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## Offcase

### Off 1

#### R&D isn’t T

#### Violates Energy production---it’s pre-production

Koplow 4 Doug Koplow is the founder of Earth Track in Cambridge, MA. He has worked on natural resource subsidy issues for 20 years, primarily in the energy sector "Subsidies to Energy Industries" Encyclopedia of Energy Vol 5 2004www.earthtrack.net/files/Energy%20Encyclopedia,%20wv.pdf

3. SUBSIDIES THROUGH THE FUEL CYCLE

Because no two fuel cycles are exactly the same, examining subsidies through the context of a generic fuel cycle is instructive in providing an overall framework from which to understand how common subsidization policies work. Subsidies are grouped into preproduction (e.g., R&D, resource location), production (e.g., extraction, conversion/generation, distribution, accident risks), consumption, postproduction (e.g., decommissioning, reclamation), and externalities (e.g., energy security, environmental, health and safety).

3.1 Preproduction

Preproduction activities include research into new technologies, improving existing technologies, and market assessments to identify the location and quality of energy resources.

3.1.1 Research and Development

R&D subsidies to energy are common worldwide, generally through government-funded research or tax breaks. Proponents of R&D subsidies argue that because a portion of the financial returns from successful innovations cannot be captured by the innovator, the private sector will spend less than is appropriate given the aggregate returns to society. Empirical data assembled by Margolis and Kammen supported this claim, suggesting average social returns on R&D of 50% versus private returns of only 20 to 30%.

However, the general concept masks several potential concerns regarding energy R&D. First, ideas near commercialization have much lower spillover than does basic research, making subsidies harder to justify. Second, politics is often an important factor in R&D choices, especially regarding how the research plans are structured and the support for follow-on funding for existing projects.

Allocation bias is also a concern. Historical data on energy R&D (Table III) demonstrate that R&D spending has heavily favored nuclear and fossil energy across many countries. Although efficiency, renewables, and conservation have captured a higher share of public funds during recent years, the overall support remains skewed to a degree that may well have influenced the relative competitiveness of energy technologies. Extensive public support for energy R&D may also reduce the incentive for firms to invest themselves. U.S. company spending on R&D for the petroleum refining and extraction sector was roughly one-third the multi-industry average during the 1956-1998 period based on survey data from the U.S. National Science Foundation. For the electric, gas, and sanitary services sector, the value was one-twentieth, albeit during the more limited 1995-1998 period.

3.1.2 Resource Location

Governments frequently conduct surveys to identify the location and composition of energy resources. Although these have addressed wind or geothermal resources on occasion, they most often involve oil and gas. Plant siting is another area where public funds are used, primarily to assess risks from natural disasters such as earthquakes for large hydroelectric or nuclear installations. Survey information can be important to evaluate energy security risks and to support mineral leasing auctions, especially when bidders do not operate competitively. However, costs should be offset from lease sale revenues when evaluating the public return on these sales. Similarly, the costs of siting studies should be recovered from the beneficiary industries.

3.2 Production

Energy production includes all stages from the point of resource location through distribution to the final consumers. Specific items examined here include resource extraction, resource conversion (including electricity), the various distribution links to bring the energy resource to the point of final use, and accident risks.

#### Violates incentives---they have to provide money to the private sector---r&D is distinct

CCES 9 Center for Climate and Energy Solutions (also called c2es) “Buildings and Emissions: Making the Connection” No specific date dated, most recent citation from 2009 www.c2es.org/technology/overview/buildings

Policy Options to Promote Climate-Friendly Buildings

The mosaic of current policies affecting the building sector is complex and dynamic involving voluntary and mandatory programs implemented at all levels of government, from local to federal. Government efforts to reduce the overall environmental impact of buildings have resulted in numerous innovative policies at the state and local levels. Non-governmental organizations, utilities, and other private actors also play a role in shaping GHG emissions from buildings through third-party “green building” certification, energy efficiency programs, and other efforts.

Various taxonomies have been used to describe the policy instruments that govern buildings, typically distinguishing between regulations, financial incentives, information and education, management of government energy use, and subsidies for research and development (R&D). Each of these is broadly described below.

-Standards and codes

Regulatory policies include building and zoning codes, appliance energy efficiency standards, clean energy portfolio standards, and electricity interconnection standards for distributed generation equipment. Building codes can require a minimum level of energy efficiency for new buildings, thus mandating reductions at the construction stage, where there is the most opportunity to integrate efficiency measures. Zoning codes can provide incentives to developers to achieve higher performance. Because of regional differences in such factors as climatic conditions and building practices, and because building and zoning codes are implemented by states and localities, the codes vary considerably across the country. While substantial progress has been made over the past decade, opportunities to strengthen code requirements and compliance remain.

Appliance and equipment standards require minimum efficiencies to be met by all regulated products sold; they thereby eliminate the least efficient products from the market. Federal standards exist for many residential and commercial appliances, and several states have implemented standards for appliances not covered by federal standards (see Appliance Efficiency Standards).

-Financial incentives

Financial incentives can best induce energy-efficient behavior where relatively few barriers limit information and decision-making opportunities (e.g., in owner-occupied buildings). Financial incentives include tax credits, rebates, low-interest loans, energy-efficient mortgages, and innovative financing, all of which address the barrier of first costs. Many utilities also offer individual incentive programs, because reducing demand, especially peak demand, can enhance the utility’s system-wide performance.

-Information and education

While many businesses and homeowners express interest in making energy-efficiency improvements for their own buildings and homes, they often do not know which products or services to ask for, who supplies them in their areas, or whether the energy savings realized will live up to claims. Requiring providers to furnish good information to consumers on the performance of appliances, equipment and even entire buildings is a powerful tool for promoting energy efficiency by enabling intelligent consumer choices.

-Lead-by-example programs

A variety of mechanisms are available to ensure that government agencies lead by example in the effort to build and manage more energy-efficient buildings and reduce GHG emissions. For example, several cities and states, and federal agencies (including the General Services Administration), have mandated LEED or LEED-equivalent certification for public buildings, and the Energy Independence and Security Act of 2007 includes provisions for reduced energy use and energy efficiency improvements in federal buildings.

-Research and development (R&D)

In the long run, the opportunities for a low-greenhouse gas energy future depend critically on new and emerging technologies. Some technological improvements are incremental and have a high probability of commercial introduction over the next decade (such as low-cost compact fluorescents). Other technology advances will require considerable R&D before they can become commercially feasible (such as solid-state lighting). The fragmented and highly competitive market structure of the building sector and the small size of most building companies discourage private R&D, on both individual components and the interactive performance of components in whole buildings.

Building Technologies Center. The Oak Ridge National Laboratory’s Buildings Technology Center was established by the U.S. Department of Energy (DOE) and performs research into issues including heating and cooling equipment, thermal engineering, weatherization, building design and performance, envelope systems and materials, and power systems.

Emerging Technologies. This U.S. DOE-sponsored program develops technology that would reduce energy use in residential and commercial buildings by 60-70 percent. Technologies are in fields including solid-state lighting, space conditioning and refrigeration, building envelopes, and analysis tools and design strategies that would facilitate the development of energy efficient buildings through software and computer-based building analysis.

#### At best they’re indirect which means they’re FX---this cards draws a predictable limit and brightline

GSWH 11 Global Solar Water Heating Market Transformation and Strengthening Initiative, This publication is the result of a joint effort from the following contributors: The European Solar ThermalIndustry Federation (ESTIF), the United Nations Environment Program (UNEP) through its Division ofTechnology, Industry and Economics (DTIE) and the Global Environment Fund (GEF). "Guidelines for policy and framework conditions" No Specific Date Cited, Most Recent Citations From 2011 www.solarthermalworld.org/files/policy\_framework.pdf?download

8 Non financial incentives for solar thermal

Non Financial Incentives include all public policies that support the creation of public good, even when providing an indirect financial advantage to the solar thermal market. For instance: an awareness raising campaign financed from public money or a programme to subsidise craftsmen training or R&D, etc. Obviously, all these instruments create an indirect financial advantage for companies involved in the market and this benefit is then passed on to the users.

8.1 Solar thermal obligations

• What is a Solar Thermal Obligation (STO)?

STO are legal provisions making mandatory the installation of solar thermal systems in buildings. The obligation mainly applies to new buildings and those undergoing major refurbishment. The owner must then install a solar thermal system meeting legal requirements. Most of the existing STOs are connected to national or regional energy laws and implemented through the municipal building codes. A growing number of European municipalities, regions and countries have adopted solar thermal obligations. Already today, more than 150 million people live in regions covered by a STO.

• Benefits

A major benefit of solar thermal ordinances is their effectiveness combined with low costs and limited administrative overheads for public authorities. As part of the building permit process, the inspection with regard to the renewable energy requirement is simple and thus does not strain public finances.

The introduction of a solar thermal ordinance prevents market fluctuation caused by inconsistent incentive programmes. It provides a stable planning environment for market actors and investors, encouraging local economic growth and creating new jobs in this sector.

• Unwanted effects and flanking measures

Solar obligations have a profound effect on the solar thermal market's structure. Therefore, to maximise their benefits, they require flanking measures.

In a market where solar thermal becomes mandatory, promoters and customers will tend to question the solar systems' operation and react more negatively than in a voluntary market.

Ends users and the construction sector will often go for the cheapest possible solution, while building owners will try to circumvent the obligation through exemptions. The real impact of any regulation strongly depends on its technical parameters and control procedures.

It is vital, therefore, that the regulations adopted ensure state-of-the-art quality assurance, products, planning, installation and maintenance of the system, guaranteeing the same high level of customer satisfaction as in the current voluntary market. Poor performance of "mandatory" systems would not only undermine public acceptance of the obligation, but also, possibly, of the solar thermal technology in general.

Israel, 30 years of experience with solar thermal ordinances

Thirty years ago, Israel was the first country to pass legislation on solar thermal installations. With the second oil crisis at the end of the 1970s, members of parliament examined ways to make their country less dependent on imported energy. The result was a law, which made solar water heaters mandatory in new buildings such as residential housing, hotels, guest houses and old people's homes up to 27 metres high. The legislation entered into force in 1980.

Nowadays over 80% of Israel's households get their domestic hot water from solar rooftop heaters. A typical domestic unit consists of a 150 litre insulated storage tank and a 2 m2 collector. These hot water heaters save the country the need to import about 4% of its energy needs, and replace about 9% of the electricity production.

The law has now become redundant. More than 90% of the solar systems are installed on a voluntary basis, i.e. they are installed in existing buildings, or the systems are larger than required by the obligation.

Source: PROSTO project

8.2 Quality, standards and certification policy

The need and methods to ensure quality in the market are so important for solar thermal, that a complete guide is dedicated to this topic in the framework of the GSWH project.

Why do we need standards?

The objective of standardisation and quality assurance is to guarantee product safety and quality, as well as lower prices. At every stage of market development, the capacity of solar thermal systems to deliver the expected level of performance is a key factor. In the early stage of the market, quality issues have had long lasting devastating effects. The existence of standards is the cornerstone of quality assurance.

The actors of standards and certification

Standardisation and quality for solar thermal should be the result of a joint effort from public authorities (market regulation), the industry, the technical community and, when they are adequately organised, the end users.

• Public authorities have a key role to play in imposing stringent quality requirements and in initiating, facilitating and controlling the standardisation process.

• The industry must provide product and technical expertise. It must understand the benefits

of ensuring standardised level of quality. Public authorities should guarantee that the standards are neutral and do not favour certain products or companies.

• I t is essential to be able to rely on independent testing facilities and certification bodies. If the private initiative is not adequate, then public authorities should actively support the creation of such structures.

• Consumer organisations can bring a useful contribution to the process. Quality installation for quality products

Solar thermal products usually need to be installed. This operation can be simple to the extent that it might not require the intervention of a specialist, e.g. some termosiphons systems, but on average it should be undertaken by a professional. To guarantee performance, the quality of the installation is as important as the quality of the system. Minimum requirements in terms of training and qualification of installers should be implemented in parallel with product requirements. Public authorities should regulate in the absence of initiatives from trade and industry.

Performance and quality for a sustainable market

Performance and quality measures do not constitute flanking or accompanying measures. Framework and regulations should be developed, and relevant bodies involved from the beginning, even if this has to be imposed to the market to some extent.

The market tends to be shortsighted; industry will naturally prefer to avoid costs and regulations. The benefits of high quality regulations and market surveillance will emerge eventually and guarantee a sustainable market. Public authorities should ensure that incentives and promotion endorse quality.

8.3 Research and development, demonstration projects (definition, importance, recommendations, examples)

Solar thermal is a simple and mature technology; however, research and development are necessary to guarantee that performance will continue to improve and costs to decrease. Research and development can also contribute to adapt the technical features of products to local needs, e.g. improve water tightness in tropical areas, resistance to frost in mountainous regions. Research and development cannot proceed only from public initiative but, through public universities and public research centres, public authorities have a leading role to play.

Building up centres of technical excellence

Applied research, engineering education, development, product innovation, standardisation, testing are closely linked and there are a lot of synergies between those fields. Most of the time, the same persons will be likely to teach, test and lead research projects. A sustainable market will always require relying on a high level engineering community. Public authorities should encourage the creation of multi disciplinary technical facilities for solar thermal engineering and encourage or even impose on the industry to participate in this effort.

Importance of demonstration projects

For both promotion and technical (experimental) reasons demonstrations projects are extremely useful. Projects implementing technologies that are not market ready, but which have an important potential, will allow testing and improving the solution, gather data, monitor functioning and finally demonstrate the feasibility to the general public and the industry in order to prepare the introduction on the market.

9 Financial incentives (direct, indirect, tax incentives, low interest loans): definition, importance, recommendations, examples

Financial Incentives include any public policy giving a financial advantage to those who install a solar thermal system or that use solar thermal energy.

#### Voting issue for limits and ground---creates an unmanageable topic of new speculative tech via government research that doesn’t interact with the market

**Dyson et al, 3** - International Union for Conservation of Nature and Natural Resources (Megan, Flow: The Essentials of Environmental Flows, p. 67-68)

Understanding of the term ‘incentives’ varies and economists have produced numerous typologies. A brief characterization of incentives is therefore warranted. First, the term is understood by economists as incorporating both positive and negative aspects, for example a tax that leads a consumer to give up an activity that is an incentive, not a disincentive or negative incentive. Second, although incentives are also construed purely in economic terms, incentives refer to more than just financial rewards and penalties. They are the “positive and negative changes in outcomes that individuals perceive as likely to result from particular actions taken within a set of rules in a particular physical and social context.”80 Third, it is possible to distinguish between direct and indirect incentives, with direct incentives referring to **financial** or other inducements and indirect incentives referring to both variable and **enabling incentives**.81 Finally, incentives of any kind may be called ‘perverse’ where they work against their purported aims or have significant adverse side effects. ¶ Direct incentives lead people, groups and organisations to take particular action or inaction. In the case of environmental flows these are the same as the net gains and losses that different stakeholders experience. The key challenge is to ensure that the incentives are consistent with the achievement of environmental flows. This implies the need to compensate those that incur additional costs by providing them with the appropriate payment or other compensation. Thus, farmers asked to give up irrigation water to which they have an established property or use right are likely to require a payment for ceding this right. The question, of course, is how to obtain the financing necessary to cover the costs of developing such transactions and the transaction itself. ¶ Variable incentives are policy instruments that affect the relative costs and benefits of different economic activities. As such, they can be manipulated to affect the behaviour of the producer or consumer. For example, a government subsidy on farm inputs will increase the relative profitability of agricultural products, hence probably increasing the demand for irrigation water. Variable incentives therefore have the ability to greatly increase or reduce the demand for out-of-stream, as well as in-stream, uses of water. The number of these incentives within the realm of economic and fiscal policy is practically **limitless.**

### Off 2

#### Comprehensive immigration reform will pass---maintaining political pressure on the GOP is key

Joseph 2/21 Cameron is a writer for The Hill. “More than half of Congress has never debated immigration reform,” 2013, http://thehill.com/homenews/senate/284131-more-than-half-of-congress-has-never-debated-immigration-reform

