### Contention 1 – Proliferation

Middle East prolif coming now– early detection key to head it off

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Nonproliferation after Iran

If Iran is already a de facto nuclear weapons state, where should the U.S. go from here with regards to its nonproliferation policy? The key will be to learn from our failure with Iran and prevent additional countries from acquiring nuclear weapons. This will require a two prong approach.

First, as President Obama has indicated, Iran’s de facto nuclear status will motivate a number of other countries to try to emulate Iran’s success. The U.S. needs to take decisive action to head off these efforts on a county by country basis as soon as the first steps towards acquiring the fissile material for nuclear weapons are detected. Taking early action runs counter to normal government instinct, which is to try to “kick the can down the road” and avoid taking any unpleasant actions unless it has to. The lack of early action has been a hallmark of U.S. nonproliferation policy since the Reagan Administration, and has allowed Pakistan, India, North Korea and now Iran to acquire the fissile material required for nuclear weapons.

Yet as we saw with Libya, early action can be quite effective. Many believe that Gaddafi made a mistake by giving up a nuclear weapons program but the fact of the matter is that he had no choice. His effort was discovered early, before Libya had even begun to enrich uranium, and Gaddafi had no other option.

Second, there needs to be a change to the IAEA’s safeguards regime to prevent countries from acquiring the fissile material needed for nuclear weapons with the IAEA’s approval. Some in the U.S. Congress have called for military action against Iran if it starts to enrich uranium to levels greater than 20, but under current IAEA rules such Iranian actions would be perfectly acceptable as long as Iran declared the activity to the IAEA. Similarly, the IAEA permits nonnuclear weapons states to produce pure compounds of plutonium by reprocessing spent fuel. Informally, the IAEA does require that the country carrying out these activities provide some rationale as to how these activities are related to some peaceful nuclear activity but the rationale does not have to be very plausible. For example, a country can say that it is stockpiling the plutonium for use in a breeder reactor even if it is now more than 40 years since such reactors were first supposed to come into operation and that such reactors are still decades away.

Much of providing the proper rationale involves learning to play the game properly. As was discussed above, Iran got itself into trouble by conducting clandestine nuclear activities prior to 2004. More recently Iran did a better job and explained that its production of 20enriched uranium was required to produce research reactor fuel. This activity, which is generally agreed to be carrying Iran close to the possession of the fissile material for a nuclear weapon, has not caused the IAEA to say that Iran is violating safeguards even though Iran is currently producing more 20 enriched uranium in one month than the research reactor uses in one year.¶ The U.S. Government has recognized this problem and in its Nuclear Cooperation Agreement with the United Arab Emirates, it requires the UAE not possess facilities that can be used for uranium ¶ enrichment or the reprocessing of spent fuel, which could produce ¶ plutonium, HEU or U-233 (another material that can be used to produce nuclear weapons). However, the U.S. administration has discovered the drawback of attempting to handle this problem though ¶ bilateral nuclear cooperation agreements. In the face of competition from Russia and France, the U.S. has proposed nuclear cooperation agreements with Vietnam and Jordan that lack these provisions on enriching and reprocessing. Only if the issue is approached by the IAEA will there be uniform standards without commercial pressures undercutting nonproliferation.

Furthermore, even the standards for the UAE are not enough. Nonnuclear weapons states need to be prohibited from possessing any materials or facilities that can quickly provide fissile material for nuclear weapons. This includes prohibiting not only enrichment and reprocessing facilities, but also HEU, plutonium, or U-233 that has either been separated from spent fuel or and HEU, plutonium or U-233 contained in unirradiated reactor fuel (such as HEU fuel for research reactors or mixed oxide fuel for power reactors).The IAEA does not have the legal authority to prohibit countries from possessing such materials or facilities, but it does have the responsibility to safeguard these materials and facilities. As I have discussed elsewhere,¶ 19

IAEA safeguards are supposed to be more than just an accounting system; they should provide “timely warning” of diversions of nuclear materials. However, the IAEA cannot safeguard these facilities and materials in a timely warning sense. The IAEA needs to admit this fact and make clear that any such facilities and materials in nonnuclear weapons states are not being ¶ effectively safeguarded. This issue is significantly larger than just Iran and, at a minimum, includes Japan, Germany, the Netherlands, ¶ and Brazil. It will be up to these countries to explain why they need to continue to possess these materials and facilities since they cannot be effectively safeguarded. Given the state of nuclear power in a post-Fukushima world, this could be difficult.

The U.S. needs to urge the IAEA to be clear about what materials and facilities it can effectively safeguard and which it cannot. At the same time, the U.S. needs to take early action to ensure that any countries that attempt to follow Iran’s successful path are prevented from gaining access to the fissile material required for nuclear weapons. Otherwise, the number of nuclear-armed countries will continue to grow until the catastrophe of nuclear use occurs. Just one nuclear weapon detonated in a city could kill hundreds of thousands of people—roughly 100 times as many as were killed on 9/11.

#### **Proliferation causes nuclear war.**

Heisbourg ’12, [Francois Heisbourg, Chairman of the International Institute for Strategic Studies, prof at the Geneva Center for Security Policy, July 2012, “How Bad Would the Further Spread of Nuclear Weapons Be?”, <http://www.npolicy.org/userfiles/file/oving%20Beyond%20Pretense%20web%20version.pdf#page=182>]

