### 1AC Economy Advantage

#### Economic recovery stalling- Unemployment and manufacturing

**Rugaber 9/21** (Christopher S. Rugaber and Martin Crutsinger, September 21, 2012, “U.S. economy struggling with weak manufacturing and unemployment,” Denver Post, http://www.denverpost.com/business/ci\_21596304/u-s-economy-struggling-weak-manufacturing-and-unemployment)

A trio of reports Thursday offered a reminder that the U.S. economy is struggling to grow and add jobs. The number of people seeking unemployment benefits last week stayed near a level that signals only weak hiring in September. Manufacturing shrank for a fifth straight month in the Philadelphia region, a sign that weaker global growth has hurt demand for American-made goods. And a measure of future economy activity declined for the second time in three months.¶ The data followed a poor month of hiring in August and the Federal Reserve's move last week to launch new stimulus measures to give the hobbled recovery a jolt.¶ "There certainly doesn't appear to be much improvement in the performance of the economy," said Sam Bullard, senior economist at Wells Fargo Securities. "Manufacturing continues to soften and decelerate. We shouldn't expect to see substantial gains in hiring or output from manufacturers any time soon."¶ Thursday's reports showed:¶ • Weekly applications for unemployment benefits fell by only 3,000 last week to a seasonally adjusted 382,000, the Labor Department said. The four-week average, a less volatile measure, rose for the fifth straight week to 377,750. Applications, which are a proxy for layoffs, typically need to fall below 375,000 consistently to signal the job market is strong enough to lower unemployment.¶ • The Federal Reserve Bank of Philadelphia says its September index of regional manufacturing activity stayed below zero, which signals contraction in the market. While the index rose to -1.9, it has been negative since May. Nearly 23 percent of firms in the region reported declines in activity this month, only slight improvement from 30 percent of firms in August. The region includes firms in Pennsylvania, Delaware and New Jersey.¶ • The Conference Board said its index of leading indicators dipped 0.1 percent in August. The report noted that manufacturing orders, consumer confidence and average weekly manufacturing hours all slipped. The index anticipates conditions three to six months out.

#### SMRs solve- Job creation and manufacturing output

Solan 2010 (David Solan, Director, Energy Policy Institute, Associate Director, Center for Advanced Energy Studies, Assistant Professor of Public Policy and Administration at Boise State University, June 2010, “ECONOMIC AND EMPLOYMENT IMPACTS OF SMALL MODULAR NUCLEAR REACTORS,” Energy Policy Institute, http://www.nuclearcompetitiveness.org/images/EPI\_SMR\_ReportJune2010.pdf)

The development of a robust domestic SMR industry will result in significant economic benefits. Given the assumptions regarding the deployment of SMRs as outlined in the Moderate and High Nuclear Adoption cases, the manufacture and construction of SMRs in 2030 will be responsible for an estimated range of: 215,000 255,000 jobs,; $40 - $48 billion in sales; $19 - $23 billion in value-added; $12 - $15 billion in annual earnings; and $1.1 - $1.3 billion in indirect business taxes. From cumulative operations through 2030, SMRs will be responsible for: 52,000 80,000 jobs; $15 - $23 billion in sales; $10 - $15 billion in value-added; $4 - $6 billion in annual earnings; and $1.3 - $2 billion in indirect business taxes. Aggressive development of a domestic SMR industry, as outlined in the Disruptive Nuclear Adoption Case, roughly triples these estimated impacts and generates very significant economic benefits.¶ In stark contrast, the conditions assumed in the Low Nuclear Adoption (also called the No Greenhouse Gas Legislation) case, result in approximately 1/10th of the economic benefits of the High and Moderate cases, with just a few SMRs manufactured domestically on an annual basis by 2030. The results of the Low Nuclear Adoption Case indicate a likely low probability for achieving a globally competitive and stable SMR manufacturing industry in the U.S.¶ Based on the overall results of this study, a robust SMR market, both globally and nationally, will add to the U.S. manufacturing base and provide a significant number of high-paying jobs in manufacture and operations. This conclusion is based on a number of dependencies that temper the relative certainty of the results.

#### Multiplier effect magnifies the short-term internal link

Solan 2010 (David Solan, Director, Energy Policy Institute, Associate Director, Center for Advanced Energy Studies, Assistant Professor of Public Policy and Administration at Boise State University, June 2010, “ECONOMIC AND EMPLOYMENT IMPACTS OF SMALL MODULAR NUCLEAR REACTORS,” Energy Policy Institute, http://www.nuclearcompetitiveness.org/images/EPI\_SMR\_ReportJune2010.pdf)

In terms of the economic impacts of the SMR industry, the direct effects stem from the actual change in final demand for SMR units. An increase in SMR demand, for example, will create additional employment and salaries within the SMR industry. The indirect effects stem from the purchases of goods and services by the SMR industry from suppliers in other domestic industries. In effect, the SMR industry,as its purchases from other firms, ripple through the economy in a chain- like manner. The induced effects stem from the increase in wage and salary earnings and other household income that ripples though the economy as direct and indirect dollars are spent and re-spent in the national economy. The biggest driver of these induced effects is employee spending from wage and salary payroll and earnings.¶ The presence of indirect and induced economic effects means that an initial increase in demand for a given industry’s output will get multiplied in the economy.¶ The size of the multiplier effects is of primary concern in I-O analysis and is an important component in determining the overall economic impacts of industry changes. In essence, multipliers determine how the direct change in final demand of a single¶ industry ripples throughout all the other industries in an economy. Two basic types of multipliers are recognized in standard I-O analysis. Type I multipliers measure the direct changes and the indirect Type II multipliers, also known as Social Accounting Matrix (SAM) multipliers, are larger in magnitude and more broad-based by virtue of the fact that they include the direct, indirect, and induced effects. They assume wages, salaries, and other income circulate through the economy along with backward linkages of business purchases. Type II multipliers measure the direct, indirect, and induced impacts from a change in final demands as measured by sales (output). Because the sum of the direct, indirect, and induced measures the total impact of an industry to an economy, this report will employ Type II multipliers. Once the Type II multipliers for the SMR industry are calculated, they can be used to estimate the changes in the overall economic activity of the U.S. economy stemming from different levels of activity in the SMR industry.

#### Manufacturing expansion key to growth and competitiveness

Atkinson et al 2012 (Dr. Robert Atkinson, President of the Information Technology and Innovation Foundation, Luke A. Stewart, economic analyst at the Information Technology and Innovation Foundation, Scott Andes, research fellow at The Information Technology and Innovation Foundation, Stephen Ezell, Senior Analyst at the Information Technology and Innovation Foundation, with a focus on international information technology competitiveness and national innovation policies, March 2012, “￼Worse Than the Great Depression: What Experts Are Missing About American Manufacturing Decline,” The Information Technology and Innovation Foundation, http://www2.itif.org/2012-american-manufacturing-decline.pdf)

In the 2000s, U.S. manufacturing suffered its worst performance in American history in terms of jobs. Not only did America lose 5.7 million manufacturing jobs, but the decline as a share of total manufacturing jobs (33 percent) exceeded the rate of loss in the Great Depression.1 Despite this unprecedented negative performance, most economists, pundits and elected officials are remarkably blasé about what has transpired. Manufacturing, they argue, has simply become incredibly productive. While tough on workers who are laid off, job losses indicate superior performance. All that is needed, if anything, are better programs to help laid-off workers.¶ This report argues that this dominant view on the loss of manufacturing jobs is fundamentally mistaken. Manufacturing lost jobs because manufacturing lost output, and it lost output because its ability to compete in global markets—some manipulated by egregious foreign mercantilist policies, others supported by better national competiveness policies, like lower corporate tax rates—declined significantly. In 2010, 13 of the 19 U.S. manufacturing sectors (employing 55 percent of manufacturing workers) were producing less than they there were in 2000 in terms of inflation-adjusted output.2 Moreover, we assert that the government’s official calculation of manufacturing output growth, and by definition productivity, is significantly overstated. Overall, U.S. manufacturing output actually fell by 11 percent during a period when GDP increased by 17 percent.3¶ The alarm bells are largely silent for two reasons: government statistics significantly overstate the change in U.S. manufacturing output, and most economists and pundits do not extend their analysis beyond one macro-level number (change in real manufacturing value added relative to GDP). But the conventional wisdom that U.S. manufacturing job loss is simply a result of productivity-driven restructuring (akin to how U.S. agriculture lost jobs but is still healthy) is wrong, or at least not the whole story. This report contends that the loss of U.S. manufacturing jobs is a function of slow growth in output (and, in most sectors, actual loss of output) caused by a steep increase in the manufactured goods trade deficit.¶ Even if economic policy experts acknowledge that manufacturing’s share of output has declined, many comfort themselves with a narrative that such decline comes as the inevitable result of market forces. “Manufacturing is in decline everywhere, even in China,” they argue. They would be wise to consult actual data, for they would find that while manufacturing has declined as a share of GDP in some nations (notably Canada, Italy, Spain, the United Kingdom, and the United States), it is stable or even growing in many others (including Austria, China, Finland, Germany, Japan, Korea, the Netherlands, and Switzerland). The loss of U.S. manufacturing is due to the failure of U.S. policies (for¶ example, underinvestment in manufacturing technology support policies and a corporate tax rate that is increasingly uncompetitive, among others) and the expansion of other nations’ mercantilist policies; it is not the work of the invisible hand.¶ Some go so far as to assert that manufacturing industries are “old economy” and that it is a reflection of failure, not success, if a country has a manufacturing sector that is either stable or growing. Perhaps they are thinking of the kind of factory represented in old movies, television shows, or news clips: dirty, clunky, mechanical havens filled with low- and moderate-skilled workers producing commodity products. They would be well-advised to visit the clean, streamlined, IT-driven manufacturing facilities operating in the United States today. The new facilities use advanced technologies and employ moderate- and high- skilled workers to turn out advanced products, from jet aircraft, computers, advanced instruments and vehicles, to sophisticated chemical and biological compounds.¶ Even these sophisticated areas, U.S. manufacturing leadership is in peril. Correcting for biases in the official data, ITIF finds that from 2000 to 2010, U.S. manufacturing labor productivity growth was overstated by a remarkable 122 percent. Moreover, manufacturing output, instead of increasing at the reported 16 percent rate, in fact fell by 11 percent over the period. Thus, while productivity increases have played some role in declining manufacturing employment, the overriding factor is output decline, highlighted by a striking result: if from 2000 to 2010 manufacturing output had grown at the same rate as that of the rest of the business sector, the United States would currently have some 13.8 million more jobs. Indeed, there is a strong relationship between manufacturing job loss and overall employment performance. In a comparison of 10 nations, there is a strong (0.57) correlation between change in manufacturing employment between 1987 and 2005 and employment growth from 2005 to 2010.4

#### Otherwise collapse is inevitable- Persistent unemployment causes double dip and erodes resilience to outside shocks

**Levine 2012** (Linda Levine, Specialist in Labor Economics, April 18, 2012, Congressional Research Service, “Economic Growth and the Unemployment Rate,” http://goo.gl/94oO2)

Despite the resumption of economic (output) growth in June 2009, the unemployment rate remains at an historically high level almost three years into the recovery from the 11 th recession of the postwar period. The unemployment rate has settled at a little over 8.0% during the first few months of 2012. The slow rebound of the labor market has renewed calls for measures to stimulate the economy beyond those Congress has previously enacted. 1 It has, from time to time, prompted speculation about a so-called double-dip recession that might result from another shock to the U.S. economy (e.g., the slowdown of European economies). From a public policy perspective, the main driver of the unemployment rate is the pace of economic growth. This report first examines the long-run relationship between the two economic variables and then narrows its focus to the periods of recovery from the postwar recessions.