More than half of Congress has turned over since the last time the House and Senate tried to move legislation to overhaul the nation's immigration laws.¶ The high turnover rate bolsters the argument of Republican leaders, who say Congress must move methodically on immigration. President Obama, meanwhile, has pushed for swift passage of a bill, saying lawmakers have long debated the issue.¶ Only 54 current senators were in the Senate in June of 2007, when the upper chamber last voted on comprehensive immigration and border-security legislation. And just five of the 23 GOP senators who voted in favor of the 2006 immigration reform bill are still serving: Sens. Lindsey Graham (S.C.), John McCain (Ariz.), Susan Collins (Maine), Lisa Murkowski (Alaska) and Mitch McConnell (Ky.).¶ In the House, the turnover has been higher since the lower chamber last cast a major vote on immigration at the end of 2005.¶ Fifty-eight percent of new House members have taken office since then, meaning less than half of the lower chamber took part in the last significant legislative battle over tightening the border and granting legal status to the nation's illegal immigrants.¶ The high level of turnover suggests it’s hard to predict how negotiations will fare, as a number of lawmakers haven’t yet indicated where they stand. It could also slow down the pace of legislation.¶ There are potential upsides in the high turnover rate for reform advocates, however. New sets of eyes on the legislation, and new ways to discuss immigration policy, could translate into a different ending for a bill this Congress.¶ For example, freshman Sen. Marco Rubio’s (Fla.) is among the GOP leaders on immigration and has so far skillfully navigated the thorny matter.¶ “There's an opportunity and a challenge,” said America’s Voice Executive Director Frank Sharry, a top immigration reform advocate who was involved in the last round of negotiations. “The key is going to be whether a whole crop of new lawmakers say, 'Hey man, I get it, this is sound.' We haven't been able to break through the white noise before. Here's our chance.”¶ Another factor: Few Republicans backed the bill even though then-President George W. Bush lobbied hard for it in 2006 and 2007.¶ There is a much bigger political impetus for the GOP to resolve the issue following their 2012 losses, and Rubio is perhaps better liked by the GOP base now than Bush was after he led his party to a drubbing at the polls in 2006. But if a sitting president couldn’t rally members of his own party around his bill, it’s unclear whether pro-reform Republicans will be able to do any better this time.¶ The 2006 vote on the McCain-Kennedy bill is the best comparison to the current bill, because the June 2007 vote on a bill co-sponsored by the late Edward Kennedy (D-Mass.) and then-Sen. Jon Kyl (R-Ariz.) had many senators who’d once supported the legislation bail out when it was clear it would fail. The Kennedy-Kyl bill died on the floor after a fight over a series of amendments portrayed as "poison pills" that would sink the measure, including one sponsored by then-Sen. Illinois Barack Obama.¶ Of the Democrats who opposed the bill in 2006, only Sen. Debbie Stabenow (Mich.) is still around. Yet, nine current Democratic senators, including three members facing challenging reelection races next year, voted against a key procedural motion on the 2007 Kennedy-Kyl bill. Many GOP Senate opponents remain: Of the 22 who remain from 2006, 17 voted against both reform bills.¶ House Judiciary Committee Chairman Bob Goodlatte (R-Va.) told The Hill earlier this month that his panel would move at a deliberate pace on immigration, in part because Republican leaders need to educate more than 100 first- and second-term members. He said these legislators “know very little” about the complexities of immigration law.¶ “We’re going to be aggressively pursuing the issue to see if we can do something that is — I won’t call it all-encompassing, but that encompasses a number of the different issues that are addressed in immigration,” he said.¶ Obama has warned that if Congress doesn’t move fast enough on legislation, he’ll seek a vote on his own bill. Over the weekend, a draft White House immigration bill was leaked to the press. Rubio’s office blasted the move, arguing that the White House was injecting “additional partisanship into an already difficult process.”¶ Obama has since called on Rubio and other Republicans to lower the temperature on immigration.¶ Proponents of comprehensive immigration reform have been pushing hard to educate House members on the issue, and remain optimistic that the political pressure on the GOP to get something done has changed the conversation.

#### Political capital is still key---Obama’s leading negotiations with the GOP

AFP 2/19 “Obama courts key Republicans on immigration reform,” 2013, Factiva

US President Barack Obama on Tuesday called key Senate Republicans, with whom he is at odds on other many top issues, to discuss the prospects for bipartisan immigration reform.¶ Obama placed the calls following complaints he had not done enough to reach across the political aisle on the key issue, and after the leak of partial White House immigration plans angered Republican players in the debate.¶ The White House said that Obama had spoken to Republican Senators Lindsey Graham, John McCain and Marco Rubio, to discuss a "shared commitment to bipartisan, commonsense immigration reform."¶ "The President reiterated that he remains supportive of the effort underway in Congress, and that he hopes that they can produce a bill as soon as possible that reflects shared core principles on reform."¶ "He thanked the senators for their leadership, and made clear that he and his staff look forward to continuing to work together with their teams to achieve needed reform."¶ Obama's aides said he also wanted to speak to Republican Senator Jeff Flake, of Arizona, but was unable to reach him because he was traveling.¶ Cuban-American Rubio, a rising star of the Republican Party, is emerging as a key player in the immigration debate, and he warned that leaked versions of White House plans obtained by USA Today would be "dead on arrival."¶ Eight senators -- four of Obama's Democratic allies and four Republicans -- unveiled a joint plan last month aiming to provide a route to legal status for illegal immigrants living on US soil.¶ Under the White House fallback plan, illegal immigrants would have to wait eight years until applying for legal permanent residency, and, in practice, at least 13 years before they could apply for US citizenship.¶ Advocates of immigration reform say that time period is too long -- while conservative opponents still rail against "amnesty" for illegal immigrants, reflecting the toxicity of much of the immigration reform debate.¶ Obama had been sharply at odds with Graham and McCain for their role in delaying the confirmation of his pick for defense secretary Chuck Hagel.¶ His call to Rubio, who is traveling in the Middle East, came after the Florida senator's office had said that no one in his office had met White House officials to discuss immigration.¶ The White House had maintained that its staffers had met congressional officials working on immigration reform.¶ Obama's move may be seen as an effort to prevent partisan wrangling from derailing hopes of immigration reform, as it did under the presidency of his predecessor George W. Bush.¶ Immigration reform may be Obama's best chance for a genuine legacy-boosting success in his second term.¶ Senior Republicans, meanwhile, are wary of entering another election hampered by the mistrust of Hispanic voters, a growing slice of the electorate for whom immigration reform is a key issue.¶ A key sticking point in the debate is the Republican demand that the process of offering legal status to illegals should only start once the US southern border with Mexico has been certified as secure.¶ Obama has so far declined to make that linkage.

#### Plan’s a political football

Chameides 10/8 Bill is the Dean of Duke University’s School of the Environment. “Fusion: Maybe Less Than 30 Years, But This Year Unlikely,” 2012, <http://www.huffingtonpost.com/bill-chameides/fusion-maybe-less-than-30_b_1949573.html>

But by July 19, 2012, the fusion bubble was burst. An external review (pdf) of NIF by the National Nuclear Security Administration presented a mixed bag of praise -- "NIF has demonstrated an 'unprecedented level of quality and accomplishment'" -- and circumspection -- "considerable hurdles must be overcome to reach ignition ... [G]iven the unknowns with the present ...approach, the probability of ignition before the end of December is extremely low."¶ Bad Timing¶ Just so happens that LIFE's funding was to run out at the end of this fiscal year, which fell on September 30. Perhaps that's why the fusion researchers were so publicly sanguine about having results by the end of 2012. So now the scientists hand off this energy holy grail to the politicians, transforming, at least for the time being, a scientific quest into a political football, or, you might say fusing the scientific and the political. What should Congress do? Scrap the project or double down? Just another spending issue poised on the fiscal cliff our folks on the Hill will have to wrestle with.

#### CIR’s critical to economic growth---multiple internals

Klein 1/29 Ezra is a columnist for The Washington Post. “To Fix the U.S. Economy, Fix Immigration,” 2013, http://www.bloomberg.com/news/2013-01-29/to-fix-the-u-s-economy-fix-immigration.html

Washington tends to have a narrow view of what counts as “economic policy.” Anything we do to the tax code is in. So is any stimulus we pass, or any deficit reduction we try. Most of this mistakes the federal budget for the economy.¶ The truth is, the most important piece of economic policy we pass -- or don’t pass -- in 2013 may be something we don’t think of as economic policy at all: immigration reform.¶ Congress certainly doesn’t consider it economic policy, at least not officially. Immigration laws go through the House and Senate judiciary committees. But consider a few facts about immigrants in the American economy: About a tenth of the U.S. population is foreign-born. More than a quarter of U.S. technology and engineering businesses started from 1995 to 2005 had a foreign-born owner. In Silicon Valley, half of all tech startups had a foreign-born founder.¶ Immigrants begin businesses and file patents at a much higher rate than their native-born counterparts, and while there are disputes about the effect immigrants have on the wages of low-income Americans, there’s little dispute about their effect on wages overall: They lift them.¶ The economic case for immigration is best made by way of analogy. Everyone agrees that aging economies with low birth rates are in trouble; this, for example, is a thoroughly conventional view of Japan. It’s even conventional wisdom about the U.S. The retirement of the baby boomers is correctly understood as an economic challenge. The ratio of working Americans to retirees will fall from 5-to-1 today to 3-to-1 in 2050. Fewer workers and more retirees is tough on any economy.¶ Importing Workers¶ There’s nothing controversial about that analysis. But if that’s not controversial, then immigration shouldn’t be, either. Immigration is essentially the importation of new workers. It’s akin to raising the birth rate, only easier, because most of the newcomers are old enough to work. And because living in the U.S. is considered such a blessing that even very skilled, very industrious workers are willing to leave their home countries and come to ours, the U.S. has an unusual amount to gain from immigration. When it comes to the global draft for talent, we almost always get the first-round picks -- at least, if we want them, and if we make it relatively easy for them to come here.¶ From the vantage of naked self-interest, the wonder isn’t that we might fix our broken immigration system in 2013. It’s that we might not.¶ Few economic problems wouldn’t be improved by more immigration. If you’re worried about deficits, more young, healthy workers paying into Social Security and Medicare are an obvious boon. If you’re concerned about the slowdown in new company formation and its attendant effects on economic growth, more immigrant entrepreneurs should cheer you. If you’re worried about the dearth of science and engineering majors in our universities, an influx of foreign-born students is the most obvious solution you’ll find.

#### Global nuclear war

Cesare Merlini 11, nonresident senior fellow at the Center on the United States and Europe and chairman of the Board of Trustees of the Italian Institute for International Affairs, May 2011, “A Post-Secular World?”, Survival, Vol. 53, No. 2

Two neatly opposed scenarios for the future of the world order illustrate the range of possibilities, albeit at the risk of oversimplification. The first scenario entails the premature crumbling of the post-Westphalian system. One or more of the acute tensions apparent today evolves into an open and traditional conflict between states, perhaps even involving the use of nuclear weapons. The crisis might be triggered by a collapse of the global economic and financial system, the vulnerability of which we have just experienced, and the prospect of a second Great Depression, with consequences for peace and democracy similar to those of the first. Whatever the trigger, the unlimited exercise of national sovereignty, exclusive self-interest and rejection of outside interference would self-interest and rejection of outside interference would likely be amplified, emptying, perhaps entirely, the half-full glass of multilateralism, including the UN and the European Union. Many of the more likely conflicts, such as between Israel and Iran or India and Pakistan, have potential religious dimensions. Short of war, tensions such as those related to immigration might become unbearable. Familiar issues of creed and identity could be exacerbated. One way or another, the secular rational approach would be sidestepped by a return to theocratic absolutes, competing or converging with secular absolutes such as unbridled nationalism**.**

### Off 3

#### The plan collapses uranium demand by replacing fission nuclear production with fusion---that collapses Kazakhstan’s economy

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

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

#### Prevents diversification of Kazakhstan’s economy

Pleitgen 12 (Frederick, CNN, “Kazakhstan hopes uranium, oil and gas will fuel its future,” 7-18-12,

<http://articles.cnn.com/2012-07-18/asia/world_asia_kazakhstan-natural-resources-economy_1_vladimir-shkolnik-kazakhstan-uranium>)

Kazakhstan's mineral wealth will be a major source of income for decades to come, but it won't last forever. The country is trying to use it wisely to transition to a broader economic base while developing the natural resources industries to the maximum. Last year Kazakhstan was the world's top producer of uranium, accounting for over a third of global production. The industry's rapid expansion, plus the good quality of the uranium and the comparatively cheap method of mining it have combined to give Kazakhstan an advantage over other big exporters like Australia and Canada. With continued investment, Vladimir Shkolnik, the head of Kazakhstan's national atomic energy company, Kazatomprom, is keen to maintain that position. "We are hoping to keep our leadership position in the uranium field," he says. "We have dozens of facilities and hundreds of mines and we think we will remain a world leader in the uranium sector." Kazakhstan's government is also trying to encourage more foreign investment. Since independence in 1991, around $150 billion of foreign investment has flowed into the country; $18 billion dollars last year alone, according to the government. Companies like GE and Eurocopter have been attracted to the country, entering partnerships with national companies that have helped bring training and new skills to the local workforce. While money is flowing from the country's natural resources industry, the government is using some of its revenue to boost other sectors, like IT and engineering. The aim is to make the economy more resilient when commodities prices fall and better prepared for the day when the gush of oil and gas reduce to a trickle. "Of course revenues from raw materials are still by far the largest share of the country's budget," says energy analyst, Murat Karymsakov. "But in recent years the president (of Kazakhstan) has announced and put into place a plan for industrial and technological development to diversify the economy."

#### Destroys stability

Hamm 12 (Nathan, founder and Principal Analyst for Registan, MA in Central Asian Studies from the University of Washington, “Kazakhstan’s Stability, Central Asia’s Stability,” 1-31-12, <http://registan.net/2012/01/31/kazakhstans-stability-central-asias-stability/>)

I’m paraphrasing, but on the first two items, Dr. Roberts argues that the thoroughly Soviet education and background of Kazakhstan’s leadership leaves it out of touch and unable to adequately respond to the public. The government’s response to labor strikes, including the violence in Zhanaozen, he says, show that the government was not prepared to deal with dissatisfaction over unmet economic expectations. Dr. Roberts says that these challenges are not extreme nor likely to cause widespread unrest in the near term, but that the stagnancy of the political system means that the government lacks mechanisms to deal with large socio-economic changes. [Note: Alima wrote about the crisis of unmet expectations at length recently.] This is good, succinct analysis of the situation that puts risks to Kazakhstan’s stability in good context. The risks are there, the government is ill-prepared to deal with them at present, but it’s unlikely that it will be overwhelmed by them soon. These risks, however, aren’t present only in Kazakhstan. They exist in similar forms and combinations throughout Central Asia. Growing segments of society throughout the region are bringing (or attempting to…) Islam into the public square, where it is responded to with shock and terror by secular officials. National economies are failing to meet the expectations, and in many areas, even the basic needs, of the public. And though nationalism is not so clearly a problem the way it is Kazakhstan and Kyrgyzstan in the rest of Central Asia, there are small signs that society is challenging the state’s monopoly on defining what it means to be Uzbek, Tajik, Kyrgyz, etc. In talking about risks to stability, there is often a tendency to focus on presidential succession, the specter of fundamentalism and political Islam, and a more recent tendency to talk about replication of the Arab Spring. Recent history should make it abundantly clear though, that analysts, experts, and observers are taken by surprise in the region. Game-planning what happens after Karimov dies or a resurgence of the IMU activity in Tajikistan and Kyrgyzstan might be worthless because they assume state and society lack the mechanisms to respond to and manage succession or terrorist groups. The greatest risks to stability throughout the region are medium- to long-term risks arising from the three aforementioned factors and the oppositional relationship between state and society. Devising a list of indicators and warnings based on the three factors Dr. Roberts identifies — rising public religiosity, increasing nationalism, and under-performance in the economy — are more likely not only to lead to better anticipation of the trajectory of stability in Central Asia but also to provide a better idea of when serious risks to stability are likely to arise.

#### Spreads throughout the region

Assenova 8 (Margarita Assenova, IND Director; Natalie Zajicova, Program Officer (IND); Janusz Bugajski, CSIS NEDP Director; Ilona Teleki, Deputy Director and Fellow (CSIS); Besian Bocka, Program Coordinator and Research Assistant (CSIS), “Kazakhstan’s Strategic Significance,” 2008, CSIS-IND Taskforce Policy Brief team, European Dialogue, <http://eurodialogue.org/Kazakhstan-Strategic-Significance>)

The decision by the Organization for Security and Cooperation in Europe (OSCE) to award Kazakhstan the chairmanship of the organization for 2010 underscores a growing recognition of the country’s regional and continental importance. Kazakhstan is a strategic linchpin in the vast Central Asian-Caspian Basin zone, a region rich in energy resources and a potential gateway for commerce and communications between Europe and Asia. However, it is also an area that faces an assortment of troubling security challenges. Ensuring a stable and secure Central Asia is important for the international interests of the United States and its European allies for several prescient reasons: • Asian Security: Because of its proximity to Russia, China, Iran, and the South Asian sub-continent, Kazakhstan’s security and stability is an increasingly vital interest to all major powers. Kazakhstan’s tenure as chair of the OSCE will become an opportunity for greater multilateral cooperation in achieving this objective while strengthening the role and prestige of the OSCE throughout Central Asia.

