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## Solvency

#### Plan: The United States federal government should substantially increase loan guarantees for the expansion of nuclear power in the United States

### Solvency – Loan Guarantees

#### Loan guarantees attract private capital – increases are key

Ari Peskoe, associate in the law firm of McDermott Will and Emery LLP and focuses his practice on regulatory, legislative, compliance, and transactional issues related to energy markets, 4-20-2012, “A Solution Looking For a Problem: Building More Nuclear Reactors after Vogtle,” The Electricty Journal, vol 25 issue 3, Science Direct

Given the checkered history of reactor construction projects,56 private lenders are understandably skittish about lending billions of dollars to develop a new reactor. Construction of the Vogtle and SCANA reactors will be a critical test, and significant cost overruns on these two projects could doom the prospects for construction of additional reactors. Even if the construction of Vogtle and SCANA are on budget, it will likely still be difficult for future project developers to raise enough debt financing without government support.57 Federal loan guarantees shift “a large part of the learning costs and construction risks” from private lenders to the federal government by ensuring that lenders receive payment in the event that the developer defaults on repayments.58 Appropriations for the guarantees authorized by the Energy Policy Act of 2005 will soon run out, so future guarantees will require congressional action.59 Loan guarantees cost the federal government little or nothing unless there is an event of default.60 Creating a long-term guarantee program would be entirely consistent with the government's historic role in accepting risks and liabilities of nuclear power. Although it has not been implemented effectively, the Nuclear Waste Policy Act (NWPA) of 1982 requires the DOE to transport nuclear waste from privately owned reactors to permanent government storage facilities.61 Concerned about a “cloud of bankruptcy” hanging over its operations,62 the nascent nuclear industry pushed Congress to pass the Price-Anderson Act in 1957, which indemnifies the industry against claims arising from a nuclear incident. Both the NWPA and the Price-Anderson Act socialize costs of nuclear energy. In the case of the NWPA, the industry pays the DOE a tenth of a penny for each kilowatt-hour of nuclear energy sold to fund waste disposal activities.63 The Price-Anderson Act also requires generators to contribute to a fund, but the federal treasury would likely cover much of the liabilities associate with a nuclear disaster.64

#### Government support overcomes financial barriers – key hurdle

Kassia Yanosek, entrepreneur-in-residence at Stanford University’s Steyer-Taylor Center for Energy Policy and Finance and a private equity investor in the energy sector as a principal at Quadrant Management and Founder of Tana Energy Capital LLC, Spring 2012, " Financing Nuclear Power in the US", energyclub.stanford.edu/index.php/Journal/Financing\_Nuclear\_Power\_by\_Kassia\_Yanosek

Over the course of the last decade, it appeared that concerns about carbon emissions, aging coal fleets, and a desire for a diversified generation base were reviving the U.S. utility sector interest in building new nuclear plants. Government and companies worked closely on design certification for Generation III reactors, helping to streamline the licensing process. New loan guarantees from the federal government targeted for nuclear projects were created as part of the 2005 Energy Policy Act. Consequently, dozens of projects entered the planning stages. Following more than 30 years in which no new units were built, it looked as if the U.S. nuclear industry was making significant headway. However, it is yet to be seen how many new nuclear projects will actually make it beyond blueprints due to one of the largest barriers to new nuclear construction: financing risk. Large upfront capital costs, a complex regulatory process, uncertain construction timelines, and technology challenges result in a risk/return profile for nuclear projects that is unattractive for the capital markets without supplementary government or ratepayer support. To many investors, nuclear seems too capital-intensive. Nuclear energy has attractive qualities in comparison to other sources of electricity. A primary motivation to pursue the development of nuclear energy in the U.S. has been its low operating fuel costs compared with coal, oil, and gas-fired plants. Over the lifetime of a generating station, fuel makes up 78% of the total costs of a coal-fired plant. For a combined cycle gas-fired plant, the figure is 89%. According to the Nuclear Energy Institute, the costs for nuclear are approximately 14%, and include processing, enrichment, and fuel management/disposal costs. Today’s low natural gas prices have enhanced the prospects of gas-fired power, but utilities still remain cautious about over-investing in new natural gas generation given the historical volatility of prices. Furthermore, nuclear reactors provide baseload power at scale, which means that these plants produce continuous, reliable power to consistently meet demand. In contrast, renewable energies such as wind or solar are only available when the wind blows or the sun shines, and without storage, these are not suitable for large-scale use. Finally, nuclear energy produces no carbon emissions, which is an attractive attribute for utilities that foresee a carbon tax being imposed in the near future. Given nuclear’s benefits, one may wonder why no new nuclear units have been ordered since the 1970s. This hiatus is in great part due to nuclear’s high cost comparative to other alternatives, and its unique set of risks. As a result, financing nuclear has necessitated government involvement, as the cost of nuclear typically exceeds that of the cost of conventional generation technologies such as coal and natural gas fired generation on a levelized cost of energy (LCOE) basis. LCOE represents the present value of the total cost of building and operating a generating plant over its financial life, converted to equal annual payments and amortized over expected annual generation, and is used to compare across different power generation technologies. For both regulated utilities and independent power producers, nuclear is unattractive if the levelized cost exceeds that of other technologies, since state utility commissions direct regulated utilities to build new capacity using the technology with the lowest LCOE. Furthermore, capital costs are inherently high, ranging in the billions or tens of billions of dollars, and are compounded by financing charges during long construction times. Without government support, financing nuclear is currently not possible in the capital markets. Recently, Constellation Energy and NRG separately pulled the plug on new multi-billion dollar plants, citing financing problems. Projects, however, will get done on a one-off basis. Southern Company’s Vogtle Plant in Eastern Georgia is likely to be the sponsor of the first new generation to be constructed, taking advantage of local regulatory and federal support. Two new reactors of next-generation technology are in the permitting stage, which will bring online 2,200 megawatts (MW) of new capacity, and will cost $14 billion. The project will take advantage of tax credits and loan guarantees provided in the 2005 Energy Policy Act.

#### Makes nuclear competitive – nuclear plants are cheap to operate

Charles Ferguson, president of the Federation of American Scientists, November 2011, “JAPAN MELTED DOWN. BUT THAT DOESN'T MEAN THE END OF THE ATOMIC AGE,” Foreign Policy issue 189, EBSCO

IN FACT, NUCLEAR POWER plants are relatively cheap to operate. Averaging the costs over the life of the operation, a safely run plant can even be a cash cow, generating power at as low as 6 cents per kilowatt-hour, comparable to a coal-fired power plant. The problem is getting them built. A large reactor can cost several billion dollars, and construction delays -- as well as slowdowns forced by inevitable legal challenges -- have been known to drive up construction costs by $1 million a day. This problem is nothing new; it has plagued the industry since the 1970s. Years before the Three Mile Island disaster turned public opinion against the atom, the U.S. nuclear sector was already in trouble on account of legal and bureaucratic changes enacted under Presidents Richard Nixon, Gerald Ford, and Jimmy Carter that made new plants easier to stop with lawsuits -- usually filed by environmental and citizens' groups -- and regulations more unpredictable. That spooked investors, who in turn raised interest rates on borrowing for plant developers. The then-ongoing recession, which depressed energy demand, didn't help; neither did the plummeting price of oil and deregulation of natural gas that followed in the 1980s. Today, the industry argues that plant construction can only happen with the help of tens of billions of dollars in federal loan guarantees, which transfer financial risks onto taxpayers. But the fact is that nuclear power has never succeeded anywhere without enormous government backing. Until 2004, the French government wholly owned Électricité de France, the utility that operates all French nuclear power plants, and the government still controls more than 80 percent of it today. The Chinese government also largely or wholly owns China's nuclear-power utilities. And nuclear is hardly the only energy source that hasn't stood up in the free market once you factor in the external costs. Consider how much of the Pentagon's $550 billion-a-year budget goes toward securing oil supplies. For a country like Japan or South Korea, with virtually no domestic energy supplies, nuclear power may be worth the upfront costs if it allows for a measure of energy security. As for the rest of us, nuclear power may also come to seem a good deal, once you factor in the risks of climate change.

#### Federal signal is key to attracting private capital

Michael Scott, former senior advisor at the Department of Treasury and partner and managing director at Miller Buckfire & Co as well as head of the firm’s U.S. Government Advisory practice, 4-20-2010, “Statement of Michael D. Scott” Testimony before the Subcommittee on Domestic Policy of the Committee on Oversight and Government Reform in the House of Representatives, http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg65123/pdf/CHRG-111hhrg65123.pdf

The President and Congress have a very powerful policy tool in Title XVII that is unique and important in the current economic environment, especially with the U.S. Government facing the stresses and difficult choices involved with our significant budget deficits. Title XVII can drive economic growth due to the development of clean-energy infrastructure projects that are built and fully paid for by the private sector; provide significant short-term and long-term construction and manufacturing jobs; provide long-term operating jobs; promote the development of new U.S.-based manufacturing, particularly significant in the case of manufacturing that will develop from a robust new nuclear build; develop environmentally clean and secure domestic energy supply capacity, particularly in the case of carbon-free baseload generation from new nuclear; correct the private market failure to finance clean and innovative energy technologies; and, finally, provide well-qualified project sponsors with the confidence that credible projects can receive a Federal loan guarantee, which is an important signal for private-sector project sponsors to pursue these substantial investments because of the up-front costs that they bear before any application and, significantly, before any closing on a Federal loan guarantee.

## Gas Advantage

#### Natural gas is gaining market dominance – expansion of nuclear power avoids a bridge to nowhere

Jesse Jenkins, director of energy and climate policy at the Breakthrough Institute, previously worked as a Policy and Research Associate at the Renewable Northwest Project, 1-20-2012, “Avoiding a Natural Gas Bridge to Nowhere,” The Energy Collective, http://theenergycollective.com/breakthroughinstitut/74658/avoiding-natural-gas-bridge-nowhere