#### Plan is key- Risk mitigation unlocks massive private investment

Fertel 2011 (Marvin S. Fertel, President of the Nuclear Energy Institute, July 14, 2011, testimony before the Senate Committee on Appropriations Subcommittee on Energy & Water Development, http://www.nei.org/publicpolicy/congressionaltestimony/testimony-for-the-record-for-the-hearing-on-light-water-small-modular-reactors-july-14-2011/)

The cost-shared government-industry SMR program proposed by the President is designed to address these issues and reduce the risk and uncertainty of moving forward. Traditional partnerships among technology vendors, component manufacturers and end users are necessary – but not sufficient in themselves. Industry is prepared to absorb its share of these initial development costs, but revenues from the sale and operation of the first SMRs are some years away, and some level of government investment in this promising technology is both necessary and appropriate. Absent additional business risk mitigation through government investment, the potential benefits of these small, modular reactor concepts may go unrealized, or may be realized later than desirable.¶ Leveraging private sector resources through public partnerships with the Department of Energy and other government entities will help move these new reactor technologies to market, capturing their many benefits while maintaining U.S. nuclear energy technology leadership. ¶ Conclusions and Recommendations¶ The potential benefits of small, modular, nuclear power plants are substantial. These technologies should be pursued and supported. These designs expand the strategic role of nuclear energy in meeting national environmental, energy security and economic development goals. While the U.S. has the lead today in developing these small reactors, other countries are already developing them. Reducing the time to market is key to ensuring that U.S. companies gain a share of the global market and influence the international safety and security culture. The proposed DOE cost-shared small reactor program will help achieve this goal.

#### No decoupling

**Caploe 2009** David Caploe (the CEO of the Singapore-incorporated American Centre for Applied Liberal Arts and Humanities in Asia) April 2009 “Focus Still on America to Lead Global Recovery” Online

While superficially sensible, this view is deeply problematic. To begin with, it ignores the fact that the global economy has in fact been 'America-centred' for more than 60 years. Countries - China, Japan, Canada, Brazil, Korea, Mexico and so on - either sell to the US or they sell to countries that sell to the US. To put it simply, Mr Obama doesn't seem to understand that there is no other engine for the world economy - and hasn't been for the last six decades. If the US does not drive global economic growth, growth is not going to happen. Thus, US policies to deal with the current crisis are critical not just domestically, but also to the entire world. This system has generally been advantageous for all concerned. America gained certain historically unprecedented benefits, but the system also enabled participating countries - first in Western Europe and Japan, and later, many in the Third World - to achieve undreamt-of prosperity. At the same time, this deep inter-connection between the US and the rest of the world also explains how the collapse of a relatively small sector of the US economy - 'sub-prime' housing, logarithmically exponentialised by Wall Street's ingenious chicanery - has cascaded into the worst global economic crisis since the Great Depression. To put it simply, Mr Obama doesn't seem to understand that there is no other engine for the world economy - and hasn't been for the last six decades. If the US does not drive global economic growth, growth is not going to happen. Thus, US policies to deal with the current crisis are critical not just domestically, but also to the entire world. Consequently, it is a matter of global concern that the Obama administration seems to be following Japan's 'model' from the 1990s: allowing major banks to avoid declaring massive losses openly and transparently, and so perpetuating 'zombie' banks - technically alive but in reality dead. As analysts like Nobel laureates Joseph Stiglitz and Paul Krugman have pointed out, the administration's unwillingness to confront US banks is the main reason why they are continuing their increasingly inexplicable credit freeze, thus ravaging the American and global economies. Team Obama seems reluctant to acknowledge the extent to which its policies at home are failing not just there but around the world as well. Which raises the question: If the US can't or won't or doesn't want to be the global economic engine, which country will? The obvious answer is China. But that is unrealistic for three reasons. First, China's economic health is more tied to America's than practically any other country in the world. Indeed, the reason China has so many dollars to invest everywhere - whether in US Treasury bonds or in Africa - is precisely that it has structured its own economy to complement America's. The only way China can serve as the engine of the global economy is if the US starts pulling it first. Second, the US-centred system began at a time when its domestic demand far outstripped that of the rest of the world. The fundamental source of its economic power is its ability to act as the global consumer of last resort. China, however, is a poor country, with low per capita income, even though it will soon pass Japan as the world's second largest economy. There are real possibilities for growth in China's domestic demand. But given its structure as an export-oriented economy, it is doubtful if even a successful Chinese stimulus plan can pull the rest of the world along unless and until China can start selling again to the US on a massive scale. Finally, the key 'system' issue for China - or for the European Union - in thinking about becoming the engine of the world economy - is monetary: What are the implications of having your domestic currency become the global reserve currency? This is an extremely complex issue that the US has struggled with, not always successfully, from 1959 to the present. Without going into detail, it can safely be said that though having the US dollar as the world's medium of exchange has given the US some tremendous advantages, it has also created huge problems, both for America and the global economic system. The Chinese leadership is certainly familiar with this history. It will try to avoid the yuan becoming an international medium of exchange until it feels much more confident in its ability to handle the manifold currency problems that the US has grappled with for decades. Given all this, the US will remain the engine of global economic recovery for the foreseeable future, even though other countries must certainly help. This crisis began in the US - and it is going to have to be solved there too.

#### Global economic crisis causes war and great power transitions

Royal 2010 (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. 213-214)

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 states. Research in this vein has been considered at systemic, dyadic and national levels. Several notable contributions follow. First, on the systemic level, Pollins (2008) advances Modelski and Thompson’s (1996) work on leadership cycle theory, finding that rhythms in the global economy are associated with the rise and fall of 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, 10981) that leads to uncertainty about power balances, increasing the risk of miscalculation (Fearon, 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). Seperately, Polllins (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 behavior 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 expectation 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. Third, others have considered the link between economic decline and external armed conflict at a national level. Blomberg and Hess (2002) find a strong correlation between internal conflict and external conflict, particularly during periods of economic downturn. They write, The linkages between internal and external conflict and prosperity are strong and mutually reinforcing. Economic conflict tends 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. (Blomberg & Hess, 2002, p.89). Economic decline has also been linked with an increase in the likelihood of terrorism (Blomberg, Hess, & Weerapana, 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 create a ‘rally round the flag’ effect. Wang (1996), DeRouen (1995), and Blomberg, Hess and Thacker (2006) find supporting evidence showing that economic decline and use of force are at least indirectly correlated. Gelpi (1997) Miller (1999) and Kisanganie and Pickering (2009) suggest that the tendency towards diversionary tactics are 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.

#### Extinction

Burrows and Harris 2009 Mathew J. Burrows counselor in the National Intelligence Council and Jennifer Harris a member of the NIC’s Long Range Analysis Unit “Revisiting the Future: Geopolitical Effects of the Financial Crisis” The Washington Quarterly 32:2 https://csis.org/files/publication/twq09aprilburrowsharris.pdf

Increased Potential for Global Conflict¶ Of course, the report encompasses more than economics and indeed believes the¶ future is likely to be the result of a number of intersecting and interlocking¶ forces. With so many possible permutations of outcomes, each with ample opportunity for unintended consequences, there is a growing sense of insecurity.¶ Even so, history may be more instructive than ever. While we continue to¶ believe that the Great Depression is not likely to be repeated, the lessons to be¶ drawn from that period include the harmful effects on fledgling democracies and¶ multiethnic societies (think Central Europe in 1920s and 1930s) and on¶ the sustainability of multilateral institutions (think League of Nations in the¶ same period). There is no reason to think that this would not be true in the¶ twenty-first as much as in the twentieth century. For that reason, the ways in¶ which the potential for greater conflict could grow would seem to be even more¶ apt in a constantly volatile economic environment as they would be if change¶ would be steadier.¶ In surveying those risks, the report stressed the likelihood that terrorism and¶ nonproliferation will remain priorities even as resource issues move up on the¶ international agenda. Terrorism’s appeal will decline if economic growth¶ continues in the Middle East and youth unemployment is reduced. For those¶ terrorist groups that remain active in 2025, however, the diffusion of¶ technologies and scientific knowledge will place some of the world’s most¶ dangerous capabilities within their reach. Terrorist groups in 2025 will likely be a¶ combination of descendants of long established groupsinheriting¶ organizational structures, command and control processes, and training¶ procedures necessary to conduct sophisticated attacksand newly emergent¶ collections of the angry and disenfranchised that become self-radicalized,¶ particularly in the absence of economic outlets that would become narrower¶ in an economic downturn.¶ The most dangerous casualty of any economically-induced drawdown of U.S.¶ military presence would almost certainly be the Middle East. Although Iran’s¶ acquisition of nuclear weapons is not inevitable, worries about a nuclear-armed¶ Iran could lead states in the region to develop new security arrangements with¶ external powers, acquire additional weapons, and consider pursuing their own¶ nuclear ambitions. It is not clear that the type of stable deterrent relationship¶ that existed between the great powers for most of the Cold War would emerge¶ naturally in the Middle East with a nuclear Iran. Episodes of low intensity¶ conflict and terrorism taking place under a nuclear umbrella could lead to an¶ unintended escalation and broader conflict if clear red lines between those states¶ involved are not well established. The close proximity of potential nuclear rivals¶ combined with underdeveloped surveillance capabilities and mobile¶ dual-capable Iranian missile systems also will produce inherent difficulties in¶ achieving reliable indications and warning of an impending nuclear attack. The¶ lack of strategic depth in neighboring states like Israel, short warning and missile¶ flight times, and uncertainty of Iranian intentions may place more focus on¶ preemption rather than defense, potentially leading to escalating crises.Types of conflict that the world continues¶ to experience, such as over resources, could¶ reemerge, particularly if protectionism grows and¶ there is a resort to neo-mercantilist practices.¶ Perceptions of renewed energy scarcity will drive¶ countries to take actions to assure their future¶ access to energy supplies. In the worst case, this¶ could result in interstate conflicts if government¶ leaders deem assured access to energy resources,¶ for example, to be essential for maintaining domestic stability and the survival of¶ their regime. Even actions short of war, however, will have important geopolitical¶ implications. Maritime security concerns are providing a rationale for naval¶ buildups and modernization efforts, such as China’s and India’s development of¶ blue water naval capabilities. If the fiscal stimulus focus for these countries indeed¶ turns inward, one of the most obvious funding targets may be military. Buildup of¶ regional naval capabilities could lead to increased tensions, rivalries, and¶ counterbalancing moves, but it also will create opportunities for multinational¶ cooperation in protecting critical sea lanes. With water also becoming scarcer in¶ Asia and the Middle East, cooperation to manage changing water resources is¶ likely to be increasingly difficult both within and between states in a more¶ dog-eat-dog world.¶