#### Global nuclear war

Peimani 2 - Head of Energy Security and Geopolitics @ the Energy Studies Institute (Dr. Hooman, “Failed Transition and Bleak Future? War and Instability in Central Asia and the Caucasus,” Book, <http://www.questia.com/PM.qst?a=o&d=101331065>, EMM)

If the existing negative trend continues, the entire Caucasus and Central Asia will likely head toward long-term tension and instability. The first and foremost victims of this undesirable future will obviously be the three Caucasian and five CA countries. Yet, this bleak future will also have major implications for a number of regional (Iran, China, Turkey, and Russia) and nonregional (United States) powers with long-term interests in the two regions most of which share borders with them. The deteriorating situation will create a suitable ground for the emergence and growth of political extremism among the peoples of the Caucasus and Central Asia, who are mostly dissatisfied with the status quo. These frustrated and disenchanted peoples will likely find the extremist political ideologies and programs more appealing and more convincing than those of their discredited rulers. The latter’s legitimacy is being questioned by a growing number of their nationals for a wide range of reasons, including incompetence, rampant corruption, and an antidemocratic style of government. In response to the rising internal threat, the ruling elites will likely resort to nationalism. In particular, they might promote extreme forms of nationalism, including chauvinism, as experienced in many other countries in different continents confronting the same situation. Creating an appealing alternative to that of the opposition extremist groups aimed at the dissatisfied people will be one of its major objectives. Extreme nationalism will be very attractive for the youth—the social stratum most vulnerable to extremist ideologies and the main targets of extremist groups. The ruling elites might also find their resort to extreme nationalism necessary for the sake of consolidating their challenged power apparatus. In this case, they could seek to manipulate the nationalist sentiment of their peoples as a means to increase their legitimacy and strengthen their social basis of support. However, using the nationalist card will have a negative backlash, with weakening and destabilizing effects on its users. Extreme nationalism could, and will likely, provoke ethnic conflicts within the multiethnic Caucasian and CA countries. It could therefore lead to civil wars. Moreover, it could spread fear in the neighboring countries. They might feel threatened by the surge of nationalism in their vicinity, which could easily take the form of expansionism in the Caucasian and CA countries characterized with territorial and border disputes. In addition to various external influences, many internal social, economic, and political factors will determine in what form and to what extent instability will surface in each Caucasian and CA country. Needless to say, based on the specific situation in each country there will be differences in its shape and in the extent of its initial emergence. Regardless of these differences, the logical and predictable outcome of the current trend will likely be instability in the form of civil, interstate, and regional wars in the Caucasus and Central Asia. The existence of unsettled, although currently inactive, violent conflicts (i.e., independence movements and civil wars) in these two regions have left no doubt about the feasibility of this scenario. To this list, one should also add the existence of many ethnic grievances and territorial and border disagreements, which will likely create a suitable ground for the instigation of new ethnic conflicts and territorial disputes in violent forms. For a number of reasons, there is a great possibility that many of them could escalate to civil wars and interstate wars, respectively. Among other factors, the ethnic makeup of the Caucasus and Central Asia and the existence of many sources of conflict between their regional states will pave the way for their further escalation to the level of regional wars, despite the intention of their initiators. The presence of certain regional (Iran, China, Turkey, and Russia) and nonregional ([and the] United States) powers with long-term interests in the two regions will have a certain impact on the development of the scenarios mentioned above and will likely contribute to the extent, intensity, and duration of wars of various forms. In particular, the presence of these powers will increase the possibility of their intentional or unintentional involvement in those wars in support of one side or another, while preserving their interests. Depending on the situation, whether this involvement takes a direct or indirect form will be determined by many factors, including the importance of the affected Caucasian or CA countries for each of the five states and the latter’s political, economic, and military capabilities. These factors also include the geographical realities, which, depending on the case, facilitate or impede their access to the affected countries, and the overall political environment in Central Asia and the Caucasus. The latter determines whether a foreign intervention in whatever form can take place at all. The possibility of some or all of the five states being dragged into any future military conflict will therefore strengthen the potential for the escalation and expansion of military conflicts in either of the two regions. War and instability in these energy-producing regions bordering regional and global powers with strong conventional military and/or nuclear capabilities will have long-term political, economic, and security implications. They will not be confined only to the countries directly involved in any future regional military conflict. In one way or another, they could affect the stability of the Caucasus and Central Asia as well as that of the Asian and/or European regions in their proximity. As a result, wars in whatever form in those two regions could escalate and affect the stability of the international system and global peace.

### Off 4

#### The Commonwealth of Massachusetts should substantially increase funding for fusion energy development in the United States at the Alcator C-Mod.

#### States can empirically fund energy research at national labs

Kay Corditz, 3-15-2010, “State Grant to Fund Advanced Battery Materials Partnership,” Brookhaven National Lab, http://www.bnl.gov/newsroom/news.php?a=21663

Funded by a $550,000 grant from the New York State Energy Research and Development Authority (NYSERDA), Brookhaven National Laboratory will partner with battery materials researchers from leading New York State universities to explore new chemistries and synthesize new materials for long-lasting batteries. The Laboratory will partner with SUNY’s University at Buffalo and Binghamton University on three projects to develop improved batteries for use in stationary grid-scale energy storage applications, including lithium-air, lithium-ion, and lithium-titanate batteries. The Brookhaven effort, led by Brookhaven materials scientist Jason Graetz, will focus on the development and synthesis of new materials, and application of advanced experimental techniques to characterize these materials using Brookhaven’s National Synchrotron Light Source (NSLS). The SUNY-Buffalo lead is Esther S. Takeuchi, and the Binghamton University lead is M. Stanley Whittingham. “This partnership among Brookhaven and two leading SUNY schools will capitalize on the research strengths of each, and our materials characterization capabilities will be a key element of the project,” said James Misewich, Brookhaven’s Associate Laboratory Director for Basic Energy Sciences. The collaboration grew out of a workshop sponsored by Brookhaven and Stony Brook University’s Joint Photon Sciences Institute (JPSI) last spring. Chi-Chang Kao, NSLS Chair and Founding Director of JPSI, coordinated the collaboration’s successful proposal. “It is an excellent example of how universities, industries, and national laboratories can work together to address an important scientific challenge with major societal impact,” said Kao. Said Graetz: “NYSERDA’s funding of this program will give us the opportunity to expand our energy storage research to large-scale stationary energy storage systems, which are crucial for integrating intermittent renewable generation sources such as wind and solar. In the past, the vast majority of battery research investment has focused on the important problem of electrical energy storage for transportation. However, a different set of criteria exist for stationary systems, and this project will allow us to explore new electrode materials, like lithium titanate, that meet those criteria.”

### Off 5

#### The United States Federal Government should shift the research agenda and responsibilities of the Alcator C-Mod to the Princeton Plasma Physics Laboratory and/or the DIII-D tokamak.

#### The United States Federal Government should prohibit explosive testing of its nuclear weapons arsenal.

#### Solves the entire C-Mod advantage---their research can just be shifted to the other domestic facilities

David Malakoff, Science Magazine, 3/21/12, Proposed U.S. Fusion Cuts Ignite Debate, news.sciencemag.org/scienceinsider/2012/03/proposed-us-fusion-cuts-ignite.html

Members of the panel repeatedly asked Brinkman about the implications of a plan, outlined in the Obama Administration's 2013 budget request released in February, to trim DOE's fusion energy sciences budget by 0.8%, to $398 million. At the same time, the budget would increase the U.S. contribution to ITER, a $23 billion fusion reactor being built in Cadarache, France, to $150 million, up from $105 million this year. To help pay for the ITER increase, DOE is proposing to shut down a fusion experiment known as the Alcator C-Mod at the Massachusetts Institute of Technology (MIT) in Cambridge. Cutting C-Mod, which is one of three major fusion devices in the United States, would save $18 million in the next fiscal year, which begins in October.

That plan, Brinkman told committee members, partly reflected an effort to avoid duplication, since C-Mod does research that could also be done elsewhere in the United States and abroad. "I don't want to belittle the MIT work, [they have] done some very fine work," he said. But the other two U.S. fusion projects—particularly the DIII-D tokamak operated by General Atomics in San Diego, California—are now more scientifically productive, he said.

## Solvency

#### Fusion is impossible and even the best case is 60 years – obstacles are enormous

Chris Rhodes, Sussex University, Physical Chemistry Professor, 6/10/2012, The Progress made in the Different Fields of Nuclear Fusion, oilprice.com/Alternative-Energy/Nuclear-Power/The-Progress-made-in-the-Different-Fields-of-Nuclear-Fusion.html

When I was about 10, I recall hearing that nuclear fusion power would become a reality "in about thirty years". The estimate has increased steadily since then, and now, forty odd years on, we hear that fusion power will come on-stream "in about fifty years". So, what is the real likelihood of fusion-based power stations coming to our aid in averting the imminent energy crisis? Getting two nuclei to fuse is not easy, since both carry a positive charge and hence their natural propensity is to repel one another. Therefore, a lot of energy is required to force them together so that they can fuse. To achieve this, suitable conditions of extremely high temperature, comparable to those found in stars, must be met. A specific temperature must be reached in order for particular nuclei to fuse with one another. This is termed the "critical ignition temperature", and is around 400 million degrees centigrade for two deuterium nuclei to fuse, while a more modest 100 million degrees is sufficient for a deuterium nucleus to fuse with a tritium nucleus. For this reason, it is deuterium-tritium fusion that is most sought after, since it should be most easily achieved and sustained. One disadvantage of tritium is that it is radioactive and decays with a half-life of about 12 years, and consequently, it exists naturally in only negligible amounts. However, tritium may be "bred" from lithium using neutrons produced in an initial deuterium-tritium fusion. Ideally, the process would become self-sustaining, with lithium fuel being burned via conversion to tritium, which then fuses with deuterium, releasing more neutrons. While not unlimited, there are sufficient known resources of lithium to fire a global fusion programme for about a thousand years, mindful that there are many other uses for lithium, ranging for various types of battery to medication for schizophrenics. The supply would be effectively limitless if lithium could be extracted from the oceans. In a working scenario, some of the energy produced by fusion would be required to maintain the high temperature of the fuel such that the fusion process becomes continuous. At the temperature of around 100 - 300 million degrees, the deuterium/lithium/tritium mixture will exist in the form of a plasma, in which the nuclei are naked (having lost their initial atomic electron clouds) and are hence exposed to fuse with one another. The main difficulty which bedevils maintaining a working fusion reactor which might be used to fire a power station is containing the plasma, a process usually referred to as "confinement" and the process overall as “magnetic confinement fusion” (MCF). Essentially, the plasma is confined in a magnetic bottle, since its component charged nuclei and electrons tend to follow the field of magnetic force, which can be so arranged that the lines of force occupy a prescribed region and are thus centralised to a particular volume. However, the plasma is a "complex" system that readily becomes unstable and leaks away. Unlike a star, the plasma is highly rarefied (a low pressure gas), so that the proton-proton cycle that powers the sun could not be thus achieved on earth, as it is only the intensely high density of nuclei in the sun's core that allows the process to occur sustainably, and that the plasma is contained within its own gravitational mass, and isolated within the cold vacuum of space. In June 2005, the EU, France, Japan, South Korea, China and the U.S. agreed to spend $12 billion to build an experimental fusion apparatus (called ITER) by 2014. It is planned that ITER will function as a research instrument for the following 20 years, and the knowledge gained will provide the basis for building a more advanced research machine. After another 30 years, if all goes well, the first commercial fusion powered electricity might come on-stream. The Joint European Torus (JET) I attended a fascinating event recently - a Cafe' Scientifique meeting held in the town of Reading in South East England. I have also performed in this arena, talking about "What Happens When the Oil Runs Out?", which remains a pertinent question. This time it was the turn of Dr Chris Warrick from the Culham Centre for Fusion Energy based near Abingdon in Oxfordshire, which hosts both the MAST (Mega Amp Spherical Tokamak) and the better known JET (Joint European Torus) experiments. In the audience was a veteran engineer/physicist who had worked on the pioneering ZETA4 experiment in the late 1950s, from which neutrons were detected leading to what proved later to be false claims that fusion had occurred, their true source being different versions of the same instability processes that had beset earlier machines. Nonetheless, his comment was salient: "In the late 50s, we were told that fusion power was 20 years away and now, 50-odd years later it is maybe 60 years away." Indeed, JET has yet to produce a positive ratio of output power/input energy, and instability of the plasma is still a problem. Dr Warrick explained that while much of the plasma physics is now sorted-out, minor aberrations in the magnetic field allow some of the plasma to leak out, and if it touches the far colder walls of the confinement chamber, it simply "dies". In JET it is fusion of nuclei of the two hydrogen isotopes, deuterium and tritium that is being undertaken, a process that as noted earlier, requires a "temperature" of 100 million degrees. I say "temperature" because the plasma is a rarefied (very low pressure) gas, and hence the collisions between particles are not sufficiently rapid that the term means the same distribution of energy as occurs under conditions of thermal equilibrium. It is much the same as the temperatures that may be quoted for molecules in the atmospheric region known as the thermosphere which lies some 80 kilometres above the surface of the Earth. Here too, the atmosphere is highly rarefied and thus derived temperatures refer to translational motion of molecules and are more usefully expressed as velocities. However expressed, at 100 million degrees centigrade, the nuclei of tritium and deuterium have sufficient translational velocity (have enough energy) that they can overcome the mutual repulsion arising from their positive charges and come close enough that they are drawn together by attractive nuclear forces and fuse, releasing vast amounts of energy in the process. JET is not a small device, at 18 metres high, but bigger machines will be necessary before the technology is likely to give out more energy than it consumes. Despite the considerable volume of the chamber, it contains perhaps only one hundredth of a gram of gas, hence its very low pressure. There is another matter and that is how long the plasma and hence energy emission can be sustained. Presently it is fractions of a second but a serious "power station" would need to run for some hours. There is also the problem of getting useful energy from the plasma to convert into electricity even if the aforementioned and considerable problems can be overcome and a sustainable, large-scale plasma maintained. The plan is to surround the chamber with a "blanket" of lithium with pipes running through it and some heat-exchanger fluid passing through them. The heated fluid would then pass on its heat to water and drive a steam-turbine, in the time-honoured fashion used for fossil fuel fired and nuclear power plants. Now my understanding is that this would not be lithium metal but some oxide material. The heat would be delivered in the form of very high energy neutrons that would be slowed-down as they encounter lithium nuclei on passing through the blanket. In principle this is a very neat trick, since absorption of a neutron by a lithium nucleus converts it to tritium, which could be fed back into the plasma as a fuel. Unlike deuterium, tritium does not exist is nature, being radioactive with a half-life of about 12 years. However produced, either separately or in the blanket, lithium is the ultimate fuel source, not tritium per se. Deuterium does exist in nature but only to the extent of one part in about two thousand of ordinary hydrogen (protium) and hence the energy costs of its separation are not inconsiderable. The neutron flux produced by the plasma is very high, and to enhance the overall breeding efficiency of lithium to tritium the reactor would be surrounded with a “lithium” blanket about three feet thick. The intense neutron flux will render the material used to construct the reactor highly radioactive, to the extent that it would not be feasible for operators to enter its vicinity for routine maintenance. The radioactive material will need to be disposed of similarly to the requirements for nuclear waste generated by nuclear fission, and hence fusion is not as "clean" as is often claimed. Exposure to radiation of many potential materials necessary to make the reactor, blanket, and other components such as the heat-exchanger pipes would render them brittle, and so compromise their structural integrity. There is also the possibility that the lithium blanket around the reactor might be replaced by uranium, so enabling the option of breeding plutonium for use in nuclear weapons. Providing a fairly intense magnetic field to confine the plasma (maybe Tesla - similar to that in a hospital MRI scanner) needs power (dc not ac as switching the polarity of the field would cause the plasma to collapse) and large power-supply units containing a lot of metals including rare earths which are mined and processed using fossil fuels. The issue of rare earths is troublesome already, and whether enough of them can be recovered to meet existing planned wind and electric car projects is debatable, let alone that additional pressure should be placed upon an already fragile resource to build a first generation of fusion power stations. World supplies of lithium are also already stressed, and hence getting enough of it not only to make blankets for fusion reactors and tritium production but also for the millions-scale fleet of electric vehicles needed to divert our transportation energy demand away from oil is probably a bridge too far, unless we try getting it from seawater, which takes far more energy than mining lithium minerals. The engineering requirements too will be formidable, however, most likely forcing the need to confront problems as yet unknown, and even according to the most favourable predictions of the experts, fusion power is still 60 years away, if it will arrive at all. Given that the energy crisis will hit hard long before then, I suggest we look to more immediate solutions, mainly in terms of energy efficiency, for which there is ample scope. To quote again the ZETA veteran, "I wonder if maybe man is not intended to have nuclear fusion," and all in all, other than from solar energy I wonder if he is right. At any rate, garnering real electrical power from fusion is so far distant as to have no impact on the more immediately pressing fossil fuels crisis, particularly for oil and natural gas. Fusion Power is a long-range "holy grail" and part of the illusion that humankind can continue in perpetuity to use energy on the scale that it presently does. Efficiency and conservation are the only real means to attenuate the impending crisis in energy and resources.

## Leadership Adv

### 1NC AT: Energy Leadership/Sci Dip Advantage

#### < Insert General Science Diplomacy Answers >

#### ITER solves – their author

Fedoroff 8 Nina V. Fedoroff, Ph.D., Science and Technology Adviser to the Secretary of State and the Administrator of USAID, “Testimony Before the House Science Subcommittee on Research and Science Education”, April 2, 2008, http://2001-2009.state.gov/g/stas/2008/105286.htm

Finally, some types of science – particularly those that address the grand challenges in science and technology – are inherently international in scope and collaborative by necessity. The ITER Project, an international fusion research and development collaboration, is a product of the thaw in superpower relations between Soviet President Mikhail Gorbachev and U.S. President Ronald Reagan. This reactor will harness the power of nuclear fusion as a possible new and viable energy source by bringing a star to earth. ITER serves as a symbol of international scientific cooperation among key scientific leaders in the developed and developing world – Japan, Korea, China, E.U., India, Russia, and United States – representing 70% of the world’s current population.

