offers – prioritize negotiation skills because they are essential for resolving all macro and micro level problems

Nierenberg, Lawyer and founder of the Negotiation Institute, 68

(The Art of Negotiating, pg. vii - 3)

When human beings exchange ideas for the purpose of changing their relationships, we call this process "negotiation." Although the term has often been applied to the limited area of labor-management relations or political confrontations, the activity of negotiating is universal. It is used as a means of achieving one's goals in every relationship regardless of the circumstances. This broad view of negotiation opens our minds; we see that we negotiate every day, in every way, in every relationship. The art of negotiating—which is rooted in the study of human behavior—is applicable in all life situations. The Cooperative Process In the days of the robber barons, negotiation was usually consid- ered a "game" that was won or lost. Indeed, in unstructured, un- tutored negotiation, the winning or losing is the main point. If, however, we broaden our point of view to see that all life situations are negotiable, the win/lose approach becomes untenable. Would vou play win/lose games with your wife or husband? your boss? your community? Your nation? Probably not. The risks are great, and the chances are you will wind up a loser as often as you are a winner. The complexity of today's world requires new, well-thought-out methods of negotiation that produce agreement and understanding. Both parties involved can gain and ultimately win. A competitive spirit is necessary but does not have to be divisive. In fact, quite the opposite will happen . . . instead of creating a rift, each negotiator's competence will enhance the other's, and result in the achievement of a common goal. Competition then becomes a cooperative effort. My observations and research indicate that good negotiation is manifested similarly no matter what the level of organization. From families to businesses, from block associations to international orga- nizations, the basic needs (although weighted differently) are the same. If the negotiator, both generally and in terms of the specific negotiation, will evaluate his or her own attitudes, values, and philo- sophies, then a similar evaluation of the attitudes, values, and philosophies of the opposer should become second nature. Armed with this awareness, the negotiator ensures that the needs of both parties are satisfied. The idea that wveryone wins in a successful negotiation is not being presented here solely on ethical grounds. In actuality it is con- sidered simply good business. It is a matter of securing long-range objectives instead of short-term advantages. Negotiated solutions are likely to be long-lasting when each party has gained and has a stake in maintaining the conclusion. The negotiator who has acquired the skills and techniques presented here will be able to negotiate successful conclusions that will satisfy all parties involved, by replacing the outdated win-lose attitude with the art of genuinely creative negotiating. Recently two of my sons were squabbling over some leftover apple pie, each insisting that he should have the larger slice. Neither would agree to an even split. So I suggested that one boy cut the pie any way he liked, and the other boy could choose the piece he wanted. This sounded fair to both of them, and they accepted it. Each felt that he had gotten a square deal. This was an example of "perfect" negotiation. A salesman is trying to close a large sale. Basically his proposi- tion is acceptable to the prospective customer—but there are still a number of questions to be answered. How much discount can he give? Who will have to warehouse the bulk of the order—buyer or seller? Can delivery be sped up? Will the seller agree to give the buyer price protection on reorders for two years? Buyer and seller negotiate the sale. In a time when the computer has made many jobs obsolete, the role of negotiator grows in importance. For we arc all negotiators. What Is Negotiation? Nothing could be simpler in definition or broader in scope than negotiation. Every desire that demands satisfaction—and every need to be met—is at least potentially an occasion for people to initiate the negotiating process. Whenever people exchange ideas with the intention of changing relationships, whenever they confer for agreement, they are negotiating. Negotiation depends on communication. It occurs between in- dividuals acting either for themselves or as representatives of organized groups. Therefore negotiation can be considered an element of human behavior. Aspects of it have been dealt with by both the traditional and the new behavioral sciences, from history, jurisprudence, economics, sociology, and psychology to cybernetics, general semantics, game and decision-making theory, and general systems. Yet the full scope of negotiation is too broad to be confined to one or even a group of the existing behavioral sciences. Every day, the New York Times reports hundreds of negotiations. At the United Nations and in capitals around the world attempts are made to settle the "small" wars. Government agencies negotiate with the United States Congress for appropriations. A utility company confers with a regulatory agency on rates. A strike is settled. Two companies agree to merge but must obtain the consent of the Justice Department. A small but valuable piece of real estate changes hands. These are the types of negotiations that the Times might describe any day of the week. Occasionally there may be a spectacular agreement, such as the nuclear test ban treaty, to attract worldwide attention. But even more important, at least to the people that participated in them, are the countless negotiations that are not mentioned in the Times or in any other newspaper.