#### SMRs also key to tech leadership

O’Connor 2011 (Dan O’Connor, Policy Fellow in AEL’s New Energy Leaders Project, January 4, 2011, “Small Modular Reactors: Miracle, Mirage, or Between?,” Americans for Energy Leadership, http://leadenergy.org/2011/01/small-modular-reactors-miracle-mirage-or-medium/)

From an international leadership perspective, the SMR may be one of the few remaining technologies which the US stands to commercialize more successfully and rapidly than its competitors. Interest among nations like China and India in SMR technology development is weaker than in the US, principally because their rapidly growing energy demand and comparably quick nuclear implementation policies are conducive to constructing large reactors.¶ Thus, the SMR should be considered neither a miracle nor a mirage, but is aptly-viewed as a medium: a stepping-stone for technological innovation and implementation as the nuclear industry adapts to the needs of national and international markets. The design’s reemergence illustrates the long-dormant industry’s newfound vitality and responsiveness. Reacting, in the US, to harsh regulatory standards and high resulting upfront costs, the industry is adjusting to curtail price tags and expand the buyer’s market.¶ In order for the SMR to help initiate the growth of a more robust nuclear future, though, demonstration is absolutely essential. Government support to this end is certainly welcome, but commercial realization is most likely to start in a remote location for which SMRs were originally intended, and spread as experience grows and costs come down.¶ Mr. Gates’ miracles will not be borne out of thin air – they must be cultivated. The SMR seed should be one of many the government aggressively nurtures, with the hope that industry, academia, and policy makers keep a watchful eye on its maturation. We might find that the advent of hype-driven public support, a substantial amount of research funding, and a growing market of environmentally-concerned customers, are just the right nutrients to bear our miracle.

#### Key internal link to heg- Explains last five centuries of global hegemons

Drezner 2001 Daniel Drezner (professor of international politics at The Fletcher School of Law and Diplomacy at Tufts University) 2001 “State structurdae, technological leadership and the maintenance of hegemony” http://www.danieldrezner.com/research/tech.pdf

In this decade, proponents of globalization argue that because information and capital are mobile, the location of innovation has been rendered unimportant.6 While this notion has some popular appeal, the globalization thesis lacks theoretical or empirical support. Theoretically, even in a world of perfect information and perfect capital mobility, economists have shown that the location of technological innovation matters. Empirically, the claims of globalization proponents have been far-fetched. Capital is not perfectly mobile, and increased economic exchange does not lead to a seamless transfer of technology from one country to another.8 The location of innovation still matters. Long-cycle theorists have paid the most attention to the link between technological innovation, economic growth, and the rise and fall of hegemons.9 They argue that the past five hundred years of the global political economy can be explained by the waxing and waning of hegemonic powers. Countries acquire hegemonic status because they are the first to develop a cluster of technologies in leading sectors. These innovations generate spillover effects to the rest of the lead economy, and then to the global economy. Over time, these ‘technological hegemons’ fail to maintain the rate of innovations, leading to a period of strife until a new hegemonic power is found.

#### Otherwise – status based great power conflict is inevitable – relative lead key to prevent global conflict

Wohlforth 2009 William C. Wohlforth (a professor of government at Dartmouth College) 2009 “Unipolarity, Status Competition, and Great Power War” Project Muse

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

#### Solves escalation of global hotspots- retrenchment causes bickering internationally over leadership and prevents cooperation

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For if America falters, the world is unlikely to be dominated by a single preeminent successor -- not even China. International uncertainty, increased tension among global competitors, and even outright chaos would be far more likely outcomes. While a sudden, massive crisis of the American system -- for instance, another financial crisis -- would produce a fast-moving chain reaction leading to global political and economic disorder, a steady drift by America into increasingly pervasive decay or endlessly widening warfare with Islam would be unlikely to produce, even by 2025, an effective global successor. No single power will be ready by then to exercise the role that the world, upon the fall of the Soviet Union in 1991, expected the United States to play: the leader of a new, globally cooperative world order. More probable would be a protracted phase of rather inconclusive realignments of both global and regional power, with no grand winners and many more losers, in a setting of international uncertainty and even of potentially fatal risks to global well-being. Rather than a world where dreams of democracy flourish, a Hobbesian world of enhanced national security based on varying fusions of authoritarianism, nationalism, and religion could ensue. RELATED 8 Geopolitically Endangered Species The leaders of the world's second-rank powers, among them India, Japan, Russia, and some European countries, are already assessing the potential impact of U.S. decline on their respective national interests. The Japanese, fearful of an assertive China dominating the Asian mainland, may be thinking of closer links with Europe. Leaders in India and Japan may be considering closer political and even military cooperation in case America falters and China rises. Russia, while perhaps engaging in wishful thinking (even schadenfreude) about America's uncertain prospects, will almost certainly have its eye on the independent states of the former Soviet Union. Europe, not yet cohesive, would likely be pulled in several directions: Germany and Italy toward Russia because of commercial interests, France and insecure Central Europe in favor of a politically tighter European Union, and Britain toward manipulating a balance within the EU while preserving its special relationship with a declining United States. Others may move more rapidly to carve out their own regional spheres: Turkey in the area of the old Ottoman Empire, Brazil in the Southern Hemisphere, and so forth. None of these countries, however, will have the requisite combination of economic, financial, technological, and military power even to consider inheriting America's leading role. China, invariably mentioned as America's prospective successor, has an impressive imperial lineage and a strategic tradition of carefully calibrated patience, both of which have been critical to its overwhelmingly successful, several-thousand-year-long history. China thus prudently accepts the existing international system, even if it does not view the prevailing hierarchy as permanent. It recognizes that success depends not on the system's dramatic collapse but on its evolution toward a gradual redistribution of power. Moreover, the basic reality is that China is not yet ready to assume in full America's role in the world. Beijing's leaders themselves have repeatedly emphasized that on every important measure of development, wealth, and power, China will still be a modernizing and developing state several decades from now, significantly behind not only the United States but also Europe and Japan in the major per capita indices of modernity and national power. Accordingly, Chinese leaders have been restrained in laying any overt claims to global leadership. At some stage, however, a more assertive Chinese nationalism could arise and damage China's international interests. A swaggering, nationalistic Beijing would unintentionally mobilize a powerful regional coalition against itself. None of China's key neighbors -- India, Japan, and Russia -- is ready to acknowledge China's entitlement to America's place on the global totem pole. They might even seek support from a waning America to offset an overly assertive China. The resulting regional scramble could become intense, especially given the similar nationalistic tendencies among China's neighbors. A phase of acute international tension in Asia could ensue. Asia of the 21st century could then begin to resemble Europe of the 20th century -- violent and bloodthirsty. At the same time, the security of a number of weaker states located geographically next to major regional powers also depends on the international status quo reinforced by America's global preeminence -- and would be made significantly more vulnerable in proportion to America's decline. The states in that exposed position -- including Georgia, Taiwan, South Korea, Belarus, Ukraine, Afghanistan, Pakistan, Israel, and the greater Middle East -- are today's geopolitical equivalents of nature's most endangered species. Their fates are closely tied to the nature of the international environment left behind by a waning America, be it ordered and restrained or, much more likely, self-serving and expansionist. A faltering United States could also find its strategic partnership with Mexico in jeopardy. America's economic resilience and political stability have so far mitigated many of the challenges posed by such sensitive neighborhood issues as economic dependence, immigration, and the narcotics trade. A decline in American power, however, would likely undermine the health and good judgment of the U.S. economic and political systems. A waning United States would likely be more nationalistic, more defensive about its national identity, more paranoid about its homeland security, and less willing to sacrifice resources for the sake of others' development. The worsening of relations between a declining America and an internally troubled Mexico could even give rise to a particularly ominous phenomenon: the emergence, as a major issue in nationalistically aroused Mexican politics, of territorial claims justified by history and ignited by cross-border incidents. Another consequence of American decline could be a corrosion of the generally cooperative management of the global commons -- shared interests such as sea lanes, space, cyberspace, and the environment, whose protection is imperative to the long-term growth of the global economy and the continuation of basic geopolitical stability. In almost every case, the potential absence of a constructive and influential U.S. role would fatally undermine the essential communality of the global commons because the superiority and ubiquity of American power creates order where there would normally be conflict. None of this will necessarily come to pass. Nor is the concern that America's decline would generate global insecurity, endanger some vulnerable states, and produce a more troubled North American neighborhood an argument for U.S. global supremacy. In fact, the strategic complexities of the world in the 21st century make such supremacy unattainable. But those dreaming today of America's collapse would probably come to regret it. And as the world after America would be increasingly complicated and chaotic, it is imperative that the United States pursue a new, timely strategic vision for its foreign policy -- or start bracing itself for a dangerous slide into global turmoil.