Just as the history of unconventional natural gas production in America was fundamentally shaped by government support for new technology development, so too will the future of natural gas depend on America's willingness to make long-term public investments in advanced energy technologies. A convenient narrative has taken hold concerning the development of unconventional gas extraction from shale formations. It goes like this: Once a marginal and shrinking contributor to domestic primary energy, hydraulic fracturing, or "fracking" has unlocked vast reserves of shale gas and ignited a revolution in North American natural gas production, leading to sharp increases in proven reserves and decreases in gas prices. Technical improvements in fracking technology and the diligence of private sector gas companies led by independent wildcatter George Mitchell brought about this renaissance, guaranteeing a future of lower energy prices, cleaner-burning fuel, and a more energy-secure economy. It's a convenient narrative of independent American ingenuity. But like so many similar stories, this popular tale belies the critical partnership of the federal government in the development of the key technologies that enabled today's shale gas boom. As an independent investigation by the Breakthrough Institute revealed, the federal government performed the requisite R&D and demonstration that led to massive hydraulic fracturing, directional drilling, and microseismic imaging -- the key component technologies that made the shale revolution possible. The gas industry was languishing in the 1970s, suffering from falling annual production and increased energy prices. Gas companies reached out to the federal government for assistance in mapping unconventional gas resources and developing the technologies needed to extract them. This partnership was sustained through the 1990s, when Texas-based Mitchell Energy experimented with hydraulic fracturing technologies pioneered with federal government assistance and partnered with the Department of Energy to complete its first horizontal drilling installation. By the late 1990s, Mitchell had perfected a cost-effective fracking technique and the shale boom had begun. It is no small exaggeration to say that government investment in unconventional gas extraction and mapping technologies fundamentally changed the history - and future - of American natural gas markets. Domestic gas prices have plummeted and production has steadily increased, reversing decades of decline. America now possesses a seemingly abundant and relatively clean substitute for polluting, carbon-intensive coal-fired power plants, potentially accelerating a transition to a healthier, lower-carbon electricity system. With increasing pollution controls on coal-fired power plants and lower relative prices for natural gas, all signs point to natural gas eclipsing coal in the electric power sector in the next couple decades. With natural gas prices achieving an unprecedented divergence from global oil prices, the United States may even enhance domestic energy security and reduce exposure to oil markets by substituting gas for oil in certain transportation segments (e.g. heavy duty trucking or fleet vehicles). Cheap gas simultaneously puts pressure on higher-cost nuclear, wind, and solar energy, however. If cheap gas leads to complacency in the development of sustainable, low-carbon electricity sources, today's gas boon may become tomorrow's curse, as natural gas eclipses not only coal, but also cleaner, carbon-free energy sources. An increasingly dominant role for natural gas in America's energy mix also exposes the United States to the inherent volatility of natural gas markets. As a gas, methane flows much faster from wells than crude oil. Natural gas wells thus produce and deplete quite rapidly, with roughly 50 percent of a typical well's lifetime production expended in the first three or four years. This basic dynamic of rapid production and depletion often leads to a boom-bust cycle in markets, as anyone observing North American natural gas markets over the past half century can attest. If North America begins to export large quantities of natural gas, this inherent volatility will only be exacerbated. The future of natural gas is unlikely to part with this history of boom and bust - unless the United States once again commits to long-term investment in the development of affordable, clean, domestic energy technologies. Without significant and strategic investments in next-generation solar, wind, nuclear, and electric vehicles, there's every reason to believe the natural gas revolution will continue and gas will ultimately become an increasingly dominant share of the U.S. energy supply. The result will likely be near-term declines in CO2 and pollutants along with growing reliance on another volatile and increasingly costly fossil energy source. The shale gas "bridge fuel" may well become a bridge to nowhere. If instead the United States makes smart, sustained investments in clean energy R&D, demonstration, manufacturing, and infrastructure, there's no reason to believe America can't continue to unlock even greater supplies of cleaner, cheaper, domestic energy technologies, from next-generation solar to advanced nuclear reactors. In short, America's energy future, just like its past, depends on our willingness to invest in innovation.

#### Long term lock in is coming – building up alternatives is key

Christopher Jones, Ciriacy-Wantrup Fellow, University of California-Berkeley, 8-29-2012, “Natural Gas: Bridge or Dead End?” Huffington Post, http://www.huffingtonpost.com/christopher-f-jones/bridge-or-dead-end\_b\_1837015.html

Natural gas is often touted as a bridge fuel: an interim step between the heavily polluting fossil fuels we depend on today and the clean renewable energy systems we hope for tomorrow. But the infrastructure we deploy to increase natural gas may actually inhibit the transition to solar and wind power. Rather than a bridge, natural gas may be a dead end. The idea of natural gas as a bridge draws on three main points. First, natural gas produces significantly less carbon dioxide than coal or oil. Second, it releases fewer impurities like sulfur and mercury compared with other fossil fuels. Third, many experts anticipate that obtaining even 20 percent of our energy from renewables in the next couple decades will be difficult. Natural gas, advocates argue, offers a more realistic large-scale carbon reduction strategy in the short-term because we have already addressed many of the technical challenges of producing, transporting, and consuming it. These considerations merit attention from the pragmatic environmentalist. Greatly reducing carbon emissions without lowering overall energy consumption is a laudable goal if it can be done in an environmentally responsible manner. Yet in addition to thinking about how we build a natural gas bridge, it is imperative that we devote equal attention to how we get off. A good bridge requires off-ramps. If we consider the role of infrastructure in energy transitions, this might be harder than we think. Critics of natural gas have typically focused on issues of pollution rather than infrastructure. First, there has been widespread opposition to 'fracking' shale gas reserves, a process that may contaminate drinking water, trigger minor earthquakes, and produce many other environmental consequences. Second, there are debates over whether natural gas really has a beneficial impact on climate. It may produce less greenhouse gas, but leaks of methane might more than offset these gains. These are important issues, but it is also worth examining the impact that expanding natural gas infrastructure will have on renewable energy systems. Building a natural gas bridge will require a significant expansion of infrastructure: drilling wells for production, pipelines for distribution, and a range of devices for consumption including power plants, home furnaces, and industrial ovens. Investing in these systems will increase the supply of natural gas and lower its costs through economies of scale. As a result, consumers will find it cheaper and easier to use natural gas. This is a straightforward account of what infrastructure does -- it facilitates certain types of behaviors. What is less appreciated is the fact that infrastructure cuts two ways. These systems will not simply provide an advantage for natural gas; they will make it progressively harder and more expensive to transition to renewables. We can examine this point by thinking about relative prices and sunk costs. Relative prices often matter more than absolute prices for energy transitions. For consumers, it is not simply the price of an energy source that matters; it is how much more or less that energy source costs than other options. Right now, natural gas is already cheaper than solar and wind for electricity production in most analyses. With significant investments in natural gas infrastructure, this price gap is only likely to grow. Therefore, even though the absolute price of renewable energy will not change, wind and solar will become less attractive to consumers because they will cost relatively more. What's more, these inequalities are likely to become more extreme over time due to sunk costs. Most of the systems designed to burn natural gas, like furnaces and electrical generating equipment, are expensive and designed to last for decades. Once large sums have been paid to purchase such systems, short-term price changes matter far less to consumers. Even if natural gas triples in price, prior investments in these systems will still act as a disincentive for switching to renewables. The sunk costs in infrastructure, therefore, further suggest that once we get on the bridge, it will be hard to get off. We need not be resigned to this fate. The key is to think not simply about building a bridge, but also about building off-ramps.

#### Use natural gas as a bridge to nowhere ensures a methane apocalypse – expansion of nuclear reduces the short run magnitude of emissions preventing the climate from crossing short run tipping points.

Bill Chameides, Dean, Duke University's Nicholas School of the Environment, 7-20-2012, “Natural Gas: A Bridge to a Low-Carbon Future or Not?” Huffington Post, http://www.huffingtonpost.com/bill-chameides/-natural-gas-a-bridge-to\_b\_1690857.html

Not really, scientists like Bob Howarth of Cornell University, protested. Why? Before answering that, you need to know a couple of background facts. First, methane, the major component of natural gas, is itself a very potent greenhouse gas -- some 21 times more effective a warmer than CO2 on a 100-year basis. And second, when we use natural gas, there are inevitably fugitive emissions, leaks during mining, transport, and consumption that allow methane to escape into the atmosphere where it can do its global warming thing. What Howarth argued in a much-debated paper published last year is that the leakage rates are so high that, contrary to conventional wisdom, transitioning from coal to natural gas would actually lead to more global warming than just sticking with coal, even though coal is the most carbon-intensive of the fossil fuels.¶ Since the paper's publication, other investigators and studies have weighed in on the matter, including RealClimate's Gavin Smith; the Council on Foreign Relations' Michael Levi; Ramón Alvarez of Environmental Defense Fund and co-authors; and another Cornell scientist, Lawrence Cathles. But a definitive conclusion has been elusive because the actual magnitude of these fugitive emissions remains very poorly defined.¶ Chapter 3. Methane Leakage Exonerated?¶ The upshot of the debate about the importance of fugitive emissions has led to a general consensus that we need a very thorough investigation into the leakage issue. In short we need to first pin down the magnitude of fugitive emissions and then cut them down by locking the methane up. (See here and here.)¶ But now Cornell's Cathles argues in a new paper published last week in the journal Geochemistry Geophysics Geosystems that fugitive emissions may not be that sinister after all. Or at least not if natural gas is indeed used as a bridge fuel that is first phased in as coal and some oil are phased out and then eventually is itself phased out in favor of carbon-free energy sources.¶ Assuming periods of 50, 100, and 200 years to make the transition from coal to natural gas to renewables, Cathles's model calculations indicate that the long-term (i.e., multiple decades to century timescales) climate impacts of the fugitive methane emissions are relatively small. The reason is that methane has a relatively short lifetime in the atmosphere -- about 12 years. And so once natural gas is no longer used as a fuel, the methane in the atmosphere from fugitive emissions will be removed from the atmosphere and so the warming from those emissions will be essentially gone. CO2 on the other hand is long-lived and so, Cathles argues, over the long term using natural gas instead of coal or oil is preferable because less CO2 will have been emitted in that scenario. Well, it's preferable provided we use natural gas as a transition fuel that eventually gives way to even cleaner renewables and/or nuclear. And then there's the issue of the short-term climate effects from fugitive emissions.¶ Chapter 4. The Question of the Short Term¶ Cathles's point about the transient effects of methane fugitive emissions is well taken. But there is a potential catch and it relates to short-term climate effects. During the transition period, when fugitive methane from using natural gas would build up in the atmosphere, there is a possibility, depending upon the magnitude of the methane emissions, that we would experience more short-term warming than if we were to have stuck with coal and oil. We might think of this as the transient version of the Howarth argument.¶ Now, as long as the fugitive emissions are small or the Earth system is "reversible," the transient Howarth scenario does not seem all that worrisome. But what if the emissions are large? And what if the disturbances from global warming are not reversible? Then we would have a problem. The transition to natural gas would lead to more warming for a period of time until natural gas is phased out and the excess methane is removed from the atmosphere. With the exit of the excess methane, the extra warming would also go away. Cathles seems to argue that all would be well:¶ "Even when methane leakage is so large (L = 10% of consumption) that substituting gas for coal and oil increases global warming in the short term, the benefit of gas substitution returns in the long term."¶ But it is not all that obvious that the impacts from global warming are reversible. If fragile ecosystems like coral reefs are decimated by a decade or two of extra methane-induced warming, can we be sure that they will recover once the methane is flushed from the atmosphere? Probably not.

#### Controlling methane emissions is more important than CO2 – methane hits us while we are vulnerable.

Joe Romm, Fellow at American Progress and is the editor of Climate Progress, acting assistant secretary of energy for energy efficiency and renewable energy in 1997, PHD in physics from MIT, 4-9-2012, “Natural Gas Is A Bridge To Nowhere Absent A Carbon Price AND Strong Standards To Reduce Methane Leakage”, http://thinkprogress.org/climate/2012/04/09/460384/natural-gas-is-a-bridge-to-nowhere-absent-a-carbon-price-and-strong-standards-to-reduce-methane-leakage/

A new journal article finds that methane leakage greatly undercuts or eliminates entirely the climate benefit of a switch to natural gas. The authors of “Greater Focus Needed on Methane Leakage from Natural Gas Infrastructure“ conclude that “it appears that current leakage rates are higher than previously thought” and “Reductions in CH4 Leakage Are Needed to Maximize the Climate Benefits of Natural Gas.” Natural gas is mostly methane – a very potent greenhouse gas, though with a much shorter lifetime in the atmosphere than CO2, which is emitted by burning fossil fuels like natural gas. Recent studies suggest a very high global warming potential (GWP) for CH4 vs CO2, particularly over a 20-year time frame. The new Proceedings of the National Academy of Sciences study introduces the idea of “technology warming potentials” (TWPs) to reveal “reveal time-dependent tradeoffs inherent in a choice between alternative technologies.” In this new approach the potent warming effect of methane emissions undercuts the value of fuel switching in the next few decades, exactly the timeframe we need to reverse the warming trend if we are to have any chance at triggering amplifying feedbacks and preventing multiple catastrophes. For instance, the new study finds that a big switch from coal to gas would only reduce TWP by about 25% over the first three decades — far different than the typical statement that you get a 50% drop in CO2 emissions from the switch. Note that the conclusion above is based on “EPA’s latest estimate of the amount of CH4 released because of leaks and venting in the natural gas network between production wells and the local distribution network” of 2.4%. Many experts believe the leakage rate is higher than 2.4%, particularly for the fastest growing new source of gas — hydraulic fracturing. Also, recent air sampling by NOAA over Colorado found 4% methane leakage, more than double industry claims. The study notes: We emphasize that our calculations assume an average leakage rate for the entire U.S. natural gas supply (as well for coal mining). Much work needs to be done to determine actual emis- sions with certainty and to accurately characterize the site-to-site variability in emissions. However, given limited current evidence, it is likely that leakage at individual natural gas well sites is high enough, when combined with leakage from downstream operations, to make the total leakage exceed the 3.2% threshold beyond which gas becomes worse for the climate than coal for at least some period of time.