### AT: Uncertainty

#### 3) Uncertainty inevitable because of regulatory approval – the counterplan doesn’t add a meaningful amount

IEA, International Energy Agency, 07

(High Risk of Underinvestment in Power Generation in current climate of uncertainty, www.iea.org/newsroomandevents/pressreleases/2007/may/name,20212,en.html)

Some of the most serious direct risks in the current investment climate result from government policy. “Uncertainty about policy on climate change and CO2 abatement is the principal risk factor when investors choose technology today”, Mr. Mandil said. Uncertainty about government support for specific generation technologies also creates considerable risks. Furthermore, no market signals or policy-driven incentives will have effect if investors cannot get permission to build new electricity infrastructure. Mr. Mandil underlined that delays associated with regulatory approval of new power plants frustrate markets, increase costs of projects and may undermine security of supply. This is particularly true for new nuclear power plants and new transport infrastructure which require several years to go through the regulatory process.

#### 4) Uncertainty inevitable – electricity prices

IEA, International Energy Agency, 03

(POWER GENERATION INVESTMENT IN ELECTRICITY MARKETS, www.hks.harvard.edu/hepg/Papers/Fraser.gen.invest.elec.mkts.1203.pdf

The most fundamental change affecting the value of investments in liberalised markets is the inherent uncertainty about electricity prices in electricity markets. The uncertain future level of prices from investment in generation creates a risk for the investor. While this risk affects all generating technologies8, it does so in different ways. Technologies which have a higher specific investment for capacity even though they may have relatively low fuel costs (wind, nuclear) are more greatly affected by this risk because there is less they can do to respond. Thus, although high capital cost and low fuel cost technologies will likely be competitive in the short-run and therefore produce electricity, they will be more exposed to cover capital employed. A firm reliant on such technologies may find itself in financial difficulties if prices slump for a prolonged period. The recent experience of British Energy in the UK electricity market – leading to action by the UK government to support the company – is a case in point9.

### AT: IAEA Sucks

#### 2) IAEA inspections are effective and US support increases their potency

Sagan, Professor of Political Science and Co-Director of the Center for International Security and Cooperation at Stanford and Co-Chair of the Global Nuclear Future Initiative at the American Academy of Arts and Sciences, 11

(4/18, The International Security Implications of U.S. Domestic Nuclear Power Decisions, http://cybercemetery.unt.edu/archive/brc/20120621005012/http://brc.gov/sites/default/files/documents/sagan\_brc\_paper\_final.pdf)

My point in raising this case is not to criticize the NRC. It is to call attention to the need for the U.S. government and the NRC to be more transparent in explaining U.S. physical security challenges, improvements over time, and procedures for evaluation and exercises to foreign governments, to encourage them to adopt similar procedures and make similar changes as new threats emerge. U.S. support for influential non-governmental organizations – such as WINS – and U.N. organizations – such as the IAEA – can further enhance their ability to promote strong global standards and the implementation of physical protection of nuclear facilities and materials in transport and storage. Current standards for physical protection of nuclear facilities vary widely around the world, and are often overly reactive. Through active support and participation in WINS, U.S. companies and the U.S. government can help identify and promote global best practices for the use of Design Basis Threat methodologies, for training guard forces and emergency management teams, and for assessing risks to facilities. The IAEA safeguards inspections discussed above also have a less direct, but nonetheless important, role in promoting physical security. IAEA oversight and the promise of visits encourage vigilance and watchfulness.

#### 3) Signal

#### a) Independent of inspections the counterplan demonstrates movement towards disarm

Sagan, Professor of Political Science and Co-Director of the Center for International Security and Cooperation at Stanford and Co-Chair of the Global Nuclear Future Initiative at the American Academy of Arts and Sciences, 10

(Shared Responsibilities for Nuclear Disarmament: A Global Debate, www.amacad.org/pdfs/saganInside.pdf)