### 1AC SMR Tech Advantage

#### Global SMR development is inevitable but the US is behind- Retaking the lead key to capture international markets

Tucker 2011 (William Tucker, nuclear energy researcher and author of Terrestrial Energy: How Nuclear Power Will Lead the Green Revolution and End America's Energy Odyssey, March 2011, “America's Last Nuclear Hope,” American Spectator, http://spectator.org/archives/2011/03/21/americas-last-nuclear-hope/print)

That America is going to miss the revival of nuclear power that is reaching into the remotest corners of the globe is now almost a foregone conclusion. While the rest of the world is discovering what will undoubtedly be the principal source of power by the end of the 21st century, Americans are preoccupied with how many picocuries of tritium are leaking out of Vermont Yankee or whether we'll ever get around to deciding what to do with Yucca Mountain. There are 60 new reactors under construction around the world in countries as diverse as Brazil, Argentina, Lithuania, India, and Sri Lanka. Twenty are being built in China alone. Kenya, Indonesia, Morocco, Bangladesh -- all have entered into agreements with one provider nation or another to begin plans on their own nuclear program.¶ Thirty years ago, the big three American companies -- General Electric, Westinghouse, and Babcock & Wilcox -- dominated the international market, building reactors in Europe and Asia. Today the field is completely dominated by foreign giants. Areva, 80 percent owned by the French government, is building in China, India, and Finland. Westinghouse, bought by Toshiba in 2008, has projects all around the globe. General Electric, still in the field but running in last place, recently partnered with Hitachi in the hope of reviving its fortunes. Russia's Rosatom has deals with Vietnam, India, Egypt, Brazil, and Venezuela. The biggest shock came when the United Arab Emirates put out bids to build four reactors in the oil-rich Persian Gulf. Areva and Westinghouse figured to be the contenders but both were upended by Korea, which only started building its own reactors five years ago. The Koreans won a $20 billion contract in late 2009, the largest international construction job in history. Yet all this will change once again when China enters the international market with its own design (reverse-engineered from Westinghouse) somewhere around 2013. France, which prides itself on being 80 percent nuclear, is already fearful that it will be closed out of the market by the rising Asian competition.¶ So how can America possibly fit into the highly competitive race to provide what is surely going to be the dominant energy source of the 21st century? Believe it or not, we still have a chance -- with small reactors.¶ LAST MARCH, in an op-ed for the Wall Street Journal in which he praised small modular reactors (SMRs) as "America's New Nuclear Option," Secretary of Energy Steven Chu acknowledged that America is in danger of falling behind other countries. "Our choice is clear," he wrote. "Develop these technologies today or import them tomorrow." In fact, America is the only major nuclear country that does not even have the capacity to forge the three-story steel vessel heads at the heart of large reactors and will have to import them as well. But Chu saw an opportunity in the new small designs. "If we can develop this technology in the U.S. and build these reactors with American workers, we will have a key competitive edge."

#### Times is running out

Tucker 2011 (William Tucker, nuclear energy researcher and author of Terrestrial Energy: How Nuclear Power Will Lead the Green Revolution and End America's Energy Odyssey, March 2011, “America's Last Nuclear Hope,” American Spectator, http://spectator.org/archives/2011/03/21/americas-last-nuclear-hope/print)

However, we should not imagine the rest of the world is standing still waiting for America to come up with the latest innovation. Japan, Korea, and Russia already have small reactors and France is preparing to enter the field. Toshiba has a 75-MW reactor it has been offering to the Alaskan village of Galena, which now generates its electricity by importing vast quantities of diesel fuel. The Russians have already built a 125-MW reactor and mounted it on a barge to float to an isolated Siberian village. Last year Rosatom started offering its small reactor to India. Korea is working on an SMR and France recently decided it was relying too heavily on its giant EPR1700 and will try to design a small reactor as well. If China ever enters the game -- which is likely by mid-decade -- it may be over for the competition. Areva's CEO Anne Lauvergeon recently expressed alarm at how quickly and efficiently China is constructing Areva's own reactors -- much faster and cheaper than the French are able to do it themselves.¶ So even though American ingenuity and inventiveness are still operating, there is no certainty that it will bring us any benefit. We have developed a bureaucracy that would make the Byzantine Empire envious. Most helpful, though, would be widespread public recognition that nuclear energy is not the devil's work but simply the practical fruition of the great scientific discoveries of the 20th century. Just as we led the world into the Computer Revolution -- and just about every other technological revolution since the 18th century -- America could still lead the world into the Nuclear Age. But it is going to be a much closer call this time.

#### SMR leadership is key to shape SMR diffusion

Loudermilk 2011 (Micah J. Loudermilk is a Research Associate for the Energy & Environmental Security Policy program with the Institute for National Strategic Studies at National Defense University, May 31, 2011, “Small Nuclear Reactors and US Energy Security: Concepts, Capabilities, and Costs,” Journal of Energy Security, http://www.ensec.org/index.php?option=com\_content&view=article&id=314:small-nuclear-reactors-and-us-energy-security-concepts-capabilities-and-costs&catid=116:content0411&Itemid=375)

Reactor safety itself notwithstanding, many argue that the scattering of small reactors around the world would invariably lead to increased proliferation problems as nuclear technology and know-how disseminates around the world. Lost in the argument is the fact that this stance assumes that US decisions on advancing nuclear technology color the world as a whole. In reality, regardless of the US commitment to or abandonment of nuclear energy technology, many countries (notably China) are blazing ahead with research and construction, with 55 plants currently under construction around the world—though Fukushima may cause a temporary lull.¶ Since Three Mile Island, the US share of the global nuclear energy trade has declined precipitously as talent and technology begin to concentrate in countries more committed to nuclear power. On the small reactor front, more than 20 countries are examining the technology and the IAEA estimates that 40-100 small reactors will be in operation by 2030. Without US leadership, new nations seek to acquire nuclear technology turn to countries other than the US who may not share a deep commitment to reactor safety and nonproliferation objectives. Strong US leadership globally on nonproliferation requires a vibrant American nuclear industry. This will enable the US to set and enforce standards on nuclear agreements, spent fuel reprocessing, and developing reactor technologies.¶ As to the small reactors themselves, the designs achieve a degree of proliferation-resistance unmatched by large reactors. Small enough to be fully buried underground in independent silos, the concrete surrounding the reactor vessels can be layered much thicker than the traditional domes that protect conventional reactors without collapsing. Coupled with these two levels of superior physical protection is the traditional security associated with reactors today. Most small reactors also are factory-sealed with a supply of fuel inside. Instead of refueling reactors onsite, SMRs are returned to the factory, intact, for removal of spent fuel and refueling. By closing off the fuel cycle, proliferation risks associated with the nuclear fuel running the reactors are mitigated and concerns over the widespread distribution of nuclear fuel allayed.

#### Otherwise the spread of dangerous SMR technology is inevitable

Ferguson 2010 (Dr. Charles D. Ferguson, President of the Federation of American Scientists, Adjunct Professor in the Security Studies Program at Georgetown University and Adjunct Lecturer in the National Security Studies Program at the Johns Hopkins University, May 19, 2010, Statement before the House Committee on Science and Technology for the hearing on Charting the Course for American Nuclear Technology: Evaluating the Department of Energy’s Nuclear Energy Research and Development Roadmap, http://www.fas.org/press/\_docs/05192010\_Testimony\_HouseScienceCommHearing%20.pdf)

The United States and several other countries have considerable experience in building and operating small and medium power reactors. The U.S. Navy, for example, has used small power reactors since the 1950s to provide propulsion and electrical power for submarines, aircraft carriers, and some other surface warships. China, France, Russia, and the United Kingdom have also developed nuclear powered naval vessels that use small reactors. Notably, Russia has deployed its KLT-40S and similarly designed small power reactors on icebreakers and has in recent years proposed building and selling barges that would carry these types of reactors for use in sea-side communities throughout the world. China has already exported small and medium power reactors. In 1991, China began building a reactor in Pakistan and started constructing a second reactor there in 2005. In the wake of the U.S.-India nuclear deal, Beijing has recently reached agreement with Islamabad to build two additional reactors rated at 650 MWe.2¶ One of the unintended consequences of more than 30 years of sanctions on India’s nuclear program is that India had concentrated its domestic nuclear industry on building small and medium power reactors based on Canadian pressurized heavy water technology, or Candu-type reactors. Pressurized heavy water reactors (PHWRs) pose proliferation concerns because they can be readily operated in a mode optimal for producing weapons-grade plutonium and can be refueled during power operations. Online refueling makes it exceedingly difficult to determine when refueling is occurring based solely on outside observations, for example, through satellite monitoring of the plant’s operations. Thus, the chances for potential diversion of fissile material increase. This scenario for misuse underscores the need for more frequent inspections of these facilities. But the limited resources of the International Atomic Energy Agency have resulted in a rate of inspections that are too infrequent to detect a diversion of a weapon’s worth of material.3 The opening of the international nuclear market to India may lead to further spread of PHWR technologies to more states. For example, last year, the Nuclear Power Corporation of India, Ltd. (NPCIL) expressed interest in selling PHWRs to Malaysia.4 NPCIL is the only global manufacturer of 220 MWe PHWRs. New Delhi favors South-to-South cooperation; consequently developing states in Southeast Asia, sub-Saharan Africa, and South America could become recipients of these technologies in the coming years to next few decades. Many of these countries would opt for small and medium power reactors because their electrical grids do not presently have the capacity to support large power reactors and they would likely not have the financial ability to purchase large reactors.¶ What are the implications for the United States of Chinese and Indian efforts to sell small and medium power reactors? Because China and India already have the manufacturing and marketing capability for these reactors, the United States faces an economically competitive disadvantage. Because the United States has yet to license such reactors for domestic use, it has placed itself at an additional market disadvantage. By the time the United States has licensed such reactors, China and India as well as other competitors may have established a strong hold on this emerging market.¶ The U.S. Nuclear Regulatory Commission cautioned on December 15, 2008 that the “licensing of new, small modular reactors is not just around the corner. The NRC’s attention and resources now are focused on the large-scale reactors being proposed to serve millions of Americans, rather than smaller devices with both limited power production and possible industrial process applications.” The NRC’s statement further underscored that “examining proposals for radically different technology will likely require an exhaustive review” ... before “such time as there is a formal proposal, the NRC will, as directed by Congress, continue to devote the majority of its resources to addressing the current technology base.”6 Earlier this year, the NRC devoted consideration to presentations on small modular reactors from the Nuclear Energy Institute, the Department of Energy, and the Rural Electric Cooperative Association among other stakeholders.7 At least seven vendors have proposed that their designs receive attention from the NRC.8¶ Given the differences in design philosophy among these vendors and the fact that none of these designs have penetrated the commercial market, it is too soon to tell which, if any, will emerge as market champions. Nonetheless, because of the early stage in development, the United States has an opportunity to state clearly the criteria for successful use of SMRs. But because of the head start of China and India, the United States should not procrastinate and should take a leadership role in setting the standards for safe, secure, and proliferation-resistant SMRs that can compete in the market. Several years ago, the United States sponsored assessments to determine these criteria.9 While the Platonic ideal for small modular reactors will likely not be realized, it is worth specifying what such an SMR would be. N. W. Brown and J. A. Hasberger of the Lawrence Livermore National Laboratory assessed that reactors in developing countries must:¶ • “achieve reliably safe operation with a minimum of maintenance and supporting infrastructure;¶ • offer economic competitiveness with alternative energy sources available to the candidate sites;¶ • demonstrate significant improvements in proliferation resistance relative to existing reactor systems.”10¶ Pointing to the available technologies at that time from Argentina, China, and Russia, they determined that “these countries tend to focus on the development of the reactor without integrated considerations of the overall fuel cycle, proliferation, or waste issues.” They emphasized that what is required for successful development of an SMR is “a comprehensive systems approach that considers all aspects of manufacturing, transportation, operation, and ultimate disposal.”¶ Considering proliferation resistance, their preferred approach is to eliminate the need for on-site refueling of the reactor and to provide for waste disposal away from the client country. By eliminating on-site refueling the recipient country would not need to access the reactor core, where plutonium—a weapons-usable material—resides. By removing the reactor core after the end of service life, the recipient country would not have access to fissile material contained in the used fuel. Both of these proposed criteria present technical and political challenges.

