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### Competitiveness

#### Recovery is stalling now, threatening global growth- No resilience

Zeng and Vigna 2012 (Min Zeng and Paul Vigna, July 16, 2012, “Economy Hitting ‘Stall Speed,’ Again,” Wall Street Journal, http://blogs.wsj.com/marketbeat/2012/07/16/economy-hitting-stall-speed-again/)

Another disappointing retail sales report prompted some economists to cut the second-quarter U.S. GDP again.¶ Stephen Stanley, chief economist at Pierpont Securities, now sees 0.6% growth rather than 1% previously predicted. ”As you can see, I am running out of room with regard to being above zero.”¶ “The economy has downshifted from muddling to near-stagnation,” says Stanley. Signs of the economy losing steam raised more pressure on the Fed to add stimulus and investors will zero in on Bernanke’s testimony Tuesday before lawmakers.¶ “The hyperactive Fed is going to attempt to ride to the rescue,” says Stanley, though he adds that it is too bad “Bernanke’s steed is a broken down mule.”¶ At these anemic rates, the economy is at the loosely defined “stall speed,” which anything around or under roughly 1.5% (different economists define it differently). Depressingly, this is almost exactly where we were last year.¶ All this has helped bring the U.S. 10-year Treasury yield down to 1.45%, near the 1.437% all-time low set on June 1 after a disappointing U.S. employment report. Stocks are down, with the Dow off by 28, and the S&P 500 by 1, and you can bet it’d be worse if Bernanke was trudging up to the Hill tomorrow.¶ Indeed, only a handful of the Dow’s components, like Chevron and 3M, are rising. Most are falling, including IBM, J.P. Morgan, and Coca-Cola.¶ “The report does not bode well for real consumer spending as measured by the GDP accounts,” Michael Moran at Daiwa wrote. “Figures available before today already were showing modest growth in real consumer expenditures (1.4% by our calculations, annual rate), but today’s report suggests something closer to 1%.”¶ Michael Feroli, chief US economist at JPMorgan, cut his 2Q US growth to 1.4% from 1.7%, and the only reason he didn’t slash the call more is that the May retail inventories number came in on the strong side.¶ “The combination of weak final demand and more rapid inventory accumulation last quarter does not bode well for growth in the current quarter,” Feroli says. “While we still believe the FOMC will opt to wait until September before acting, we think today’s number makes it a closer call, as the economy is already looking exceptionally feeble.”¶ They’re not the only ones downshifting. The IMF today lowered its outlook not just for the U.S., but for the global economy. The outfit now sees global growth of 3.5% in 2012, its lowest forecast since 2009.

#### SMRs provide a fast boost- Jobs, manufacturing, exports

ITA 2011 (US Department of Commerce, International Trade Administration, February 2011, “The Commercial Outlook for U.S. Small Modular Nuclear Reactors,” http://trade.gov/mas/ian/build/groups/public/@tg\_ian/@nuclear/documents/webcontent/tg\_ian\_003185.pdf)

A serious obstacle to the resurgence of traditional nuclear power in the United States is the eroded domestic manufacturing capacity for the major nuclear components. A robust program of building SMRs, however, could make use of existing domestic capacity that is already capable of completely constructing most proposed SMR designs. SMRs would not require the ultra-heavy forgings that currently can only be made overseas. U.S. suppliers say that firms could retool using existing capabilities and resources and could source most of the components of SMRs here in the United States. This ability could mean tremendous new commercial opportunities for U.S. firms and workers.¶ A substantial SMR deployment program in the United States could result in the creation of many new jobs in manufacturing, engineering, transportation, construction (for site preparation and installation) and craft labor, professional services, and ongoing plant operations. As SMR manufacturers prove their designs in the domestic market, they will likely consider export opportunities. The modular nature of SMRs and their relative porta- bility means that locating export-oriented SMR manufacturing and assembly could make sense for U.S. companies, as opposed to the localiza-¶ tion that is typically necessary for building larger reactors.

#### Multiplier effect magnifies the 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.

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

**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.

#### Global economic crisis causes war- Strong statistical support

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.

#### 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 to heg, prefer our internal link – explains the 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.7 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