Second, Article IV refers to “all the Parties to the Treaty,” not just the NNWS. This should lead to increased opportunities to share responsibility for nonproliferation and disarmament, for it suggests that as part of their Article IV commitment, the NWS should reaffirm that international safeguards can eventually be placed on all of their nuclear power plants and enrichment and reprocessing facilities. Indeed, such an agreement in principle, with an exception for facilities with “direct national security significance,” was in fact made by President Lyndon Johnson in 1967, as a major compromise during the NPT negotiations.10 Reaffirming this commitment, as a responsibility under Article IV, should be easy to accept in principle; after all, if NWS are committed to working in good faith toward nuclear disarmament, at some point they would become, to coin an acronym, FNWS (former nuclear-weapons states), and the safeguard exceptions they currently maintain would no longer apply. In practice, it would be helpful for NWS to go beyond reaffirmations and expressions of principle and pick one or more model facilities to place under advanced safeguards, to demonstrate future intentions and help create best practices. Strict safeguards on existing nuclear-fuel production facilities in the NWS are not really necessary today to ensure that the materials from the plants are not diverted for nuclear weapons, since NWS already have sufficient fissile materials from their military nuclear production programs. But placing new facilities under IAEA safeguards would signal equitable treatment and a longterm commitment to disarmament. Similar safeguards will also be needed if a Fissile Material Cut-off Treaty (FMCT), ending the production of materials for weapons, is successfully negotiated, though in this case the verification and safeguarding functions would be best handled (at least initially) by a new organization of inspectors from NWS, rather than the IAEA, so as to limit access into sensitive former weapons-material production facilities

#### b) That’s a prerequisite to solving global prolif

Sagan, Professor of Political Science and Co-Director of the Center for International Security and Cooperation at Stanford and Co-Chair of the Global Nuclear Future Initiative at the American Academy of Arts and Sciences, 10

(Shared Responsibilities for Nuclear Disarmament: A Global Debate, www.amacad.org/pdfs/saganInside.pdf)

A closer reading of these various declarations, however, reveals both the complexity of motives and the multiplicity of fears behind the current surge in support of nuclear disarmament. Some declarations emphasize concerns that the current behavior of nuclear-weapons states (NWS) signals to non-nuclearweapons states (NNWS) that they, too, will need nuclear weapons in the future to meet their national security requirements. Other disarmament advocates stress the growth of global terrorism and the need to reduce the number of weapons and the amount of fissile material that could be stolen or sold to terrorist groups. Some argue that the risk of nuclear weapons accidents or launching nuclear missiles on false warning cannot be entirely eliminated, despite sustained efforts to do so, and thus believe that nuclear deterrence will inevitably fail over time, especially if large arsenals are maintained and new nuclear states, with weak command-and-control systems, emerge. Perhaps the most widespread motivation for disarmament is the belief that future progress by the NWS to disarm will strongly influence the future willingness of the NNWS to stay within the NPT. If this is true, then the choice we face for the future is not between the current nuclear order of eight or nine NWS and a nuclear-weapons-free world. Rather, the choice we face is between moving toward a nuclear-weapons-free world or, to borrow Henry Rowen’s phrase, “moving toward life in a nuclear armed crowd.”

#### 4) IAEA inspections work – they build confidence necessary to prevent chains of proliferation

Acton, Associate in the Nonproliferation Program at the Carnegie Endowment, 10

(Deterring Safeguards Violations, www.carnegieendowment.org/files/acton\_policy\_outlook.pdf)

Moreover, downplaying safeguards violations is short-sighted from a policy perspective since reporting and inspections are central to the purpose of the NPT. Security is, as George Perkovich has remarked, the often-ignored “fourth pillar” of the NPT (nonproliferation, disarmament, and promoting the peaceful use of nuclear energy are the widely recognized three). The treaty’s basic security logic is that a state will be more secure and less likely to acquire nuclear weapons if it is convinced that its neighbors (and any other states it worries about) are not proliferating. Similarly, the neighbors will also be more likely to refrain from proliferation if they are convinced that the first state is showing similar restraint. The transparency regime created by safeguards is central to this confidence building and therefore to the whole purpose of the NPT. For this reason it is self-defeating to dismiss intentional safeguards violations as minor technical issues.