#### Rapid nuclearization

Cook 2011 (David Cook, Analyst at National Nuclear Security Administration, MPA from The Ohio State University at the John Glenn School of Public Affairs, “Slowing Atomic Arms Acquisition: More Small Modular Reactors Needed to Combat Nuclear Proliferation,” online)

Reports of Iran seeking to acquire a nuclear weapon are¶ becoming more and more prevalent. Numerous countries are seeking nuclear power and¶ it is vital that the world not export¶ nuclear power to countries that would use¶ that nuclear technology for nefarious ends. The production of nuclear energy, clearly presents inherent security challenges because nuclear material may be used to make nuclear weapons. Countries often defy international norms and pressures that attempt to stop their nuclear proliferation efforts. It is vitally important that these countries not nuclear proliferate. Legislators can take a realistic precaution to ensure that nuclear power used is used for safe purposes. Small modular reactors or SMRs can provide a level of security against nuclear proliferation. Small modular reactors are smaller versions of nuclear plants. These plants can be manufactured in a country that has been traditionally trusted with nuclear power like the United States and sent to other countries that are not traditionally trusted with nuclear power. Legislators need to ensure that more SMR are financed and that the United States takes the lead in the manufacturing process of SMRS to guarantee that the nuclear material needed to produce nuclear energy is safe and secure. Problem? More¶ Countries Are Seeking Nuclear Power¶ More than 80 countries receive technological assistance from the International¶ Atomic Energy Agency. 1 This number is likely to increase as the world turns to nuclear power to meet rising energy needs. While¶ the stalled in¶ America, other countries are turning to nuclear power. As of 2011, there are over 60 nuclear reactors under construction in 14 countries. 2¶ The problem with all of the sudden interest in nuclear power is that all nuclear technology and materials are in inherently “dual use.” Nuclear technology and materials¶ can be used to either to produce energy or enhance a country’s ability to produce nuclear weapons. 3Policy Alternatives¶ The current system that utilizes international inspectors and holding nations to a nuclear non-proliferation treaty is working for a majority of countries, however, this system does not guarantee that countries will not nuclear proliferate. The UN has brought sanctions against Iran for violating the NPT, but these sanctions are not as effective as international leaders hope. A variety of options are available to governments to ensure that countries do not nuclear proliferate.¶ One option is to build more Small Modular Reactors in countries that are newer to the production of nuclear energy. Small Modular Reactors are much smaller than traditional nuclear reactors. The nuclear material is secured safely within these plants and cannot be accessed by anyone once the plant has been manufactured. However, these units may not be made quickly enough and might not provide enough energy to meet the world energy needs.4 Another option is for the IAEA to provide more oversight and inspectors at the nuclear facilities in countries. On the other hand, the IAEA inspectors may not be welcomed in the offending countries and this policy option may not be feasible.¶ Recommendation Finance and Build Small¶ Modular Reactors¶ Legislators can help to ensure the safety of the United States by passing legislation that provides for the financing and building of small modular reactors. These units can be manufactured in countries that have been traditionally trusted with nuclear power and sent to other countries that are not traditionally trusted with nuclear power.¶ SMRs Contain Numerous Safety Features: The reactors contain less nuclear material than traditional power plants, inherently reducing the overall nuclear proliferation risk.¶ SMRS can be built at a factory and the construction of these plants can be overseen safely in a country with a trusted nuclear power background.¶ Light-water SMRs could cool the reactor core in the event of a meltdown even if the power goes out.¶ Nuclear proliferation continues to be a concern to the United States as more countries are acquiring nuclear energy technologies to meet rising energy demands. Numerous countries are seeking nuclear power and it is vital that world not export nuclear power to countries that would¶ use that nuclear technology for nefarious ends. Countries often defy international norms and pressures that attempt to stop their nuclear proliferation efforts.¶ The production and implementation of SMRs to the world nuclear security environment can help to ensure the safety of the United States and the world. Countries all over the globe are turning to nuclear power to meet energy needs in their respective countries and SMRs can help to ensure that nuclear energy is being used for the betterment of the world. It is imperative that the United States takes the lead in ensuring that more SMRs are built and built safely.

#### Unchecked nuclear spread will cause global nuclear war – shorter flight times and lack of second-strike capacity

Cimbala 2008

(Stephen, Political Science Professor at the University of Pennsylvania, March, “Anticipatory Attacks: Nuclear Crisis Stability in Future Asia” Comparative Strategy, Vol 27 No 2, p 113-132, InformaWorld)

The spread of ballistic missiles and other nuclear-capable delivery systems in Asia, or in the Middle East with reach into Asia, is especially dangerous because plausible adversaries live close together and are already engaged in ongoing disputes about territory or other issues.13 The Cold War Americans and Soviets required missiles and airborne delivery systems of intercontinental range to strike at one another’s vitals. But short-range ballistic missiles or fighter-bombers suffice for India and Pakistan to launch attacks at one another with potentially “strategic” effects. China shares borders with Russia, North Korea, India, and Pakistan; Russia, with China and NorthKorea; India, with Pakistan and China; Pakistan, with India and China; and so on. The short flight times of ballistic missiles between the cities or military forces of contiguous states means that very little time will be available for warning and attack assessment by the defender. Conventionally armed missiles could easily be mistaken for a tactical nuclear first use. Fighter-bombers appearing over the horizon could just as easily be carrying nuclear weapons as conventional ordnance. In addition to the challenges posed by shorter flight times and uncertain weapons loads, potential victims of nuclear attack in Asia may also have first strike–vulnerable forces and command-control systems that increase decision pressures for rapid, and possibly mistaken, retaliation. This potpourri of possibilities challenges conventional wisdom about nuclear deterrence and proliferation on the part of policymakers and academic theorists. For policymakers in the United States and NATO, spreading nuclear and other weapons of mass destruction in Asia could profoundly shift the geopolitics of mass destruction from a European center of gravity (in the twentieth century) to an Asian and/or Middle Eastern center of gravity (in the present century).14 This would profoundly shake up prognostications to the effect that wars of mass destruction are now passe, on account of the emergence of the “Revolution in Military Affairs” and its encouragement of information-based warfare.15 Together with this, there has emerged the argument that large-scale war between states or coalitions of states, as opposed to varieties of unconventional warfare and failed states, are exceptional and potentially obsolete.16 The spread of WMD and ballistic missiles in Asia could overturn these expectations for the obsolescence or marginalization of major interstate warfare. For theorists, the argument that the spread of nuclear weapons might be fully compatible with international stability, and perhaps even supportive of international security, may be less sustainable than hitherto.17 Theorists optimistic about the ability of the international order to accommodate the proliferation of nuclear weapons and delivery systems in the present century have made several plausible arguments based on international systems and deterrence theory. First, nuclear weapons may make states more risk averse as opposed to risk acceptant, with regard to brandishing military power in support of foreign policy objectives. Second, if states’ nuclear forces are second-strike survivable, they contribute to reduced fears of surprise attack. Third, the motives of states with respect to the existing international order are crucial. Revisionists will seek to use nuclear weapons to overturn the existing balance of power; status quo–oriented states will use nuclear forces to support the existing distribution of power, and therefore, slow and peaceful change, as opposed to sudden and radical power transitions. These arguments, for a less alarmist viewof nuclear proliferation, take comfort from the history of nuclear policy in the “first nuclear age,” roughly corresponding to the Cold War.18 Pessimists who predicted that some thirty or more states might have nuclear weapons by the end of the century were proved wrong. However, the Cold War is a dubious precedent for the control of nuclear weapons spread outside of Europe. The military and security agenda of the ColdWar was dominated by the United States and the Soviet Union, especially with regard to nuclear weapons. Ideas about mutual deterrence based on second-strike capability and the deterrence “rationality” according to American or allied Western concepts might be inaccurate guides to the avoidance of war outside of Europe.19

#### Extinction

Robock 09 – Professor of climatology @ Rutgers University [Alan Robock (Associate director of Rutger’s Center for Environmental Prediction. 30 year researcher in the area of climate change. Holds a doctorate in meteorology from MIT. Published over 150 peer-reviewed papers on climate change), “Nuclear winter” The Encyclopedia of Earth, January 6, 2009, Pg. http://www.eoearth.org/article/Nuclear\_winter]