Brzezinski 2012 Zbigniew K. Brzezinski (CSIS counselor and trustee and cochairs the CSIS Advisory Board. He is also the Robert E. Osgood Professor of American Foreign Policy at the School of Advanced International Studies, Johns Hopkins University, in Washington, D.C. He is cochair of the American Committee for Peace in the Caucasus and a member of the International Advisory Board of the Atlantic Council. He is a former chairman of the American-Ukrainian Advisory Committee. He was a member of the Policy Planning Council of the Department of State from 1966 to 1968; chairman of the Humphrey Foreign Policy Task Force in the 1968 presidential campaign; director of the Trilateral Commission from 1973 to 1976; and principal foreign policy adviser to Jimmy Carter in the 1976 presidential campaign. From 1977 to 1981, Dr. Brzezinski was national security adviser to President Jimmy Carter. In 1981, he was awarded the Presidential Medal of Freedom for his role in the normalization of U.S.-China relations and for his contributions to the human rights and national security policies of the United States. He was also a member of the President’s Chemical Warfare Commission (1985), the National Security Council–Defense Department Commission on Integrated Long-Term Strategy (1987–1988), and the President’s Foreign Intelligence Advisory Board (1987–1989). In 1988, he was cochairman of the Bush National Security Advisory Task Force, and in 2004, he was cochairman of a Council on Foreign Relations task force that issued the report Iran: Time for a New Approach. Dr. Brzezinski received a B.A. and M.A. from McGill University (1949, 1950) and Ph.D. from Harvard University (1953). He was a member of the faculties of Columbia University (1960–1989) and Harvard University (1953–1960). Dr. Brzezinski holds honorary degrees from Georgetown University, Williams College, Fordham University, College of the Holy Cross, Alliance College, the Catholic University of Lublin, Warsaw University, and Vilnius University. He is the recipient of numerous honors and awards) February 2012 “After America” http://www.foreignpolicy.com/articles/2012/01/03/after\_america?page=0,0

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.

### Proliferation

#### 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."

#### Time 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.

#### Domestic SMR development allows US to shape global 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 SMRs 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.

#### Fast nuclearization- US leadership solves

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

#### Al Qaeda steals unsecured fissile material in SSA

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.

#### 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.”

#### Extinction

Ayson 2010

(Robert, Professor of Strategic Studies and Director of the Centre for Strategic Studies: New Zealand – Victoria University of Wellington, “After a Terrorist Nuclear Attack: Envisaging Catalytic Effects”, Studies in Conflict & Terrorism, 33(7), July)

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.

### Solvency

#### No disads- Lots of SMR funding now, Obama’s already 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."

#### Commercialization fails now- Production cost incentive key to deployment

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. The Energy Policy Act of 2005 authorized a production tax credit of $18/MWh (1.8¢/kWh) for up to 6,000 MW of new nuclear power plant capacity. To qualify, a project must commence operations by 2021. Treasury Department guidelines further required that a qualifying project initiate construction, defined as the pouring of safety- related concrete, by 2014. Currently, two GW-scale projects totaling 4,600 MW are in early construction; consequently, as much as 1,400 MW in credits is available for other nuclear projects, including SMRs.¶ The budgetary cost of providing the production cost incentive depends on the learning rate and the market price of electricity generated from the SMR project. Higher learning rates and higher market prices would decrease the magnitude of the incentive; lower rates and lower market prices would increase the need for production incentives. Using two scenarios (with market prices based on the cost of natural gas combined-cycle generation) yields the following range of estimates of the size of production incentives required for the FOAK plants described earlier. For a 10% learning rate,¶ 􏰂 Based on a market price of $60/MWh44 (6¢/kWh), the LEAD plant and the subsequent eight FOAK plants would need, on average, a production credit of $13.60/MWh (1.4¢/kWh), 24% less than the $18 credit currently available to renewable and GW-scale nuclear technologies. (The actual credit would be on a sliding scale, with the credit for the LEAD plant at approximately $31/MWh, or 3.1¢/kWh, declining to a credit of about $6/MWh, or 0.6¢/kWh, by the time of deployment of FOAK-8). The total cost of the credit would be about $600 million per year (once all plants were built and operating).¶ If the market price were about $70/MWh (7¢/kWh), the LEAD and only four subsequent FOAK plants would require a production incentive. In this case, the average incentive would be $8.40/MWh (0.8¢/kWh), with a total cost of about $200 million per year.¶ Higher learning rates would drive down the size of the production incentive. For example, at a 12% learning rate,¶ 􏰂 At a market price of $60/MWh (6¢/kWh), the LEAD and the subsequent five FOAK plants would require a production incentive, with an average incentive level of about $15/MWh (1.5¢/kWh). Total annual cost (after all plants are in full operation) would be about $450 million per year.¶ 􏰂 At a market price of $70/MWh (7¢/kWh), the LEAD and three FOAK plants would require a production incentive averaging $9.00/MWh (0.9¢/kWh, half of the current statutory incentive), with a total annual cost of about $170 million per year.¶ The range of costs for the production incentive illustrates the sensitivity of the incentive level to the learning rate and the market price of electricity. Thus, efforts to achieve higher learning rates, including fully optimized engineering designs for the SMRs and the manufacturing plant, as well as specially targeted market introduction opportunities that enable SMRs to sell electricity for higher priced and higher value applications, can have a critical impact on the requirements for production incentives. The potential size of the incentive should be subject to further analysis as higher quality cost estimates become available.

### Plan

#### Plan: The United States Federal Government should substantially increase market-fixed production cost incentives for domestic deployment of water-cooled small modular nuclear reactors.

#### 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.

#### 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 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.

#### 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?