#### Fugitive emissions are large massive – best sources

David Lewis, PHD, staff writer, 12-7-2010, “EPA confirms high Natural Gas leakage rates,” The Energy Collective, http://theenergycollective.com/david-lewis/48209/epa-confirms-high-natural-gas-leakage-rates

The latest EPA study confirms that its original "seminal" study of methane leaks from natural gas use, i.e. "Methane Emissions from the Natural Gas Industry (GRI/EPA 1996) was in error. The GRI/EPA 1996 study was the holy grail. The IPCC used GRI/EPA numbers when it assessed the climate impact of gas. The old figures drastically underestimate the climate impact of the use of natural gas. This confirms the work of Dr. Robert Howarth, the Cornell professor whose work I described in two recent posts (first, here, and later, here) in a most authoritative way. The original GRI/EPA study was regarded as so good it served as "the basis for most CH4 [methane] estimates from natural gas systems". These include: the main EPA Inventory of US GHG Emissions and Sinks, the American Petroleum Institute (API) Compendium, the studies done by the Interstate Natural Gas Association of America, the protocols developed by the California Climate Action Registry, and "many of the emission factors included in the Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories." The EPA page that refers to the study is here. The study in question is: "Technical Support Document: Petroleum and Natural Gas Systems". Gory details follow. (Noises of busy newsroom in background) Actually this isn't some news flash. EPA posted the study on a webpage that looks like it was created in November 2010. The document I dug out was an obscure looking link only a demented wonk would click on, late at night, near the bottom of the page. How could something this old, stuffed here, have news in it? Gas gets such a free ride from the usual suspects who scrutinize this type of thing something like this can be hidden in broad daylight. I quote: "Although the GRI/EPA Study has been the cornerstone for estimating CH4 emissions from the natural gas industry to date, the data on which the study is based are now over a decade and a half old and in some cases (e.g., wells, compressors), not always reflective of current conditions in the United States. In recognition of the fact that existing methane emission factors were becoming quickly outdated, in 2007 EPA funded a 4-year cooperative agreement with UT Austin to support research and, as appropriate, measurement studies to update selected CH4 emission factors from the 1996 GRI study" So it isn't even a final paper from a completed study yet. They didn't get enough funds to completely revamp GRI/EPA 1996, even though they know its data is invalid. They are now in the process of "evaluating the most efficient use of the remaining resources". But the paper used new data on methane leakage its authors believe supercede the old GRI/EPA numbers. There are drastic changes. Howarth and the EPA are in the process of changing how the world views natural gas. Table 1, Table 2, and the explanatory note to Table 2, say it all. On Table 1, note the Revised Emissions Factors. One is more than 8,000 times higher than the old one. Its the figure for new shale gas well completions : The explanatory note under Table 2 was the clue for me. I wanted to put the data into the basic form Howarth uses when he assesses how bad methane emissions from gas are. I.e. what percentage of the overall production was leaked to the atmosphere as methane? In that explanatory note I saw that for 2006, they are breaking out the data for just the gas industry that isn't separated in the Table. So they say "the natural gas industry emitted 261 MMTCO2e of CH4 in 2006. A GAO report I've been studying had a conversion factor to convert MMTCO2e to billions of cubic feet of natural gas. Total US gas production for 2006 is available from EIA in cubic feet. The conversion figure GAO-11-34 published in 2010 page 41 is".4045 million metric tons of carbon dioxide equivalent per billion cubic feet of vented natural gas". So I took the 261 million metric tons of CO2e, divided by .4045 and got 645 billion cubic feet. I took this 645 Bcf and divided by the 2006 marketed production of around 20 trillion cubic feet. This gave me: 3.25 % of US natural gas production leaks into the atmosphere as methane gas. The industry has been saying the leaks are tiny, less than a fraction of 1%. Howarth wrote in an email to me that his figures were much higher than old EPA data: "at least 1.9% and perhap 5.6% or greater" Howarth's to be published paper will have more detail. Howarth was saying EPA was low and he had a number of solid studies showing why. Now EPA is saying they agree - their own figures are much higher than old EPA data. This EPA data is in the range of gas is worse than coal. David Hone said on the Natural Gas Webinar recently aired by The Energy Collective that leaks in Europe are essentially "zero". Hone called Howarth's work "unimpressive". This is a big can of worms. And, as I analyse this new EPA document I see there is potential for the number to be greater. E.g.: EPAs new reporting rule allows an estimated 15% of emissions to go unreported - it isn't clear whether they then jack up or intend to jack up what's reported by 15%. "Engineering" calculations such as some the EPA still seem to rely on have proven to be in error compared to what actual measurement of what's in the air surrounding facilities shows. And I didn't include US gas flaring CO2 because it was too late at night. I just wanted to calculate long enough to get the drift of what EPA was saying. One reason I explained how I derived my 3.25% figure up there is because it seemed odd I have to calculate at all. I thought they hired the people preparing these reports to do the calculating, so people like me won't misunderstand what they've discovered. It was the same thing with the GAO study on venting and flaring I just studied. If I want data in a form that is meaningful to compare the climate impact of gas to coal, I have to calculate. Everyone involved understands that there are some who see climate as serious, even though the denial campaign has been a splendid success. If I was guessing, I'd say if an agency expresses itself too clearly about what it has discovered about US gas, the report is taken by industry to be antagonistic.) But the fact that the EPA now estimates methane venting to be this high is the end of the fantasy world for all those who were saying gas is "green". Its one thing to say some professor must be off his head. This is the agency that came up with the reference data everyone was using. EPA clearly states the reference data was bad all along.

#### Methane release is insulated the typical warming debate – unique threat

Clean Energy Educational Trust, energy and environmental analysts, 2001, “Runaway Methane Global Warming,” Hydrogen NOW! Journal, http://www.hydrogen.co.uk/h2\_now/journal/articles/3\_Methane.htm

Core samples taken from old ocean sediment layers have been used to trace back in time the climate changes that have occurred over the past tens of millions of years. By analysing the incidence of different fossil shell remains of sea creatures occurring in these sediments it is possible to track the changes in the sea water temperatures and levels of atmospheric CO2 occurring at the time the shells were formed and deposited. These shells contain carbon from the CO2 in the atmosphere which was dissolved in the sea water in which the creatures lived just as takes place today. From these records it appears that there have been short periods of only a few hundred years in the geological past when rapid increases of the Earth's temperature have occurred superimposed on top of the rise and fall of average temperatures over the longer term. For these short periods temperature rises of up to 8 degrees centigrade appear to have occurred on top of existing long term rises of 5 to 7 degrees to give temperatures up to 15 degrees centigrade warmer than today. Temperatures then fell back to the long term trend, the whole rise and fall only lasting a few hundred years. The most likely cause of this rapid global warming over such a short period is the release of methane into the atmosphere. Methane is 60 times more powerful than CO2 as a greenhouse gas but only remains in the atmosphere for about ten years and so looses it's greenhouse effect quickly compared to CO2 which remains in the atmosphere for 100 years. CO2 would not be available in sufficient quantities to achieve the rapid warming and if CO2 was the cause then the raised temperatures would last a lot longer.

#### Rapid climate shifts cause extinction

Max Mcclure, staff writer, 6-7-2012, “Earth may be approaching 'tipping point,' Stanford scientist says,” Stanford University News, http://news.stanford.edu/news/2012/june/earth-tipping-point-060712.html

It's already established that global biological systems are capable of very rapid, wholesale shifts. Of the five major extinction events in Earth's history, at least four of them were accompanied by this kind of critical transition. Global conditions that had remained relatively stable for millions of years changed dramatically over a period lasting less than 5 percent of that time.¶ There's reason to believe that "pronounced change" in "assemblages of species," as the paper puts it – such as extinction events – are a reliable marker of these shifts. And we happen to be in the middle of an ongoing human-driven mass extinction.¶ The litany of ways in which humans have altered the Earth's environment is well known. But why do these scientists now believe that we are moving toward a major, irreversible shift?¶ "There's the idea that, once you have more than 50 percent of wholesale disturbance in a given ecological system, major disturbance in the rest of the system will inevitably follow," said Hadly, who is also a senior fellow at the Stanford Woods Institute for the Environment.¶ L.A. Cicero¶ Professor Elizabeth Hadly¶ About 43 percent of Earth's land has already been converted to agricultural or urban use and, if current trends continue, is expected to reach the 50 percent mark by 2025. By 2060, using current trends, the number will be 70 percent.¶ By comparison, the last critical shift Earth underwent was the end of the last Ice Age. That famously dramatic example of climate change only involved ice melting from 30 percent of Earth's surface, and it resulted in a major transition in global climatic conditions and the distribution of life on the planet.¶ No escape¶ What Hadly saw in Yellowstone suggests these global shifts may already be affecting isolated, local environments.¶ "As an ecologist, I was trained to measure changes on a local or a regional level – looking at changes in a 1-by-1-meter plot," said Hadly. "Now, there's a heck of a lot of change in that 1-meter plot that has nothing to do with local processes."¶ The global drivers that are working their way into every corner of the planet all have humans behind the wheel. Human population growth and increased resource consumption mean that anywhere from 20 to 40 percent of the planet's energy produced by living things now goes to support human society.¶ The ecosystems that do survive are becoming more homogeneous and simpler – a combination of human-introduced species and habitat degradation and fragmentation.¶ "We're fairly naïve in managing for new combinations of species that will exist," Hadly said, "in part because we usually anticipate ecosystem change on a species-by-species basis."¶ The human connection¶ Although the exact nature of Earth's next state is unpredictable, the researchers expect it to resemble an accelerated version of these already-in-motion processes.¶ These shifts are potentially disastrous for humanity as well.¶ "Citizens of wealthy countries like the U.S. are less aware of catastrophic shifts in ecosystem services because we have the ability to cobble together short-term fixes that mask the global trend," said Hadly. "But other countries aren't so buffered." In a world marked by water shortages and climate change, "we simply aren't yet equipped with a flexible intergovernmental structure necessary to manage for this future."