The problem with this reassuring reading of the past is that it is not entirely true. Yes, the NPT had a major material effect by gradually making non nuclear the new normal. Yes again, defense guarantees by the US weaned Germany, Italy (13), South Korea, Taiwan and even neutral Sweden away from the nuclear road, followed by the US-French-British assurances to post-Soviet Ukraine. Yes too, various levels of coercion worked in Iraq, Libya and Syria. But no, the practice of even the most ‘classical’ bilateral deterrence was not nearly as reassuring as the mainstream narrative inherited from the Cold War would have it. Nor can we consider that our elements for empirical judgment as methodologically satisfactory in terms of their breadth and depth. These two negatives will be examined in turn.¶ Nuclear archives, as other sensitive governmental archives, open up usually after an interval of decades and even then with varying levels of culling and redaction. Even oral histories tend to follow this pattern, as ageing witnesses feel freer to speak up. Hence a paradox: when the Soviet- American nuclear confrontation was central to our lives and policies during the Cold War, we didn’t how bad things really where; now that we are beginning to know, there is little public interest given the disappearance of the East-West contest. Yet there are lessons of general interest which can be summarized as follows: 1) the Cuban missile crisis brought us much closer to the brink than the acute sense of danger which prevailed at the time, for reasons which are germane to the current situation: massive **failures of intelligence** on Soviet nuclear preparations and dispositions in Cuba, notably on tactical nukes and on the operational readiness of a number of IRBMs and their warheads; dysfunctional or imperfect command and control arrangements (notably vis à vis Soviet submarines), unintentionally mixed signals on each antagonist’s actions). These are effectively laid out in Michael Dobb’s book, “One Minute to Midnight”(14). 2) the safety and security of nuclear forces are subject to potentially calamitous procedural, technical or operational mishaps and miscalculations, somewhat along the lines of what applies to related endeavors (nuclear power and aerospace). Scott Sagan in his “Limits of Safety”(15) provides compelling research on the American Cold War experience. It would be interesting to have a similar treatment on the Soviet experience…Although it can be argued that today’s nuclear arsenals are much smaller and easier to manage reliable, and that the technology for their control has been vastly improved, several facts remain:¶ the US has continued to witness serious procedural lapses in the military nuclear arena (16); the de-emphasis of the importance of nuclear weapons in the US force structure is not conducive to treating them with the respect which is due to their destructive power; other nuclear powers do not necessarily benefit from the same technology and learning curves as the older nuclear states, and notably the US; cheek-to-jowl nuclear postures, which prevailed in the Cuban missile crisis and which help explain why World War III nearly occurred, and which characterize India and Pakistan today.¶ Despite the dearth of detail on Indian and Pakistani nuclear crisis management, we know that the stability of nuclear deterrence between India and Pakistan is by no means a given, with serious risks occurring on several occasions since the mid-1980s(17).¶ At another level of analysis, we have to recognize the limits of the database on which we ground our policies on nonproliferation. The nuclear age, in terms of operationally usable devices, began in 1945, less than seventy years, less than the age of an old man. The fact that there has been no accidental or deliberate nuclear use during that length of time is nearly twice as reassuring as the fact that it took more than thirty years (18) for a nuclear electricity generating plant to blow up, in the form of the Chernobyl disaster of 1986. But given the destructive potential of nuclear weapons, twice as much reassurance (in the form of no use of nuclear weapons for close to seventy years) is probably not good enough. Furthermore, the Chernobyl disaster involved the same sort of errors of judgment, procedural insufficiencies and crisis-mismanagement visible in Scott Sagan’s book, not only or even mainly, flawed design choices: inadvertence at work, in other words of the sort which could prevail in a time-sensitive, geographically constrained Indo- Pakistani or Middle Eastern conflict. Give it another seventy years to pass judgment?¶ The same empirical limits apply to the number of actors at play: we have simple bipolar (US-USSR/Russia or India/Pakistan) and complex bipolar (US/France/UK/NATO-Soviet Union/Russia) experience; we’ve had US-Soviet-Chinese or Sino- Indian-Pakistani tripolarity; and we’ve had a number of unipolar moments (one nuclear state vis à vis non-nuclear antagonists). But we mercifully have not had to deal with more complex strategic geometries –yet- in the Middle East or East Asia. We only know what we know, we don’t know what we don’t know.¶ A historical narrative which is not reassuring and an empirical record that is less than compelling need to inform the manner in which we approach further proliferation.¶ PROLIFERATION PUSH AND PULL¶ Ongoing proliferation differs from that of the first halfcentury of the nuclear era in three essential ways: on the demand side, the set of putative nuclear actors is largely focused in the most strategically stressed regions of the world; on the supply side, the actual or potential purveyors of proliferation are no longer principally the first, industrialized, generation of nuclear powers; the technology involved in proliferation is somewhat less demanding than it was during the first nuclear age. Taken together, these changes entail growing risks of nuclear use.¶ Demand is currently focusing on two regions, the Middle East and East Asia (broadly defined) and involves states and, potentially, non-state actors. In the Middle East, Iran’s nuclear program is the focus of the most intense concerns. A potential consequence in proliferation terms would be to lead regional rivals of Iran to acquire nuclear weapons in term: this concern was vividly in 2007 by the then President of France, Jacques Chirac (19) who specifically mentioned Egypt and Saudi Arabia. The likelihood of such a “proliferation chain-reaction” may have been increased by President Obama’s recent repudiation of containment as an option (20): short of Iran being persuaded or forced to abandon its nuclear ambitions, the neighboring states would presumably have to contemplate security options other than a Cold War style US defense guarantee. Given prior attempts by Iraq, Syria and Libya to become nuclear powers, the probability of a multipolar nuclear Middle East has to be rated as high in case Iran is perceived as having acquired a military nuclear capability. Beyond the Middle East, the possibility of civil war in nuclear-armed Pakistan leading to state failure and the possibility of nukes falling out of the hands of an effective central government. There are historical precedents for such a risk, most notably, but not only(21)in the wake of the collapse of the Soviet Union: timely and lasting action by outside powers, such as the US with the Nunn-Lugar initiative, and the successor states themselves has prevented fissile material from falling into unauthorized hands in significant quantities. Pakistan could pose similar problems in a singularly more hostile domestic environment. As things stand, non-state actors, such as post-Soviet mafiya bosses (interested in resale potential) or Al Qaeda (22) have sought, without apparent success, to benefit from opportunities arising from nuclear disorder in the former USSR and Central Asia. Mercifully, the price Al Qaeda was ready to pay was way below the going rate (upwards of hundreds of $million) for the sorts of services provided by the A.Q.Khan network (see below)to some of his clients.¶ Although North Korea’s nuclear ambitions appear to be both more self-centered and more containable than is the case for Iran, the possibility of state collapse in combination with regional rivalry leave no room for complacency.¶ More broadly we are facing the prospect of a multipolar nuclear Middle East, linked to an uncertain nuclear Pakistan already part of a nuclear South Asia tied via China to the Korean nexus in which nuclear America and Russia also have a stake. More broadly still, such a nuclear arc-of-crisis from the Mediterranean to the Sea of Japan, would presumably imply the breakdown of the NPT regime, or at least its reversion to the sort of status it had during the Seventies, when many of its currently significant members had not yet joined (23), unloosening both the demand and supply sides of proliferation.¶ On the supply side, “old style” proliferation relied on official cooperation between first-generation nuclear or nuclearizing powers, of which the Manhattan project was a forerunner (with American, British and Canadian national contributions and multinational scientific teams), followed inter alia by post-1956 French-Israeli, post-1958 US-UK, pre- 1958 USSR-China cooperation. If India relied heavily on the “unwitting cooperation” , notably on the part of Canada and the US involved in the Atoms for Peace CIRUS research reactor, Pakistan set up the first dedicated, broad spectrum, crossborder trading network to make up for the weakness of its limited industrial base. This import-focused organization thus went beyond traditional espionage-aided efforts (as practiced by the USSR during and after the Manhattan project) or case-by-case purloining or diversion of useful material on the global market (as practiced by Israeli operatives). Even before the Pakistani network had fulfilled its primary task of supplying the national program, it began its transformation into an export-oriented venture.¶ Libya, Iran, North Korea and a fourth country which remains officially unnamed became the main outlets of what became the world’s first private-sector (albeit government originated and ,presumably, supported)proliferation company which was only wound down after strong Western pressure on Pakistan after 9/11. Although the by-now richly documented A.Q.Khan network (24) appears to have ceased to function in its previous incarnation, it has powerfully demonstrated that there is an international market for proliferation which other operators can expect to exploit. Furthermore, budding, resource-weak nuclear powers have a strong incentive to cover the cost of their investment by selling or bartering their nuclear-related assets, including delivery systems. The fruits of state-tostate cooperation between Iran, North Korea and Pakistan are clearly apparent in the close-to-identical genealogy of their nuclear-capable ballistic missiles of the No- Dong/Ghauri/Shahab families displayed in military parades and test launches. Not all such cooperation consists of televised objects.