#### Their internal link card is a joke – doesn’t say the word “fusion” anywhere in the article

#### Empirically denied – their card is about the 2008 election means we should have seen the impact

#### Natural gas solves US energy leadership

Jaffe 11 (Amy Myers Jaffe is director of the Baker Institute Energy Forum at Rice University and member of the Council on Foreign Relations, “The Americas, Not the Middle East, Will Be the World Capital of Energy”, October 2011, <http://www.foreignpolicy.com/articles/2011/08/15/the_americas_not_the_middle_east_will_be_the_world_capital_of_energy?page=0,0>)

This hydrocarbon-driven reordering of geopolitics is already taking place. The petropower of Iran, Russia, and Venezuela has faltered on the back of plentiful American natural gas supply: A surplus of resources in the Americas is sending other foreign suppliers scrambling to line up buyers in Europe and Asia, making it more difficult for such exporters to assert themselves via heavy-handed energy "diplomacy." The U.S. energy industry may also be able to provide the technical assistance necessary for Europe and China to tap unconventional resources of their own, scuttling their need to kowtow to Moscow or the Persian Gulf. So watch this space: America may be back in the energy leadership saddle again.

#### Squo solves

Steyer and Podesta 12 TOM STEYER And JOHN PODESTA, writers for the Wall Street Journal, “We Don't Need More Foreign Oil and Gas “, January 24, 2012, http://online.wsj.com/article/SB10001424052970203718504577178872638705902.html

Under President Obama's leadership, we appear to be at the beginning of a domestic gas and oil boom. After a four-decade decline in oil production, the U.S. is now producing more than half of our oil domestically. This can free us from our addiction to foreign-sourced barrels, particularly if we utilize our dramatically larger and cheaper natural gas reserves. Natural gas now costs the equivalent of less than $15 per barrel, versus the $100-plus barrels we import from the Middle East.¶ There are critical environmental questions associated with developing these resources, particularly concerning methane leakage and water pollution. Yet as long as we ensure high regulatory standards and stay away from the riskiest and most polluting of these activities, we can safely assemble a collection of lower-carbon, affordable and abundant domestic-energy assets that will dramatically improve our economy and our environment. Under President Obama's watch, increased domestic production from developing these reserves has already created 75,000 new gas and oil-production jobs since 2009. And we have much further to go.¶ At the same time, the U.S. is well on its way to becoming a global clean-energy leader. America is the largest clean-energy investor, after reclaiming this title from China last year. Our companies make over 75% of all venture investments in clean technologies world-wide. Overall, because of U.S. public and private investments in clean energy—including renewables, efficiency, transportation and infrastructure—the clean economy grew by 8.3% from 2008 to 2009, even during the depths of the recession.

#### Their article concludes other tech solves and outweigh fusion

Lugar 7 Dick Lugar, United States Senator, “U.S. Energy Security and the 2008 Presidential Election”, December 18, 2007, http://lugar.senate.gov/energy/press/speech/brookings2.cfm

The development and deployment of new technologies is likely to be the difference between success and failure of our efforts at energy transformation. The next President must demand that research projects related to battery technology, cellulosic ethanol, carbon capture and storage, solar and wind power, and dozens of other technologies receive the highest priority within the Administration.

#### Squo solves the internal links cited in their ev –

#### a) Fuel standards

NYT 12 “U.S. Sets Higher Fuel Efficiency Standards”, August 28, 2012, http://www.nytimes.com/2012/08/29/business/energy-environment/obama-unveils-tighter-fuel-efficiency-standards.html?\_r=0

DETROIT — The Obama administration issued on Tuesday the final version of new rules that require automakers to nearly double the average fuel economy of new cars and trucks by 2025. ¶ The standards — which mandate an average fuel economy of 54.5 miles per gallon for the 2025 model year — will increase the pressure on auto manufacturers to step up development of electrified vehicles as well as sharply improve the mileage of their mass-market models through techniques like more efficient engines and lighter car bodies.¶ Current rules for the Corporate Average Fuel Economy, or CAFE, program mandate an average of about 29 miles per gallon, with gradual increases to 35.5 m.p.g. by 2016.¶ The new rules represent a victory for environmentalists and advocates of fuel conservation, but were attacked by opponents, including the Republican presidential nominee Mitt Romney, as too costly for consumers.

#### b) Solar

WSJ 12 “Fueled by Cheap Chinese Panels, U.S. Solar Use Soars”, September 9, 2012, http://online.wsj.com/article/SB10000872396390443589304577637333545350176.html

The solar-power business is expanding quickly in the U.S., helping lift the cloud that has surrounded the industry since the demise of Solyndra LLC a year ago.¶ But the growth isn't coming from U.S. solar-panel manufacturing, despite the money and rhetoric devoted to the industry by the Obama administration. Instead, it is in installations of largely foreign-made panels, whose falling price has made solar more competitive with other forms of power.¶ "There should be little emphasis put on where the panels are made," said Lyndon Rive, chief executive of SolarCity Corp., which finances and installs rooftop solar systems. "Most of the jobs are in delivery and they're long-term, permanent jobs."¶ The U.S. is on pace to install as much solar power this year as it did in this century's entire first decade: at least 2,500 megawatts, the equivalent of more than two nuclear-power plants. The U.S. added about 742 megawatts of solar capacity in the second quarter, or enough to power about 150,000 homes, the Solar Energy Industries Association said in a report scheduled for release Monday.

#### c) Wind

Koch 12 Wendy Koch, writer for USA Today, “U.S. solar and wind industries expand”, March 14, 2012, http://usatoday30.usatoday.com/money/industries/energy/story/2012-03-14/solar-wind-energy/53517526/1

Despite last year's bankruptcies of several solar manufacturers, including government-backed Solyndra, the U.S. solar and wind industries continue to expand in the face of obstacles this year.¶ Newly installed solar panels produced 109% more electricity nationwide last year than in 2010, reaching a record 1,855 megawatts, as the price of these panels plummeted by more than 50%, according to a report today by the Solar Energy Industries Association (SEIA), an industry group, and GTM Research.¶ "The U.S. remains the innovative center of the solar industry worldwide," says Rhone Resch, SEIA's president. He says "run-of-the-mill" panels may increasingly be made overseas, but the U.S. still will make the most advanced solar components and post double-digit annual growth. He expects solar power, which now produces less than 1% of U.S. electricity, to generate 10% by 2020.¶ "There's no bubble" bursting in the clean-tech sector, Resch says, although he cautions that more companies likely will fail as the industries mature and cope with decreased government subsidies.¶ Other recent reports indicate that the U.S. clean-tech sector remains strong despite Republican criticism of President Obama's half-billion-dollar loan guarantee to Solyndra and his other support for renewable energy.¶ Wind power increased 31% last year, says the American Wind Energy Association, and venture capital invested in clean technology grew from $3.8 billion in 2010 to $4.3 billion last year, the National Venture Capital Association says.

## STEM Adv

### STEM Adv 1NC

#### High number of nuclear PhDs even if the industry declines.

Patel 12—Prachi Patel, March 2012, Should You Still Choose Nuclear Engineering as a Career? Inside Technology Spectrum, <http://spectrum.ieee.org/at-work/tech-careers/should-you-still-choose-nuclear-engineering-as-a-career>

 The chairs of 47 nuclear engineering departments in North America regularly discuss concerns about their academic programs. After the Fukushima Dai-ichi incident unfolded, one question was on everyone’s mind: Would nuclear engineering take a hit? E-mails were quickly exchanged among the group members, and the clear answer was no. Students were not dropping the major, and engineering freshmen were still just as interested in it.¶ “We’re now accepting applications for 2012, and they are on track to be equivalent to last year’s numbers,” says Kathryn Higley, head of the nuclear engineering and radiation health physics department at Oregon State University, in Corvallis.¶ It has been only a year since Fukushima, but the continuing student interest is an indication that the discipline is holding its ground. The industry, bolstered by the need for carbon-free energy, is on its way up, and nuclear engineering remains a solid career path, says Arthur Motta, chair of Pennsylvania State University’s nuclear engineering program. “Even if the United States doesn’t build any new plants right now, 20 percent of our power is from nuclear, and that’s not going away anytime soon,” Motta says.¶ And not just in the United States. Germany and Italy have backpedaled, but many other countries are forging ahead with nuclear power. And with the Fukushima incident highlighting the need for improved reactors and better safety measures, the demand for nuclear engineers will only increase.¶ The contrast with the 1980s is striking. After Chernobyl, the nuclear industry buckled, and academic programs in nuclear science and engineering languished around the world. U.S. enrollments plummeted, bottoming out in 2000. But over time, the industry’s reputation has healed. Concerned about both nuclear security and a diminishing workforce, the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy have been supporting nuclear engineering programs through scholarships and internships.¶ The result is skyrocketing enrollments. In the freshman class of 2000 at North Carolina State University, in Raleigh, there were 37 nuclear engineering majors; this year there are 209. Other schools show similar trends.¶ This past December, the NRC approved Westinghouse Electric Co.’s new AP1000 nuclear reactor design, clearing the path for two utilities to build new plants. This has boosted confidence among academics and the industry, says Yousry Azmy, head of the nuclear engineering department at NCSU.¶ Nuclear engineering graduates work mostly for utility companies and for vendors such as Westinghouse, GE, and Areva. Some go to national laboratories, regulatory agencies, or into nuclear medicine. But nuclear engineers gain systems and engineering skills, along with a solid background that they can apply to other realms. “Even if the market shifts, students will have a versatile tool kit and abilities that will allow them to move around,” Higley says. During the nuclear power lull in the early 2000s, many graduates went to computer chip and software companies, she points out.¶ Besides, Azmy says, “The future of nuclear engineering education in the United States isn’t entirely held hostage to the utilities in this country.” China is building 27 new reactors and expects to have another 120 operating within the next two decades. Saudi Arabia, Turkey, the United Arab Emirates, and Vietnam are actively building new nuclear power programs. “Many jobs will materialize in the United States and Europe,” says Azmy.

#### There are tons of jobs and interesting work involving current reactor development

Schiermeier 9—Quirin Schiermeier, Nature's Germany correspondent, 5/6/09, Going nuclear, http://www.nature.com/naturejobs/science/articles/10.1038/nj7243-124a

The search is on for the scientists and engineers who will design, build and operate these nuclear reactors, but also for the experts who will guide uranium mining, design and partition nuclear fuels (that is, transmute radioactive waste into non-radioactive elements), dispose of radioactive waste, and protect nuclear workers and the world at large from harmful radiation. "There is a strong and increasingly competitive job market emerging," says Carol Berrigan, who monitors the nuclear workforce for the Nuclear Energy Institute, an industry group based in Washington DC.¶ Academic institutions have responded to the nuclear comeback. Many universities have revived nuclear programmes that closed in the 1980s and 1990s because of lack of demand. In the United States alone, six new departments or programmes have been created in recent years at universities in Colorado, South Carolina, Texas and Virginia, and there are plans to set up programmes at the University of California, Los Angeles, and possibly also at the California Institute of Technology in Pasadena. Since 1999, enrolment in undergraduate nuclear engineering programmes in the United States has grown from 470 to around 2,000, while graduate enrolments have climbed from 220 to around 1,200, Berrigan found.¶ In Europe, advanced training and master's programmes in nuclear engineering exist, for example, at the University of Paris South 11, the Swiss Federal Institute of Technology in Zurich and Lausanne, and the Karlsruhe Institute of Technology (KIT) in Germany. In the United Kingdom, vocational training and advanced courses in nuclear engineering are also offered by industry agencies such as Cogent and the National Skills Academy for Nuclear.¶ When it comes to exploiting that education, prospects in the US job market are promising. Graduate and postgraduate science and engineering students interested in pursuing a career in the nuclear industry have ample choices between jobs at government labs, with private plant operators, in reactor construction or in the defence business, says Michael Corradini, head of nuclear engineering at the University of Wisconsin–Madison. "It's an incredibly healthy and vibrant environment for us right now, despite the economic downturn," he says. "Most of my students can choose from at least a handful of job offerings; ten years ago they were glad when they got one." Students often start with bachelor's degrees in civil, chemical or process engineering, then specialize in nuclear engineering as part of a master's degree.¶ Employment prospects in many regions of Europe are just as encouraging. "If a talented student turns up today, he or she will have a work contract tomorrow, either from me or from a company we're collaborating with," says Joachim Knebel, head of nuclear safety research and acting head of neutron physics and reactor technology at KIT. The Areva Nuclear Professional School was established at KIT in February, funded by Areva, the Paris-based company that is the world's largest manufacturer of reactor components and nuclear fuel. It provides postgraduate training for young scientists and engineers specializing in various fields of nuclear engineering. The 30 PhD students enrolled at the school at any one time are paid by Areva and have a guarantee that they will be employed when their training is completed. Areva, with a workforce of 75,000 and euro dollar13.2 billion (US$17.2 billion) in global sales, is the market leader in the field and is now hiring about 1,000 people a month globally. Engineers of all sorts, from civil, electromechanical, chemical and process engineers to automation and computation experts, account for roughly one-half of newly hired staff.¶ Ongoing technological challenges should provide work for the most enterprising. Generation IV nuclear reactors are intended to replace current types such as the European Pressurized Reactor (also called Evolutionary Power Reactor or just EPR), a generation III reactor design that uses water under high pressure as coolant. A mammoth research and development challenge ahead is the next generation of thermal and fast reactors (where the chain reaction is sustained by fast neutrons), which are designed to produce significantly less radioactive waste, to cost less and to be less vulnerable to violent attack. In principle, these systems would partition and reprocess nuclear waste repeatedly, which will require new technologies and new materials. These reactors could become commercially available in 20 to 30 years' time.

#### Decline in nuclear PhDs hasn’t affected the weapons program—they train in house.

APS 8—Readiness of the U.S. Nuclear Workforce for 21st Century Challenges, A Report from the American Physical Society Panel on Public Affairs Committee on Energy and Environment, June 2008, http://www.aps.org/policy/reports/popa-reports/upload/Nuclear-Readiness-Report-FINAL-2.pdf

6. One might expect that the reduced university-based training opportunities in nuclear science and engineering would have had a dramatic effect on the manpower levels in the nuclear weapons complex. This does not appear to have been the case. This is understandable, if only from the point of view that the design and construction of nuclear weapons will never be a part of publicly-available nuclear science and engineering curricula. Rather, these workforce members for the most part will be trained in situ. Perhaps that is why the steady and precipitous 40-year decline in the number of Ph.D.'s granted in nuclear chemistry - to the point where the numbers each year are now in the low single digits - seems to have had little effect on our nuclear weapons programs. However, with the recent reconfiguring and downsizing of the weapons labs, coupled with an aging (and now retiring) workforce, this situation is confused and uncertain at best (the same is true for many other aspects of the critical technologies workforce). These matters have been, and are, being studied carefully by the DOE-NNSA, the NSTC, and a number of professional organizations because it is clear that for the foreseeable future the Nation will continue to need a significant number of talented, well-trained nuclear scientists and engineers, physicists, chemists, mathematicians, and computer scientists to maintain the strength of its homeland security and nuclear weapons programs.

#### NNSA has a plan to adapt to STEM shortages, but the plan is a shock to the system – derails human capital planning

GAO-12-468, Apr 26, 2012, Strategies and Challenges in Sustaining Critical Skills in Federal and Contractor Workforces, <http://www.gao.gov/products/GAO-12-468>

Building a pipeline of critically skilled employees. Both NNSA and its M&O contractor officials acknowledge that, due to the long period required for developing some critical skills employees, they need to anticipate their critical skills needs for multiple years in the future.All sites have recruiting and development plans to preserve critical skills in their workforce, which they refer to as a pipeline. Sites use pipelines in two ways to avoid critical skills gaps. First, they use training and project assignments to ensure that critical skills are being developed and preserved in newer employees. For example, Lawrence Livermore has assessed its employees’ skill sets and experience, so it knows which are currently performing essential operations more than 25 percent of the time––called core employees––and which are being prepared to perform those operations––called pipe employees. They can augment a pipe employee’s expertise in an area if management sees a shortage of core employees in that skill set. Second, in recruiting activities, human resources staff may maintain information about potential future candidates for weapons programs, either with contacts made in internship, fellowship, and coop programs or by keeping records of interested candidates who were not hired. For example, Sandia is building a database of potential candidates, so that in the future it is not relying exclusively on that year’s graduating class from the top science and engineering programs. Succession planning can also inform pipeline decisions. M&O contractor officials at some sites said that they have begun to analyze potential skills gaps if a specific retirement or separation were to occur. Those M&O contractors who are undertaking these analyses can rely on managers’ assessments of their employees or software packages designed to facilitate succession planning. M&O contractors told us that this kind of planning is currently used in management or leadership capacities, but in the future it could be applied to other areas such as critical skills capacities. Each M&O contractor has a unique way of implementing its pipeline, but M&O contractor officials from all sites told us they all realize the need to consider future retirements and mission requirements in their current hiring and development plans. For example, a senior M&O contractor manager at Sandia National Laboratories responsible for building the laboratories’ talent pipeline told us that Sandia is facing unprecedented hiring needs due in part to expected increases in retirements. He expects to experience 33 to 50 percent attrition in the next 4 to 5 years, while the total number of Sandia employees will need to remain about the same. Accordingly, Sandia officials told us they expect to have hired approximately 3,100 new employees in the 3 years ending in 2012—about 800 in 2010, 1,100 in 2011, and 1,200 in 2012. Some of the human capital challenges facing the enterprise are beyond the control of NNSA and its M&O contractors, and in these cases, NNSA has authorized increased compensation to help the sites acquire or retain the personnel they require. The site locations are fixed, and site staff cannot change the number of U.S. citizens completing graduate science and technology programs. Similarly, NNSA and its contractors have no choice but to adapt to the increased mobility of their staff resulting from the shift to a defined contribution retirement systems. To mitigate these challenges, NNSA and its contractors continue to offer financial incentives to recruit and retain critically skilled employees, with competitive starting salaries. The scale of these financial incentives can vary by location and position, but NNSA reported that this strategy has thus far been adequate for recruiting and retaining the talent they need.