#### Nuclear build up insulates diversifies energy production – insulates against price spikes

Christine Todd Whitman, former EPA administrator and New Jersey governor, is the co-chair of the Clean and Safe Energy Coalition which promotes the inclusion of nuclear power as part of a clean energy portfolio, 5-9-2012, “It's dangerous to depend on natural gas,” Fortune, http://tech.fortune.cnn.com/2012/05/09/christine-whitman-nuclear-energy/

The United States needs an "all of the above" energy strategy that focuses on low-carbon electricity sources that will lower energy costs, reduce dependency on foreign fuel sources and promote clean electricity. This is a prudent strategy to help drive American manufacturing and transportation networks of the future. Most importantly, this approach can put the country on a sustainable path toward long-term economic growth. While today's rock-bottom natural gas prices are attractive, an unbalanced dependence on natural gas in the electricity sector would put Americans at risk, both economically and in terms of longer term energy security. While many look at energy prices from today's lens, successful energy policy requires a long view that promotes fuel diversity but doesn't pick technology winners; it preserves our air, land and water and is affordable for consumers. We need only look at the volatile history of natural gas prices. Consider the shift from the low, stable prices of the 1990s to the record-high rates and wild supply fluctuations of the mid-2000s. We should take advantage of our domestic energy resources, recognizing that today's natural gas market is still vulnerable. The present oversupply of natural gas opens opportunities for exports into foreign markets at prices two-to-three times higher. If demand from other countries increases as they meet growing energy demand, it will cause our prices to align with higher world prices. MORE: 8 characteristics of Green Insurgents During my tenure as governor of a state that relies heavily on nuclear energy, I can attest to the cost effectiveness of nuclear fuel and the protection it offers against price spikes in natural gas or future environmental controls such as a cost on carbon. Nuclear energy doesn't emit any greenhouse gases or controlled pollutants while producing power and it is affordable, predictable and efficient. Moreover, a nuclear power plant with a footprint of one square mile generates the same amount of energy as 20 square miles of solar panels or 2,400 wind turbines spread out across 235 square miles. Uranium fuel is abundant and costs an average of 2.14 cents per kilowatt-hour, compared to 4.86 cents per kilowatt-hour for natural gas. A nuclear plant typically generates electricity at 90 percent capacity—an electric sector best and twice that of combined cycle natural gas plants at 40 to 45 percent capacity. Clean energy production costs, which include fuel, operations and maintenance, run nearly equal for nuclear and natural gas. A new nuclear plant with state or federal support can generate power at $84-$91 per megawatt-hour with zero carbon emissions. Natural gas plants produce power at today's gas prices for $56-$71 per megawatt-hour, but still emit greenhouse gases at about half the rate of coal plants. Assuming a carbon price of $30 per ton, natural gas power generation costs rise to about $74-$89 per megawatt-hour. At Fortune's Brainstorm Green conference, I noted a March 2012 Gallup poll that found 57% of Americans support nuclear energy. This support reflects the momentum behind nuclear energy's expansion, including recent U.S. Nuclear Regulatory Commission approval of four reactors in Georgia and South Carolina. New large-scale electricity is needed today in the fast-growing Southeast electric grid because of business expansion and population growth. These new reactors will serve the needs of 3 million homes while creating thousands of high-paying jobs. On average, a nuclear facility creates up to 3,500 construction jobs and 400 to 700 operation positions. MORE: Green businesses: Don't abandon Washington According to the Bureau of Labor Statistics, nuclear energy accounted for 54% of green jobs in the utility sector in 2010, supplying the most green goods-and-services jobs—35,800—in private sector electricity generation. For example, 90% of the components for the Westinghouse reactors being built in Georgia and South Carolina will be manufactured domestically. As the dash to gas accelerates across America, I am encouraged by the support from government and industry leaders for nuclear energy as part of a diverse electricity supply. Secretary of Energy Steven Chu recently restated the administration's support for nuclear energy to be developed alongside renewable energy sources and natural gas. Kevin Marsh, president and CEO of Columbia, S.C.-based SCANA, which is developing two advanced designed Westinghouse reactors, said a balanced energy portfolio is best. "You don't want to be all gas, all nuclear or all coal." Fuel diversity is one of the great strengths of the United States' electric supply system, and we must be mindful of that lesson. In the coming years, we will need hundreds of new power plants from a variety of fuel sources along with significant investment in the smart grid that will move that power to homes, businesses and an evolving electrified transportation system. Nuclear energy is the only large-scale, carbon-free electricity source, and it must be among these energy choices if we are to secure a safe and sustainable portfolio of energy resources.

#### Price spikes are inevitable and collapse the economy without nuclear power

Rod Adams, gained his nuclear knowledge as a submarine engineer officer and as the founder of a company that tried to develop a market for small, modular reactors from 1993-1999, 8-30-2012, “Will natural gas prices in North America skyrocket by the end of 2014?” The Energy Collective, http://theenergycollective.com/rodadams/107901/look-out-natural-gas-prices-north-america-will-skyrocket-end-2014?ref=node\_other\_posts\_by

In the publications that I regularly read, it is impossible to avoid noticing that there are some enormous bets being placed on the premise that natural gas prices in North America will remain at levels that are between 1/3 and 1/6th of the world price. Despite all words to the contrary, those prices are not the result of some kind of incredible technical innovation that has fundamentally reduced the cost of finding and extracting natural gas; they are the result of a temporary imbalance in the market that makes available supply slightly larger than available demand. Several factors have combined to produce the pleasant effect – for gas buyers – of very low prices relative to history and relative to the prices paid almost everywhere else. Mild weather, slow economic conditions, associated production from wells drilled in search of far more lucrative oil, the high rate of initial production typical in frack jobs, leases that require drilling, the inherent inertia associated with drilling activities and, perhaps, a little purposeful push from people who understand how to use low prices to destroy competition have all combined to ensure that gas seems plentiful – in North America. The rocks and shoals ahead are a result of a different combination of factors. Independent gas producers are having enormous difficulty attracting financing needed to continue drilling; major producers have cut their drilling programs as a natural result of getting numerous questions about low prices from analysts and stockholders; too many new customers are buying into the marketing pitch that hydraulic fracturing will lead to cheap gas forever; the housing market looks poised to begin a serious recovery led by low supply and pent up demand; and there is a serious push to try to eliminate the transportation bottlenecks that have kept natural gas prices from equalizing around the world. The significantly higher prices that I predict will last at least as long as the pleasant times with low prices because the only effective response – other than another dramatic recession – has a long lead time. Yes, I purposely used the singular in the previous sentence because I can only see one alternative to a replay of the dramatic rise in gas prices that occurred here between 2000-2008. The only reasonable answer to a price rise driven by having an overall energy supply that is lower than the demand is an increased supply. There are only two technologies with the capacity to make a difference – coal and nuclear energy. I may be totally off base, but I do not see a new round of coal plant building anyplace outside of Germany, the home of brown coal fans. In my less than humble opinion, we need to build new nuclear plants. We should have started building in earnest at least a decade ago, but the second best time to start any long lead time effort that should have already started is NOW. Unfortunately, I think that almost everyone who has the ability to take action on this warning is either hypnotized, dozing, or celebrating the fact that they will be the wreckers who capture the spoils as the economy crashes against the rocky shore of high energy prices.

#### Stable energy prices are key to manufacturing

Shelly Schwartz, staff writer, 6-20-2012, “Can the Natural Gas Sector Save the US Economy?” CNBC, http://www.cnbc.com/id/47280026/Can\_the\_Natural\_Gas\_Sector\_Save\_the\_US\_Economy

Like most commodities, natural gas has been prone to dramatic price swings for decades, creating cost uncertainty for industries that rely on such fuel as an energy source or feedstock. As a result of current excess supply, however, the price of natural gas in North America has fallen dramatically to about $2.20 per thousand cubic feet (mcf), a quarter of its record high of $8.86 in 2008. Domestically, analysts expect natural gas prices to average $3.50 per mcf for at least the next five years. By comparison, Europe and Asia, which use naphtha, a more expensive oil-based feedstock, are still paying up to $17 per mcf. According to the IHS report, low and stable gas prices in the U.S. are contributing to a 10 percent reduction in electricity costs to consumers and a 1.1 percent increase in the level of 2012 GDP. Perhaps more importantly, it is encouraging manufacturers to expand operations in the U.S., building new production facilities, or reopen plants that were shuttered during the recession. The American Chemistry Council estimates that petrochemical companies and other manufacturers will spend upwards of $25 billion over the next five years on the more than 30 major domestic projects currently under development. Natural Gas Among them: Royal Dutch Shell, ExxonMobil [XOM 91.92 0.40 (+0.44%) ], Dow Chemical [DOW 30.26 -0.62 (-2.01%) ], and Chevron Phillips Chemical, a joint venture of Chevron [CVX 117.80 -0.05 (-0.04%) ] and Phillips 66 [PSX 46.82 1.04 (+2.27%) ] , which is building a $5 billion ethane facility in Baytown, Texas, that should be operational in 2017. “This is a game changer because it’s leading to an industrial renaissance,” says IHS VP John Larson. “Our manufacturing sector is recovering because they are now able to compete on energy prices where they haven’t been able to compete in the global market on labor prices or taxes.” Lower costs, of course, lead to lower prices for consumers — and higher demand for products made in the U.S. That spurs manufacturers to hire more workers. A 2011 PricewaterhouseCoopers report estimates that U.S. chemical, metal and industrial manufacturers could employ approximately 1 million more workers by 2025 due to benefits from affordable energy and demand for products used to extract natural gas. “There’s a silent oil and gas boom going on in this country,” says Kevin Swift, chief economist for the American Chemistry Council. “Eight years ago, everyone was writing off the U.S. petrochemical industry, but our competitiveness has improved so much in terms of the global cost curve that the U.S. and Canada are now second only to the Middle East.”

#### Manufacturing isn’t resilient – could totally collapse

Arvind Kaushal et al, partner with Booz and Co, Thomas Mayor, senior executive advisor, Patricia Riedel, principal at Booz and Co. Fall 2011, "Manufacturing’s Wake-Up Call" Booz and Co. http://booz.com/media/file/sb64-11306-Manufacturing~’s-Wake-Up-Call.pdf

Both the optimists and the pessimists are partially correct. U.S. manufacturing is at a moment of truth. Currently, U.S. factories competitively produce about 75 percent of the products that the nation consumes. A series of identifiable smart actions and choices by business leaders, educators, and policymakers could lead to a robust, manufacturing-driven economic future and push that figure up to 95 percent. Alternatively, if the U.S. manufacturing sector remains neglected, its output could fall by half, meeting less than 40 percent of the nation’s demand, and U.S. manufacturing capabilities could then erode past the point of no return.

#### Economic shocks are inevitable – strong domestic manufacturing is key to economic resilience and retaining our innovation leadership

Michael Ettlinger, the Vice President for Economic Policy at the Center for American Progress, former director of the Economic Analysis and Research Network of the Economic Policy Institute, and Kate Gordon, the Vice President for Energy Policy at the Center for American Progress, April 2011, "The Importance and Promise of American Manufacturing" [http://www.americanprogress.org/issues/2011/04/pdf/manufacturing.pdf-](http://www.americanprogress.org/issues/2011/04/pdf/manufacturing.pdf-http%3A//www.americanprogress.org/issues/2011/04/pdf/manufacturing.pdf)

Manufacturing is critically important to the American economy. For generations, the strength of our country rested on the power of our factory floors—both the machines and the men and women who worked them. We need manufacturing to continue to be a bedrock of strength for generations to come. Manufacturing is woven into the structure of our economy: Its importance goes far beyond what happens behind the factory gates. The strength or weakness of American manufacturing carries implications for the entire economy, our national security, and the well-being of all Americans. Manufacturing today accounts for 12 percent of the U.S. economy and about 11 percent of the private-sector workforce. But its significance is even greater than these numbers would suggest. The direct impact of manufacturing is only a part of the picture. First, jobs in the manufacturing sector are good middle-class jobs for millions of Americans. Those jobs serve an important role, offering economic opportunity to hard-working, middle-skill workers. This creates upward mobility and broadens and strengthens the middle class to the benefit of the entire economy. What’s more, U.S.-based manufacturing underpins a broad range of jobs that are quite different from the usual image of manufacturing. These are higher-skill service jobs that include the accountants, bankers, and lawyers that are associated with any industry, as well as a broad range of other jobs including basic research and technology development, product and process engineering and design, operations and maintenance, transportation, testing, and lab work. Many of these jobs are critical to American technology and innovation leadership. The problem today is this: Many multinational corporations may for a period keep these higher-skill jobs here at home while they move basic manufacturing elsewhere in response to other countries’ subsidies, the search for cheaper labor costs, and the desire for more direct access to overseas markets, but eventually many of these service jobs will follow. When the basic manufacturing leaves, the feedback loop from the manufacturing floor to the rest of a manufacturing operation—a critical element in the innovative process—is eventually broken. To maintain that feedback loop, companies need to move higher-skill jobs to where they do their manufacturing. And with those jobs goes American leadership in technology and innovation. This is why having a critical mass of both manufacturing and associated service jobs in the United States matters. The "industrial commons" that comes from the crossfertilization and engagement of a community of experts in industry, academia, and government is vital to our nation’s economic competitiveness. Manufacturing also is important for the nation’s economic stability. The experience of the Great Recession exemplifies this point. Although manufacturing plunged in 2008 and early 2009 along with the rest of the economy, it is on the rebound today while other key economic sectors, such as construction, still languish. Diversity in the economy is important—and manufacturing is a particularly important part of the mix. Although manufacturing is certainly affected by broader economic events, the sector’s internal diversity—supplying consumer goods as well as industrial goods, serving both domestic and external markets— gives it great potential resiliency. Finally, supplying our own needs through a strong domestic manufacturing sector protects us from international economic and political disruptions. This is most obviously important in the realm of national security, even narrowly defined as matters related to military strength, where the risk of a weak manufacturing capability is obvious. But overreliance on imports and substantial manufacturing trade deficits weaken us in many ways, making us vulnerable to everything from exchange rate fluctuations to trade embargoes to natural disasters.