¶ Even in the absence of game-changing breakthroughs, technical trends facilitate both demand and supply-side proliferation. For the time being, the plutonium route towards the bomb remains essentially as easy and as difficult as from the earliest years of the nuclear era. Provided a country runs a (difficult-to-hide) research or a power reactor from which low-irradiated fuel can be downloaded at will (such as CANDUtype natural uranium reactors), reprocessing is a comparatively straightforward and undemanding task. Forging and machining a multiple-isotope metal which is notorious for its numerous physical states and chemical toxicity is a substantial challenge, with the companion complications of devising a reliable implosion mechanism. Nuclear testing is highly desirable to establish confidence in the end-result. Opportunities for taking the plutonium-proliferation road may increase somewhat as new techniques (such as pyro-processing) come on stream. Developments in the enriched uranium field have been more substantial in facilitating proliferation. The development of lighter and more efficient centrifuges make it easier for a state to extract enriched uranium speedily in smaller and less visible facilities. Dealing with the resulting military-level HEU is a comparatively undemanding task. The long-heralded advent of industrially effective and reliable laser enrichment technology may eventually further increase ease of access. Downstream difficulties would still remain. Although implosion-mechanisms are not mandatory, they are desirable in order both to reduce the critical mass of U235 for a nuclear explosion and to make for a lighter and smaller more-readily deliverable weapons package.¶ In sum, incremental improvements increase the risk of proliferation. However, non-state actors are not yet, and will not be on the basis of known technical trends, in a position to master the various steps of the two existing military nuclear fuel cycles, which remain the monopoly of states. Nonstate actors would need the active complicity from (or from accomplices within) states, or benefit from the windfall of state collapse, to acquire a military nuclear capability. The threat of nuclear terrorism continues to be subordinated to developments involving state actors, a remark which is not meant to be reassuring since such developments (see above) are increasingly likely as proliferation spreads to new states and as state failure threatens in the ‘arc of proliferation’ extending from the Mediterranean to North-East Asia. Furthermore, non-state actors can be satisfied with levels of nuclear reliability and performance which states could not accept. A difficult-to-deliver or fizzle-prone nuclear device would not provide a state with the level of deterrence needed to shield it from pre-emptive or retaliatory action, whereas a terrorist group would not be seeking such immunity. A road or ship-delivered imperfect device, which would be closer to a radiological bomb than to a fully-fledged atomic weapon would provide its non-state owners with immense potential. The road to a non-state device does not need to be as well-paved.¶ NUCLEAR FUTURES¶ ‘New’ lessons from a revisited past and current trends in nuclear proliferation, will tie into a number of characteristics of contemporary international relations with potentially destabilizing consequences, leading to an increasing likelihood of nuclear use. Four such characteristics will be singled out here both because of their relevance to nuclear crisis management and because of their growing role in the world system in the age of globalization:¶ - Strategic upsets¶ - Limits of imagination¶ - Unsustainable strains¶ - Radical aims¶ The 2008 French Defence and National Security White Paper (25) developed the concept of ‘ruptures stratégiques’ (strategic upsets) to describe the growing tendency of the world system to generate rapid, unexpected, morphing upsets of international security as a consequence of globalization broadly defined against the backdrop of urbanizing populations generating economic growth and environmental and resource constraints. In themselves, such upsets are not novel (see inter alia, a pandemic such as the Black Death in 1348-49, the Great Depression not to mention World Wars or indeed the major and benign strategic upset of 1989-1991) but the very nature of globalization and the relationship between human activity and the Earth’s ability to sustain them) mean more, and more frequent as well as more complex upsets. If this reading is correct –and the Great financial crisis, the Arab revolutions, the accession of China to superpower status can be mentioned as examples which followed the publication of the White paper- ,then the consequences in the nuclear arena will be twofold. First, nuclear doctrines and dispositions which were conceived under a set of circumstances (such as the Cold War or the India-Pakistan balance of power) may rapidly find themselves overtaken by events. For instance it is easier to demonstrate that US and Russian nuclear forces still visibly bear the imprint of their 1950s template than it is to demonstrate their optimal adaptation to post-post-Cold War requirements. Second, more challenges to international security and of a largely unforeseeable nature mean greater strains placed on the ability of nuclear powers to manage crises against the backdrop of their possession of nuclear weapons. In many, indeed most, cases, such ‘ruptures stratégiques’ will no doubt be handled with nuclear weapons appearing as irrelevant: hypothetical security consequences of an epidemic (such as the interhuman transmission of the H5N1 bird flu virus) or prospective conflicts resulting from climate change do not have prima facie nuclear aspects. But beyond the reminder that we don’t know that as a fact, the probability is, under the ‘rupture stratégique’ hypothesis, that there will be more occasions for putting all crisis management, including nuclear, to the test.¶ Human societies tend to **lack the imagination to think through**, and to act upon, what have become known as “**black swan” events** 26 : **That which has never occurred** (or which has happened very rarely and in a wholly different context) **is deemed not to be in the field of reality,** and to which must be added eventualities that are denied because their consequences are too awful to contemplate. The extremes of human misconduct (the incredulity in the face of evidence of the Holocaust, the failure to imagine 9/11) bear testimony to this hardwired trait of our species. This would not normally warrant mention as a factor of growing salience if not for the recession into time of the original and only use of nuclear weapons in August 1945. Nonuse of nuclear weapons may soon be taken for granted rather than being an absolute taboo. Recent writing on the reputedly limited effects of the Hiroshima and Nagasaki bombs 27 may contribute to such a trend, in the name of reducing the legitimacy of nuclear weapons. Recent, and often compelling, historical accounts of the surrender of the Japanese Empire that downplay the role of the atomic bombings in comparison to early research can produce a similar effect, even if that may not have been the intention. 28 However desirable it has been, the end of atmospheric nuclear testing 29 has removed for more than three decades the periodic reminders that such monstrous detonations made as to the uniquely destructive nature of nuclear weapons. There is a real and growing risk that we forget what was obvious to those who first described in 1941 the unique nature of yet-to-be produced nuclear weapons. 30 The risk is no doubt higher in those states for which the history of World War II has little relevance and that have not had the will or the opportunity to wrestle at the time or ex post facto with the moral and strategic implications of the nuclear bombing of Japan in 1945.¶ Unsustainable strains are possibly the single most compelling feature of contemporary proliferation. Examples include tight geographical constraints–with, for instance, New Delhi and Islamabad, located within 300 miles of each other; nuclear multi-polarity against the backdrop of multiple, crisscrossing sources of tension in the Middle East, as opposed to the relative simplicity of the U.S.-Soviet confrontation; the existence of doctrines, such as India’s “cold start,” and force postures, such as Pakistan’s broadening array of battle- field nukes, that rest on the expectation of early use; and the role of non-state actors as aggravating or triggering factors when they are perceived as operating with the connivance of an antagonist state (in the past, the assassination of the Austrian Archduke in Sarajevo in 1914; and in the future, Hezbollah operatives launching rockets with effect against Israel or Lashkar-e-Taiba commandos doing a “Bombay” redux in India?). Individually or in combination, **these factors test crisis management capabilities** more severely than anything seen during the Cold War with the partial exception of the Cuban Missile Crisis. Even the overabundant battlefield nuclear arsenals in Cold War Central Europe, with their iffy weapons’ safety and security arrangements, were less of a challenge: The U.S. and Soviet short-range nuclear weapons so deployed were not putting U.S. and Soviet territory and capitals at risk.¶ It may be argued that these risk factors are known to potential protagonists and that they therefore will be led to avoid the sort of nuclear brinksmanship that characterized U.S. and Soviet behavior during the Cold War in crises such as the Korean War, Berlin, Cuba or the Yom Kippur War. Unfortunately, the multiple nuclear crises between India and Pakistan demonstrate no such prudence, rather the contrary. And were such restraint to feed into nuclear policy and crisis planning, along the lines of apparently greater U.S. and Soviet nuclear caution from the mid-seventies onwards, the fact would remain that initial intent rarely resists the strains of a complex, multiactor confrontation between inherently distrustful antagonists. It is also worth reflecting on the fact that during the 1980s there was real and acute fear in Soviet ruling circles that the West was preparing an out-of-the-blue nuclear strike, a fear which in turn fed into Soviet policies and dispositions. 31¶ The Cold War was a set of crises and misunderstandings that came within a whisker of a nuclear holocaust. India and Pakistan’s nuclear standoff is deeply unstable, not least as a result of the interaction with non-state actors. A multipolar nuclear Middle East would make the Cuban Missile Crisis look easy in comparison.