#### NNSA workforce strong now

GAO-12-468, Apr 26, 2012, St rategies and Challenges in Sustaining Critical Skills in Federal and Contractor Workforces, <http://www.gao.gov/products/GAO-12-468>

The National Nuclear Security Administration (NNSA) and its M&O contractors have developed and implemented multifaceted strategies to recruit, develop, and retain both the federal and contractor workforces needed to preserve critical skills in the enterprise. NNSA’s recruiting and retention efforts for its federal staff focus on attracting early career hires with competitive pay and development opportunities. Its development efforts generally rely on two key programs to develop its critically skilled workforce––one that identifies needs and another that identifies the qualifications necessary to meet them. For strategic planning purposes, NNSA is also undertaking a comprehensive reassessment and analysis of staffing requirements to ascertain future federal workforce requirements. M&O contractors’ recruitment and retention strategies vary from site to site, but each site focuses on maintaining competitive compensation packages. Their development efforts vary in approach and scope and face some challenges––particularly in preserving underground nuclear testing skills. To assess the effectiveness of its own––and its M&O contractors’––strategies for recruiting, developing, and retaining the workforces needed to preserve critical skills, NNSA monitors key human capital metrics. NNSA focuses on two key metrics in assessing its own strategies—the time it takes to hire a new employee and its attrition rates. To assess the effectiveness of its contractors’ strategies, NNSA monitors key human capital metrics using data that M&O contractors collect, including acceptance rates, attrition rates, comparability of pay and benefits with peer institutions, and the ability to fill a critical skills position within a certain number of days. M&O contractors assess key human capital performance measures, but these metrics do not have standardized definitions. For example, one of the M&O contractors’ key metrics—acceptance rates for offers of employment—may not be consistently measured across the enterprise. Without this information, NNSA’s ability to monitor the effectiveness of its and its M&O contractors’ strategies to recruit, develop, and retain the workforces needed to preserve critical skills may be hindered. In particular, without common enterprise-wide definitions of human capital performance metrics, NNSA may not be able to collect consistent and comparable data across all eight sites in the enterprise. The enterprise’s work environments and site locations pose recruiting challenges, and NNSA and its M&O contractors face shortages of qualified candidates, among other challenges. For example, staff must often work in secure areas that prohibit the use of personal cell phones, e-mail, and social media, which is a disadvantage in attracting younger skilled candidates. In addition, many sites are geographically isolated and may offer limited career opportunities for candidates’ spouses. Critically skilled positions also require security clearances—and therefore U.S. citizenship—and a large percentage of students graduating from top science, technology, and engineering programs are foreign nationals. The pool of qualified candidates is also attractive to high technology firms in the private sector, which may offer more desirable work environments. NNSA and its M&O contractors are taking actions to address these challenges where possible, including streamlining hiring and security clearance processes and taking actions to proactively identify new scientists and engineers to build a pipeline of critically skilled candidates.

### Defense Base Defense

#### No impact to the defense base

Fettweis 11 Christopher J. Fettweis, Department of Political Science, Tulane University, 9/26/11, Free Riding or Restraint? Examining European Grand Strategy, Comparative Strategy, 30:316–332, EBSCO

It is perhaps worth noting that **there is** no evidence **to support a direct relationship between** the relative level of **U.S. activism and** international stability. In fact, the limited data we do have suggest the opposite may be true. During the 1990s, the United States cut back on its defense spending fairly substantially. By 1998, the United States was spending $100 billion less on defense in real terms than it had in 1990.51 To internationalists, defense hawks and believers in hegemonic stability, this irresponsible “peace dividend” endangered both national and global security. “No serious analyst of American military capabilities,” argued Kristol and Kagan, “doubts that the defense budget has been cut much too far to meet America’s responsibilities to itself and to world peace.”52 On the other hand, if the pacific trends were not based upon U.S. hegemony but a strengthening norm against interstate war, one would not have expected an increase in global instability and violence. The verdict from the past two decades is fairly plain: **The world grew more peaceful while the United States cut its forces.** No state seemed to believe that its security was endangered by a less-capable United States military, or at least none took any action that would suggest such a belief. No militaries were enhanced to address power vacuums, no security dilemmas drove insecurity or arms races, and no regional balancing occurred once the stabilizing presence of the U.S. military was diminished. The rest of the world acted as if the threat of international war was not a pressing concern, despite the reduction in U.S. capabilities. Most of all, the United States and its allies were no less safe. The incidence and magnitude of global conflict declined while the United States cut its military spending under President Clinton, and kept declining as the Bush Administration ramped the spending back up. No complex statistical analysis should be necessary to reach the conclusion that the two are unrelated. Military spending figures by themselves are insufficient to disprove a connection between overall U.S. actions and international stability. Once again, one could presumably argue that spending is not the only or even the best indication of hegemony, and that it is instead U.S. foreign political and security commitments that maintain stability. Since neither was significantly altered during this period, instability should not have been expected. Alternately, advocates of hegemonic stability could believe that relative rather than absolute spending is decisive in bringing peace. Although the United States cut back on its spending during the 1990s, its relative advantage never wavered. However, even if it is true that either U.S. commitments or relative spending account for global pacific trends, then at the very least stability can evidently be maintained at drastically lower levels of both. In other words, even if one can be allowed to argue in the alternative for a moment and suppose that there is in fact a level of engagement below which the United States cannot drop without increasing international disorder, a rational grand strategist would still recommend cutting back on engagement and spending until that level is determined. Grand strategic decisions are never final; continual adjustments can and must be made as time goes on. Basic logic suggests that the United States ought to spend the minimum amount of its blood and treasure while seeking the maximum return on its investment. And if the current era of stability is as stable as many believe it to be, no increase in conflict would ever occur irrespective of U.S. spending, which would save untold trillions for an increasingly debt-ridden nation. It is also perhaps worth noting that if opposite trends had unfolded, if other states had reacted to news of cuts in U.S. defense spending with more aggressive or insecure behavior, then internationalists would surely argue that their expectations had been fulfilled. If increases in conflict would have been interpreted as proof of the wisdom of internationalist strategies, then logical consistency demands that the lack thereof should at least pose a problem. As it stands, the only evidence we have regarding the likely systemic reaction to a more restrained United States suggests that the current **peaceful trends are unrelated to U.S.** military spending. Evidently the rest of the world can operate quite effectively without the presence of a **global policeman.** Those who think otherwise base their view on faith alone.

### Nuclear Deterrence Defense

#### Nuclear modernization isn’t k2 deterrence

Travis Sharp 10, Research Associate at the Center for a New American Security, “The Numbers Game”, Nukes of Hazard, Center for Arms Control & Nonproliferation, 2-24, http://www.nukesofhazardblog.com/story/2010/2/24/123221/390

This complaint is regularly expressed by Keith Payne, the paragon of conservative nuclear strategists. For instance, Payne wrote last year that “informed estimates about the functioning of deterrence must also include assessments of opponent decision-making processes, values, intentions, histories, levels of determination, goals, stakes and worldviews.” Since deterrence is not a quantifiable or scientific outcome, Payne concluded,¶ In the contemporary strategic environment, it is impossible to provide high-confidence, quantitatively precise and enduring answers to the question “how much is enough” for deterrence. The familiar game of linking some specific number of nuclear weapons with confidence in deterrence and the adequacy of U.S. strategic forces in general remains popular, but it now is unsupportable…even if done rigorously, identifying the requirements for deterrence is an incomplete basis for defining the necessary parameters for U.S. strategic forces in general.¶ Before considering whether this “numbers game” critique is justified, a comment is needed on Bolton’s and Payne’s methodology. Deterrence indubitably involves historical, cultural, psychological, and political calculations, as Payne suggests. NOH readers should recognize, however, that predicating deterrence on potential adversaries’ values, goals, stakes, and worldviews allows Bolton and Payne to configure U.S. nuclear forces according to how evil they perceive other countries to be. Do we really want to dismiss targeting-based deterrence analyses, such as Cimbala’s JFQ article and Lieber’s and Press’s Foreign Affairs appendix, as mere Cold War remnants and replace them with 1 inflammatory Ahmadinejad quote = 1 credible limited U.S. counterforce option? Payne is arguing, laudably, for recognizing deterrence’s complexity. Yet will an injection of red-blooded Manichaeism make U.S. nuclear policy more effective? I doubt it.¶ Payne is right that it is difficult to formulate “quantitatively precise” answers to deterrence questions, but that uncertainty doesn’t necessarily justify rounding up to the larger U.S. nuclear arsenal he would prefer. As Charles Glaser convincingly put it, “Deterrence is likely to be effective because, as was argued extensively during the Cold War, even relatively little credibility is sufficient when the costs of retaliation are so large.” In other words, a little nuke still goes a long way.

#### The stockpile isn’t decaying---we’re upgrading every leg of the triad

McDonough 9 – David S. McDonough, Doctoral Fellow at the Centre for Foreign Policy Studies at Dalhousie University, March 2009, “Tailored Deterrence: The ‘New Triad’ and the Tailoring of Nuclear Superiority,” online: http://www.canadianinternationalcouncil.org/download/resourcece/archives/strategicd~2/sd\_no8\_200

Less noticed is the continuing modernization of the existing arsenal. The remaining low-yield Minuteman III ICBM warheads will be replaced by the high-yield MX warhead and further augmented by the inclusion of GPS guidance systems. The SLBM force of highly accurate and high-yield D-5 warheads will also benefit from the addition of GPS accuracy and ground-burst capability. Even the bomber force will become armed with stealthy and low-flying cruise missiles – ideal to avoid an adversary’s early warning radar. The nuclear force may indeed be smaller, but it is also becoming more accurate and more lethal, and ideal for disarming counterforce strikes.

### Bioweps Def

#### They don’t cause mass destruction

O’Neill 4O’Neill 8/19/2004 [Brendan, “Weapons of Minimum Destruction” http://www.spiked-online.com/Articles/0000000CA694.htm]

David C Rapoport, professor of political science at University of California, Los Angeles and editor of the Journal of Terrorism and Political Violence, has examined what he calls 'easily available evidence' relating to the historic use of chemical and biological weapons. He found something surprising - such weapons do not cause mass destruction. Indeed, whether used by states, terror groups or dispersed in industrial accidents, they tend to be far less destructive than conventional weapons. 'If we stopped speculating about things that might happen in the future and looked instead at what has happened in the past, we'd see that our fears about WMD are misplaced', he says. Yet such fears remain widespread. Post-9/11, American and British leaders have issued dire warnings about terrorists getting hold of WMD and causing mass murder and mayhem. President George W Bush has spoken of terrorists who, 'if they ever gained weapons of mass destruction', would 'kill hundreds of thousands, without hesitation and without mercy' (1). The British government has spent £28million on stockpiling millions of smallpox vaccines, even though there's no evidence that terrorists have got access to smallpox, which was eradicated as a natural disease in the 1970s and now exists only in two high-security labs in America and Russia (2). In 2002, British nurses became the first in the world to get training in how to deal with the victims of bioterrorism (3). The UK Home Office's 22-page pamphlet on how to survive a terror attack, published last month, included tips on what to do in the event of a 'chemical, biological or radiological attack' ('Move away from the immediate source of danger', it usefully advised). Spine-chilling books such as Plague Wars: A True Story of Biological Warfare, The New Face of Terrorism: Threats From Weapons of Mass Destruction and The Survival Guide: What to Do in a Biological, Chemical or Nuclear Emergency speculate over what kind of horrors WMD might wreak. TV docudramas, meanwhile, explore how Britain might cope with a smallpox assault and what would happen if London were 'dirty nuked' (4). The term 'weapons of mass destruction' refers to three types of weapons: nuclear, chemical and biological. A chemical weapon is any weapon that uses a manufactured chemical, such as sarin, mustard gas or hydrogen cyanide, to kill or injure. A biological weapon uses bacteria or viruses, such as smallpox or anthrax, to cause destruction - inducing sickness and disease as a means of undermining enemy forces or inflicting civilian casualties. We find such weapons repulsive, because of the horrible way in which the victims convulse and die - but they appear to be less 'destructive' than conventional weapons. 'We know that nukes are massively destructive, there is a lot of evidence for that', says Rapoport. But when it comes to chemical and biological weapons, 'the evidence suggests that we should call them "weapons of minimum destruction", not mass destruction', he says. Chemical weapons have most commonly been used by states, in military warfare. Rapoport explored various state uses of chemicals over the past hundred years: both sides used them in the First World War; Italy deployed chemicals against the Ethiopians in the 1930s; the Japanese used chemicals against the Chinese in the 1930s and again in the Second World War; Egypt and Libya used them in the Yemen and Chad in the postwar period; most recently, Saddam Hussein's Iraq used chemical weapons, first in the war against Iran (1980-1988) and then against its own Kurdish population at the tail-end of the Iran-Iraq war. In each instance, says Rapoport, chemical weapons were used more in desperation than from a position of strength or a desire to cause mass destruction. 'The evidence is that states rarely use them even when they have them', he has written. 'Only when a military stalemate has developed, which belligerents who have become desperate want to break, are they used.' (5) As to whether such use of chemicals was effective, Rapoport says that at best it blunted an offensive - but this very rarely, if ever, translated into a decisive strategic shift in the war, because the original stalemate continued after the chemical weapons had been deployed. He points to the example of Iraq. The Baathists used chemicals against Iran when that nasty trench-fought war had reached yet another stalemate. As Efraim Karsh argues in his paper 'The Iran-Iraq War: A Military Analysis': 'Iraq employed [chemical weapons] only in vital segments of the front and only when it saw no other way to check Iranian offensives. Chemical weapons had a negligible impact on the war, limited to tactical rather than strategic [effects].' (6) According to Rapoport, this 'negligible' impact of chemical weapons on the direction of a war is reflected in the disparity between the numbers of casualties caused by chemicals and the numbers caused by conventional weapons. It is estimated that the use of gas in the Iran-Iraq war killed 5,000 - but the Iranian side suffered around 600,000 dead in total, meaning that gas killed less than one per cent. The deadliest use of gas occurred in the First World War but, as Rapoport points out, it still only accounted for five per cent of casualties. Studying the amount of gas used by both sides from1914-1918 relative to the number of fatalities gas caused, Rapoport has written: 'It took a ton of gas in that war to achieve a single enemy fatality. Wind and sun regularly dissipated the lethality of the gases. Furthermore, those gassed were 10 to 12 times as likely to recover than those casualties produced by traditional weapons.' (7) Indeed, Rapoport discovered that some earlier documenters of the First World War had a vastly different assessment of chemical weapons than we have today - they considered the use of such weapons to be preferable to bombs and guns, because chemicals caused fewer fatalities. One wrote: 'Instead of being the most horrible form of warfare, it is the most humane, because it disables far more than it kills, ie, it has a low fatality ratio.' (8) 'Imagine that', says Rapoport, 'WMD being referred to as more humane'. He says that the contrast between such assessments and today's fears shows that actually looking at the evidence has benefits, allowing 'you to see things more rationally'. According to Rapoport, even Saddam's use of gas against the Kurds of Halabja in 1988 - the most recent use by a state of chemical weapons and the most commonly cited as evidence of the dangers of 'rogue states' getting their hands on WMD - does not show that unconventional weapons are more destructive than conventional ones. Of course the attack on Halabja was horrific, but he points out that the circumstances surrounding the assault remain unclear. 'The estimates of how many were killed vary greatly', he tells me. 'Some say 400, others say 5,000, others say more than 5,000. The fighter planes that attacked the civilians used conventional as well as unconventional weapons; I have seen no study which explores how many were killed by chemicals and how many were killed by firepower. We all find these attacks repulsive, but the death toll may actually have been greater if conventional bombs only were used. We know that conventional weapons can be more destructive.' Rapoport says that terrorist use of chemical and biological weapons is similar to state use - in that it is rare and, in terms of causing mass destruction, not very effective. He cites the work of journalist and author John Parachini, who says that over the past 25 years only four significant attempts by terrorists to use WMD have been recorded. The most effective WMD-attack by a non-state group, from a military perspective, was carried out by the Tamil Tigers of Sri Lanka in 1990. They used chlorine gas against Sri Lankan soldiers guarding a fort, injuring over 60 soldiers but killing none. The Tamil Tigers' use of chemicals angered their support base, when some of the chlorine drifted back into Tamil territory - confirming Rapoport's view that one problem with using unpredictable and unwieldy chemical and biological weapons over conventional weapons is that the cost can be as great 'to the attacker as to the attacked'. The Tigers have not used WMD since.