#### 5) History validates the importance of IAEA safeguards

Sagan, Professor of Political Science and Co-Director of the Center for International Security and Cooperation at Stanford and Co-Chair of the Global Nuclear Future Initiative at the American Academy of Arts and Sciences, 11

(4/18, The International Security Implications of U.S. Domestic Nuclear Power Decisions, http://cybercemetery.unt.edu/archive/brc/20120621005012/http://brc.gov/sites/default/files/documents/sagan\_brc\_paper\_final.pdf)

Moreover, the NPT includes requirements for NNWS members to accept safeguards –inspections run by the IAEA – on their nuclear power facilities as a precondition for receiving peaceful nuclear assistance. This IAEA inspection system has caught a number of states (including Iran, North Korea, South Korea, and Egypt) either cheating on their NPT commitments or engaging in ambiguous but suspicious weapons-related activities. Thus, the NPT should not be seen as ineffective or irrelevant because some states have not complied with their commitments, for it is the treaty that legitimizes the inspections that can catch violators.

#### 6) IAEA inspections deter proliferation even if they don’t catch every violator

Hirsch , Attorney in the nonproliferation office of the State Department Legal Adviser, 04

(The IAEA Additional Protocol: What It Is and Why it Matters, cns.miis.edu/npr/pdfs/113hirsch.pdf)

The Additional Protocol, as it will be applied in NNWS, can be characterized as an effort to transform IAEA inspectors from accountants to detectives. But exactly what investigative powers does the Additional Protocol bestow? Does it provide for surprise inspections anytime, anywhere? Does it provide for more intrusive inspections? Does it allow for challenge inspections based on other states' allegations? In fact, while providing a significant enhancement of the IAEA's inspection mandate, it does none of these things. The Additional Protocol is best understood not as a panacea, but as a powerful, albeit limited, tool for deterring noncompliance with the NPT It does not eliminate the possibility of secret nuclear weapons development, but it makes pursuing such a program more costly and greatly increases the odds of being caught.

## 1NR Prolif Adv

#### FRs provide easy access for weapons grade plutonium – risks terrorism and proliferation

Cochran et al. 2010 – PhD. and consultant to the Natural Resources Defense Council where he began working in 1973. Prior to retiring in 2011, he was a senior scientist and held the Wade Greene Chair for Nuclear Policy at NRDC, and was director of its Nuclear Program until 2007. He has served as a consultant to numerous government and non-government agencies on energy, nuclear nonproliferation, nuclear reactor and nuclear waste matters (February, Thomas B., Harold A. Feiveson, Walt Patterson, Gennadi Pshakin, M.V. Ramana, Mycle Schneider, Tatsujiro Suzuki, Frank von Hippel, “Fast Breeder Reactor Programs: History and Status” <http://fissilematerials.org/library/rr08.pdf>)

The fast-neutron reactor fuel cycle provides easy access to plutonium for weapons. All reactors produce plutonium in their fuel but breeder reactors require plutonium recycle, the separation of plutonium from the ferociously radioactive fission products in the spent fuel. This makes the plutonium more accessible to would-be nuclear-weapon makers. Breeder reactors — and separation of plutonium from the spent fuel of ordinary reactors to provide startup fuel for breeder reactors — therefore create proliferation problems. This fact became dramatically clear in 1974, when India used the first plutonium separated for its breeder reactor program to make a “peaceful nuclear explosion.” Breeders themselves have also been used to produce plutonium for weapons. France used its Phénix breeder reactor to make weapon-grade plutonium in its blanket. India, by refusing to place its breeder reactors under international safeguards as part of the U.S.-India nuclear deal, has raised concerns that it might do the same. India’s Prototype Fast Breeder Reactor (PFBR), expected to be completed in 2010, will have the capacity to make 90 kg of weapon-grade plutonium per year, if only the radial blanket is reprocessed separately and 140 kg per year if both radial and axial blankets are reprocessed. 15 The Nagasaki bomb contained 6 kg of weapon-grade plutonium and modern weapons designs contain less. At 5 kg per warhead, the PFBR would produce enough weapon-grade plutonium for 20–30 nuclear weapons a year, a huge increase in production capacity in the context of the South Asian nuclear arms race. The G.W. Bush Administration proposed to make reprocessing more “proliferation resistant” by leaving some of the other transuranic elements (neptunium, americium and curium) mixed with the plutonium. 16 Even if all the transuranics were left mixed with the plutonium, however — a project that the U.S. Department of Energy abandoned when it learned that the technology was not in hand — the gamma radiation field surrounding the mix would still be less than one-hundredth the level the IAEA considers self-protecting against theft and thousands of times less than the radiation field surrounding plutonium when it is in spent fuel (figure 1.4).