#### The impact is extinction – nuclear optimists are naïve.

Kroenig, 12 [May 26th, Matthew Kroenig: Assistant Professor of Government, Georgetown University and Stanton Nuclear Security Fellow, Council on Foreign Relations, The History of Proliferation Optimism: Does It Have A Future? Prepared for the Nonproliferation Policy Education Center, <http://www.npolicy.org/article.php?aid=1182&tid=30>]

Proliferation Optimism: Proliferation optimism was revived in the academy in Kenneth Waltz’s 1979 book, Theory of International Politics.[[1]](#endnote-1)[29] In this, and subsequent works, Waltz argued that the spread of nuclear weapons has beneficial effects on international politics. He maintained that states, fearing a catastrophic nuclear war, will be deterred from going to war with other nuclear-armed states. As more and more states acquire nuclear weapons, therefore, there are fewer states against which other states will be willing to wage war. The spread of nuclear weapons, according to Waltz, leads to greater levels of international stability. Looking to the empirical record, he argued that the introduction of nuclear weapons in 1945 coincided with an unprecedented period of peace among the great powers. While the United States and the Soviet Union engaged in many proxy wars in peripheral geographic regions during the Cold War, they never engaged in direct combat. And, despite regional scuffles involving nuclear-armed states in the Middle East, South Asia, and East Asia, none of these conflicts resulted in a major theater war. This lid on the intensity of conflict, according to Waltz, was the direct result of the stabilizing effect of nuclear weapons. Following in the path blazed by the strategic thinkers reviewed above, Waltz argued that the requirements for deterrence are not high. He argued that, contrary to the behavior of the Cold War superpowers, a state need not build a large arsenal with multiple survivable delivery vehicles in order to deter its adversaries. Rather, he claimed that a few nuclear weapons are sufficient for deterrence. Indeed, he even went further, asserting that any state will be deterred even if it merely suspects its opponent might have a few nuclear weapons because the costs of getting it wrong are simply too high. Not even nuclear accident is a concern according to Waltz because leaders in nuclear-armed states understand that if they ever lost control of nuclear weapons, resulting in an accidental nuclear exchange, the nuclear retaliation they would suffer in response would be catastrophic. Nuclear-armed states, therefore, have strong incentives to maintain control of their nuclear weapons. Not even new nuclear states, without experience in managing nuclear arsenals, would ever allow nuclear weapons to be used or let them fall in the wrong hands. Following Waltz, many other scholars have advanced arguments in the proliferation optimist school. For example, Bruce Bueno de Mesquite and William Riker explore the “merits of selective nuclear proliferation.”[[2]](#endnote-2)[30] John Mearsheimer made the case for a “Ukrainian nuclear deterrent,” following the collapse of the Soviet Union.[[3]](#endnote-3)[31] In the run up to the 2003 Gulf War, John Mearsheimer and Steven Walt argued that we should not worry about a nuclear-armed Iraq because a nuclear-armed Iraq can be deterred.[[4]](#endnote-4)[32] And, in recent years, Barry Posen and many other realists have argued that nuclear proliferation in Iran does not pose a threat, again arguing that a nuclear-armed Iran can be deterred.[[5]](#endnote-5)[33] What’s Wrong with Proliferation Optimism? The proliferation optimist position, while having a distinguished pedigree, has several major problems. Many of these weaknesses have been chronicled in brilliant detail by Scott Sagan and other contemporary proliferation pessimists.[[6]](#endnote-6)[34] Rather than repeat these substantial efforts, I will use this section to offer some original critiques of the recent incarnations of proliferation optimism. First and foremost, proliferation optimists do not appear to understand contemporary deterrence theory. I do not say this lightly in an effort to marginalize or discredit my intellectual opponents. Rather, I make this claim with all due caution and with complete sincerity. A careful review of the contemporary proliferation optimism literature does not reflect an understanding of, or engagement with, the developments in academic deterrence theory in top scholarly journals such as the American Political Science Review and International Organization over the past few decades.[[7]](#endnote-7)[35] While early optimists like Viner and Brodie can be excused for not knowing better, the writings of contemporary proliferation optimists ignore the past fifty years of academic research on nuclear deterrence theory. In the 1940s, Viner, Brodie, and others argued that the advent of Mutually Assured Destruction (MAD) rendered war among major powers obsolete, but nuclear deterrence theory soon advanced beyond that simple understanding.[[8]](#endnote-8)[36] After all, great power political competition does not end with nuclear weapons. And nuclear-armed states still seek to threaten nuclear-armed adversaries. States cannot credibly threaten to launch a suicidal nuclear war, but they still want to coerce their adversaries. This leads to a credibility problem: how can states credibly threaten a nuclear-armed opponent? Since the 1960s academic nuclear deterrence theory has been devoted almost exclusively to answering this question.[[9]](#endnote-9)[37] And, unfortunately for proliferation optimists, the answers do not give us reasons to be optimistic. Thomas Schelling was the first to devise a rational means by which states can threaten nuclear-armed opponents.[[10]](#endnote-10)[38] He argued that leaders cannot credibly threaten to intentionally launch a suicidal nuclear war, but they can make a “threat that leaves something to chance.”[[11]](#endnote-11)[39] They can engage in a process, the nuclear crisis, which increases the risk of nuclear war in an attempt to force a less resolved adversary to back down. As states escalate a nuclear crisis there is an **increasing probability** that the conflict will spiral out of control and result in an inadvertent or accidental nuclear exchange. As long as the benefit of winning the crisis is greater than the incremental increase in the risk of nuclear war, threats to escalate nuclear crises are inherently credible. In these games of nuclear brinkmanship, the state that is willing to run the greatest risk of nuclear war before back down will win the crisis as long as it does not end in catastrophe. It is for this reason that Thomas Schelling called great power politics in the nuclear era a “competition in risk taking.”[[12]](#endnote-12)[40] This does not mean that states eagerly bid up the risk of nuclear war. Rather, they face gut-wrenching decisions at each stage of the crisis. They can quit the crisis to avoid nuclear war, but only by ceding an important geopolitical issue to an opponent. Or they can the escalate the crisis in an attempt to prevail, but only at the risk of suffering a possible nuclear exchange. Since 1945 there were have been many high stakes nuclear crises (by my count, there have been twenty) in which “rational” states like the United States run a risk of nuclear war and inch very close to the brink of nuclear war.[[13]](#endnote-13)[41] By asking whether states can be deterred or not, therefore, proliferation optimists are asking the wrong question. The right question to ask is: what risk of nuclear war is a specific state willing to run against a particular opponent in a given crisis? Optimists are likely correct when they assert that Iran will not intentionally commit national suicide by launching a bolt-from-the-blue nuclear attack on the United States or Israel. This does not mean that Iran will never use nuclear weapons, however. Indeed, it is almost inconceivable to think that a nuclear-armed Iran would not, at some point, find itself in a crisis with another nuclear-armed power and that it would not be willing to run any risk of nuclear war in order to achieve its objectives. If a nuclear-armed Iran and the United States or Israel have a geopolitical conflict in the future, over say the internal politics of Syria, an Israeli conflict with Iran’s client Hezbollah, the U.S. presence in the Persian Gulf, passage through the Strait of Hormuz, or some other issue, do we believe that Iran would immediately capitulate? Or is it possible that Iran would push back, possibly even brandishing nuclear weapons in an attempt to deter its adversaries? If the latter, there is a real risk that proliferation to Iran could result in nuclear war. An optimist might counter that nuclear weapons will never be used, even in a crisis situation, because states have such a strong incentive, namely national survival, to ensure that nuclear weapons are not used. But, this objection ignores the fact that leaders operate under competing pressures. Leaders in nuclear-armed states also have very strong incentives to convince their adversaries that nuclear weapons could very well be used. Historically we have seen that in crises, leaders purposely do things like put nuclear weapons on high alert and **delegate nuclear launch authority to low level commanders**, purposely increasing the risk of accidental nuclear war in an attempt to force less-resolved opponents to back down. Moreover, not even the optimists’ first principles about the irrelevance of nuclear posture stand up to scrutiny. Not all nuclear wars would be equally devastating.[[14]](#endnote-14)[42] Any nuclear exchange would have devastating consequences no doubt, but, if a crisis were to spiral out of control and result in nuclear war, any sane leader would rather be facing a country with five nuclear weapons than one with thirty-five thousand. Similarly, any sane leader would be willing to run a greater risk of nuclear war against the former state than against the latter. Indeed, systematic research has demonstrated that states are willing to run greater risks and, therefore, more likely to win nuclear crises when they enjoy nuclear superiority over their opponent.[[15]](#endnote-15)[43] Proliferation optimists miss this point, however, because they are still mired in 1940s deterrence theory. It is true that no rational leader would choose to launch a nuclear war, but, depending on the context, **she would almost certainly be willing to risk one.** Nuclear deterrence theorists have proposed a second scenario under which rational leaders could instigate a nuclear exchange: a limited nuclear war.[[16]](#endnote-16)[44] By launching a single nuclear weapon against a small city, for example, it was thought that a nuclear-armed state could signal its willingness to escalate the crisis, while leaving its adversary with enough left to lose to deter the adversary from launching a full-scale nuclear response. In a future crisis between a nuclear-armed China and the United States over Taiwan, for example, China could choose to launch a nuclear attack on Honolulu to demonstrate its seriousness. In that situation, with the continental United States intact, would Washington choose to launch a full-scale nuclear war on China that could result in the destruction of many more American cities? Or would it back down? China might decide to strike hoping that Washington will choose a humiliating retreat over a full-scale nuclear war. If launching a limited nuclear war could be rational, it follows that the spread of nuclear weapons increases the risk of nuclear use. Again, by ignoring contemporary developments in scholarly discourse and relying exclusively on understandings of nuclear deterrence theory that became obsolete decades ago, optimists reveal the shortcomings of their analysis and fail to make a compelling case. The optimists also error by confusing stability for the national interest. Even if the spread of nuclear weapons contributes to greater levels of international stability (which discussions above and below suggest it might not) it does not necessarily follow that the spread of nuclear weapons is in the U.S. interest. There might be other national goals that trump stability, such as reducing to zero the risk of nuclear war in an important geopolitical region. Optimists might argue that South Asia is more stable when India and Pakistan have nuclear weapons, but certainly the risk of nuclear war is higher than if there were no nuclear weapons on the subcontinent. In addition, it is wrong to assume that stability is always in the national interest. Sometimes it is, but sometimes it is not. If stability is obtained because Washington is deterred from using force against a nuclear-armed adversary in a situation where using force could have advanced national goals, stability harms, rather than advances, U.S. national interests. The final gaping weakness in the proliferation optimist argument, however, is that it rests on a logical contradiction. This is particularly ironic, given that many optimists like to portray themselves as hard-headed thinkers, following their premises to their logical conclusions. But, the contradiction at the heart of the optimist argument is glaring and simple to understand: either the probability of nuclear war is zero, or it is nonzero, but it cannot be both. If the probability of nuclear war is zero, then nuclear weapons should have no deterrent effect. States will not be deterred by a nuclear war that could never occur and states should be willing to intentionally launch large-scale wars against nuclear-armed states. In this case, proliferation optimists cannot conclude that the spread of nuclear weapons is stabilizing. If, on the other hand, the probability of nuclear war is nonzero, then there is a real danger that the spread of nuclear weapons increases the probability of a catastrophic nuclear war. If this is true, then proliferation optimists cannot be certain that nuclear weapons will never be used. In sum, the spread of nuclear weapons can either raise the risk of nuclear war and in so doing, deter large-scale conventional conflict. Or there is no danger that nuclear weapons will be used and the spread of nuclear weapons does not increase international instability. But, despite the claims of the proliferation optimists, it is nonsensical to argue that nuclear weapons will never be used and to simultaneously claim that their spread contributes to international stability. Proliferation Anti-obsessionists: Other scholars, who I label “anti-obsessionists” argue that the spread of nuclear weapons has neither been good nor bad for international politics, but rather irrelevant. They argue that academics and policymakers concerned about nuclear proliferation spend too much time and energy obsessing over something, nuclear weapons, that, at the end of the day, are not all that important. In Atomic Obsession, John Mueller argues that widespread fears about the threat of nuclear weapons are overblown.[[17]](#endnote-17)[45] He acknowledges that policymakers and experts have often worried that the spread of nuclear weapons could lead to nuclear war, nuclear terrorism and cascades of nuclear proliferation, but he then sets about systematically dismantling each of these fears. Rather, he contends that nuclear weapons have had little effect on the conduct of international diplomacy and that world history would have been roughly the same had nuclear weapons never been invented. Finally, Mueller concludes by arguing that the real problem is not nuclear proliferation, but nuclear nonproliferation policy because states do harmful things in the name of nonproliferation, like take military action and deny countries access to nuclear technology for peaceful purposes. Similarly, Ward Wilson argues that, despite the belief held by optimists and pessimists alike, nuclear weapons are not useful tools of deterrence.