Nuclear winter is a term that describes the climatic effects of nuclear war. In the 1980's, work conducted jointly by Western and Soviet scientists showed that for a full-scale nuclear war between the United States and the Soviet Union the climatic consequences, and indirect effects of the collapse of society, would be so severe that the ensuing nuclear winter would produce famine for billions of people far from the target zones. There are several wrong impressions that people have about nuclear winter. One is that there was a flaw in the theory and that the large climatic effects were disproven. Another is that the problem, even if it existed, has been solved by the end of the nuclear arms race. But these are both wrong. Furthermore, new nuclear states threaten global climate change even with arsenals that are much less than 1% of the current global arsenal. What's New Based on new work published in 2007 and 2008 by some of the pioneers of nuclear winter research who worked on the original studies, we now can say several things about this topic. New Science: A minor nuclear war (such as between India and Pakistan or in the Middle East), with each country using 50 Hiroshima-sized atom bombs as airbursts on urban areas, could produce climate change unprecedented in recorded human history. This is only 0.03% of the explosive power of the current global arsenal. This same scenario would produce global ozone depletion , because the heating of the stratosphere would enhance the chemical reactions that destroy ozone. A nuclear war between the United States and Russia today could produce nuclear winter, with temperatures plunging below freezing in the summer in major agricultural regions, threatening the food supply for most of the planet. The climatic effects of the smoke from burning cities and industrial areas would last for several years, much longer than we previously thought. New climate model simulations, that have the capability of including the entire atmosphere and oceans, show that the smoke would be lofted by solar heating to the upper stratosphere, where it would remain for years. New Policy Implications: The only way to eliminate the possibility of this climatic catastrophe is to eliminate the nuclear weapons. If they exist, they can be used. The spread of nuclear weapons to new emerging states threatens not only the people of those countries, but the entire planet. Rapid reduction of the American and Russian nuclear arsenals will set an example for the rest of the world that nuclear weapons cannot be used and are not needed. How Does Nuclear Winter Work? A nuclear explosion is like bringing a piece of the Sun to the Earth's surface for a fraction of a second. Like a giant match, it causes cities and industrial areas to burn. Megacities have developed in India and Pakistan and other developing countries, providing tremendous amounts of fuel for potential fires. The direct effects of the nuclear weapons, blast, radioactivity, fires, and extensive pollution, would kill millions of people, but only those near the targets. However, the fires would have another effect. The massive amounts of dark smoke from the fires would be lofted into the upper troposphere, 10-15 kilometers (6-9 miles) above the Earth's surface, and then absorption of sunlight would further heat the smoke, lifting it into the stratosphere, a layer where the smoke would persist for years, with no rain to wash it out. The climatic effects of smoke from fires started by nuclear war depend on the amount of smoke. Our new calculations show that for 50 nuclear weapons dropped on two countries, on the targets that would produce the maximum amount of smoke, about 5 megatons (Tg) of black smoke would be produced, accounting for the amount emitted from the fires and the amount immediately washed out in rain. As the smoke is lofted into the stratosphere, it would be transported around the world by the prevailing winds. We also did calculations for two scenarios of war between the two superpowers who still maintain large nuclear arsenals, the United States and Russia. In one scenario, 50 Tg of black smoke would be produced and in another, 150 Tg of black smoke would be produced. How many nuclear weapons would be required to produce this much smoke? It depends on the targets, but there are enough weapons in the current arsenals to produce either amount. In fact, there are only so many targets. Once they are all hit by weapons, additional weapons would not produce much more smoke at all. Even after the current nuclear weapons reduction treaty between these superpowers is played out in 2012, with each having about 2,000 weapons, 150 Tg of smoke could still be produced. Here are movies of the smoke transport from three different scenarios: These new results were made possible by the use of a state-of-the-art general circulation model of the climate. For the first time a complete calculation of not only atmospheric but also oceanic circulation was conducted, including the entire atmosphere from the surface up through the troposphere, stratosphere, and mesosphere, to an elevation of 80 kilometers (50 miles). Previous calculations had not been run for the 10 year simulations here, and had not allowed the smoke to be lofted into the upper stratosphere, where it would persist for many years. We calculated the climate response to the three scenarios illustrated above. Compared to the global warming observed for the past century, all three scenarios show massive cooling. Compared to the climate change for the Northern Hemisphere for the past 1,000 years, the famous hockey stick diagram, the climate change from any of these scenarios is unprecedented. Compared to climate change for the past millenium, even the 5 Tg case ( a war between India and Pakistan) would plunge the planet into temperatures colder than the Little Ice Age (approximately1600-1850 ). This would be essentially instantly , and agriculture would be severely threatened . Larger amounts of smoke would produce larger climate changes, and for the 150 Tg case produce a true nuclear winter, making agriculture impossible for years. In both cases, new climate model simulations show that the effects would last for more than a decade. Analogs Support the Theory Nuclear winter is a theory based on computer model calculations. Normally, scientists test theories by doing experiments, but we never want to do this experiment in the real world. Thus we look for analogs that can inform us of parts of the theory. And there are many such analogs that convince us that the theory is correct: Cities burning. Unfortunately, we have several examples of cities burning, firestorms created by the intense release of energy, and smoke being pumped into the upper atmosphere. These include San Francisco as a result of the earthquake in 1906, and cities bombed in World War II, including Tokyo, Dresden, Hamburg, Darmstadt, Hiroshima, and Nagasaki. The seasonal cycle. In the winter, the climate is cooler, because the days are shorter and sunlight is less intense. Again, this helps us quantify the effects of reduction of solar radiation. The diurnal cycle. At night the Sun sets and it gets cold at the surface. If the Sun did not rise tomorrow, we already have an intuitive feel for how much cooling would take place and how fast it would cool. Volcanic eruptions. Explosive volcanic eruptions, such as those of Tambora in 1815, Krakatau in 1883 and Pinatubo in 1991, provide several lessons. The resulting sulfate aerosol cloud in the stratosphere is transported around the world by winds, thus supporting the results from the animations above. The surface temperature plummets after each large eruption, in proportion to the thickness of the stratospheric cloud. In fact 1816, following Tambora, is known as the "Year Without a Summer," with global cooling and famine. Following the Pinatubo eruption, global precipitation, river flow, and soil moisture all reduced, since cooling the planet by blocking sunlight has a strong effect on reducing evaporation and weakening the hydrologic cycle. This is also what the nuclear winter simulations show. Forest fires. Smoke from large forest fires sometimes is injected into the lower stratosphere. And the smoke is transported around the world, also producing cooling under the smoke. Dust storms on Mars. Occasionally, dust storms start in one region of Mars, but the dust is heated by the Sun, lofted into the upper atmosphere, and transported around the planet to completely enshroud it in a dust blanket. This process takes a couple weeks, just like our computer simulations for the nuclear winter smoke. Extinction of the dinosaurs. 65,000,000 years ago an asteroid or comet smashed into the Earth in southern Mexico. The resulting dust cloud, mixed with smoke from fires, blocked out the Sun, killing the dinosaurs, and starting the age of mammals. This Cretaceous-Tertiary (K-T) extinction may have been exacerbated by massive volcanism in India at the same time. This teaches us that large amounts of aerosols in Earth's atmosphere have caused massive climate change and extinction of species . The difference with nuclear winter is that the K-T extinction could not have been prevented. Policy Implications The work on nuclear winter in the 1980's, and the realization that both direct and indirect effects of nuclear war would be a global catastrophe, led to the end of arms race and the end of the Cold War. In response to the comment "In the 1980s, you warned about the unprecedented dangers of nuclear weapons and took very daring steps to reverse the arms race," in an interview in 2000, Mikhail Gorbachev said "Models made by Russian and American scientists showed that a nuclear war would result in a nuclear winter that would be extremely destructive to all life on Earth; the knowledge of that was a great stimulus to us, to people of honor and morality, to act in that situation."[1] Since the 1980's, the number of nuclear weapons in the world has decreased to 1/3 of the peak number of more than 70,000. The consequences of regional-scale nuclear conflicts are unexpectedly large, with the potential to become global catastrophes. The combination of nuclear proliferation, political instability, and urban demographics may constitute one of the greatest dangers to the stability of society since the dawn of humans. The current and projected American and Russian nuclear arsenals can still produce nuclear winter. Only nuclear disarmament will prevent the possibility of a nuclear environmental catastrophe.

#### Loose fissile material in SSA gets stolen

Belcher 2011 (Emma L. Belcher, former Stanton nuclear security fellow at the Council on Foreign Relations and MA/PhD from Tufts University, July 2011, “A Nuclear Security Fund,” Council on Foreign Relations, http://www.cfr.org/proliferation/nuclear-security-fund/p25388)

Al-Qaeda and other terrorist groups say they want nuclear weapons and will use them if they can. The most likely acquisition method is to buy or steal fissile material and fashion a crude Hiroshima-style device, provided they have some training in explosives and engineering. Alternatively, a group could use fissile material in a radiological dispersal device, or dirty bomb, which would cause panic, even if it did not cause significant destruction. This makes securing fissile material, and preventing its trafficking if it is stolen, vitally important. There are approximately 1,600 metric tons of highly enriched uranium (HEU) and 400 metric tons of plutonium in over 1,100 civilian and military locations worldwide—enough for many thousands of bombs. The security of these sources varies widely, as does the robustness of measures to prevent smuggling of stolen sources.¶ Though many nations are taking measures to prevent terrorists from acquiring fissile material, others lack the resources or prefer to fund other and—in their view—more pressing problems. This situation is most prevalent in eastern Europe and the Caucasus, where sources of fissile material are concentrated, and in sub-Saharan Africa, where public health and civil strife issues take priority over securing borders against smuggling. Terrorist groups could exploit these critical gaps, thus undermining global nuclear security efforts.

#### Al Qaeda is moving into SSA

Dorell 2012 (Oren Dorell, April 19, 2012, “Al-Qaeda expands its reach to 'like-minded' groups in Africa,” USA Today, http://www.usatoday.com/news/world/story/2012-04-18/al-qaeda-helps-africa-radical-groups/54399376/1)

The Nigerian religious sect Boko Haram had been sporadically attacking police stations and people for years with machetes and sometimes guns to create an Islamic state in its corner of Africa's largest nation.

Then, in 2010, the group exploded into violence with suicide bombings, car bombs and coordinated assaults, months after an al-Qaeda leader in Algeria disclosed that the terror group had decided to help the Nigerian radicals.¶ Now Nigeria, whose government was trying to calm old conflicts between Muslims and Christians with negotiation, is headed for possible civil war in what experts say is an emerging strategy by al-Qaeda to convert local rebellions across sub-Saharan Africa into part of a global terror front against the West. "This new Jihadist nexus in Africa" is a rising danger that the West has yet to fully comprehend, said Max Boot, a senior fellow at the Council on Foreign Relations.¶ The pattern is seen not just in Nigeria, but also in Somalia and Mali, where al-Qaeda is prompting independence movements to broaden and heighten attacks, analysts said. Unilateral military operations, such as drone strikes, may have a role, but the focus should be on bolstering U.S. allies throughout North Africa and training their security forces to combat this growing extremism, Boot said.¶ In Somalia, al-Qaeda recently announced a merger with al-Shabaab, which had been at war for years against a coalition of U.S.-backed African countries.¶ Al-Qaeda's influence on al-Shabaab has been profound, said Katherine Zimmerman of the American Enterprise Institute's Critical Threats Project.