#### No decoupling – US key to global demand and US protectionism kills the global economy

Desmond Lachman, resident fellow at AEI, 11-1-2007, “The Global Economic Decoupling Myth,” AEI, http://www.aei.org/article/27052

Not so long ago, the conventional wisdom was that if the U.S. economy were to sneeze, the rest of the world would contract pneumonia. My, how much the world has changed over the past ten years. Now the prevailing view on Wall Street and at the IMF is that the global economy has "decoupled" from the United States. And this decoupling supposedly would make one expect that any weakness in the U.S. economy would be largely offset by resilience in the rest of the global economy. It would be wonderful if one could truly believe the decoupling paradigm. One would then have much less reason to be concerned about any U.S. economic hard landing since any such hard landing would be largely confined to the United States. It would also be less severe than otherwise would be the case since it would be cushioned by economic strength abroad. Sadly, much like the story of the tooth fairy, the decoupling thesis has little support either in theory or in practice. At the most basic level, the proponents of the decoupling thesis choose to overlook the fact that during the past five years, the U.S. economy was the fastest growing among the G-7 economies. Also overlooked is the fact that the U.S. economy remained the major generator of aggregate demand to the rest of the world, still accounting for around 20 percent of total world imports. The decoupling advocates also turn a blind eye to the fact that a number of the shocks presently impacting the U.S. economy are global in nature. To be sure, as U.S. housing construction activity began to swoon earlier this year, U.S. imports were not much impacted, since U.S. housing activity is primarily domestic in nature. However, as the weakness in the housing sector spreads to the rest of the U.S. economy through the deleterious effect of falling home prices and reduced construction sector employment, one has to expect reduced U.S. imports to seriously impact the rest of the world economy. More telling still for the rest of the world economy has to be the prospective large further depreciation of the U.S. dollar, which will both encourage U.S. exports abroad and will discourage U.S. imports at home. During the course of 2007, the U.S. dollar has already fallen on an effective basis by over 7 percent to its lowest level since floating began in 1973. And one must expect the dollar to fall a lot further as the Federal Reserve continues to reduce interest rates to support the weakening of the U.S. economy at a time when the U.S. external imbalance remains large. This will almost certainly deal a hard blow to the European and Japanese economies, whose growth is already stuttering and whose currencies bear the brunt of U.S. dollar depreciation in a world where many non-Japanese Asian countries manipulate their currencies for competitive advantage. The decoupling advocates also turn a blind eye to the fact that a number of the shocks presently impacting the U.S. economy are global in nature. This would certainly be true of the "credit crunch" flowing from the U.S. sub-prime mortgage market's troubles, which is causing a global increase in market interest rate spreads and a global tightening in bank lending standards. Reflecting the wide distribution of U.S. sub-prime U.S. mortgage market debt around the globe, the sub-prime debacle has already caused a couple of German banks to fail and a few French proprietary bank funds to fold. The recent spectacular run-up in international oil prices is also a global rather than simply a U.S. supply-side economic shock. While it is true that the depreciation of the U.S. dollar makes this shock more sorely felt in the U.S. than it is abroad, that does not mean that the oil price shock will not have global reverberations. After all, while the dollar has depreciated by less than 10 percent since the beginning of the year, international oil prices have approximately doubled. This leaves oil prices still very high even in non-dollar terms. The decoupling optimists are ever hopeful that China's continued very rapid economic growth will offset any US economic slowdown. They forget, however, how export-led is China's economic miracle and how vulnerable China's economy is to any increase in protectionism that might be spawned by any significant US or European economic slowdown. They also forget how China increasingly subtracts from global aggregate demand by insisting on running ever larger external trade surpluses. Those who peddle the global decoupling myth do us a gross disservice by detracting attention from the still very strong global economic linkages. By so doing, they undermine the case for a much-needed coordinated policy approach to today's many global economic challenges, which very much threaten the global, as distinct from simply the U.S., economic recovery.

#### Economic decline causes global war

Walter Russell Mead, Henry A. Kissinger senior fellow ofU.S. foreign policy at the Council on Foreign Relations, 2-4-2009, , The New Republic, “Only Makes You Stronger,” http://www.tnr.com/politics/story.html?id=571cbbb9-2887-4d81-8542-92e83915f5f8&p=2

So far, such half-hearted experiments not only have failed to work; they have left the societies that have tried them in a progressively worse position, farther behind the front-runners as time goes by. Argentina has lost ground to Chile; Russian development has fallen farther behind that of the Baltic states and Central Europe. Frequently, the crisis has weakened the power of the merchants, industrialists, financiers, and professionals who want to develop a liberal capitalist society integrated into the world. Crisis can also strengthen the hand of religious extremists, populist radicals, or authoritarian traditionalists who are determined to resist liberal capitalist society for a variety of reasons. Meanwhile, the companies and banks based in these societies are often less established and more vulnerable to the consequences of a financial crisis than more established firms in wealthier societies. As a result, developing countries and countries where capitalism has relatively recent and shallow roots tend to suffer greater economic and political damage when crisis strikes--as, inevitably, it does. And, consequently, financial crises often reinforce rather than challenge the global distribution of power and wealth. This may be happening yet again. None of which means that we can just sit back and enjoy the recession. History may suggest that financial crises actually help capitalist great powers maintain their leads--but it has other, less reassuring messages as well. If financial crises have been a normal part of life during the 300-year rise of the liberal capitalist system under the Anglophone powers, so has war. The wars of the League of Augsburg and the Spanish Succession; the Seven Years War; the American Revolution; the Napoleonic Wars; the two World Wars; the cold war: The list of wars is almost as long as the list of financial crises. Bad economic times can breed wars. Europe was a pretty peaceful place in 1928, but the poisoned German public opinion and helped bring Adolf Hitler to power. If the current crisis turns into a depression, what rough beasts might start slouching toward Moscow, Karachi, Beijing, or New Delhi to be born? The United States may not, yet, decline, but, if we can't get the world economy back on track, we may still have to fight.

#### Our theoretical models trump – transitions, future expectations, and diversionary war theory all confirm econ decline causes war

Jedediah Royal, Director of Cooperative Threat Reduction at the U.S. Department of Defense, 2010, Economic Integration, Economic Signaling and the Problem of Economic Crises, in Economics of War and Peace: Economic, Legal and Political Perspectives, ed. Goldsmith and Brauer, p. 213-215

Less intuitive is how periods of economic decline may increase the likelihood of external conflict. Political science literature has contributed a moderate degree of attention to the impact of economic decline and the security and defence behaviour of interdependent stales. Research in this vein has been considered at systemic, dyadic and national levels. Several notable contributions follow. First, on the systemic level. Pollins (20081 advances Modclski and Thompson's (1996) work on leadership cycle theory, finding that rhythms in the global economy are associated with the rise and fall of a pre-eminent power and the often bloody transition from one pre-eminent leader to the next. As such, exogenous shocks such as economic crises could usher in a redistribution of relative power (see also Gilpin. 19SJ) that leads to uncertainty about power balances, increasing the risk of miscalculation (Fcaron. 1995). Alternatively, even a relatively certain redistribution of power could lead to a permissive environment for conflict as a rising power may seek to challenge a declining power (Werner. 1999). Separately. Pollins (1996) also shows that global economic cycles combined with parallel leadership cycles impact the likelihood of conflict among major, medium and small powers, although he suggests that the causes and connections between global economic conditions and security conditions remain unknown. Second, on a dyadic level. Copeland's (1996. 2000) theory of trade expectations suggests that 'future expectation of trade' is a significant variable in understanding economic conditions and security behaviour of states. He argues that interdependent states are likely to gain pacific benefits from trade so long as they have an optimistic view of future trade relations. However, if the expectations of future trade decline, particularly for difficult to replace items such as energy resources, the likelihood for conflict increases, as states will be inclined to use force to gain access to those resources. Crises could potentially be the trigger for decreased trade expectations either on its own or because it triggers protectionist moves by interdependent states.4 Third, others have considered the link between economic decline and external armed conflict at a national level. Mom berg and Hess (2002) find a strong correlation between internal conflict and external conflict, particularly during periods of economic downturn. They write. The linkage, between internal and external conflict and prosperity are strong and mutually reinforcing. Economic conflict lends to spawn internal conflict, which in turn returns the favour. Moreover, the presence of a recession tends to amplify the extent to which international and external conflicts self-reinforce each other (Hlomhen? & Hess. 2(102. p. X9> Economic decline has also been linked with an increase in the likelihood of terrorism (Blombcrg. Hess. & Wee ra pan a, 2004). which has the capacity to spill across borders and lead to external tensions. Furthermore, crises generally reduce the popularity of a sitting government. "Diversionary theory" suggests that, when facing unpopularity arising from economic decline, sitting governments have increased incentives to fabricate external military conflicts to create a 'rally around the flag' effect. Wang (1996), DcRoucn (1995), and Blombcrg. Hess, and Thacker (2006) find supporting evidence showing that economic decline and use of force arc at least indirecti) correlated. Gelpi (1997). Miller (1999). and Kisangani and Pickering (2009) suggest that Ihe tendency towards diversionary tactics arc greater for democratic states than autocratic states, due to the fact that democratic leaders are generally more susceptible to being removed from office due to lack of domestic support. DeRouen (2000) has provided evidence showing that periods of weak economic performance in the United States, and thus weak Presidential popularity, are statistically linked to an increase in the use of force. In summary, rcccni economic scholarship positively correlates economic integration with an increase in the frequency of economic crises, whereas political science scholarship links economic decline with external conflict al systemic, dyadic and national levels.' This implied connection between integration, crises and armed conflict has not featured prominently in the economic-security debate and deserves more attention.