[[18]](#endnote-18)[46] In his study of the end of World War II, for example, Wilson argues that it was not the U.S. use of nuclear weapons on Hiroshima and Nagasaki that forced Japanese surrender, but a variety of other factors, including the Soviet Union’s decision to enter the war. If the actual use of nuclear weapons was not enough to convince a country to capitulate to its opponent he argues, then there is little reason to think that the mere threat of nuclear use has been important to keeping the peace over the past half century. Leaders of nuclear-armed states justify nuclear possession by touting their deterrent benefits, but if nuclear weapons have no deterrent value, there is no reason, Ward claims, not to simply get rid of them. Finally, Anne Harrington de Santana argues that nuclear experts “fetishize” nuclear weapons.[[19]](#endnote-19)[47] Just like capitalists, according to Karl Marx, bestow magical qualities on money, thus fetishizing it, she argues that leaders and national security experts do the same thing to nuclear weapons. Nuclear deterrence as a critical component of national security strategy, according to Harrington de Santana, is not inherent in the technology of nuclear weapons themselves, but is rather the result of how leaders in countries around the world think about them. In short, she argues, “Nuclear weapons are powerful because we treat them as powerful.”[[20]](#endnote-20)[48] But, she maintains, we could just as easily “defetish” them, treating them as unimportant and, therefore, rendering them obsolete. She concludes that “Perhaps some day, the deactivated nuclear weapons on display in museums across the United States will be nothing more than a reminder of how powerful nuclear weapons used to be.”[[21]](#endnote-21)[49] The anti-obsessionists make some thought-provoking points and may help to reign in some of the most hyperbolic accounts of the effect of nuclear proliferation. They remind us, for example, that our worst fears have not been realized, at least not yet. Yet, by taking the next step and arguing that nuclear weapons have been, and will continue to be, irrelevant, they go too far. Their arguments call to mind the story about the man who jumps to his death from the top of a New York City skyscraper and, when asked how things are going as he passes the 15th story window, replies, “so far so good.” The idea that world history would have been largely unchanged had nuclear weapons not been invented is a provocative one, but it is also unfalsifiable. There is good reason to believe that world history would have been different, and in many ways better, had certain countries not acquired nuclear weapons. Let’s take Pakistan as an example. Pakistan officially joined the ranks of the nuclear powers in May 1998 when it followed India in conducting a series of nuclear tests. Since then, Pakistan has been a poster child for the possible negative consequences of nuclear proliferation. Pakistan’s nuclear weapons have led to further nuclear proliferation as Pakistan, with the help of rogue scientist A.Q. Khan, transferred uranium enrichment technology to Iran, Libya, and North Korea.[[22]](#endnote-22)[50] Indeed, part of the reason that North Korea and Iran are so far along with their uranium enrichment programs is because they got help from Pakistan. Pakistan has also become **more aggressive** since acquiring nuclear weapons, displaying an increased willingness to sponsor cross-border incursions into India with terrorists and irregular forces.[[23]](#endnote-23)[51] In a number of high-stakes nuclear crises between India and Pakistan, U.S. officials worried that the conflicts could escalate to a nuclear exchange and intervened diplomatically to prevent Armageddon on the subcontinent. The U.S. government also worries about the safety and security of Pakistan’s nuclear arsenal, fearing that Pakistan’s nukes could fall into the hands of terrorists in the event of a state collapse or a break down in nuclear security. And we still have not witnessed the full range of consequences arising from Pakistani nuclear proliferation. Islamabad has only possessed the bomb for a little over a decade, but they are likely to keep it for decades to come, meaning that we could still have a nuclear war involving Pakistan. In short, Pakistan’s nuclear capability has already had deleterious effects on U.S. national security and these threats are only likely to grow over time. In addition, the anti-obsessionists are incorrect to argue that the cure of U.S. nuclear nonproliferation policy is worse than the disease of proliferation. Many observers would agree with Mueller that the U.S. invasion of Iraq in 2003 was a disaster, costing much in the way of blood and treasure and offering little strategic benefit. But the Iraq War is hardly representative of U.S. nonproliferation policy. For the most part, nonproliferation policy operates in the mundane realm of legal frameworks, negotiations, inspections, sanctions, and a variety of other tools. Even occasional preventive military strikes on nuclear facilities have been far less calamitous than the Iraq War. Indeed, the Israeli strikes on nuclear reactors in Iraq and Syria in 1981 and 2007, respectively, produced no meaningful military retaliation and a muted international response. Moreover, the idea that the Iraq War was primarily about nuclear nonproliferation is a contestable one, with Saddam Hussein’s history of aggression, the unsustainability of maintaining the pre-war containment regime indefinitely, Saddam’s ties to terrorist groups, his past possession and use of chemical and biological weapons, and the window of opportunity created by September 11th, all serving as possible prompts for U.S. military action in the Spring of 2003. The claim that nonproliferation policy is dangerous because it denies developing countries access to nuclear energy also rests on shaky ground. If anything, the global nonproliferation regime has, on balance, increased access to nuclear technology. Does anyone really believe that countries like Algeria, Congo, and Vietnam would have nuclear reactors today were it not for Atoms for Peace, Article IV of the NPT, and other appendages of the nonproliferation regime that have provided developing states with nuclear technology in exchange for promises to forgo nuclear weapons development? Moreover, the sensitive fuel-cycle technology denied by the Nuclear Suppliers Group (NSG) and other supply control regimes is not even necessary to the development of a vibrant nuclear energy program as the many countries that have fuel-cycle services provided by foreign nuclear suppliers clearly demonstrate. Finally, the notion that nuclear energy is somehow the key to lifting developing countries from third to first world status does not pass the laugh test. Given the large upfront investments, the cost of back-end fuel management and storage, and the ever-present danger of environmental catastrophe exemplified most recently by the Fukushima disaster in Japan, many argue that nuclear energy is not a cost-effective source of energy (if all the externalities are taken into account) for any country, not to mention those developing states least able to manage these myriad challenges. Taken together, therefore, the argument that nuclear nonproliferation policy is more dangerous than the consequences of nuclear proliferation, including possible nuclear war, is untenable. Indeed, it would certainly come as a surprise to the mild mannered diplomats and scientists who staff the International Atomic Energy Agency, the global focal point of the nuclear nonproliferation regime, located in Vienna, Austria. The anti-obsessionsists, like the optimists, also walk themselves into logical contradictions. In this case, their policy recommendations do not necessarily follow from their analyses. Ward argues that nuclear weapons are irrelevant and, therefore, we should eliminate them.[[24]](#endnote-24)[52] But, if nuclear weapons are really so irrelevant, why not just keep them lying around? They will not cause any problems if they are as meaningless as anti-obsessionists claim and it is certainly more cost effective to do nothing than to negotiate complicated international treaties and dismantle thousands of warheads, delivery vehicles, and their associated facilities. Finally, the idea that nuclear weapons are only important because we think they are powerful is arresting, but false. There are properties inherent in nuclear weapons that can be used to create military effects that simply cannot, at least not yet, be replicated with conventional munitions. If a military planner wants to quickly destroy a city on the other side of the planet, his only option today is a nuclear weapon mounted on an ICBM. Therefore, if the collective “we” suddenly decided to “defetishize” nuclear weapons by treating them as unimportant, it is implausible that some leader somewhere would not independently come to the idea that nuclear weapons could advance his or her country’s national security and thereby re-fetishize them. In short, the optimists and anti-obsessionists have brought an important perspective to the nonproliferation debate. Their arguments are provocative and they raise the bar for those who wish to argue that the spread of nuclear weapons is indeed a problem. Nevertheless, their counterintuitive arguments are not enough to wish away the enormous security challenges posed by the spread of the world’s most dangerous weapons. These myriad threats will be considered in the next section. Why Nuclear Proliferation Is a Problem The spread of nuclear weapons poses a number of severe threats to international peace and U.S. national security including: nuclear war, nuclear terrorism, emboldened nuclear powers, constrained freedom of action, weakened alliances, and further nuclear proliferation. This section explores each of these threats in turn. Nuclear War. The greatest threat posed by the spread of nuclear weapons is nuclear war. The more states in possession of nuclear weapons, the greater the probability that somewhere, someday, there is a **catastrophic nuclear war**. A nuclear exchange between the two superpowers during the Cold War could have arguably resulted in human extinction and a nuclear exchange between states with smaller nuclear arsenals, such as India and Pakistan, could still result in millions of deaths and casualties, billions of dollars of economic devastation, environmental degradation, and a parade of other horrors. To date, nuclear weapons have only been used in warfare once. In 1945, the United States used one nuclear weapon each on Hiroshima and Nagasaki, bringing World War II to a close. Many analysts point to sixty-five-plus-year tradition of nuclear non-use as evidence that nuclear weapons are unusable, but it would be naïve to think that nuclear weapons will never be used again. After all, analysts in the 1990s argued that worldwide economic downturns like the great depression were a thing of the past, only to be surprised by the dot-com bubble bursting in the later 1990s and the Great Recession of the late Naughts.[[25]](#endnote-25)[53] This author, for one, would be surprised if nuclear weapons are not used in my lifetime. **Before** reaching a state of MAD, new nuclear states go through a transition period in which they lack a secure-second strike capability. In this context, one or both states might believe that it has an incentive to use nuclear weapons first. For example, if Iran acquires nuclear weapons neither Iran, nor its nuclear-armed rival, Israel, will have a secure, second-strike capability. Even though it is believed to have a large arsenal, given its small size and lack of strategic depth, Israel might not be confident that it could absorb a nuclear strike and respond with a devastating counterstrike. Similarly, Iran might eventually be able to build a large and survivable nuclear arsenal, but, when it first crosses the nuclear threshold, Tehran will have a small and vulnerable nuclear force. In these pre-MAD situations, there are at least three ways that nuclear war could occur. First, the state with the nuclear advantage might believe it has a splendid first strike capability. In a crisis, Israel might, therefore, decide to launch a preemptive nuclear strike to disarm Iran’s nuclear capabilities and eliminate the threat of nuclear war against Israel. Indeed, this incentive might be further increased by Israel’s aggressive strategic culture that emphasizes preemptive action. Second, the state with a small and vulnerable nuclear arsenal, in this case Iran, might feel use ‘em or loose ‘em pressures. That is, if Tehran believes that Israel might launch a preemptive strike, Iran might decide to strike first rather than risk having its entire nuclear arsenal destroyed. Third, as Thomas Schelling has argued, nuclear war could result due to the reciprocal fear of surprise attack.[[26]](#endnote-26)[54] If there are advantages to striking first, one state might start a nuclear war in the **belief that war is inevitable** and that it would be better to go first than to go second. In a future Israeli-Iranian crisis, for example, Israel and Iran might both prefer to avoid a nuclear war, but decide to strike first rather than suffer a devastating first attack from an opponent. Even in a world of MAD, there is a risk of nuclear war. Rational deterrence theory assumes nuclear-armed states are governed by rational leaders that would not intentionally launch a suicidal nuclear war. This assumption appears to have applied to past and current nuclear powers, but there is no guarantee that it will continue to hold in the future. For example, Iran’s theocratic government, despite its inflammatory rhetoric, has followed a fairly pragmatic foreign policy since 1979, but it contains leaders who genuinely hold millenarian religious worldviews who could one day ascend to power and have their finger on the nuclear trigger. We cannot rule out the possibility that, as nuclear weapons continue to spread, one leader will choose to launch a nuclear war, knowing full well that it could result in self-destruction. One does not need to resort to irrationality, however, to imagine a nuclear war under MAD. Nuclear weapons may deter leaders from intentionally launching full-scale wars, but they do not mean the end of international politics. As was discussed above, nuclear-armed states still have conflicts of interest and leaders still seek to coerce nuclear-armed adversaries. This leads to the credibility problem that is at the heart of modern deterrence theory: how can you threaten to launch a suicidal nuclear war? Deterrence theorists have devised at least two answers to this question. First, as stated above, leaders can choose to launch a limited nuclear war.[[27]](#endnote-27)[55] This strategy might be especially attractive to states in a position of conventional military inferiority that might have an incentive to escalate a crisis quickly. During the Cold War, the United States was willing to use nuclear weapons first to stop a Soviet invasion of Western Europe given NATO’s conventional inferiority in continental Europe. As Russia’s conventional military power has deteriorated since the end of the Cold War, Moscow has come to rely more heavily on nuclear use in its strategic doctrine. Indeed, Russian strategy calls for the use of nuclear weapons early in a conflict (something that most Western strategists would consider to be escalatory) as a way to de-escalate a crisis. Similarly, Pakistan’s military plans for nuclear use in the event of an invasion from conventionally stronger India. And finally, Chinese generals openly talk about the possibility of nuclear use against a U.S. superpower in a possible East Asia contingency. Second, as was also discussed above leaders can make a “threat that leaves something to chance.”[[28]](#endnote-28)[56] They can initiate a nuclear crisis. By playing these risky games of nuclear brinkmanship, states can increases the risk of nuclear war in an attempt to force a less resolved adversary to back down. Historical crises have not resulted in nuclear war, but many of them, including the 1962 Cuban Missile Crisis, have come close. And scholars have documented historical incidents when accidents could have led to war.[[29]](#endnote-29)[57] When we think about future nuclear crisis dyads, such as India and Pakistan and Iran and Israel, there are fewer sources of stability that existed during the Cold War, meaning that there is a very real risk that a future Middle East crisis could result in a devastating nuclear exchange.