#### They’ll WMD attack the US in the next 2 years- Neg evidence underestimates their capability

Kanani 2011 (Rahim Kanani, founder and editor-in-chief of World Affairs Commentary, Citing Rolf Mowatt-Larssen, Senior Fellow, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University, former Director of the Office of Intelligence and Counterintelligence, U.S. Department of Energy, former Chief of the Weapons of Mass Destruction Department, Counter-terrorist Center, Central Intelligence Agency, recipient of the CIA Director’s Award, graduate of the U.S. Military Academy, June 29th, “New al-Qaeda Chief Zawahiri Has Strong Nuclear Intent”, Forbes, http://blogs.forbes.com/rahimkanani/2011/06/29/new-al-qaeda-chief-zawahiri-has-strong-nuclear-intent/)

We should be especially worried about the threat of nuclear terrorism under Zawahiri’s leadership. In a recent report titled “Islam and the Bomb: Religious Justification For and Against Nuclear Weapons”, which I researched for and contributed to, lead author Rolf Mowatt-Larssen, former director of intelligence and counterintelligence at the U.S. Department of Energy, argues that al-Qaeda’s WMD ambitions are stronger than ever. And that “this intent no longer feels theoretical, but operational.” “I believe al-Qaeda is laying the groundwork for a large scale attack on the United States, possibly in the next year or two,” continues Mowatt-Larssen in the opening of the report issued earlier this year by the Belfer Center for Science and International Affairs at Harvard Kennedy School. “The attack may or may not involve the use of WMD, but there are signs that al-Qaeda is working on an event on a larger scale than the 9/11 attack.” Most will readily dismiss such claims as implausible and unlikely, and we hope they are right, but after spending months with Mowatt-Larssen, who also served as the former head of the Central Intelligence Agency’s WMD and terrorism efforts, scrutinizing and cross-referencing Zawahiri’s 268-page treatise published in 2008 titled “Exoneration”, the analytics steered us towards something far more remarkable than expected. “As I read the text closely, in the broader context of al-Qaeda’s past, my concerns grew that Zawahiri has written this treatise to play a part in the ritualistic process of preparing for an impending attack,” states Mowatt-Larssen. “As Osama bin Laden’s fatwa in 1998 foreshadowed the 9/11 attack, Ayman Zawahiri’s fatwa in 2008 may have started the clock ticking for al-Qaeda’s next large scale strike on America. If the pattern of al-Qaeda’s modus operandi holds true, we are in the middle of an attack cycle.” Among several important findings, Zawahiri sophisticatedly weaves identical passages, sources and religious justifications for a nuclear terrorist attack against the United States previously penned by radical Saudi cleric Nasir al Fahd. Indeed, the language used, research cited, and arguments put forth are nothing short of detailed and deliberate. Reading as both a religious duty to kill millions of Americans and a lengthy suicide note together, this piece of literature is something we must take seriously with Zawahiri now at the helm of al-Qaeda. The time may have come for al-Qaeda’s new CEO to leave a legacy of his own. Concluding the author’s note, Mowatt-Larssen states, “Even if this theory proves to be wrong, it is better to overestimate the enemy than to under­estimate him. Conventional wisdom holds that al-Qaeda is spent—that they are incapable of carrying out another 9/11. Leaving aside whether this view is correct, for which I harbor grave doubts, we will surely miss the signs of the next attack if we continue to overestimate our own successes, and dismiss what terrorists remain capable of accomplishing when they put their minds to it.”

#### Terrorism causes miscalculation that draws in Russia and China and culminates in extinction- also causes rising alert levels

Ayson 2010 (Robert Ayson, Professor of Strategic Studies and Director of the Centre for Strategic Studies: New Zealand at the Victoria University of Wellington, “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.

#### Rapid escalation in alert levels causes decentralized command authority – makes uncontrollable escalation inevitable

Sagan 1990 (Scott Sagan, professor of political science and co-director of Stanford's Center for International Security and Cooperation, 1990 “Nuclear Alerts and Crisis Management” in “Nuclear diplomacy and crisis management: an International security reader” p. 191-3)

A “NO-ALERTS” POLICY? It would be equally in error, however, to believe that because the nuclear alerts and accompanying conventional force operations taken in past crises were difficult to control, they must never be used again under any circumstances. Any suggestion for a “no-alerts” policy would ignore the fact that the purposes that nuclear alerts were meant to serve in the past are likely to remain important in future crises and are unlikely to be met, in all scenarios, other means. Any decision to place nuclear forces on alert in the future will be an extremely dangerous step, but it is by no means clear that the inherent risks involved with an alert will always be greater than the dangers produced by refraining from alerting forces. Even if the United States could threaten a devastating retaliatory response without generating its forces, the failure to alert nuclear forces in a severe crisis, especially one in which Soviet strategic forces were moving to a higher state of readiness, might tempt the leadership in Moscow to continue escalating the crisis in the belief that the United States was willing to back down.89 difficult judgments would have to be made, weighing the risks of alerting versus not alerting strategic forces, in numerous unlikely but possible scenarios: if the Soviets threaten to attack NATO’s Central Front in the chaotic situation produced by a disintegration of the Eastern European bloc; if the Soviets threatened a nuclear strike against China; if an invasion of Saudi Arabia appeared imminent; or if there was a replay of the Cuban missile crisis with the Soviets placing missiles in Nicaragua or Cuba. In each of these cases, the risks of escalation and war are present whether or not nuclear forces are put on alert. The 1973 case illustrates the point. Putting forces on alert was not a risk-free option; neither, however, was allowing the Soviets to put forces into Egypt. Not only would such an action have set erous precedent for future crises, but Soviet intervention might have led to direct combat with the Israelis, increasing the risk of American involve- ment. Indeed, the risk of escalation was inherent in the situation. The alert certainly highlighted this fact, but it did not create it. In short, wisdom begins in this area with an awareness that one can err either on the side of being excess cautious or excessively provocative. The following observations on what can go wrong when nuclear and con- ventional forces are put on a higher state of readiness in a crisis do not, therefore, mean that such steps must never be taken in the future. They do suggest, however, that if military alerts are deemed necessary in a crisis, it will be essential that they be controlled with the utmost prudence and discipline. What can go Wrong? Much of the recent public concern about nuclear war has focused on the frightening “Dr. Strangelove” scenario: the danger of an unauthorized use of nuclear weapons Of nuclear weapons by a military commander leading to nuclear war. In normal peacetime circumstances, however, the numerous mechanical devices and organizational “checks and balances” that have been developed to prevent unauthorized use of weaponry make this path of accidental nuclear war highly unlikely. In a severe crisis, with nuclear forces placed on extremely high levels of alert, some of these restriction are lifted, however, in order to reduce the probability of a Soviet first-strike successfully “decapitating” the American arsenal. For other obvious reasons, the precise details of the process by which the devolution of command authrotiy takes place and the extent of predelegation of authority to use nuclear weapons, if any in fact exists, are kept highly classified. Although layers of secrecy surround this issue, it is unlikely that predelegation extends to the first-use of offensive strategic nuclear weapons against the Soviet Union under any circumstances. Still, any predelegation authority to launch nuclear forces in retaliation after a Soviet attack upon the United States would produce serious problems with respect to controlling or terminating a nuclear exchange once begun and at least would raise the possibility of accidental war occurring through a warning or assessment failure during a superpower crisis. It would be a mistake, however, to focus exclusively on the danger of an accidental or unauthorized use of nuclear weapons. As the Cuban missile crisis demonstrated, a variety of incidents can occur during a crisis which are neither purely accidental nor unauthorized, but which nonetheless raise the danger of inadvertent escalation. In many of the cases, actions that may have been judged inappropriate by higher political or military authorities were taken by local military commanders who have both good military reasons for taking the action and ample discretionary authority to do so. Such incidents are likely to be a permanent danger in severe crises. Crises are unique and unpredictable. Military rules of engagement and delegations of authority must be preplanned, however, and in crises there is often insufficient time to review such procedures and tailor them to the specific confrontation at hand. These resulting dangers are further compounded when conventional and nuclear forces are placed at higher conditions of alert because rules of engagement and delegations of authority can change in ways that may be inadequately understood by central authorities. In addition, there is a danger that a movement toward a mutual high level alert in a serious crisis could put central authorities under severe pressure to take conventional escalatory steps that they would otherwise prefer to avoid. For example, in a severe crisis, in which both superpowers have alerted their nuclear forces to unprecedented levels, the national command authorities might feel extreme pressure to relieve the strategic arsenal from the danger of quick strike decapitation. One possible conventional option would be to attack the enemy’s most threatening forces such as submarines patrolling off one’s coasts. Moreover, in any convetional war between the Soviet Union and the United States, during which nuclear forces would be at an extremely high state of alert, American leaders could authorize what it viewed as conventional attacks against Soviet conventional forces, which mostcow might view as attacks against its strategic forces. For example, an American ASW campaign against Soviet attack submarines in “forward areas” might bee seen in Moscow, correctly or incorrectly, as an attack on Soveit strategic submarines. Any one of these authorized escalatory steps might lead to uncontrolled escalation.

### 1AC Plan

#### The United States Federal Government should provide substantial market-fixed production cost incentives for domestic energy production of light-water small modular nuclear reactors.

### 1AC Solvency

#### \*\*\*No disads- Lots of SMR funding now, Obama’s committed

Biello 2012 (David Biello, journalist at Scientific American, April 19, 2012, Missourians for a Better Energy Future, http://www.moenergyfuture.org/news/small-reactors-make-a-bid-to-revive-nuclear-power/)

Small may be beautiful for the nuclear power industry So argue a host of would-be builders of novel nuclear reactors. While the U.S. government has not given up on investing in large units that boast conventional designs, the Department of Energy has also announced the availability of $450 million in funds to support engineering and licensing of so-called "small modular reactors."¶ "The Obama Administration and the Energy Department are committed to an all-of-the-above energy strategy that develops every source of American energy, including nuclear power," said Secretary of Energy Steven Chu in a statement announcing the funding, which aims to get such modular reactors hooked into the grid by 2022. "The Energy Department and private industry are working to position America as the leader in advanced nuclear energy technology and manufacturing."

#### But, production cost incentive key- Incentivizes fast learning in advanced factory manufacturing which is necessary for commercialization

Rosner and Goldberg 2011 (Robert Rosner, astrophysicist and founding director of the Energy Policy Institute at Chicago, and Stephen Goldberg, Special Assistant to the Director at the Argonne National Laboratory, Energy Policy Institute at Chicago, “Small Modular Reactors – Key to Future Nuclear Power Generation in the U.S.”, Technical Paper, Revision 1, November 2011)

Production Cost Incentive: A production cost incentive is a performance-based incentive. With a production cost incentive, the government incentive would be triggered only when the project successfully operates. The project sponsors would assume full responsibility for the upfront capital cost and would assume the full risk for project construction. The production cost incentive would establish a target price, a so-called “market-based benchmark.” Any savings in energy generation costs over the target price would accrue to the generator. Thus, a production cost incentive would provide a strong motivation for cost control and learning improvements, since any gains greater than target levels would enhance project net cash flow. Initial SMR deployments, without the benefits of learning, will have significantly higher costs than fully commercialized SMR plants and thus would benefit from production cost incentives. Because any production cost differential would decline rapidly due to the combined effect of module manufacturing rates and learning experience, the financial incentive could be set at a declining rate, and the level would be determined on a plant-by-plant basis, based on the achievement of cost reduction targets.43 The key design parameters for the incentive include the following:¶ 1. The magnitude of the deployment incentive should decline with the number of SMR modules and should phase out after the fleet of LEAD and FOAK plants has been deployed.¶ 2. The incentive should be market-based rather than cost-based; the incentive should take into account not only the cost of SMRs but also the cost of competing technologies and be set accordingly.¶ 3. The deployment incentive could take several forms, including a direct payment to offset a portion of production costs or a production tax credit.