### Testing

#### The testing impact is stupid---empirically denied by the Cold War.

## C-Mod

### AT: Spinoffs

#### No further spinoffs --- they would’ve been discovered

Manheimer 98 WALLACE M. MANHEIMER Back to the Future: The Historical, Scientific, Naval, and Environmental Case for Fission Fusion Code 6707 Plasma Physics Division April 2, 1998 Naval Research Laboratory, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA347302>

Finally, there is now an effort to find an intermediate milestone for fusion research, so as to give our sponsors something useful in a more reasonable time. There has recently been at least one study of spinoffs [6],(using some particular algorithm to evaluate each), ranging from pollution abatement to remote sensing to medical applications to lithography. In a sense, this paper, advocating fission fusion is a search for a spin off. It would certainly be wonderful if these other spinoffs did exist, but it is unlikely that they do. The problem is that fusion has been a well funded, well publicized program for decades now. If it had another application, we probably would have known about it long ago. Furthermore, if after decades of promising an inexhaustible energy supply, we suddenly started selling say the 'medical tokamak', we would be accused of bait and switch big time. No, for better or worse, magnetic fusion is almost certainly tied to energy supply.

### AT: Quantum Computing – C-Mod Not Key

#### C-Mod isn’t key to quantum computing – we have the tech and most R&D isn’t from fusion – their author

Scott Aaronson, Comp Sci Prof @ MIT, 12-12-2008, “Quantum Computing and the Ultimate Limits of Computation,” http://www.cra.org/ccc/docs/init/Quantum\_Computing.pdf

Current funding for quantum computing is split over numerous agencies, the larger portion coming from defense and intelligence agencies (iARPA, DARPA, etc.) and a smaller portion coming from the National Science Foundation. If a national investment in quantum computing is undertaken, we believe that NSF is the natural agency for such an investment to be housed. First, this is because the majority of currently active research groups are centered around academic computer science, physics, and mathematics departments. Second, many of a quantum computer’s first applications will not be in the national security arena – it is far more likely that small quantum computers will be put to use studying chemistry or physics and thus fall much more naturally under the fundamental science purview of the NSF. We suggest that the NSF fund several large centers, based upon existing experimental efforts around the United States, which are specialized to the major approaches being taken toward building a quantum computer. These centers should have sufficient resources to fund their own internal effort as well as to support external efforts to develop the technologies needed for quantum computation. A goal should be set for these centers of building a quantum computer which outperforms today's classical computers at quantum simulation tasks within the next decade. We also believe it is essential that a significant NSF program be established to deal with computer security in a post-quantum-computing world. Such a program would focus on cryptography that is resistant to quantum attacks, the capabilities and limits of quantum computers, and the limits of feasible computation more generally. Finally, to support these efforts, we recommend that the NSF’s existing modest investment in the theoretical foundations of computer science be enhanced. A Call to Action Building a quantum computer is daunting challenge. Current progress toward this goal is best described as piecemeal. However, we are currently approaching a tipping point for quantum computers: the most promising technologies have demonstrated all the necessary building blocks of a quantum computer. A large effort to carry these technologies forward and put these blocks together is now prudent, and, we believe, likely to produce future technological spin-offs. The national security consequences of delayed investment in quantum computing, the valuable return on this investment, and the long-term benefits of putting the US at the front of this 21st-century intellectual endeavor, all argue for support of a serious national initiative in quantum computing.

### AT: Quantum Computing – SQ Solves

#### Quantum computing research now – private industry will solve it

Christie Nicholson, 12-28-2012, “Q&A: Adam Frank, astrophysicist on computing’s next revolution,” Smart Planet, http://www.smartplanet.com/blog/pure-genius/q-a-adam-frank-astrophysicist-on-computings-next-revolution/9276

What is the biggest challenge for quantum computing to become an everyday reality? The whole idea with quantum computing is the system must be retained in the purity of its quantum state. If you disturb it, which is what happens when we take measurements of variables, then the whole thing falls apart. To take thirty or a thousand qubits and have them do a computation requires them to not decohere or in other words, not fall apart at the quantum state. That’s a big challenge. But people are pursuing this at high speed with all efforts. Jeff Bezos and the CIA have recently announced that they are providing funding to a Canadian-based company, D-Wave Systems, that is entirely focused on overcoming the quantum computing challenge. So there are companies already out there trying to be the first ones to get these working systems together.

### AT: China

#### China won’t bail on their NIF’s

Fusion Power Associates, 3-5-2012, “Russia, China Building NIF-like Laser Facilities,” http://aries.ucsd.edu/fpa/fpn12-13.shtml

Russia has launched a $1.5 billion project to create a high-energy superlaser site which designers pledge will be the best in the world. Capable of igniting nuclear fusion, the facility will be used both for thermonuclear weapon and for inertial confinement fusion (ICF) studies. The laser facility will be developed by the Research Institute of Experimental Physics (RFNC-VNIIEF), a leading Russian nuclear laboratory. In its six decades of history, it was involved in the development of both the military and civilian nuclear programs in Russia. The site will have the size of a 360-meter long 10-story building and be built near the Sarov technology park in Nizhny Novgorod region in central Russia, said the institute’s head of research, Radiy Ilkaev, who said it will be a dual-purpose device. "On the one hand, there is the defense component, because high energy density plasma physics can be productively studied on such devices. It’s necessary for developing thermonuclear weapons. On the other hand, there is the power industry component. The world’s leading physicists believe that laser nuclear fusion can be useful for future energetics," the scientist said. The Russian device will be similar to the American National Ignition Facility (NIF) and the French Laser Mégajoule (LMJ) in terms of capability. The NIF is currently online. The French counterpart is due to be launched in 2012. The Russian facility may be ready in a decade, Ilkaev estimates. Ilkaev says the future Russian facility will be able to deliver 2.8 megajoules of energy to its target, as compared to energy levels of about 1.8 megajoules for the American and French lasers. "We are making our device later than they did, because such projects are costly, but ours will be the best in the world," the scientist promised. This Russian Laser Fusion System will be the fourth in the series of international facilities of megajoule-class Lasers for ICF and High Energy Density Science. They are NIF in the United States, LMJ (Laser MegaJoule) in France, Divine Light 4 in China and the Russian system. While NIF is now operational and doing experiments, these other facilities plan to be operational later in this decade. They closely resemble the NIF architecture (indirect drive fusion) and can be used for a variety of applications for strategic, energy and basic science missions. Like NIF, each is designed to do fusion burn experiments but of course the French, Chinese and Russian facilities have gained tremendously by US leadership in science research and technology development. These four megajoule-class lasers are supplemented by significant mid-capability laser systems (1-20 kilojoules) -- Omega in Rochester, Orion in Great Britain, Gekko in Japan, Divine Light 2 and 3 in China, and the NRL Nike system. These are configured to do sub-scale fusion experiments and basic science in a variety of configurations including indirect drive, direct drive and fast ignition. There are also now literally dozens of university-scale lasers doing supporting this research internationally. The HiPER effort in Europe is also exploring building large facility capabilities to study fusion energy and the Koreans have recently shown significant interest in exploring this path within their own country. According to Ed Moses, head of the NIF, "This latest Russian announcement demonstrates that laser fusion continues to grow rapidly as an international effort. One of the interesting attributes of these systems is that the size of the investment in showing full-scale burn physics can be managed within the resources of individual countries (as demonstrated above) and that the time scale of construction is now 10 years and decreasing. Many within the field think that this trend will accelerate in the years ahead as the system designs for advanced systems become better understood, the basic technologies continue to become more commercial, and that the physics performance of laser fusion, in whatever configuration, becomes more robust." China is constructing SG-III (Divine Light 3), a 48 beam, 3 ns, 3ω, 200 kJ super laser facility, which is to be in operation in 2012 and plans are in place to build a new Ignition facility, Divine Light 4 (3 ns, 3ω, 1.4 MJ) to be finished in 2020. The SG-III laser facility, which is one of the most important parts of the China ICF Program, is nearing completion in the Research Center of Laser Fusion (LFRC) of China Academy of Engineering Physics (CAEP). SG-III will be used to investigate target physics before ignition for both direct-driven and indirect-driven ICF. The facility is designed to provide up to 48 energetic laser beams (six bundles) and laser energy output of 150-200kJ (3ω) for square pulse of 3 ns. If fast ignition is workable, SG-III will couple with a PW laser of tens of kJ to demonstrate fast ignition.

### Fusion Weps Defense

#### No fusion weapons

Razani 12 Rezwan is the Executive Director of Focus Fusion Society. “Batman Fusion Redemption,” Fusion Energy league, 7/26, http://www.fusionenergyleague.org/index.php/blog/article/batman\_fusion\_redemption

Decay? **Radioactive decay** generally **turns a weapon into a** **dud**.¶ Fusion doesn’t melt down. TDKR confuses fission and fusion. Fission (FIZZ) is the one that breaks up big radioactive uranium nuclei, that has the chain reactions that can get out of control and lead to a “melt down” (hence, “control rods” and big cooling towers). Fusion (FUSE) is different. You have to work REALLY hard to get light nuclei (like Hydrogen) to fuse. And to sustain fusion? With any fusion device conceived, if you break the circuit anywhere, that would shut it off. If it’s any consolation, Spider Man II was also very confused on this point.¶ **You** can’t weaponize a fusion energy device**.** FUSION IS DIFFICULT. This is why we don’t have commercial fusion energy yet. If a fusion energy device was something that could easily get out of control and blow up, scientists would have been able to exploit it as an energy source a lot sooner! **Even theoretically**, a fusion energy device is not weaponizable.¶ Making a Fusion Bomb is REALLY, REALLY DIFFICULT: The only way to weaponize fusion fuel (the fuel, mind you - you can forget the energy device) is to wrap it in an atomic (FISSION) bomb. And this must be done in an incredibly sophisticated way. The atomic bomb has to explode perfectly around the fusion fuel to make it fuse. Fusion fuel would really rather not fuse. It repels itself. Which is why, once again, it is taking some time to exploit as an energy source.¶ Some fusion energy research is funded by NNSA and has a role in weapons “stockpile stewardship” – but NOT because it makes bombs. It just helps scientists look inside existing bombs. The fusion researchers have figured out how to make beams to penetrate a warhead and see if it is still radioactively potent enough to blow, or if it has decayed (see note on “decay” above). This technology is useful if you are a big country like the USA with tens of thousands of warheads and want to know if they still work without conducting weapons tests. If you’re a terrorist, you probably don’t have many weapons, and there’s no point in testing them. You can threaten people just as easily with a dud - and then take your shot and hope for the worst. Fusion is not useful for terrorists.

### Firebreak Defense

#### Declining firebreak inevitable---high-tech conventional weapons

WSLF 2 - The Western States Legal Foundation, non-profit, public interest organization founded in 1982, which monitors and analyzes U.S. nuclear weapons programs and policies and related high technology energy and weapons programs, April 2002, online: http://www.wslfweb.org/docs/shape.pdf, accessed October 7, 2003

This assertion is questionable on two counts. First, the development of powerful, accurate conventional weapons with global reach threatens to blur the boundary between conventional and nuclear warfare “from the bottom” by giving the U.S. capabilities that other countries may feel they only can counter with nuclear weapons or other weapons of mass destruction (see “The New Strategic Triad: Making the Unthinkable Possible,” below) But in addition, a major thrust of the NPR is precisely to accelerate research on more useable nuclear weapons, nuclear weapons that could be used not just to deter a nuclear exchange but to provide “[n]uclear attack options that vary in scale, scope, and purpose” that “will complement other military capabilities.”25 New nuclear capabilities slated to be explored include both warheads and delivery systems, ranging from “‘warheads that reduce collateral damage’” and an existing warhead fitted to a new 5,000 pound earth penetrator bomb, to modifications of delivery platforms now in the pipeline to equip them to deliver nuclear weapons.26

### AT: EMALS

#### SQ solves EMALS which is what their ev is talking about– their author

Lewis Page, 5-12-2012, “US Navy's Plane-Hurling Mass Driver in Tech Hiccup,” The Register, http://www.theregister.co.uk/2010/05/12/emals\_backfire/

Radical plans by the US Navy to equip its next aircraft carrier with electromagnetic mass-drivers for launching aircraft instead of the traditional steam catapults have hit technical snags. The so-called Electromagnetic Aircraft Launch System, or EMALS, is now under development in a shore-based test facility at Lakehurst naval air station in New Jersey. However, according to reports, the test mass-driver installation suffered serious damage earlier this year in a mishap blamed on a "software malfunction". Apparently the "shuttle" - which moves along the catapult track to accelerate a plane to flying speed - went the wrong way in a test shot and smashed into important equipment. The Newport News Daily Press, reporting on an interview with EMALS programme chief Captain Randy Mahr, says that the accident has delayed the shore-based testing by several months. It had been planned to commence launching aircraft - as opposed to test loads - this summer, but that will not now happen until autumn. The next US supercarrier, CVN 78, aka USS Gerald R Ford, is now under construction and intended to join the fleet in 2015. Navy officials confirmed last year that it is now too late to amend the ship's design and revert to steam catapults: EMALS must be made to work or the US Navy will receive the largest and most expensive helicopter carrier ever. Mahr says that the EMALS mishap won't delay the Ford's arrival, as the hardware is ready for installation on schedule. He is confident that remaining software problems can be rectified after the kit is in place. "The hardware issues we're comfortable with," he told the Daily Press. "The things that are delaying me right now are software integration issues, which can be fine-tuned after the equipment is installed in the ship." Mahr had been supposed to hand over the EMALS to another officer and move on to another job by now, following his selection for promotion last year. However, sceptical politicians in Washington, seeking to increase accountability in the event of potentially disastrous failures by the project, have demanded that he remain in post past his normal time. Present-day catapult carriers, operated only by the US and France, use steam generated by their nuclear propulsion to power their aircraft launchers. The steam catapult was actually a British invention, but the Royal Navy has not had conventional fixed-wing carriers since the 1970s for reasons of cost, instead being limited to more basic ships carrying helicopters and vertical-landing Harrier jumpjets. Steam catapults are hard on the planes they launch, require a lot of maintenance and manpower, and are bulky and heavy as well. The USN wants to move to EMALS as it should be cheaper to run, less burdensome on the ship and less damaging to aircraft. The electromotive launchers are more flexible and controllable, too, and are expected to be capable of launching lightweight unmanned aircraft as well as new and heavier naval aircraft of the future which steam cats couldn't manage.

## T

### T-R&D Overview

#### Nuclear production must be for the purpose of energy generation

**IAEA ‘7** (International Atomic Energy Agency 7 <http://www-ub.iaea.org/MTCD/publications/PDF/Pub1290_web.pdf>

Under the terms of Article III of its Statute, the IAEA is authorized to establish or adopt standards of safety for protection of health and minimization of danger to life and property, and to provide for the application of these standards. The publications by means of which the IAEA establishes standards are issued in the IAEA Safety Standards Series. This series covers nuclear safety, radiation safety, transport safety and waste safety, and also general safety (i.e. all these areas of safety). The publication categories in the series are Safety Fundamentals, Safety Requirements and Safety Guides.

 The process of inducing radioactivity.􀁌 Most commonly used to refer to the induction of radioactivity in moderators, coolants, and structural and shielding materials, caused by irradiation with neutrons.􀁌 The BSS definition — “The production of radionuclides by irradiation.” [1] —is technically adequate; however, the term ‘production’ gives a connotation that this is being done intentionally rather than, as is normally the case,incidentally.

#### All research plants gets class 104 licenses – that’s not energy production

**Matuzan and Walker 85**  Controlling the Atom: The Beginnings of Nuclear Regulation, 1946-1962 George T. Mazuzan is Assistant Professor of History at State University of New York at Geneseo. University of Vermont awarded him his B.S. and M.A., and his Ph.D. was conferred by Kent State University. He has published several articles.

 Sections of the 1954 act reflected the state of the technology by establishing two classes of licenses for atomic facilities. One section authorized the AEC to issue commercial or "class 103" licenses (after the section number in the law) whenever it had determined that a facility had been "sufficiently developed to be of practical value for industrial or commercial purposes." Since the agency and the Joint Committee interpreted "practical value" to mean that atomic facilities had to be judged eco- nomically competitive with other energy sources, issuance of class-103 licenses was postponed until the industry had passed through its research and development phase.33 Instead, early power reactor facilities received "class-104" licenses un- der the terms of section 104. Reactors used in medical therapy, university research, and power demonstration came under this category. A key phrase authorized reactor licenses that would lead to the "demonstra- tion of the practical value . . . for industrial or commercial purposes." Class-104 licenses, then, covered all power reactors used during the developmental period until the industry could find a design that would eventually meet the "practical value" criterion of a class-103 commercial license. Furthermore, section 104 specifically instructed the AEC to im- pose the minimum amount of regulation on a licensee consistent with the public health and safety. In other words, a class-104 license indicated that the government wanted to encourage the new industry to undertake research and development under minimum regulation that would lead to major advances in power-reactor technology.34

### AT: For

#### For just means the financial incentives must apply to nuclear power production

Merriam-Webster, Today “for,” http://www.merriam-webster.com/dictionary/for

c —used as a function word to indicate the object or recipient of a perception, desire, or activity <now for a good rest> <run for your life> <an eye for a bargain>

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### T-Substantial

#### Independently, even if they win R&D prod is T---too small

US Department of the Interior et al 05 (Bureau of Reclamation, and the California Department of Water Resources, South Delta Improvements Program Draft Environmental Impact Statement, http://www.deltarevision.com/2005\_docs/chapter\_7.pdf)

Effects on the SWP net energy requirements would be considered significant if net electricity consumption increased substantially. For this analysis, a substantial increase is defined as an increase in net electricity consumption of more than 10%.