The plan solves – two internal links:

First, nuclear leadership:

#### Global nuclear renaissance makes proliferation and weaponization likely without nuclear leadership

Hamre and Sowcroft 2012 (John Hamre, President and CEO, Center for Strategic and International Studies. Lieutenant General Brent Scowcroft (Ret.), Former National Security Advisor, CSIS Counselor and Trustee.)

(4/11/2012 “Center for Strategic and International Studies (CSIS) Global Security Forum 2012 Scenario 2030: Is the U.S. Nuclear Industry Dying?” http://csis.org/event/global-security-forum-2012-scenario-2030-us-nuclear-industry-dying)

MR. HAMRE: Well, Brent, the only place where the wind blows 100 percent of the time is Washington. So I mean, this is the only place you could substitute – (laughter) – nuclear for wind power.¶ But let me take you – also, you’re wearing your national security hat – you know, but –¶ Going back to Eisenhower, he was trying to find a framework where we would manage the danger of nuclear power but we would still allow its promise for the world. And what – but now we’re in this period where, look, America is going to shrink. I mean – just by very conservative forecast, 20 years from now we’ll probably be down to 50 or 60 plants in America, and the rest of the world is going to build probably 200. So there’ll be about 600 plants in the world, 10 percent of them anyways. And if you go out another 20 years, it’s probably going to be 2 percent in the U.S. How does America shape the security environment if this trend continues? How do you think about that, as a former national security advisor?¶ GEN. SCOWCROFT: Well, I think about that a lot. And I didn’t even go to the national security aspects of it, which I think are dominant in a way. We’re going to have a nuclear world. We’re not doing anything. But Saudi Arabia, the homeland of petroleum, is building nuclear plants.¶ MR. HAMRE: Nineteen.¶ GEN. SCOWCROFT: Most of the world is building nuclear plants now – rapidly. We’re not. The national security aspect of nuclear weapons – of nuclear energy is also extremely important.¶ And is there a way that we can spread nuclear power for its benefits and control the resulting capability to go to nuclear weapons, which is a world we’re trying to avoid right now. And that’s a difficult question, especially if we are not in the nuclear power business; then we lose all of our ability to control the development of nuclear energy around the world in a way which provides the benefits of nuclear energy without the detriment of weaponization.¶ MR. HAMRE: You know, if by 2050 we’re down to two nuclear power plants, it’s going to be hard to tell China with 150 how they ought to behave with nuclear power.

Revitalizing the U.S. nuclear industry sets the global standard for nuclear expansion and restores credibility to nonproliferation efforts.

Wallace and Williams 12 (Michael Wallace comes to CSIS from Constellation Energy, where he served as vice chairman and COO. During his nine years at Constellation Energy, he led many company business activities, including the formation and operation of two joint ventures with EDF related to nuclear energy. Prior to joining Constellation Energy, he was cofounder and managing director of Barrington Energy Partners, LLC, a strategic consulting firm specializing in energy industry transactions and advisory services. Sarah J. Williams is program coordinator and research associate in the U.S. Nuclear Energy Project at CSIS. Prior to joining CSIS, she was a Herbert Scoville Jr. peace fellow and program coordinator at the Center for Science, Technology and Security Policy at the American Association for the Advancement of Science (AAAS).)

(4/17/12 “Nuclear Energy in America: Preventing its Early Demise” http://csis.org/files/publication/120417\_gf\_wallace\_williams.pdf)

Meanwhile, China, India, Russia, and other countries are looking to significantly expand their nuclear energy commitments. By 2016, China could have 50 nuclear power plants in operation, compared with only 14 in 2011. India could add 8 new plants and Russia 10 in the same time frame. These trends are expected to accelerate out to 2030, by which time China, India, and Russia could account for nearly 40 percent of global nuclear generating capacity. ¶ Meanwhile, several smaller nations, mostly in Asia and the Middle East, are planning to get into the nuclear energy business for the first time. In all, as many as 15 new nations could have this technology within the next two decades. Meanwhile, America’s share of global nuclear generation is expected to shrink, from about 25 percent today to about 14 percent in 2030, and—if current trends continue—to less than 10 percent by mid-century.¶ With the center of gravity for global nuclear investment shifting to a new set of players, the United States and the international community face a difficult set of challenges: stemming the spread of nuclear weapons-usable materials and know-how; preventing further catastrophic nuclear accidents; providing for safe, long-term nuclear waste management; and protecting U.S. energy security and economic competitiveness. In this context, federal action to reverse the American nuclear industry’s impending decline is a national security imperative. The United States cannot afford to become irrelevant in a new nuclear age. Our nation’s commercial nuclear industry, its military nuclear capabilities, and its strong regulatory institutions can be seen as three legs of a stool. All three legs are needed to support America’s future prosperity and security and to shape an international environment that is conducive to our long-term interests. Three specific aspects of U.S. leadership are particularly important. First, managing the national and global security risks associated with the spread of nuclear technology to countries that don’t necessarily share the same perspective on issues of nonproliferation and nuclear security or may lack the resources to implement effective safeguards in this area. An approach that relies on influence and involvement through a viable domestic industry is likely to be more effective and less expensive than trying to contain these risks militarily. Second, setting global norms and standards for safety, security, operations, and emergency response. As the world learned with past nuclear accidents and more recently with Fukushima, a major accident anywhere can have lasting repercussions everywhere. As with nonproliferation and security, America’s ability to exert leadership and influence in this area is directly linked to the strength of our domestic industry and our active involvement in the global nuclear enterprise. A strong domestic civilian industry and regulatory structure have immediate national security significance in that they help support the nuclear capabilities of the U.S. Navy, national laboratories, weapons complex, and research institutions. Third, in the past, the U.S. government could exert influence by striking export agreements with countries whose regulatory and legal frameworks reflected and were consistent with our own nonproliferation standards and commitments. At the same time, our nation set the global standard for effective, independent safety regulation (in the form of the Nuclear Regulatory Commission), led international efforts to reduce proliferation risks (through the 1970 NPT Treaty and other initiatives), and provided a model for industry self-regulation. The results were not perfect, but America’s institutional support for global nonproliferation goals and the regulatory behaviors it modeled clearly helped shape the way nuclear technology was adopted and used elsewhere around the world. This influence seems certain to wane if the United States is no longer a major supplier or user of nuclear technology. With existing nonproliferation and safety and security regimes looking increasingly inadequate in this rapidly changing global nuclear landscape, American leadership and leverage is more important and more central to our national security interests than ever.¶ To maintain its leadership role in the development, design, and operation of a growing global nuclear energy infrastructure, the next administration, whether Democrat or Republican, must recognize the invaluable role played by the commercial U.S. nuclear industry and take action to prevent its early demise.

Second, spread of SMRs:

SMRs eliminate the incentive for countries to develop nuclear enrichment knowledge and capacity.

Ioannis Kessides, Chief Economist for the Development Research Group @ World Bank, and Vladimir Kuznetsov, Consultant for the World Bank, July 2012 (“Small Modular Reactors for Enhancing Energy Security in Developing Countries.” http://www.mdpi.com/2071-1050/4/8/1806/htm)

One of the key concerns regarding nuclear deployment in developing countries is that those countries generally have a less mature regulatory regime in place compared to the advanced industrial countries. These considerations place very stringent requirements on power station reliability and safety performance. The need for enhanced levels of safety can be more easily met by SMRs with design options that maximize the use of inherent and passive safety features and incorporate additional layers of “defense in depth” [13]. These safety features can be more easily and effectively implemented in SMRs because of these reactors’ 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. The extent to which nuclear power will prove an acceptable and enduring option for meeting the future energy requirements worldwide will depend in part upon the ability of the international community to minimize the associated proliferation risks. A major nuclear expansion program, unless is accompanied by adequate technical and institutional safeguards, could increase the risk that weapons-usable fissile materials, facilities, technology, or expertise might be diverted or stolen. The common fear is that such an expansion will make it easier for countries to acquire technology as a precursor to developing nuclear weapons capability or for terrorist groups to obtain nuclear materials. This risk could be further compounded by the likelihood that plutonium-fueled breeder reactors will be widely used to stretch uranium resources under expanded nuclear power deployment. Enhanced capacity and institutional arrangements to prevent proliferation and diversion of nuclear technology to non-peaceful purposes are challenges that will need to be overcome if nuclear energy is to be expanded in developing countries One potential way of mitigating the proliferation risks of expanded nuclear deployment in developing countries might be through the adoption of hub-and-spoke configurations that restrict all sensitive activities (such as isotope separation of uranium or reprocessing of spent fuel) to large, international/regional energy parks that would export fuel, hydrogen, and even small (40–50 megawatts) sealed reactors to client states [30,31]. These reactors would be assembled and fueled at the central nuclear park, sealed (so that individual fuel assemblies could not be removed) and delivered as a unit to the power plant cites of client countries. At the end of their core life (say 15–20 years) the reactors would be returned to the central park unopened. Thus, during the 15–20 years of operation there would be no refueling and consequently the client countries would need no fuel fabrication facilities and management capabilities. **To the extent that such modular reactors would operate almost autonomously, the hub-and-spoke architecture could reduce substantially the rationale and opportunities for countries to develop nuclear research laboratories and train technical specialists and scientists whose know-how could later be diverted to weapons activities** [32]. It should be noted that providing attractive alternatives to the buildup of indigenous facilities is a good idea. However, trying to restrict knowledge diffusion is arguable futile and non-sustainable.

SMRs make covert efforts at prolif incredibly obvious – ensures international response.