#### Challengers are building up – manufacturing key to overall military superiority and deterrence

Mackenzie Eaglen et al, American Enterprise Institute, Rebecca Grant, IRIS Research, Robert P. Haffa, Haffa Defense Consulting, Michael O’Hanlon, The Brookings Institution, Peter W. Singer, The Brookings Institution, Martin Sullivan, Commonwealth Consulting, Barry Watts, Center for Strategic and Budgetary Assessments, January 2012, "The Arsenal of Democracy and How to Preserve It: Key Issues in Defense Industrial Policy, Brookings, http://www.brookings.edu/~/media/research/files/papers/2012/1/26%20defense%20industrial%20base/0126\_defense\_industrial\_base\_ohanlon

Yet there are severe challenges that could result to the nation’s security interests even with 10 percent cutbacks. Despite the likely potential of lesser resources, the demand side of the equation does not seem likely to grow easier. The international security environment is challenging and complex. China’s economic, political and now military rise continues. Its direction is uncertain, but it has already raised tension, especially in the South China Sea. Iran’s ambitions and machinations remain foreboding, with its nuclear plans entering a new phase of both capability but also crisis. North Korea is all the more uncertain with a leadership transition, but has a history of brinkmanship and indeed even the occasional use of force against the South, not to mention nuclear weapons-related activities that raise deep concern. And the hopeful series of revolutions in the broader Arab world in 2011, while inspiring at many levels, also seem likely to raise uncertainty in the broader Middle East. Revolutions are inherently unpredictable and often messy geostrategic events. On top of these remain commitments in Afghanistan and beyond and the frequent U.S. military role in humanitarian disaster relief. Thus, there are broad challenges for American defense planners as they try to address this challenging world with fewer available resources. The current wave of defense cuts is also different than past defense budget reductions in their likely industrial impact, as the U.S. defense industrial base is in a much different place than it was in the past. Defense industrial issues are too often viewed through the lens of jobs and pet projects to protect in congressional districts. But the overall health of the firms that supply the technologies our armed forces utilize does have national security resonance. Qualitative superiority in weaponry and other key military technology has become an essential element of American military power in the modern era—not only for winning wars but for deterring them. That requires world-class scientific and manufacturing capabilities—which in turn can also generate civilian and military export opportunities for the United States in a globalized marketplace. While procurement budgets have finally, in recent years, reached their historic norms as a percent of the overall defense budget, the legacy of the 1990s procurement “holiday” remains real. In that period, the United States as a matter of policy bought much less equipment than it would normally, enjoying the fruits of the 1980s buildup as it sought to reduce defense spending. But Reagan-era weaponry is wearing out, and the recent increase in procurement spending has not lasted long enough to replenish the nation’s key weapons arsenals with new weaponry. The last decade of procurement policy focused more on filling certain gaps in counterinsurgency capabilities than replacing the mainline weapons programs that make up the bulk of conventional capabilities. Meanwhile, the main elements of DoD’s weapons inventories—fighter jets, armored vehicles, surface vessels and submarines—continue to age. We often say that, in today’s American armed forces, people are our most cherished commodity and greatest asset. That is certainly true at one level, through the dedication and excellence shown by our brave men and women in uniform. But it is also true that adjusting the personnel size of the military up or down has been done with success multiple times, and seems likely to happen again. By contrast, scientific and manufacturing excellence in the defense space is not something easily moved up and down. Today’s industrial capabilities took decades to build and would be hard to restore if 3 lost (Great Britain’s difficulty restoring its ability to build nuclear submarines is a frequently cited example.)

#### US decline causes great power wars

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

## Prolif Advantage

### Yes Rapid Prolif

#### We’re on the brink of rapid prolif – access to tech is inevitable and multilateral institutions fail

CFR 7-5-2012, “The Global Nuclear Nonproliferation Regime,” Council on Foreign Relations, http://www.cfr.org/proliferation/global-nuclear-nonproliferation-regime/p18984

Nuclear weapons proliferation, whether by state or nonstate actors, poses one of the greatest threats to international security today. Iran's apparent efforts to acquire nuclear weapons, what amounts to North Korean nuclear blackmail, and the revelation of the A.Q. Khan black market nuclear network all underscore the far-from-remote possibility that a terrorist group or a so-called rogue state will acquire weapons of mass destruction or materials for a dirty bomb. The problem of nuclear proliferation is global, and any effective response must also be multilateral. Nine states (China, France, India, Israel, North Korea, Pakistan, Russia, the United Kingdom, and the United States) are known or believed to have nuclear weapons, and more than thirty others (including Japan, Germany, and South Korea) have the technological ability to quickly acquire them. Amid volatile energy costs, the accompanying push to expand nuclear energy, growing concerns about the environmental impact of fossil fuels, and the continued diffusion of scientific and technical knowledge, access to dual-use technologies seems destined to grow. In the background, a nascent global consensus regarding the need for substantial nuclear arms reductions, if not complete nuclear disarmament, has increasingly taken shape. In April 2009, for instance, U.S. president Barack Obama reignited global nonproliferation efforts through a landmark speech in Prague. Subsequently, in September of the same year, the UN Security Council (UNSC) unanimously passed Resolution 1887, which called for accelerated efforts toward total nuclear disarmament. In February 2012, the number of states who have ratified the Comprehensive Test Ban Treaty increased to 157, heightening appeals to countries such as the United States, Israel, and Iran to follow suit. Overall, the existing global nonproliferation regime is a highly developed example of international law. Yet, despite some notable successes, existing multilateral institutions have failed to prevent states such as India, Pakistan, and North Korea from "going nuclear," and seem equally ill-equipped to check Iran as well as potential threats from nonstate, terrorist groups. The current framework must be updated and reinforced if it is to effectively address today's proliferation threats, let alone pave the way for "the peace and security of a world without nuclear weapons."

#### Nuclear hedging means proliferation would be rapid

Mitchell Reiss, fmr director of the Reves Center for International Studies, 2004, “The Nuclear Tipping Point”

Or it may be that countries would not sprint to cross the nuclear finish line but rather hedge their bets by working quietly and methodically to acquire the technology and materials necessary to build nuclear bombs on short notice once a political decision was made. Today, many of the building blocks for a nuclear arsenal—the scientific and engineering expertise, precision machine tools, computer software, and nuclear design information—are more readily available than ever before. And what is unavailable on the open market can be purchased on the black market due to the flourishing illicit trade in nuclear technology and materials between and among rogue (or what used to be termed pariah) states. A hedging strategy would allow a state to gradually increase its nuclear competence and shrink the period of its greatest strategic vulnerability: the time between a decision to acquire nuclear weapons and the actual possession of a usable nuclear arsenal. States that adopt this approach could remain poised on this non-nuclear precipice for months or even years, awaiting a political decision to tip them over the edge.

### Prolif Bad – Nuke War

#### Prolif incentivizes aggression – that causes regional instability and increased conventional wars which escalate to global nuclear war

Matthew Kroenig, Professor of Government at Georgetown and Fellow at CFR specializing in Nuclear Security, 5-26-2012, “The History of Proliferation Optimism: Does It Have A Future?” Nonproliferation Policy Education Center, http://www.npolicy.org/article.php?aid=1182andrtid=2

Regional instability: The spread of nuclear weapons also emboldens nuclear powers contributing to regional instability. States that lack nuclear weapons need to fear direct military attack from other states, but states with nuclear weapons can be confident that they can deter an intentional military attack, giving them an incentive to be more aggressive in the conduct of their foreign policy. In this way, nuclear weapons provide a shield under which states can feel free to engage in lower-level aggression. Indeed, international relations theories about the “stability-instability paradox” maintain that stability at the nuclear level contributes to conventional instability.[64] Historically, we have seen that the spread of nuclear weapons has emboldened their possessors and contributed to regional instability. Recent scholarly analyses have demonstrated that, after controlling for other relevant factors, nuclear-weapon states are more likely to engage in conflict than nonnuclear-weapon states and that this aggressiveness is more pronounced in new nuclear states that have less experience with nuclear diplomacy.[65] Similarly, research on internal decision-making in Pakistan reveals that Pakistani foreign policymakers may have been emboldened by the acquisition of nuclear weapons, which encouraged them to initiate militarized disputes against India.[66] Currently, Iran restrains its foreign policy because it fears a major military retaliation from the United States or Israel, but with nuclear weapons it could feel free to push harder. A nuclear-armed Iran would likely step up support to terrorist and proxy groups and engage in more aggressive coercive diplomacy. With a nuclear-armed Iran increasingly throwing its weight around in the region, we could witness an even more crisis prone Middle East. And in a poly-nuclear Middle East with Israel, Iran, and, in the future, possibly other states, armed with nuclear weapons, any one of those crises could result in a catastrophic nuclear exchange. Nuclear proliferation can also lead to regional instability due to preventive strikes against nuclear programs. States often conduct preventive military strikes to prevent adversaries from acquiring nuclear weapons. Historically, the United States attacked German nuclear facilities during World War II, Israel bombed a nuclear reactor in Iraq in 1981, Iraq bombed Iran’s Bushehr reactors in the Iran-Iraq War in the 1980s and Iran returned the favor against an Iraqi nuclear plant, a U.S.-led international coalition destroyed Iraq’s nuclear infrastructure in the first Gulf War in 1991, and Israel bombed a Syrian nuclear reactor in 2007. These strikes have not led to extensive conflagrations in the past, but we might not be so lucky in the future. At the time of writing in 2012, the United States and Israel were polishing military plans to attack Iran’s nuclear program and some experts maintain that such a strike could very well lead to a wider war in the Middle East.

### Nuke Terror

#### Increased prolif ensures nuclear terrorism

Matthew Kroenig, Professor of Government at Georgetown and Fellow at CFR specializing in Nuclear Security, 5-26-2012, “The History of Proliferation Optimism: Does It Have A Future?” Nonproliferation Policy Education Center, http://www.npolicy.org/article.php?aid=1182andrtid=2

Nuclear terrorism. The spread of nuclear weapons also increases the risk of nuclear terrorism.[58] It used to be said that “terrorists want a lot of people watching, not a lot of people dead,” but the terrorist attacks of September 11, 2001 changed expert perceptions of the terrorist threat.[59] September 11th demonstrated that Al Qaeda and other modern terrorist groups are interested in imposing massive casualties and there are few better ways of killing large numbers of civilians than detonating a nuclear weapon in a major metropolitan area. And, while September 11th was one of the greatest tragedies in American history, it would have been much worse had Osama Bin Laden been able to acquire nuclear weapons. Osama Bin Laden declared it a “religious duty” for Al Qaeda to acquire nuclear weapons and radical clerics have issued fatwas declaring it permissible to use nuclear weapons in Jihad against the West.[60] Unlike states, which can be deterred, there is little doubt that if terrorists acquired nuclear weapons, they would use them. Indeed, in recent years, many U.S. politicians and security analysts have agreed that nuclear terrorism poses the greatest threat to U.S. national security.[61] Wanting nuclear weapons and actually possessing them, however, are two different things and many analysts have pointed out the tremendous hurdles that terrorists would have to overcome in order to acquire nuclear weapons.[62] Nevertheless, as nuclear weapons spread, the possibility that they will eventually fall into terrorist hands increases. States could intentionally transfer nuclear weapons, or the fissile material required to build them, to terrorist groups. There are good reasons why a state might be reluctant to transfer nuclear weapons to terrorists, but, as nuclear weapons spread, the possibility that a leader might someday purposely arm a terrorist group with nuclear weapons increases. Some fear, for example, that Iran, with its close ties to Hamas and Hezbollah, might be at a heightened risk of transferring nuclear weapons to terrorists. Moreover, even if no state would ever intentionally transfer nuclear capabilities to terrorists, a new nuclear state, with underdeveloped security procedures, might be vulnerable to theft, allowing terrorist groups or corrupt or ideologically-motivated insiders to transfer dangerous material to terrorists. There is evidence, for example, that representatives from Pakistan’s atomic energy establishment met with Al Qaeda members to discuss a possible nuclear deal.[63] Finally, a nuclear-armed state could collapse, resulting in a breakdown of law and order and a loose nuclear weapons problem. U.S. officials are currently very concerned about what would happen with Pakistan’s nuclear weapons if the government were to fall. As nuclear weapons spread, this problem is only further amplified. Iran is a country with a history of revolutions and a government with a tenuous hold on power. The regime change that Washing has long dreamed about in Tehran could actually become a nightmare if Iran had nuclear weapons and a break down in authority forced us to worry about the fate of Iran’s nuclear arsenal.