### AT: Reasonability

#### It’s arbitrary and undermines research

Resnick 1 Evan- assistant professor of political science – Yeshiva University, “Defining Engagement,” Journal of International Affairs, Vol. 54, Iss. 2

In matters of national security, establishing a clear definition of terms is a precondition for effective policymaking. Decisionmakers who invoke critical terms in an erratic, ad hoc fashion risk alienating their constituencies. They also risk exacerbating misperceptions and hostility among those the policies target. Scholars who commit the same error undercut their ability to conduct valuable empirical research. Hence, if scholars and policymakers fail rigorously to define "engagement," they undermine the ability to build an effective foreign policy.

## States CP

### AT: DOE Labs Key

#### DOE programs exist now to enable the CP

Timothy Fitzsimmons, PhD, 2012, “Department of Energy,” EPSCoR/IDEA Foundation, http://www.epscorideafoundation.org/about/agency/doe/

The Department of Energy’s Experimental Program to Stimulate Competitive Research (DOE EPSCoR) was established by Section 2203 of the Energy Policy Act of 1992 (P.L. 102-486). DOE EPSCoR enhances the capability of 25 eligible states and Puerto Rico to conduct sustainable and nationally competitive energy-related research, increase the number of competitive scientists and engineers in energy-related areas, and build beneficial relationships between designated states and territories and the 10 world-class laboratories managed by the Office of Science, leveraging DOE national user facilities and intellectual collaboration. The DOE EPSCoR effort to develop science and engineering research infrastructure and human resources enables the states to contribute to the current and future energy-related needs.

#### State grants can fund national lab projects

John Brandon, 10-5-2012, “Could EV car batteries be made from salt water?” Fox News, http://www.foxnews.com/leisure/2012/10/05/could-ev-car-batteries-be-made-from-salt-water/

A California company is hoping to supply 20% of the world’s lithium by 2020 with an ingenious plan to produce this material used in the batteries that power most electric cars. Simbol Materials says it wants to build a plant in the Salton Sea near Imperial Valley, California, to extract lithium from the salt water brine that flows up from geo-thermal power generators. The salt water extraction process was originally conceived at California’s Lawrence Livermore National Laboratory (LLNL) with funds from a state grant, while Argonne National Laboratory in Chicago adapted it to be used with geothermal fluids.

### AT: State Funding Fails (Hartwig)

#### Hartwig agrees fiat remedies his arguments

Zach Hartwig, email exchange w/ Harrigan, 10-23-2012, http://msudebate.blogspot.com/2012/10/exchange-with-hartwig-2.html

It would be fascinating to research the juriprudence on this issue to see how the courts have interpreted these clauses with respect to science; however, that's outside my scope. In principle, I think that state could sponsor fusion research; however, in practice and precedent, the federal government will almost exclusively fund fusion for the foreseeable future.

#### Hartwig says he has no idea what he’s talking about

Zach Hartwig, email exchange w/ Harrigan, 10-23-2012, http://msudebate.blogspot.com/2012/10/exchange-with-hartwig-2.html

However, I'll take crack at your constitutionality question because it's an important one. I will note that I am by no means a Constitional scholar or expert on this issue...

### 2NC---AT: 50 State Fiat

#### Assessing desirability of federal v. state action is key to energy education

Kay 12 (David, Cornell Community and Regional Development Institute, “Energy Federalism: Who Decides?”, July, http://devsoc.cals.cornell.edu/cals/devsoc/outreach/cardi/programs/loader.cfm?csModule=security/getfile&PageID=1071714)

Questions about energy production and consumption are acquiring renewed urgency in the 21st Century. **Among these questions are some that go to the heart of our nation’s system of federalism, as an underlying but ever-present friction mounts over the way in which decision making power has been divided between central and more locally distributed political units.** What is at stake? According to one author, **“the choice of regulatory forum often seems to determine the outcome of the controversy. That may explain why Americans have traditionally shed so much metaphorical and genuine blood deciding what are essentially jurisdictional disputes between governmental institutions.”**i

## Leadership Adv

#### Science diplomacy doesn’t create effective cooperation on geopolitical issues

Dickson 9 - David Dickson, Founding Director of the Science-Development Network, June 4, 2009, "The limits of science diplomacy," online: http://www.scidev.net/en/editorials/the-limits-of-science-diplomacy.html

Using science for diplomatic purposes has obvious attractions and several benefits. But there are limits to what it can achieve.¶ The scientific community has a deserved reputation for its international perspective — scientists often ignore national boundaries and interests when it comes to exchanging ideas or collaborating on global problems.¶ So it is not surprising that science attracts the interest of politicians keen to open channels of communication with other states. Signing agreements on scientific and technological cooperation is often the first step for countries wanting to forge closer working relationships.¶ More significantly, scientists have formed key links behind-the-scenes when more overt dialogue has been impossible. At the height of the Cold War, for example, scientific organisations provided a conduit for discussing nuclear weapons control.¶ Only so much science can do¶ Recently, the Obama administration has given this field a new push, in its desire to pursue "soft diplomacy" in regions such as the Middle East. Scientific agreements have been at the forefront of the administration's activities in countries such as Iraq and Pakistan.¶ But — as emerged from a meeting entitled New Frontiers in Science Diplomacy, held in London this week (1–2 June) — using science for diplomatic purposes is not as straightforward as it seems.¶ Some scientific collaboration clearly demonstrates what countries can achieve by working together. For example, a new synchrotron under construction in Jordan is rapidly becoming a symbol of the potential for teamwork in the Middle East.¶ But whether scientific cooperation can become a precursor for political collaboration is less evident. For example, despite hopes that the Middle East synchrotron would help bring peace to the region, several countries have been reluctant to support it until the Palestine problem is resolved. ¶ Indeed, one speaker at the London meeting (organised by the UK's Royal Society and the American Association for the Advancement of Science) even suggested that the changes scientific innovations bring inevitably lead to turbulence and upheaval. In such a context, viewing science as a driver for peace may be wishful thinking.

# 1NR

## C-Mod Adv

#### *Quantum computing is already being researched*

Christie Nicholson, 12-28-2012, “Q&A: Adam Frank, astrophysicist on computing’s next revolution,” Smart Planet, http://www.smartplanet.com/blog/pure-genius/q-a-adam-frank-astrophysicist-on-computings-next-revolution/9276

Computing is closing in on a horizon of potentially massive change, again. If you think the last decade of digital innovation brought extraordinary upheaval in our day-to-day lives, well you ain’t seen nothing yet. The shrinking size and cost of the transistor is what makes our digital products ever more powerful, small and cheap. But this constant shrinking is coming to an end as transistors can only get so small before they stop working properly. Many scientists and researchers are currently working hard to develop the next leap in computing power, and this leap will be bigger and more shocking that[n] what we’ve already witnessed in the last four decades.

#### *Breakthroughs on quantum computing now*

John Roach, 9-7-2012, “A quantum leap toward computers of the future,” NBC News, http://www.nbcnews.com/technology/futureoftech/quantum-leap-toward-computers-future-1B5988130

Practical quantum computers that will allow us to crack encrypted messages in a jiffy and design a new class of life-saving drugs are a big step closer thanks to scientists who have created the first working quantum bit based on a single atom in silicon. The scientists report in the journal Nature today that they were able to read and write information using the spin of an electron bound to a single phosphorous atom embedded in a silicon chip. The breakthrough is crucial to building quantum computers with silicon, which is important because silicon is already at the heart of the modern computing industry and is well understood scientifically. Industry could thus potentially work more easily with it to build the computers of tomorrow.

#### No risk of fleet collapse

Robert O. Work 12, United States Under Secretary of the Navy and VP of Strategic Studies @ Center for Strategic and Budgetary Assessments, "The Coming Naval Century," May, Proceedings Magazine - Vol. 138/5/1311, US Naval Institute, www.usni.org/magazines/proceedings/2012-05/coming-naval-century

For those in the military concerned about the impact of such cuts, I would simply say four things:¶ • Any grand strategy starts with an assumption that all resources are scarce, requiring a balancing of commitments and resources. As political commentator Walter Lippmann wrote: “The nation must maintain its objectives and its power in equilibrium, its purposes within its means, and its means equal to its purposes.”¶ • The upcoming defense drawdown will be less severe than past post–World War II drawdowns. Accommodating cuts will be hard, but manageable.¶ • At the end of the drawdown, the United States will still have the best and most capable armed forces in the world. The President well appreciates the importance of a world-class military. “The United States remains the only nation able to project and sustain large-scale military operations over extended distances,” he said. “We maintain superior capabilities to deter and defeat adaptive enemies and to ensure the credibility of security partnerships that are fundamental to regional and global security. In this way our military continues to underpin our national security and global leadership, and when we use it appropriately, our security and leadership is reinforced.”¶ • Most important, as the nation prioritizes what is most essential and brings into better balance its commitments and its elements of national power, we will see the beginning of a Naval Century—a new golden age of American sea power.¶ The Navy Is More Than Ships¶ Those who judge U.S. naval power solely by the number of vessels in the Navy’s battle force are not seeing the bigger picture. Our battle force is just one component—albeit an essential one—of a powerful National Fleet that includes the broad range of capabilities, capacities, and enablers resident in the Navy, Marine Corps, and Coast Guard. It encompasses our special-mission, prepositioning, and surge-sealift fleets; the ready reserve force; naval aviation, including the maritime-patrol and reconnaissance force; Navy and Marine special operations and cyber forces; and the U.S. Merchant Marine. Moreover, it is crewed and operated by the finest sailors, Marines, Coast Guardsmen, civilian mariners, and government civilians in our history, and supported by a talented and innovative national industrial base.¶ If this were not enough, the heart of the National Fleet is a Navy–Marine Corps team that is transforming itself from an organization focused on platforms to a total-force battle network that interconnects sensors, manned and unmanned platforms with modular payloads, combat systems, and network-enabled weapons, as well as tech-savvy, combat-tested people into a cohesive fighting force. This Fleet and its network would make short work of any past U.S. Fleet—and of any potential contemporary naval adversary.

## Solvency

#### Growth is sustainable – this answers every limiting factor

Lomborg 12 Dr. Bjorn, Director of Copenhagen Consensus Center and Adjunct Professor at Copenhagen Business School. "Environmental Alarmism, Then and Now," Foreign Affairs, July/August, Vol 91, Issue 4, EBSCO