Harold Feiveson, Senior Research Policy Analyst @ Program on Science and Global Security at Princeton, et al. Alexander Glaser, Asst Prof. at Woodrow Wilson School of Public Affairs @ Princeton, Marvin Miller, Senior Scientist Emeritus @ MIT Center for International Studies, and Lawrence Scheinman, International Policy @ Monterey Institute of International Studies, 2008 (http://www.cissm.umd.edu/papers/files/future\_nuclear\_power.pdf)

With respect to country proliferation:

• Any country with nuclear power and a nuclear power infrastructure could get fissile material if it wished – within months or a year – barring international action to prevent this. If it had a commercial reactor, it could build a reprocessing plant to separate out plutonium; or it could build a dedicated reactor and reprocessing plant in a somewhat longer period. It could also enrich uranium over time, but as long as the country did not have any enrichment facilities to begin with, such a route would take longer than would a plutonium path. • However, in the scenarios considered, it should be possible to have a safeguards regime such that any diversion of facilities and materials would be quickly detected, giving time for an international response (see the following bullet). In this respect, the once-through fuel cycle, the hub-spoke arrangements with sealed reactors, and possibly certain thorium cycles appear particularly attractive in making immediately visible an attempted diversion and lengthening the time for a diversion to be consummated. • Since technically most countries will be able to get nuclear weapons, enforcement and compliance provisions of any international control regime are crucial. • Compliance will be stronger and more accepted if nuclear power is nondiscriminatory. That is, for example, if countries such as the United States wish to have breeder reactors, it will be hard to argue that other countries should not be allowed these. • Secondly, compliance will be surer and more effective if ventures to produce fissile material for weapons can quickly be seen and monitored by multinational or international authorities and if the acquisition of significant quantities of fissile material by a country, clandestinely or overtly, will take months or longer. For this reason, we believe that all “sensitive” or “dangerous” nuclear facilities should ideally be put under multinational or international control. This includes reprocessing and enrichment plants. It might include also all uranium mining and milling and spent fuel. In time, the fuel could be “owned” by an international authority.

#### **International pressure solves proliferation – empirics prove.**

Reed ’10, [Alexander R. Reed, Master of Arts in Security Studies from Georgetown University, April 14, 2010 “The Role of Denial in Nuclear Nonproliferation,” <https://repository.library.georgetown.edu/bitstream/handle/10822/553565/reedAlexander.pdf?sequence=1>]

Incentives for integration with the international community benefitted nonproliferation¶ Incentives for normalization also played significant roles in some of the nonproliferation ¶ successes studied. Libya, South Africa, and Brazil all sought increased integration ¶ within the international community, but had to forgo their nuclear weapons programs ¶ before such integration could occur. South Africa, long isolated due to its policy of¶ apartheid, sought to establish a cooperative relationship with international ¶ community.¶ 137¶ While eliminating apartheid was the biggest step, South Africa also had ¶ to renounce its nuclear weapons. The sanctions and isolation imposed by the ¶ international community against apartheid thus had a significant effect on South Africa’s ¶ nuclear weapons motivationns. Brazil similarly wanted to integrate into the international ¶ community. The Brazilian Government initially saw nuclear weapons as a means to ¶ increase its prestige among global powers.¶ 138¶ When the civilian government took ¶ control, however, it saw nuclear weapons as an obstacle to unrestricted membership ¶ and leadership in the international community.¶ 139¶ Brazil chose to renounce its weapons ¶ programs and alleviate international pressure to help accomplish that central goal.

#### Delaying prolif solves –alters decision calculus and provides time for motivations to change.

Reed ’10, [Alexander R. Reed, Master of Arts in Security Studies from Georgetown University, April 14, 2010 “The Role of Denial in Nuclear Nonproliferation,” <https://repository.library.georgetown.edu/bitstream/handle/10822/553565/reedAlexander.pdf?sequence=1>]

In the cases studied, technology denial contributed to nonproliferation by delaying ¶ weapons acquisition, which created opportunities for proliferation motivations to change. ¶ To various extents, South Korea, Libya, and Brazil all renounced their nuclear programs ¶ following years of trying (or threatening) to acquire nuclear weapons technologies. In ¶ response to these attempts and threats, the international community implemented ¶ technology denial efforts to prevent proliferation to South Korea, Libya, and Brazil. ¶ While these denial efforts were in place, the motivations driving nuclear weapons ¶ acquisitions for the three states changed. For this chapter, South Africa is a unique ¶ case. Because it succeeded in acquiring nuclear weapons, the case can be deemed a ¶ failure. However, the lessons learned from South Africa’s nuclear rollback are equally ¶ applicable. Finally, Pakistan serves as a warning to the international community of the ¶ ineffectiveness of technology denial when proliferation motivations are not addressed.

In the cases studied, nonproliferation efforts succeeded when technology denial ¶ programs provided the time necessary for proliferation motivations to change. By ¶ increasing the time required for countries to develop nuclear weapons, technology ¶ denial provided opportunities for foreign and domestic pressure to eliminate proliferation ¶ drivers. The following analysis uses Scott Sagan’s three proliferation models (security,¶ domestic politics, and international norms) as a framework for analyzing nuclear ¶ weapons motivations.

### Contention 2 – Water Wars

#### Global water scarcity’s inevitable – causes war and kills billions

Nitish Priyadarshi 12, lecturer in the department of environment and water management at Ranchi University in India, “War for water is not a far cry”, June 16, <http://www.cleangangaportal.org/node/44>

The battles of yesterday were fought over land. Those of today are over energy. But the battles of tomorrow may be over water. Along with population growth and increasing per capita water consumption, massive pollution of the world's surface water systems has placed a great strain on remaining supplies of clean fresh water. Global deforestation, destruction of wetlands, dumping of pesticides and fertilizer into waterways, and global warming are all taking a terrible toll on the Earth's fragile water system.

The combination of increasing demand and shrinking supply has attracted the interest of global corporations who want to sell water for a profit. The water industry is touted by the World Bank as a potential trillion-dollar industry. Water has become the “blue gold” of the 21st century.

In many parts of the world, one major river supplies water to multiple countries. Climate change, pollution and population growth are putting a significant strain on supplies. In some areas renewable water reserves are in danger of dropping below the 500 cubic meters per person per year considered a minimum for a functioning society.

In recent times, several studies around the globe show that climatic change is likely to impact significantly upon freshwater resources availability. In India, demand for water has already increased manifold over the years due to urbanization, agriculture expansion, increasing population, rapid industrialization and economic development. At present, changes in cropping pattern and land-use pattern, over-exploitation of water storage and changes in irrigation and drainage are modifying the hydrological cycle in many climate regions and river basins of India.

Due to warming and climate change rainfall trend has been badly affected worldwide. This change has adversely affected the groundwater recharge.

Water scarcity is expected to become an even more important problem than it is today.

In a case study of Jharkhand state of India groundwater recharging is mainly dependent on rainfall. Though Jharkhand receives sufficient amount of rainfall (900 to 1400 mm/year) but from last several years the rainfall pattern is very erratic. From last two years Ranchi city the capital of Jharkhand state received sufficient rainfall but distribution of rainfall was not uniform. It rained heavily just for two to three days in the month of August and September which resulted in heavy runoff and less infiltration affecting groundwater level.

The process of urbanization and industrialization from last 20 years has caused changes in the water table of Jharkhand State of India as a result of decreased recharge and increased withdrawal. Many of the small ponds which were main source of water in the surrounding areas are now filled for different construction purpose affecting the water table.

By 2100, water scarcity could impact between 1.1 and 3.2 billion people, says a leaked draft of an Intergovernmental Panel on Climate Change (IPCC) report due to be published in April 2007. The report focuses on the consequences of global warming and options for adapting to them. In February 2007 the panel released a report on the scientific basis of climate change.

The IPCC predicts critical water shortages in China and Australia, as well as parts of Europe and the United States. Africa and poor countries such as Bangladesh would be most affected because they were least able to cope with drought.

Major cities worldwide may face a water shortage crisis by 2050 if relevant governments don't react quickly. The water shortage will mostly affect basic daily needs such as drinking, cooking, bathing and washing clothes, and the poor residents of the world's major cities in developing countries are the ones who will suffer most.

"By 2050, big cities that will not have enough water available nearby include Beijing, New Delhi, Mexico City, Lagos and Tehran. China and India will be particularly hard hit unless significant new efforts are taken by their cities,".

There are several principal manifestations of the water crisis.

1. Inadequate access to safe drinking water for about 884 million people.

2. Inadequate access to water for sanitation and waste disposal for 2.5 billion people.

3. Groundwater over drafting (excessive use) leading to diminished agricultural yields.

4. Overuse and pollution of water resources harming biodiversity.

5. Regional conflicts over scarce water resources sometimes resulting in warfare.

Potential Hot Spots:

Egypt: A coalition led by Ethiopia is challenging old agreements that allow Egypt to use more than 50 percent of the Nile’s flow. Without the river, all of Egypt would be desert.

Eastern Europe: Decades of pollution have fouled the Danube, leaving down-stream countries, such as Hungary and the Republic of Moldova, scrambling to find new sources of water.

Middle East: The Jordan River, racked by drought and diverted by Israeli, Syrian and the Jordanian dams, has lost 95 percent of its former flow.

Former Soviet Union: The Aral sea, at one time the world’s fourth largest inland sea, has lost 75 percent of its water because of diversion programs begun in the 1960s.