#### Aff incentives are necessary and compliment squo funding

Rosner and Goldberg 2011 (Robert Rosner, astrophysicist and founding director of the Energy Policy Institute at Chicago, and Stephen Goldberg, Special Assistant to the Director at the Argonne National Laboratory, Energy Policy Institute at Chicago, “Small Modular Reactors – Key to Future Nuclear Power Generation in the U.S.”, Technical Paper, Revision 1, November 2011)

Similar to other important energy technologies, such as energy storage and renewables, “market pull” activities coupled with the traditional “technology push” activities would significantly increase the likelihood of timely and successful commercialization.¶ Market transformation incentives serve two important objectives. They facilitate demand for the off-take of SMR plants, thus reducing market risk and helping to attract private investment without high risk premiums. In addition, if such market transformation opportunities could be targeted to higher price electricity markets or higher value electricity applications, they would significantly reduce the cost of any companion production incentives.¶ There are three special market opportunities that may provide the additional market pull needed to successfully commercialize SMRs: the federal government, international applications, and the need for replacement of existing coal generation plants.

#### SMRS are extremely safe

Kessides 2010 (Ioannis N. Kessides, Lead Economist in the World Bank's Development Research Group, June 2012, “The Future of the Nuclear Industry Reconsidered Risks, Uncertainties, and Continued Potential,” The World Bank Development Research Group Environment and Energy Team, http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2012/06/29/000158349\_20120629130837/Rendered/INDEX/WPS6112.txt)

Most SMR concepts envision widespread deployment of a large number of small nuclear plants sited in diverse environments and frequently in close proximity to users. These considerations place very stringent requirements on reliability and safety performance—arguably even more exacting relative to traditional large-scale nuclear plants. The need for enhanced levels of safety has led to design options that maximize the use of inherent and passive safety features and incorporate additional layers of defense in depth (IAEA, 2009).18 These safety features can be more easily and effectively implemented in SMRs because of their larger surface- to-volume ratio, reduced core power density, lower source term, and less frequent (multi-year) refueling. For example, large surface-to-volume ratios facilitate the passive (with no external source of electrical power or stored energy) removal of decay heat.¶ SMRs employ an enveloping design approach that seeks to eliminate or prevent as many accident initiators and accident consequences as possible. Any remaining plausible accident initiators and consequences are dealt with appropriate combinations of active and passive safety systems. In water-cooled SMRs, the integration of steam generators and pressurizers within the reactor vessel eliminates large-diameter pipes and penetrations in the reactor vessel, thereby reducing substantially the risk of LOCAs. Moreover, in some designs the application of in- vessel control rod drives eliminates the risk of inadvertent control rod ejections that lead to reactivity insertion accidents. Loss of coolant accidents may also be prevented with compact loop designs that employ short piping and fewer connections between components (Kuznetsov, 2009).¶ In HTGRs, the fuel particles consist of fissionable fuel kernels with tri-structural isotropic (TRISO) coating.19 The TRISO coating system constitutes a miniature pressure vessel that is capable of containing the readionuclides and gases generated by fission of the nuclear material in the kernel. One of the coating layers consists of silicon carbide (a strong refractory material) which can retain radionuclides at extremely high temperatures under all accident conditions—temperatures can remain at 1600°C for several hundred hours without loss of particle coating integrity. Furthermore, the graphite holding the TRISO-coated particles together can withstand even higher temperatures without structural damage.20 And the massive graphite structures in the core create an extremely large heat capacity. The combination of large thermal margins, low power density of the core, and relatively large length-to-diameter ratio of the core, allow for very slow and stable response to transients caused by initiating events and for passive heat removal (INL, 2011).¶ The effectiveness of passive safety features can be illustrated by comparing outcomes from probabilistic risk analysis (PRA). In 1991, a Level-2 PRA was developed for the EBR-II fast neutron spectrum experimental breeder reactor—a 21 MWe plant—to compare its operational risk to that of commercial LWR‘s for which PRA‘s were available. EBR-II employs an extensive array of passive and inherent safety measures to back up traditional active safety systems. This PRA exercise showed that for EBR-II the risk of simply violating a fuel pin technical specification (with no core damage) is less than the risk of significant core disruption for the LWRs of the time. The point of the PRA comparisons is that application of passive and inherent safety measures as incorporated in SMRs can help to overcome the increase in numbers of SMRs needed to deliver the same societal energy provided by a smaller number of large-sized LWRs. Similarly, preliminary Level-1 PRA results for the NuScale Power Reactor indicate a total single-module mean CDF of 2.8x10-8/reactor-year, well below that of existing nuclear plants. And for the VK-300, the probability of severe core damage has been estimated to be less than 2.0x10-8/reactor-year (Hill et al, 1998; Kuznetsov and Gabaraev, 2007; Modarres, 2010).¶ SMRs have a smaller fuel inventory and thus a reduced source term. So on top of reduced hazard of core damage, the hazard attendant to release of radioactivity is also reduced per deployed SMR. The combination of reduced probability of core damage failure, a reduced source term, and additional fission product release barriers, could offer major advantages for emergency planning and response.

#### \*\*\*NRC will license SMRs- Waiting on the plan’s signal

Stepp 2011 (Matthew Stepp, March 9, 2011, “The Nuclear Energy Game Changer? Thoughts After the NRC Regulatory Information Conference,” Innovation Files, http://www.innovationfiles.org/the-nuclear-energy-game-changer-thoughts-after-the-nrc-regulatory-information-conference/)

So, while “silver bullet” may be too strong of a statement – SMRs don’t solve all our clean energy needs – the potential benefits of SMRs are significant and the key to realizing these benefits comes down to creating a cohesive national clean energy policy to innovate through a number of technological barriers. And I’m not the only one who thinks so. This week was the 23rd Annual Nuclear Regulatory Commission Information Conference that brought together hundreds of nuclear energy leaders from industry and government to talk all things nuclear. The hottest topic? SMRs. The clear message? Industry and government leaders are ready to move forward in developing new small reactors as soon as policy makers give the green light.¶ In his opening conference speech, NRC Chairman Gregory Jaczko remarked that his agency will be taking the first steps in licensing new SMRs by announcing that, “[the NRC] may take final action on three design certification rules for new [LWR-SMR] reactors as early as this summer, and conduct the first mandatory hearing on a new reactor license since the 1970s.” Department of Energy’s Director for Advanced Reactor Design Sal Golub presented that the goal of his office is to “license and deploy LWR-SMRs by 2020.” The President proposed in both his 2011 and 2012 budgets to create a nearly $100 million SMR program within the DOE Office of Nuclear Energy that would focus on deploying LWR-SMRs as well as perform much needed advanced SMR RD&D. And bipartisan group of Senators have recently proposed a bill designed to speed up the deployment of SMRs.

#### \*\*\*SMRs are good to go- Plan quickly resolves any lingering issues

Adams 2010 (Rod Adams, nuclear power expert with experience designing and operating small nuclear reactors and a former Submarine Engineer Officer, March 23, 2010, “Small Modular Reactors Could Be An American Export – But We Need to Move Faster,” Atomic Insights, http://atomicinsights.com/2010/03/small-modular-reactors-could-be-an-american-export-but-we-need-to-move-faster.html)

In the March 23, 2010 issue of the Wall Street Journal, Dr. Steven Chu published an op-ed piece titled America’sNew Nuclear Option that describes the Administration’s growing interest in smaller nuclear energy systems that can be produced in factories and delivered nearly complete to sites around the country and around the world. Here is a quote from that editorial:¶ As this paper recently reported, one of the most promising areas is small modular reactors (SMRs). If we can develop this technology in the U.S. and build these reactors with American workers, we will have a key competitive edge.¶ Small modular reactors would be less than one-third the size of current plants. They have compact designs and could be made in factories and transported to sites by truck or rail. SMRs would be ready to “plug and play” upon arrival.¶ If commercially successful, SMRs would significantly expand the options for nuclear power and its applications. Their small size makes them suitable to small electric grids so they are a good option for locations that cannot accommodate large-scale plants. The modular construction process would make them more affordable by reducing capital costs and construction times.¶ Their size would also increase flexibility for utilities since they could add units as demand changes, or use them for on-site replacement of aging fossil fuel plants.¶ Those are some terrific words, but the message loses some of its impact when the numbers are revealed later down the page. In the 2011 budget, the Administration requested just $39 million for a program aimed specifically at small reactors. That amount of money would not even pay for the Nuclear Regulatory Commission costs of reviewing the license for a single nuclear energy system design certification. In an agency whose total budget request is in excess of $28,000 million ($28 billion), a $39 million line item gets lost in the decimal dust.¶ There is an old saying that is appropriate here – “For where your treasure is, there your heart will be also”. The effort by Dr. Chu to publish a piece favorable to small nuclear energy systems in the Wall Street Journal is commendable, but the tiny slice of resource support indicates that there is still a lot of work to be done to enable the technology to reach the market, especially when compared to the massive number of dollars available for industrial wind deployment as a gift from taxpayers to companies like BP, Chevron, GE, FPL, and Siemens.¶ It is beyond comprehension to me that it will take us “about 10 years” (in Dr. Chu’s words) to license and deploy smaller, light water reactors that use essentially the same technology that we have been using successfully for nearly 60 years. We have the knowledge base and the manufacturing capability now; we should build several plants in controlled locations so we can show the regulators how their safety systems work to keep the public protected.¶ Dr. Chu’s op-ed piece concludes with some additional good words about the future potential of systems using high temperature gas – one of my favorites – and fast neutrons for better fuel economy plus the use of modern modeling and simulation techniquest. Dr. Chu’s head is in the right place, but he could use some encouragement to move more aggressively to take advantage of what is currently an American strong suit.¶ There are some Americans who know more than anyone else about what it takes to build durable, safe, secure, small reactors that use light water as a heat transfer and moderating fluid and steam as the power section working fluid. We can improve the economics through well understood principles of series production. The Department of Energy’s budget request for FY2011 currently includes more than $1,000 million for small, light water reactors whose allowed market is limited to military vessels. It would seem that technologies used in that program could be used as the basis for prototype licenses for systems like the mPowerTM and NuScale in a process that could take far less than 10 years.¶ There are several places in the US (Hawaii, Guam, Puerto Rico and Alaska) where early adoption of such systems could dramatically reduce the cost of electricity, reduce the dependence on a fragile fossil fuel tether, and improve its production cleanliness. Success in those locations could lead to successes in similar markets around the world and perhaps even in system refinements allow competitive costs in more traditional electrical power production markets. What are we waiting for?