#### Nuclear terror causes retal – global escalation

Robert Ayson, Professor of Strategic Studies and Director of the Centre for Strategic Studies: New Zealand at the Victoria University of Wellington, 2010, “After a Terrorist Nuclear Attack: Envisaging Catalytic Effects,” Studies in Conflict & Terrorism, Volume 33, Issue 7, July, Available Online to Subscribing Institutions via InformaWorld)

A terrorist nuclear attack, and even the use of nuclear weapons in response by the country attacked in the first place, would not necessarily represent the worst of the nuclear worlds imaginable. Indeed, there are reasons to wonder whether nuclear terrorism should ever be regarded as belonging in the category of truly existential threats. A contrast can be drawn here with the global catastrophe that would come from a massive nuclear exchange between two or more of the sovereign states that possess these weapons in significant numbers. Even the worst terrorism that the twenty-first century might bring would fade into insignificance alongside considerations of what a general nuclear war would have wrought in the Cold War period. And it must be admitted that as long as the major nuclear weapons states have hundreds and even thousands of nuclear weapons at their disposal, there is always the possibility of a truly awful nuclear exchange taking place precipitated entirely by state possessors themselves. But these two nuclear worlds—a non-state actor nuclear attack and a catastrophic interstate nuclear exchange—are not necessarily separable. It is just possible that some sort of terrorist attack, and especially an act of nuclear terrorism, could precipitate a chain of events leading to a massive exchange of nuclear weapons between two or more of the states that possess them. In this context, today’s and tomorrow’s terrorist groups might assume the place allotted during the early Cold War years to new state possessors of small nuclear arsenals who were seen as raising the risks of a catalytic nuclear war between the superpowers started by third parties. These risks were considered in the late 1950s and early 1960s as concerns grew about nuclear proliferation, the so-called n+1 problem. It may require a considerable amount of imagination to depict an especially plausible situation where an act of nuclear terrorism could lead to such a massive inter-state nuclear war. For example, in the event of a terrorist nuclear attack on the United States, it might well be wondered just how Russia and/or China could plausibly be brought into the picture, not least because they seem unlikely to be fingered as the most obvious state sponsors or encouragers of terrorist groups. They would seem far too responsible to be involved in supporting that sort of terrorist behavior that could just as easily threaten them as well. Some possibilities, however remote, do suggest themselves. For example, how might the United States react if it was thought or discovered that the fissile material used in the act of nuclear terrorism had come from Russian stocks,40 and if for some reason Moscow denied any responsibility for nuclear laxity? The correct attribution of that nuclear material to a particular country might not be a case of science fiction given the observation by Michael May et al. that while the debris resulting from a nuclear explosion would be “spread over a wide area in tiny fragments, its radioactivity makes it detectable, identifiable and collectable, and a wealth of information can be obtained from its analysis: the efficiency of the explosion, the materials used and, most important … some indication of where the nuclear material came from.”41 Alternatively, if the act of nuclear terrorism came as a complete surprise, and American officials refused to believe that a terrorist group was fully responsible (or responsible at all) suspicion would shift immediately to state possessors. Ruling out Western ally countries like the United Kingdom and France, and probably Israel and India as well, authorities in Washington would be left with a very short list consisting of North Korea, perhaps Iran if its program continues, and possibly Pakistan. But at what stage would Russia and China be definitely ruled out in this high stakes game of nuclear Cluedo? In particular, if the act of nuclear terrorism occurred against a backdrop of existing tension in Washington’s relations with Russia and/or China, and at a time when threats had already been traded between these major powers, would officials and political leaders not be tempted to assume the worst? Of course, the chances of this occurring would only seem to increase if the United States was already involved in some sort of limited armed conflict with Russia and/or China, or if they were confronting each other from a distance in a proxy war, as unlikely as these developments may seem at the present time. The reverse might well apply too: should a nuclear terrorist attack occur in Russia or China during a period of heightened tension or even limited conflict with the United States, could Moscow and Beijing resist the pressures that might rise domestically to consider the United States as a possible perpetrator or encourager of the attack? Washington’s early response to a terrorist nuclear attack on its own soil might also raise the possibility of an unwanted (and nuclear aided) confrontation with Russia and/or China. For example, in the noise and confusion during the immediate aftermath of the terrorist nuclear attack, the U.S. president might be expected to place the country’s armed forces, including its nuclear arsenal, on a higher stage of alert. In such a tense environment, when careful planning runs up against the friction of reality, it is just possible that Moscow and/or China might mistakenly read this as a sign of U.S. intentions to use force (and possibly nuclear force) against them. In that situation, the temptations to preempt such actions might grow, although it must be admitted that any preemption would probably still meet with a devastating response. As part of its initial response to the act of nuclear terrorism (as discussed earlier) Washington might decide to order a significant conventional (or nuclear) retaliatory or disarming attack against the leadership of the terrorist group and/or states seen to support that group. Depending on the identity and especially the location of these targets, Russia and/or China might interpret such action as being far too close for their comfort, and potentially as an infringement on their spheres of influence and even on their sovereignty. One far-fetched but perhaps not impossible scenario might stem from a judgment in Washington that some of the main aiders and abetters of the terrorist action resided somewhere such as Chechnya, perhaps in connection with what Allison claims is the “Chechen insurgents’ … long-standing interest in all things nuclear.”42 American pressure on that part of the world would almost certainly raise alarms in Moscow that might require a degree of advanced consultation from Washington that the latter found itself unable or unwilling to provide. There is also the question of how other nuclear-armed states respond to the act of nuclear terrorism on another member of that special club. It could reasonably be expected that following a nuclear terrorist attack on the United States, both Russia and China would extend immediate sympathy and support to Washington and would work alongside the United States in the Security Council. But there is just a chance, albeit a slim one, where the support of Russia and/or China is less automatic in some cases than in others. For example, what would happen if the United States wished to discuss its right to retaliate against groups based in their territory? If, for some reason, Washington found the responses of Russia and China deeply underwhelming, (neither “for us or against us”) might it also suspect that they secretly were in cahoots with the group, increasing (again perhaps ever so slightly) the chances of a major exchange. If the terrorist group had some connections to groups in Russia and China, or existed in areas of the world over which Russia and China held sway, and if Washington felt that Moscow or Beijing were placing a curiously modest level of pressure on them, what conclusions might it then draw about their culpability? If Washington decided to use, or decided to threaten the use of, nuclear weapons, the responses of Russia and China would be crucial to the chances of avoiding a more serious nuclear exchange. They might surmise, for example, that while the act of nuclear terrorism was especially heinous and demanded a strong response, the response simply had to remain below the nuclear threshold. It would be one thing for a non-state actor to have broken the nuclear use taboo, but an entirely different thing for a state actor, and indeed the leading state in the international system, to do so. If Russia and China felt sufficiently strongly about that prospect, there is then the question of what options would lie open to them to dissuade the United States from such action: and as has been seen over the last several decades, the central dissuader of the use of nuclear weapons by states has been the threat of nuclear retaliation. If some readers find this simply too fanciful, and perhaps even offensive to contemplate, it may be informative to reverse the tables. Russia, which possesses an arsenal of thousands of nuclear warheads and that has been one of the two most important trustees of the non-use taboo, is subjected to an attack of nuclear terrorism. In response, Moscow places its nuclear forces very visibly on a higher state of alert and declares that it is considering the use of nuclear retaliation against the group and any of its state supporters. How would Washington view such a possibility? Would it really be keen to support Russia’s use of nuclear weapons, including outside Russia’s traditional sphere of influence? And if not, which seems quite plausible, what options would Washington have to communicate that displeasure? If China had been the victim of the nuclear terrorism and seemed likely to retaliate in kind, would the United States and Russia be happy to sit back and let this occur? In the charged atmosphere immediately after a nuclear terrorist attack, how would the attacked country respond to pressure from other major nuclear powers not to respond in kind? The phrase “how dare they tell us what to do” immediately springs to mind. Some might even go so far as to interpret this concern as a tacit form of sympathy or support for the terrorists. This might not help the chances of nuclear restraint.

#### Nuclear terrorism causes the same causalities and full scale nuke war and nuclear winter

O. B. Toon, et al. department of Atmospheric and Oceanic Sciences, U Colorado Boulder, 4-19-2007, “Atmospheric effects and societal consequences of regional scale nuclear conﬂicts and acts of individual nuclear terrorism,” Atmos. Chem. Phys., 7, 1973-2002.

To an increasing extent, people are congregating in the world’s great urban centers, creating megacities with populations exceeding 10 million individuals. At the same time, advanced technology has designed nuclear explosives of such small size they can be easily transported in a car, small plane or boat to the heart of a city. We demonstrate here that a single detonation in the 15 kiloton range can produce urban fatalities approaching one million in some cases, and casualties exceeding one million. Thousands of small weapons still exist in the arsenals of the U.S. and Russia, and there are at least six other countries with substantial nuclear weapons inventories. In all, thirty-three countries control sufﬁcient amounts of highly enriched uranium or plutonium to assemble nuclear explosives. A conﬂict between any of these countries involving 50-100 weapons with yields of 15 kt has the potential to create fatalities rivaling those of the Second World War. Moreover, even a single surface nuclear explosion, or an air burst in rainy conditions, in a city center is likely to cause the entire metropolitan area to be abandoned at least for decades owing to infrastructure damage and radioactive contamination. As the aftermath of hurricane Katrina in Louisiana suggests, the economic consequences of even a localized nuclear catastrophe would most likely have severe national and international economic consequences. Striking effects result even from relatively small nuclear attacks because low yield detonations are most effective against city centers where business and social activity as well as population are concentrated. Rogue nations and terrorists would be most likely to strike there. Accordingly, an organized attack on the U.S. by a small nuclear state, or terrorists supported by such a state, could generate casualties comparable to those once predicted for a full-scale nuclear “counterforce” exchange in a superpower conﬂict. Remarkably, the estimated quantities of smoke generated by attacks totaling about one megaton of nuclear explosives could lead to signiﬁcant global climate perturbations (Robock et al., 2007). While we did not extend our casualty and damage predictions to include potential medical, social or economic impacts following the initial explosions, such analyses have been performed in the past for large-scale nuclear war scenarios (Harwell and Hutchinson, 1985). Such a study should be carried out as well for the present scenarios and physical outcomes.

### Civilian Nukes Key

#### Civilian nuclear power is key to nuclear leadership – that’s key to control prolif

Pete Domenici, former senator from New Mexico, and Warren F. “Pete” Miller, part time Research Professor at Texas A & M University and former assistant secretary for nuclear energy at the U.S. Department of Energy, July 2012, “Maintaining U.S. Leadership in Global Nuclear Energy Markets,” Bipartisan Policy Center, http://bipartisanpolicy.org/sites/default/files/Leadership%20in%20Nuclear%20Energy%20Markets.pdf

Nuclear power technologies are distinct from other potential exports in energy or in other sectors where America’s competitive advantage may also be declining. Because of the potential link between commercial technology and weapons development, nuclear power is directly linked to national security concerns, including the threat of proliferation. Although reactors themselves do not pose significant proliferation risks, both uranium-enrichment and spent fuel–processing technologies can be misused for military purposes. If U.S. nuclear energy leadership continues to diminish, our nation will be facing a situation in which decisions about the technological capabilities and location of fuel-cycle facilities throughout the world will be made without significant U.S. participation. Leadership is important in both commercial and diplomatic arenas, and it requires a vibrant domestic industry; an effective, independent regulator; access to competitive and innovative technologies and services; and the ability to offer practical solutions to safety, security, and nonproliferation challenges (an international fuel bank, for example, could help address concerns about the proliferation of uranium-enrichment capabilities).

#### Strong nuclear industry key to global leadership – loan guarantees are critical

Olga Belogolova, staff writer, 7-19-2012, “U.S. Nuclear Industry Seen Needing a Boost,” National Journal Daily, Lexis.