FORTY YEARS ago, humanity was warned: by chasing ever-greater economic growth, it was sentencing itself to catastrophe. The Club of Rome, a blue-ribbon multinational collection of business leaders, scholars, and government officials brought together by the Italian tycoon Aurelio Peccei, made the case in a slim 1972 volume called The Limits to Growth. Based on forecasts from an intricate series of computer models developed by professors at MIT, the book caused a sensation and captured the Zeitgeist of the era: the belief that mankind's escalating wants were on a collision course with the world's finite resources and that the crash would be coming soon.¶ The Limits to Growth was neither the first nor the last publication to claim that the end was nigh due to the disease of modern development, but in many ways, it was the most successful. Although mostly forgotten these days, in its own time, it was a mass phenomenon, selling 12 million copies in more than 30 languages and being dubbed "one of the most important documents of our age" by The New York Times. And even though it proved to be phenomenally wrong-headed, it helped set the terms of debate on crucial issues of economic, social, and particularly environmental policy, with malign effects that remain embedded in public consciousness four decades later. It is not too great an exaggeration to say that this one book helped send the world down a path of worrying obsessively about misguided remedies for minor problems while ignoring much greater concerns and sensible ways of dealing with them.¶ That '70S show¶ IF THE 1950s and early 1960s had been a period of technological optimism, by the early 1970s, the mood in the advanced industrial countries had begun to turn grim. The Vietnam War was a disaster, societies were in turmoil, economies were starting to stagnate. Rachel Carson's 1962 book Silent Spring had raised concerns about pollution and sparked the modern environmental movement; Paul Ehrlich's 1968 book The Population Bomb had argued that humanity was breeding itself into oblivion. The first Earth Day, in 1970, was marked by pessimism about the future, and later that year U.S. President Richard Nixon created the Environmental Protection Agency to address the problem. This was the context in which The Limits to Growth resonated; its genius was to bring together in one argument the concerns over pollution, population, and resources, showing how so-called progress would soon run into the natural world's hard constraints.¶ Founded in 1968 and grandly declaring itself to be "a project on the predicament of mankind," the Club of Rome had set as its mission the gathering of the world's best analytic minds to find a way "to stop the suicidal roller coaster man now rides." This led it to Jay Forrester, an MIT professor who had developed a computer model of global systems, called Work2, that allowed one to calculate the impact of changes in several variables on the planet's future. The club appointed a team led by two other MIT researchers, Donella Meadows and Dennis Meadows, to create an updated version, World3, and it was the output of this model that was presented in book form in The Limits to Growth. In an age more innocent of and reverential toward computers, the reams of cool printouts gave the book's argument an air of scientific authority and inevitability; hundreds of millions of logical microcircuits seemed to banish any possibility of disagreement.¶ The model was neither simple nor easy to understand. Even the graphic summary was mind-numbingly convoluted, and the full specifications of the model were published a year later, in a separate book of 637 pages. Still, the general concept was straightforward. The team "examined the five basic factors that determine, and therefore, ultimately limit, growth on this planet--population, agricultural production, natural resources,. industrial production, and pollution." Crucially, they assumed that all these factors grow exponentially--a step so important that the whole first chapter of the book is dedicated to explaining it. They asked readers to consider the growth of lilies in a pond:¶ Suppose you own a pond on which a water lily is growing. The lily plant doubles in size each day. If the lily were allowed to grow unchecked, it would completely cover the pond in 30 days, choking off the other forms of life in the water. For a long time the lily plant seems small, and so you decide not to worry about cutting it back until it covers half the pond. On what day will that be? On the twenty-ninth day, of course. You have one day to save your pond.¶ In the standard scenario, shown in Figure 1, the authors projected the most likely future that would play out for humanity. With the years 1900 to 2100 on the horizontal axis, the graph shows levels of population, pollution, nonrenewable resources, food, and industrial output on the vertical axis. As death rates drop significantly (because of improvements in medical knowledge) and birthrates drop slightly, population increases. As each person consumes more food and products, meeting the total demand "requires an enormous input of resources." This depletes the resource reserves available, making it ever harder to fulfill next year's resource demands, and eventually leads to the collapse of the economic system. Because of lags in the effects, population keeps growing until a staggering increase in the death rate driven by a lack of food and health services kills off a large part of civilization. The culprit is clear: "The collapse occurs because of nonrenewable resource depletion."¶ What if the world gets better at conserving resources or finding new ones? It doesn't matter. Run the model again with double or infinite resources, and a collapse still occurs--only now it is caused by pollution. As population and production explode, pollution does, too, crippling food production and killing off three-quarters of the population.¶ What if pollution is kept in check through technology and policy? It still doesn't matter. Run the model again with unlimited resources and curbs on pollution, and the prediction remains bleak. As production soars, the world's population does, too, and with it demands for food. Eventually, the limit of arable land is reached, and industry is starved as capital is diverted into ever-feebler attempts to increase agricultural yields. With food production back at the subsistence level, death rates shoot up, and civilization is again doomed.¶ The authors concluded that the "basic behavior mode of the world system is exponential growth of population and capital followed by collapse." And "when we introduce technological developments that successfully lift some restraint to growth or avoid some collapse, the system simply grows to another limit, temporarily surpasses it, and falls back."¶ Unlike previous gloomy forecasts, this one offered no easy way out. Carson wanted to stop the use of pesticides; Ehrlich wanted to slow population growth. But The Limits to Growth seemed to show that even if pollution and population growth were controlled, the world's resources would eventually be exhausted and food production would decline back to the subsistence level. The only hope was to stop economic growth itself. The world needed to cut back on its consumption of material goods and emphasize recycling and durability. The only hope to avoid a civilizational collapse, the authors argued, was through draconian policies that forced people to have fewer children and cut back on their consumption, stabilizing society at a level that would be significantly poorer than the present one.¶ Since most people saw such a solution as wildly unrealistic, the real takeaway was simple: the world was screwed. And so Time magazine s 1972 story on The Limits to Growth was headlined "The Worst Is Yet to Be?" It read:¶ The furnaces of Pittsburgh are cold; the assembly lines of Detroit are still. In Los Angeles, a few gaunt survivors of a plague desperately till freeway center strips, backyards and outlying fields, hoping to raise a subsistence crop. London's offices are dark, its docks deserted. In the farm lands of the Ukraine, abandoned tractors litter the fields: there is no fuel for them. The waters of the Rhine, Nile and Yellow rivers reek with pollutants.¶ Fantastic? No, only grim inevitability if society continues its present dedication to growth and "progress."¶ The Limits to Growth got an incredible amount of press attention. Science gave it five pages, Playboy featured it prominently, and Life asked whether anyone wanted to hear "the awful truth." Publications such as The Economist and Newsweek chimed in with criticisms, but in 1973, the oil embargo made the book look prescient. With the oil shock and soaring commodity prices, it seemed that the world was fast-forwarding to the Club of Rome future.¶ OOPS¶ FORTY YEARS on, how do the predictions stack up? Defenders like to point out that The Limits to Growth carefully hedged its bets, with its authors claiming that they were not presenting "exact predictions" and that they were "deliberately… somewhat vague" on time frames because they wanted to focus on the general behavior of the system. But this is sophistry. It was obvious from the way the book was both presented and understood that it made a number of clear predictions, including that the world would soon run out many nonrenewable resources.¶ Assuming exponentially increasing demand, The Limits to Growth calculated how soon after 1970 various resources would be exhausted. Their conclusion was that before 2012, the world would run out of aluminum, copper, gold, lead, mercury, molybdenum, natural gas, oil, silver, tin, tungsten, and zinc--12 of the 19 substances they looked at. They were simply and spectacularly wrong.¶ They singled out mercury, claiming that its known global reserves in 1970 would last for only 13 years of exponential growth in demand, or 41 years if the reserves magically quintupled. They noted that "the prices of those resources with the shortest static reserve indices have already begun to increase. The price of mercury, for example, has gone up 500 percent in the last 20 years." Since then, however, technological innovations have led to the replacement of mercury in batteries, dental fillings, and thermometers. Mercury consumption has collapsed by 98 percent, and by 2000, the price had dropped by 90 percent.¶ They predicted that gold might run out as early as 1979 and would certainly do so by 1999, based on estimations of 10,980 tons of known reserves in 1970. In the subsequent 40 years, however, 81,410 tons of gold have been mined, and gold reserves are now estimated to be 51,000 tons.¶ Known reserves of copper in 1970 came to 280 million tons. Since then, about 400 million tons have been produced globally, and world copper reserves are now estimated at almost 700 million tons. Since 1946, new copper reserves have been discovered faster than existing copper reserves have been depleted. And the same goes for the other three most economically important metals: aluminum, iron, and zinc. Despite a 16-fold increase in aluminum consumption since 1950, and despite the fact that the world has consumed four times the 1950 known reserves in the years since, aluminum reserves now could support 177 years of the present level of consumption. The Limits to Growth also worried about running out of oil (in 1990) and natural gas (in 1992). Not only have those not run out, but their reserves, measured in terms of years of current consumption, are larger today than they have ever been since 1970, even though consumption has increased dramatically.¶ WHAT THEY MISSED¶ THE BASIC point of The Limits to Growth seemed intuitive, even obvious: if ever-more people use ever-more stuff, eventually they will bump into the planet's physical limits. So why did the authors get it wrong? Because they overlooked human ingenuity.¶ The authors of The Limits to Growth named five drivers of the world system, but they left out the most important one of all: people, and their ability to discover and innovate. If you think there are only 280 million tons of copper in the ground, you'll think you'll be out of luck once you have dug it out. But talking about "known reserves" ignores the many ways available resources can be increased.¶ Prospecting has improved, for example. As recently as 2007, Brazil found the Sugar Loaf oil field off the coast of São Paulo, which could hold 40 billion barrels of oil. Extraction techniques have also been improving. The oil industry now drills deeper into the ground, farther out into the oceans, and higher up in the Arctic. It drills horizontally and uses water and steam to squeeze out more from existing fields.¶ And shale gas can now be liberated with new fracking technology, which has helped double U.S. potential gas resources within the past six years. This is similar to the technological breakthrough of chemical flotation for copper, which made it possible to mine ores that had previously been thought worthless, and similar to the Haber-Bosch process, which made nitrogen fixation possible, yielding fertilizers that now help feed a third of humanity.¶ Aluminum is one of the most common metallic elements on earth. But extracting it was so difficult and expensive that not so long ago, it was more costly than gold or platinum. Napoleon III had bars of aluminum exhibited alongside the French crown jewels, and he gave his honored guests aluminum forks and spoons while lesser visitors had to make do with gold utensils. Only with the invention of the Hall-Héroult process in 1886 did aluminum suddenly drop in price and massively increase in availability. Most often, however, ingenuity manifests itself in much less spectacular ways, generating incremental improvements in existing methods that cut costs and increase productivity.¶ None of this means that the earth and its resources are not finite. But it does suggest that the amount of resources that can ultimately be generated with the help of human ingenuity is far beyond what human consumption requires. This is true even of energy, which many think of as having peaked. Costs aside, for example, by itself, the Green River Formation in the western United States is estimated to hold about 800 billion barrels of recoverable shale oil, three times the proven oil reserves of Saudi Arabia. And even with current technology, the amount of energy the entire world consumes today could be generated by solar panels covering just 2.6 percent of the area of the Sahara.¶ Worries about resources are not new. In 1865, the economist William Stanley Jevons wrote a damning book on the United Kingdoms coal use. He saw the Industrial Revolution relentlessly increasing the country's demand for coal, inevitably exhausting its reserves and ending in collapse: "It will appear that there is no reasonable prospect of any release from future want of the main agent of industry." And in 1908, it was Andrew Carnegie who fretted: "I have for many years been impressed with the steady depletion of our iron ore supply. It is staggering to learn that our once-supposed ample supply of rich ores can hardly outlast the generation now appearing, leaving only the leaner ores for the later years of the century." Of course, his generation left behind better technology, so today, exploiting harder-to-get-at, lower-grade ore is easier and cheaper.¶ Another way to look at the resource question is by examining the prices of various raw materials. The Limits to Growth camp argues that as resource constraints get tighter, prices will rise. Mainstream economists, in contrast, are generally confident that human ingenuity will win out and prices will drop. A famous bet between the two groups took place in 1980. The economist Julian Simon, frustrated by incessant claims that the planet would run out of oil, food, and raw materials, offered to bet $10,000 that any given raw material picked by his opponents would drop in price over time. Simons gauntlet was taken up by the biologist Ehrlich and the physicists John Harte and John Holdren (the latter is now U.S. President Barack Obama's science adviser), saying "the lure of easy money can be irresistible." The three staked their bets on chromium, copper, nickel, tin, and tungsten, and they picked a time frame of ten years. When the decade was up, all five commodities had dropped in price, and they had to concede defeat (although they continued to stand by their original argument). And this was hardly a fluke: commodity prices have generally declined over the last century and a half (see Figure 2).¶ In short, the authors of The Limits to Growth got their most famous factor, resources, spectacularly wrong. Their graphs show resource levels starting high and dropping, but the situation is precisely the opposite: they start low and rise. Reserves of zinc, copper, bauxite (the principal ore of aluminum), oil, and iron have all been going spectacularly up (see Figure 3).¶ MORE, MORE, MORE¶ WHAT OF the other factors in the analysis? Their devastating collapse was predicted to occur just after 2010, so it may be too soon for that to be definitively falsified. But the trends to date offer little support for the gloom-and-doom thesis.¶ The growth in industrial production per capita to date was slightly overestimated by The Limits to Growth, possibly because resources have gotten cheaper rather than more expensive and more and more production has moved into the service industry. But mainstream forecasts of long-term GDP growth, a plausible proxy, are positive as far as the eye can see, in sharp contrast to what The Limits to Growth expected. The [IPCC] Intergovernmental Panel on Climate Change, for example, the only major group to have set out informed GDP scenarios through 2100, estimates that global GDP per capita will increase 14-fold over the century and increase 24-fold in the developing world.¶ The amount of population growth was somewhat underestimated, mainly because medical advances have reduced death rates even faster than expected (despite the unforeseen HIV/AIDS crisis). But the population growth rate has slowed since the late 1960s, unlike the World3 predictions, because birthrates have fallen along with development.¶ And predictions about the last two factors, agricultural production and pollution, were way off--which is important because these were the two backup drivers of collapse if a scarcity of resources didn't do the job. Global per capita food consumption was expected to increase by more than 50 percent in the four decades after 1970, peak in 2010, and then drop by 70 percent. Calorie availability has indeed increased, if not quite so dramatically (by somewhat more than 25 percent), but the collapse of the food supply is nowhere in sight, and there is every reason to believe that the gains will continue and be sustainable. Malnutrition has not been vanquished, and the absolute number of people going hungry has in fact increased slightly recently (in part because some crops have been diverted from food to biofuel production due to concerns about global warming). But over the past 40 years, the fraction of the global population that is malnourished has dropped from 35 percent to less than 16 percent, and well over two billion more people have been fed adequately. The world is nowhere close to hitting a ceiling on the usage of arable land; currently, 3.7 billion acres are being used, and 6.7 billion acres are in reserve. Nor have productivity gains maxed out. The latest long-range UN report on food availability, from 2006, estimated that the world would be able to feed ever-more people, each with evermore calories, out to midcentury.¶ As for its pollution predictions, The Limits to Growth was simultaneously scary and vague. Pollution's increase was supposed to trigger a global collapse if the decrease of food or resources didn't do so first, but how exactly pollution was defined was left unclear. Individual pollutants, such as DDT, lead, mercury, and pesticides, were mentioned, but how those could kill any significant number of people was unspecified, making it a bit tricky to test the prediction. Air pollution might be considered a good proxy for overall pollution, since it was the biggest environmental killer in the twentieth century and since the Environmental Protection Agency estimates that its regulation produces 86-96 percent of all the social benefits from environmental regulation more generally. In the developing world, outdoor air pollution is indeed rising and killing more people, currently perhaps over 650,000 per year. Indoor air pollution (from using dirty fuels for cooking and heating) kills even more, almost two million per year (although that number has been decreasing slightly).¶ Even in the developed world, outdoor air pollution is still the biggest environmental killer (at least 250,000 dead each year), although environmental regulation has reduced the death toll dramatically over the past half century. Indoor air pollution in the developed world kills almost nobody. Whereas the Club of Rome imagined an idyllic past with no pollution and happy farmers and a future world choked by fumes and poisons from industrialization run amok, the reality is quite different. Over the last century, pollution has neither spiraled out of control nor gotten more deadly, and the risk of death from air pollution is predicted to continue to drop (see Figure 4).¶ WHO CARES?¶ So THE Limits to Growth project got its three main drivers spectacularly wrong and the other two modestly wrong. The world is not running out of resources, not running out of food, and not gagging on pollution, and the world's population and industrial output are rising sustainably. So what? Why should anyone care now? Because the project's analysis sunk deep into popular and elite consciousness and helps shape the way people think about a host of important policy issues today.

## Ban Testing CP

**No resource wars---prefer our more qualified, empirical evidence**

**Pinker**, Professor @ Harvard University, **11** (An Excerpt from "The Better Angels of our Nature," http://www.globalwarming.org/2011/11/28/steven-pinker-resource-scarcity-doesnt-cause-wars/, EMM)

Once again it seems to me that the appropriate response is “maybe, but maybe not.” Though climate change can cause plenty of misery… it will not necessarily lead to armed conflict. The political scientists who track war and peace, such as Halvard Buhaug, Idean Salehyan, Ole Theisen, and Nils Gleditsch, **are skeptical of the** popular **idea that people fight wars over** scarce **resources.** Hunger and resource shortages are tragically common in sub-Saharan countries such as Malawi, Zambia, and Tanzania, but wars involving them are not. Hurricanes, floods, droughts, and tsunamis (such as the disastrous one in the Indian Ocean in 2004) do not generally lead to conflict. The American dust bowl in the 1930s, to take another example, caused plenty of deprivation but no civil war. And while temperatures have been rising steadily in Africa during the past fifteen years, civil wars and war deaths have been falling. Pressures on access to land and water can certainly cause local skirmishes, but a genuine war requires that hostile forces be organized and armed, and that depends more on the influence of bad governments, closed economies, and militant ideologies than on the sheer availability of land and water. Certainly any connection to terrorism is in the imagination of the terror warriors: terrorists tend to be underemployed lower-middle-class men, not subsistence farmers. As for genocide, the Sudanese government finds it convenient to blame violence in Darfur on desertification, distracting the world from its own role in tolerating or encourage ing the ethnic cleansing. In a regression analysis on armed conflicts from 1980 to 1992, Theisen found that conflict was more likely if a country was poor, populous, politically unstable, and abundant in oil, but not if it had suffered from droughts, water shortages, or mild land degradation. (Severe land degradation did have a small effect.) **Reviewing analyses that examined a large number** (N) **of countries rather than cherry-picking one** or toe, **he concluded, “Those who foresee doom, because of** the relationship between **resource scarcity** and violent internal conflict, **have very little support** from the large-N literature.”

# Immigration DA

## O/V

### O/V---General

#### Immigration is a prerequisite---worker shortage now means ZERO solvency---immigration high skilled visas are key to nuclear expansion

Johnsson 11 Julie is a writer for Bloomberg Businessweek. “A Labor Shortage for U.S. Nuclear Plants,” July 7, <http://www.businessweek.com/magazine/a-labor-shortage-for-us-nuclear-plants-07072011.html>

Whether Fukushima, where the world watched three nuclear reactors begin to melt down following an earthquake and tsunami in March, marked the end of America’s nuclear renaissance remains to be seen. There is little doubt, though, that it has cast a pall over the industry’s efforts to recruit a new generation of engineers, technicians, and decontamination specialists just as nuclear plant operators face an unprecedented labor crunch.¶ Nuclear utilities in the U.S. will need to hire nearly 25,000 people to replace the 39 percent of its workforce that will be eligible for retirement by 2016, says Carol L. Berrigan, senior director for industry infrastructure for the Nuclear Energy Institute, a Washington-based trade group. Meanwhile, U.S. universities awarded a total of 715 graduate and undergraduate degrees in nuclear engineering in 2009, the most recent year for which data is available.¶ After nuclear plant disasters at Three Mile Island in Pennsylvania and Chernobyl in Ukraine, nuclear power lost political support in the U.S. Hiring slowed through the 1990s and nuclear workers under the age of 40 became a rarity as talk turned from expansion to shutting down existing plants. “That’s not an exciting prospect for a young person thinking about their career,” says K.L. “Lee” Peddicord, a professor of nuclear engineering and director of the Nuclear Power Institute at Texas A&M University.

### AT: Manufacturing Turn

#### Even if it boosts manufacturing the internal link is TINY---it only creates a FEW JOBS in a SINGLE LABORATORY

#### Manufacturing’s not key---it has diminishing returns as the economy improves

Chapman, 12 -- Tribune editorial board member

(Steve, "Manufacturing an economic myth," Chicago Tribune, 3-18-12, articles.chicagotribune.com/2012-03-18/news/ct-oped-0318-chapman-20120318\_1\_manufacturing-sector-rick-santorum-products, accessed 10-3-12

Manufacturing accounts for a **shrinking slice** of the total economy mainly because as we grow wealthier, we spend a smaller portion of our income on physical products, like carsand appliances, and a bigger one on services, from health care to cellphone contracts to restaurant meals. That phenomenon holds across the developed world. It's the result of the free market at work, endlessly shifting resources to accommodate changes in consumer demand. Politicians don't think they should tell Americans to eat at Burger King instead of Chipotle, or buy baseball bats instead of soccer balls. They didn't insist we keep our typewriters when personal computers came along. For the most part, our leaders take it as normal and sensible to defer to consumer demand, rather than try to dictate it. Given that, why do they think they ought to rig the tax code to push consumption dollars from services, which Americans want, to goods, which they don't want quite so much? Why should they divert investment from more popular businesses to less popular ones? That's what the measures offered by Santorum and Obama would do. The point is to ease the tax burden of manufacturers at the expense of other companies, on the superstition that the former are more valuable than the latter. It's hard to see the fairness or the economic logic. When the president unveiled his proposal, Jade West of the National Association of Wholesaler-Distributors complained to The New York Times, "My guys are totally freaked out by manufacturing getting a different tax rate than we do. They're not more important in the economy than retail or distribution or anything else." In fact, manufacturing is bound to be a diminishing share of any advanced economy. Obama and Santorum can fling money into the teeth of that trend. But any time politicians want to resist powerful and beneficial economic forces, bet on the economic forces.

### AT: Economy Resilient

#### Decline causes protectionism---guts trade and undermines resliency

Harris & Burrows 9 Mathew, PhD European History @ Cambridge, counselor of the U.S. National Intelligence Council (NIC) and Jennifer, member of the NIC’s Long Range Analysis Unit “Revisiting the Future: Geopolitical Effects of the Financial Crisis” http://www.ciaonet.org/journals/twq/v32i2/f\_0016178\_13952.pdf

As markets prove truly global in reach and risk, as margins progressively thin, and states assume ever-more market presence, the fictional barriers between ‘‘economic’’ and ‘‘foreign’’ policy will be increasingly difficult, even dangerous, to maintain. Finance and markets are now high politics. Mere days after the G-20 convened in Washington and promised to ‘‘refrain from raising new barriers to investment or to trade,’’ Brazil supported hikes in Mercosur common external tariffs on a range of goods, China tightened its dollar-peg and announced a new round of export tax-breaks, India levied a new duty on iron and steel manufactures, and Russian leaders increased auto import tariffs. Inability to hold ground on these old and familiar problems will exacerbate progress on new, arguably more difficult tasks such as managing stimulus efforts, coordinating their eventual drawdown, and not least, undertaking any meaningful financial regulation. Against these odds, and in face of untold consequences of failure, the price of admission onto the international high table, whether indeed the G-20 or some successor entity, must be more than aggregate GDP, and include increased responsibility for shouldering global burdens if new institutions are to be effective.

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### Not sure where the rest of the 1nr doc went but it’s basically the same as what got read v. MSU GT earlier that weekend