A robust nuclear-energy industry should be a high priority for the country's energy and national-security policy given the importance of the sector to global nonproliferation, according to a new report released on Thursday by the Bipartisan Policy Center's Nuclear Initiative. Specifically, the United States needs to lead in the licensing and development of new reactors and on safety reforms, management of spent nuclear fuel, the nuclear-export market, and research and development in the nuclear sector, according to the report led by former Sen. Pete Domenici, R-N.M., and former Energy Department Assistant Secretary for Nuclear Energy Warren (Pete) Miller. But leadership on nuclear issues could prove to be a challenge for the United States. Although the country has long led the charge on civilian nuclear power, the combination of a slowed electricity market, the lack of sweeping climate legislation, a natural-gas boom, and last year's Fukushima Daiichi nuclear accident in Japan have created obstacles for the development of new nuclear power in the United States in recent years. While the Nuclear Regulatory Commission this year has approved four new reactors for the Vogtle and Summer nuclear plants in Georgia and South Carolina, respectively, there are likely to only be a few more plants licensed in the United States in the near future. The story is very different on the international level. After Fukushima, countries such as Germany, Italy, Switzerland, and of course Japan have paused or slowed down their nuclear-energy development, but that hasn't stopped the rest of the world. Many other nations such as China, India, South Korea, and Russia have reaffirmed plans to expand their fleets of nuclear reactors, while some countries in the Middle East have even announced plans to develop nuclear energy for the first time. China alone, which has 26 new reactors under development, is expected to account for 40 percent of planned nuclear construction globally. The United States might be a leader now, accounting for nearly one-third of global nuclear generation, but it won't be long before others come out ahead of us, especially given how long it takes to construct new reactors, Domenici and Miller explained. "It will be increasingly difficult for the United States to maintain its technological leadership without some near-term domestic demand for new construction," they write in the report. In order to control the proliferation of nuclear weapons, the United States needs to remain involved in everything that happens to nuclear materials, from the export of nuclear fuel for energy use to the disposal of spent fuel. Given the global picture, Domenici and Miller suggest a shift in U.S. policies in order to ensure that the U.S. nuclear energy program is not stuck at a near-standstill. "Market signals alone are unlikely to result in a diverse fuel mix, so helping to maintain and improve a range of electricity supply options remains a role for federal policy," the two write in the report. "In particular, U.S. policy should be aimed at helping to preserve nuclear energy as an important technology option for near- or longer-term deployment." The vast shale-gas reserves in the United States and new technology to tap them will probably keep natural-gas prices low for the foreseeable future, making financing of more expensive nuclear power more difficult. Federal loan guarantees have long been viewed as crucial to growing the nuclear industry, but the Energy Department has dragged its feet on these conditional loans, especially after the bankruptcy of the federally funded solar firm Solyndra - so much so that some companies have decided not to wait around and see what happens. Southern Company, which is building the first two new reactors to be approved in decades at its Vogtle nuclear plant in Georgia, on Thursday said that it is now considering doing so without federal support. The company had been waiting for an $8.33 billion loan guarantee to build the two new reactors, but Southern CEO Tom Fanning told Reuters on Thursday that talks with DOE were going slowly and they might not be willing to wait any longer.

#### US leverage is key

CFR 7-5-2012, “The Global Nuclear Nonproliferation Regime,” Council on Foreign Relations, http://www.cfr.org/proliferation/global-nuclear-nonproliferation-regime/p18984

International instruments for combating nuclear proliferation were largely successful before 1991, but are proving unable to meet today's challenges. Although three states (India, Israel, and Pakistan) are known or believed to have acquired nuclear weapons during the Cold War, for five decades following the development of nuclear technology, only nine states have developed—and since 1945 none has used—nuclear weapons. However, arguably not a single known or suspected case of proliferation since the early 1990s—Pakistan, Iraq, Iran, North Korea, Libya, or Syria— was deterred or reversed by the multilateral institutions created for this purpose. The continued advancement of Iran's nuclear program—despite the implementation of crosscutting economic sanctions and near universal global condemnation—has elicited serious concerns from states including Israel, the United States, and Saudi Arabia. Additionally, recent nonproliferation success stories, such as Libya's abandoning its nuclear program in 2003 and the accession of all of the Soviet successor states except Russia to the Nuclear Nonproliferation Treaty (NPT) as nonnuclear weapon states, have been the result of direct government-to-government negotiations and pressure rather than action by global bodies. In dealing with today's proliferation challenges, international organizations work in tandem with ad hoc forums of interested parties, such as the Six Party Talks on North Korea, the P5+1 grouping on Iran, and the most recent development of biannual global nuclear security summits. But such forums have often proven inadequate to arrest the spread of nuclear technology, and states such as Iran and North Korea continue to pursue nuclear capability, if not outright weaponization. Given these trends, rising doubts about the sustainability of the nonproliferation regime are no surprise.

#### New nuclear capacity is vital – slowing investment swamps all alt causes

Pete Domenici, former senator from New Mexico, and Warren F. “Pete” Miller, part time Research Professor at Texas A & M University and former assistant secretary for nuclear energy at the U.S. Department of Energy, July 2012, “Maintaining U.S. Leadership in Global Nuclear Energy Markets,” Bipartisan Policy Center, http://bipartisanpolicy.org/sites/default/files/Leadership%20in%20Nuclear%20Energy%20Markets.pdf

As the world’s largest commercial nuclear operator and dominant weapons state, the United States has traditionally been the clear leader on international nuclear issues. Today, the United States still accounts for approximately one-quarter of commercial nuclear reactors in operation around the world and one-third of global nuclear generation.33 This position is likely to shift in coming decades, as new nuclear investments go forward in other parts of the world while slowing or halting in the United States. In past decades, the United States was also a significant exporter of nuclear materials and technologies, but this dominance too has slowly declined. At present, however, the U.S. safety and security infrastructure and regulatory framework remain without peer and U.S. expertise and guidance on operational and regulatory issues continues to be sought around the world. The domestic nuclear industry established the INPO in the wake of the Three Mile Island accident in 1979 in a collective effort to hold all industry players accountable to the highest standards for safe and reliable commercial operations. Similarly, the NRC is seen as the gold standard for commercial nuclear regulation. As long as other countries seek to learn from the experience and expertise of U.S. firms and regulators, the United States will enjoy greater access to international nuclear programs. A substantial reduction in domestic nuclear energy activities could erode U.S. international standing.

#### Civilian nuclear policy is modeled and spills over to global nuclear leadership

Scott D. Sagan, Professor of Political Science and Co-Director of the Center for International Security and Cooperation at Stanford University, 4-18-2011, “The International Security Implications Of U.S. Domestic Nuclear Power Decisions,” http://cybercemetery.unt.edu/archive/brc/20120621005012/http://brc.gov/sites/default/files/documents/sagan\_brc\_paper\_final.pdf

Reasonable people may well disagree about the value of specific policy proposals regarding nuclear power or on how best to evaluate trade-offs between policies that may promote achievement of one policy objective but retard another. But reasonable people should not ignore the important role that American nuclear policies have in shaping, even if they do not fully determine, the decisions made in foreign capitals about nuclear power, the fuel cycle, and nuclear security. U.S. leadership is critical to promote a safer and more secure global nuclear future. The Blue Ribbon Commission should encourage the U.S. government to place nuclear non-proliferation and nuclear terrorism prevention very high on its priority list of objectives as it 7 makes domestic nuclear energy decisions and ensure that U.S. officials more fully appreciate how much our policies influence the decisions made by foreign governments.

#### Regional prolif causes cascades

Kurt Campbell, senior vice president and director of the International Security Program and Chair in National Security at CSIS, 2004, “The Nuclear Tipping Point”

A nation’s desire to achieve a balance of military power with it neighbors is another possible incentive for it to adopt a pro-nuclear stance. In South Korea, for instance, there has been considerable concern for a long time that an increasing conventional military capability in the North could present an overwhelming and destabilizing challenge to the government in the South. This concern was similar to the belief at the height of the cold war that the conventional might of Warsaw Pact member countries threatened the stability and security of Western Europe. Concerns over an enduring and widening gap in conventional forces on the Korean peninsula have eased somewhat with the chronic problems plaguing the North, but imbalances in conventional forces have catalyzed nuclear innovations elsewhere. For example, the imbalance in battlefield forces in Europe directly led to the development of tactical nuclear weapons for the European theater. In this context, the nuclear capability of NATO forces was seen as the great equalizer that would enable Western Europe to face off against the far superior conventional might of the Soviet Union and the Warsaw Pact (at least in theory and on paper). Currently, the increasingly militarized relationship between China and Taiwan across the Taiwan Strait has sparked similar concerns. China’s seemingly inexorable buildup of a conventional arsenal of fighter planes, medium-range ballistic missiles, naval assets, and expeditionary forces suggests a worrisome trend. Many fear that, at some point in the future, absent external assistance, Taiwan could become vulnerable to a conventional onslaught by the mainland.15 For this reason, Taiwan has considered a nuclear alternative at points in the past, but it was dissuaded through quiet pressure from Washington. An increasing conventional military imbalance coupled with any sense of alienation or lack of support from Washington could cause Taiwan’s leaders to reevaluate their non-nuclear stance. Regional nuclear proliferation would also create a major incentive for neighboring states to acquire a similar capability. One of the primary RECONSIDERING A NUCLEAR FUTURE 25 Campbell reasons for seeking to block various states—such as Iran, Iraq, and North Korea—from achieving nuclear status has long been the concern about how such a capacity would affect neighboring states. A rogue state’s successful acquisition of a nuclear weapon could trigger a range of potentially destabilizing regional responses, including the further proliferation of nuclear weapons beyond the rogue.16 This central concern has been one of the driving forces behind U.S. diplomacy in the recent past, including the protracted negotiation of the Agreed Framework nuclear deal with North Korea in 1994. This issue is also arguably one of the animating features behind the “axis of evil” phrase in President Bush’s 2002 State of the Union address and the harder U.S. line toward Iraq, Iran, and North Korea—all states that are seeking to develop or acquire nuclear weapons. Policymakers realize that the regional impact of particular states acquiring nuclear weapons could be great, particularly in Asia and the Middle East, where nuclear and non-nuclear states barely maintain an uneasy coexistence. Further proliferation by rogues in these regions could have far-reaching consequences in terms of nuclear proliferation and heightened regional rivalries. For example, the development of a nuclear capability by North Korea might quickly lead to nuclear proliferation in Japan and South Korea, heighten tensions with an already nuclear-armed China, and destroy the tenuous balance of power in the region. The domino effect could reach farther, upsetting regional relations with the United States, Russia, and South Asia.

#### Prolif snowballs – declining cred causes allied prolif

Matthew Kroenig, Professor of Government at Georgetown and Fellow at CFR specializing in Nuclear Security, 5-26-2012, “The History of Proliferation Optimism: Does It Have A Future?” Nonproliferation Policy Education Center, http://www.npolicy.org/article.php?aid=1182andrtid=2

Undermines alliances: The spread of nuclear weapons also complicates U.S. alliance relationships. Washington uses the promise of military protection as a way to cement its alliance structures. U.S. allies depend on America’s protection, giving Washington influence over allied states’ foreign policies. Historically, the United States has offered, and threatened to retract, the security guarantee carrot to prevent allied states from acting contrary to its interests. As nuclear weapons spread, however, alliances held together by promises of military protection are undermined in two ways. First, U.S. allies may doubt the credibility of Washington’s commitments to provide a military defense against nuclear-armed states, leading them to weaken ties with their patron. As Charles de Gaulle famously asked about the U.S. commitment to defend France from the Soviet Union during the Cold War, would Washington be willing to trade New York for Paris? Similarly, if Iran acquires nuclear weapons, U.S. partners in the Middle East, such as Israel and Gulf States, will question Washington’s resolve to defend them from Iran. After all, if the United States proves unwilling to use force to prevent Iran from acquiring nuclear weapons, would it really be willing to fight a war against a nuclear-armed Iran? Qatar, for example, already appears to be hedging its bets, loosening ties to Washington and warming to Tehran. Second, nuclear proliferation could encourage client states to acquire nuclear weapons themselves, giving them greater security independence and making them less dependable allies. According to many scholars, the acquisition of the force de frappe was instrumental in permitting the French Fifth Republic under President Charles de Gualle to pursue a foreign policy path independent from Washington at NATO.[68] Similarly, it is possible that Turkey, Saudi Arabia, and other regional states will acquire independent nuclear capabilities to counter Iran’s nuclear arsenal, greatly destabilizing an already unstable region and threatening Washington’s ability to influence regional dynamics.