There are many other countries of the world that are severely impacted with regard to human health and inadequate drinking water. The following is a partial list of some of the countries with significant populations (numerical population of affected population listed) whose only consumption is of contaminated water:

Sudan: 12.3 million

Venezuela: 5.0 million

Ethiopia: 2.7 million

Tunisia: 2.1 million

Cuba :1.3 million

#### Those wars go global

Reilly ‘2

(Kristie, Editor for In These Times, a nonprofit, independent, national magazine published in Chicago. We’ve been around since 1976, fighting for corporate accountability and progressive government. In other words, a better world, “NOT A DROP TO DRINK,” <http://www.inthesetimes.com/issue/26/25/culture1.shtml>)

\*Cites environmental thinker and activist Vandana Shiva Maude Barlow and Tony Clarke—probably North America’s foremost water experts

The two books provide a chilling, in-depth examination of a rapidly emerging global crisis. “Quite simply,” Barlow and Clarke write, “unless we dramatically change our ways, between one-half and two-thirds of humanity will be living with severe fresh water shortages within the next quarter-century. … The hard news is this: Humanity is depleting, diverting and polluting the planet’s fresh water resources so quickly and relentlessly that every species on earth—including our own—is in mortal danger.” The crisis is so great, the three authors agree, that the world’s next great wars will be over water. The Middle East, parts of Africa, China, Russia, parts of the United States and several other areas are already struggling to equitably share water resources. Many conflicts over water are not even recognized as such: Shiva blames the Israeli-Palestinian conflict in part on the severe scarcity of water in settlement areas. As available fresh water on the planet decreases, today’s low-level conflicts can only increase in intensity.

#### And that goes nuclear

Weiner ‘90

(Jonathan, Visiting Professor of Molecular Biology at Princeton University. The Next One Hundred Years: Shaping the Fate of Our Living Earth, p. 214)

If we do not destroy ourselves with the A-bomb and the H-bomb, then we may destroy ourselves with the C-bomb, the Change Bomb. And in a world as interlinked as ours, one explosion may lead to the other. Already in the Middle East, from North Africa to the Persian Gulf and from the Nile to the Euphrates, tensions over dwindling water supplies and rising populations are reaching what many experts describe as a flashpoint. A climate shift in the single battle-scarred nexus might trigger international tensions that will unleash some of the 60,000 nuclear warheads the world has stockpiled since Trinity.

#### **Specifically, water shortages cause central Asian war, Indo-Pak war, and mid-east war**

Hernandez 9/28/12 (Col Nelson E. Hernández is a Command pilot with more than 2,000 of flying hours, who has served in the El Salvador Air Force for 30 years. He graduated from the Salvadoran Military Academy in 1984, and has done studies in the United States for Pilot Training, Squadron Officer School, Air Command and Staff College and Air War College in Maxwell AFB, Alabama. Col Hernández has commanded several units in the Salvadoran Air Force from Squadron to Air Brigade level, and served as Chief of the General Staff during 2010 and 2011. He served in Iraq as a Chief Planner in the Multinational Force-Iraq staff in 2005, and is currently working at USCENTCOM as the El Salvador Representative and also as an Action Officer in the Combined Planning Group (CCJ5/CPG).)

(“Water Security Conflicts: A Regional Perspective” http://smallwarsjournal.com/jrnl/art/water-security-conflicts-a-regional-perspective)

INTRODUCTION¶ On the 1st of April 2014, the world was caught off guard when the Syrian Air Force attacked the power plant facilities at Karkamis Dam in the upstream of the Euphrates River 4.5 kilometers north of the Turkey-Syrian border. Two people were reportedly killed and six more injured.¶ After taking office as the new Syrian President in June 2013, Adib Al-Atassi declared Turkey’s construction of the dam was depleting downstream water from the Euphrates. He claimed Turkey was withdrawing too much water from the river basin and preventing it from reaching downstream Syria and Iraq.¶ According to Syrian officials, a dozen Russian Su-22 Fitter jets launched more than 250 rockets at the power plant, aiming for trucks, power lines, transformers, and main towers. Gen Hafez Al-Quwatli, Chief of the Syrian Armed Forces, told the press that the dam itself was not being targeted because of the obvious danger to the people living downstream. “We are only targeting equipment and materiel for now; we want to show Turkey that we are serious in defending our right to a vital resource that should flow unrestricted and does not belong to any country but to all humans.”¶ In response, twenty Turkish F-16C jets launched a similar strike on Syria’s Tichrin and Tabqa dams, located on the Syrian side of the Euphrates. Twelve people were reported killed and another twenty injured.¶ The same day, Turkish troops clashed with Syrian border troops, advancing and expanding the disputed Hatay Province some fifty miles to the south into Syrian territory. Hatay Province, formerly known as Alexandretta, a semi-autonomous part of French-mandated Syria, became independent from France in 1937 and was annexed to Turkey in 1939. Syria claims that Hatay was illegally ceded to Turkey by France and still considers it an integral part of Syrian territory.¶ President Alib Al-Atassi took power after Bashar Al-Assad was forced to resign by domestic and international (Russian and Iranian) pressure in June 2013. Al-Atassi had been unable to bring stability to the country and the Turkish government held the view that Al-Atassi was trying to direct attention to the Hatay Province and water issues in order to rally domestic support and turn away attention from its own internal problems.¶ Pressured by uprisings in several main cities and by a severe drought that had struck northern Syria, the government denounced Turkish water flow reduction of the Euphrates. By extracting vast quantities of water for irrigation purposes, Syria claimed the results were severe droughts in its downstream northwestern provinces.¶ Several efforts were made to appease an unsatisfied, thirsty Syria but the International Community had not been able to reach an agreement. Diplomatic attempts were overrun by mutual accusations of border violations and alleged support to terrorist groups.¶ Although the scenario portrayed above is fictional, the conditions described are plausible if international leaders neglect this water-related issue that, combined with other national security aspects, can escalate to become an igniter for interstate armed conflict.¶ BACKGROUND¶ Water scarcity has received a lot of attention over the last three decades. It has been predicted to be the source of future wars and many experts have publicly warned about the dangers of water scarcity as the main factor for armed conflict in the Middle East and Africa. Despite the predictions by experts in this field, there is still no evidence that water or even food scarcity has been the single or most important cause for an interstate war.¶ It could be that the attention given to the issue at national, regional, and global levels produced initiatives to reduce this possibility. Another reason may be that the high costs of war in human lives and resources has made it less attractive while regional and bilateral cooperation proved more effective and less costly in addressing the issue.¶ Whatever the reasons behind water scarcity’s relatively low correlation with armed conflict, the combination of a water-related dispute with other conditions may fuel radicalization of national security objectives or interstate armed conflict. Furthermore, a U.S. intelligence report on Global Water Security stated that water scarcity will become a source for failed states by 2023.[1]¶ Water scarcity is one of the major problems in the Area of Responsibility (AOR) of U.S. Central Command (USCENTCOM), especially in the Middle East. Water availability in these countries is among the lowest in the world. As most water in the region is used for agricultural purposes,[2] its scarcity not only affects human consumption and domestic use but also brings the ensuing possibility of food scarcity and the potential for internal or regional conflict that comes with it.¶ Food shortages are closely interrelated with water scarcity. Water sources, like rivers and lakes, not only quench human thirst but also irrigate soils to produce food at a scale that greatly impacts human consumption and national economies. This article will explain how dangerous water scarcity may become in the region, how it can affect the countries involved, and how military leaders, especially in USCENTCOM, may best prepare for such this kind of contingencies.¶ DEMAND AND SUPPLY¶ To better understand water scarcity, it will be discussed in terms of demand and supply. There are trends throughout the region that evidence an increase in water demand and a concurrent decrease in governments’ capability to keep up.¶ Demand¶ The most important trend that affects the demand for water is Population Growth, which directly increases the pressure over available resources and production capabilities in a country. The world’s population grew to seven billion people in October 2011. Concurrently, the population in the Middle East has doubled in the last three decades[3] and it keeps growing at a rate of approximately 6.8 million people per year. This means that every day in the Middle East, the demand for water (and food) supplies increases by almost 19,000.¶ Although the basic natural use of water is human consumption, the real challenge lies in the availability of water for large scale irrigation and food production to feed the people or to obtain revenue from agricultural exports. Therefore, Population Growth in a country not only increases demand for domestic water consumption but also for large quantities of food (which requires considerable amounts of water). In the region, only 12 percent of the water is used for domestic consumption purposes, whereas 84 percent is used in Agriculture (See Table 1).¶ Supply¶ Despite the growing demand for water, there is no evidence that supply in the region is able to keep pace. On the contrary, evidence points to a decrease in availability. Due to the growth of the population and other geographic trends, including climate change and depletion of aquifers, the availability of water for the people in the Middle East has fallen more than one half in the last thirty years (from 3,645 cubic meters of annual renewable fresh water per capita in 1970, to an average of 1,640 cubic meters in 2001), and it keeps shrinking.[4]¶ Experts measure water availability in terms of annual renewable freshwater per person. In quantifiable terms, a “water-scarce” country is one with total renewable freshwater resources below 1,000 cubic meters per person per year.[5] According to this definition, eleven of the world’s fifteen water-scarce countries are located in the USCENTCOM AOR (highlighted in red in Table 1).¶ Why?¶ Besides the natural geographic inclination to water scarcity in the region, there are three other major factors that have a direct impact on the supply side: poor planning in the use of water for irrigation purposes; inadequate agriculture strategies that rely on massive production of water-intensive crops; and the large-scale reduction in the export of harvested food crops in some countries out of the region, either for domestic biofuel production or simply to balance their own economy.¶ First, many countries extract massive amounts of water for irrigation purposes by overpumping underground water (pumping beyond capability to recharge) and by diverting water from rivers and lakes. Although it has economic benefits in the agricultural sector, this practice decreases the availability of water at a dangerous rate in a region that annually experiences increasingly severe droughts.¶ For example, the disproportionate use of the water of the Jordan River basin, coupled with drastic climate changes in the region, has shrunk the Dead Sea by one third in the last four decades; its water level continues sinking one meter every year.¶ Another example of poor water management is the shrinking of the Aral Sea. Irrigation projects along its main tributaries - the Amu Darya and Syr Darya Rivers - since the 1960s have shrunk the Aral Sea to less than 30 percent its original size, and it has lost its title as the world’s fourth largest lake;[6] it is now the world’s 31st largest lake.¶ Second, agriculture, in some countries in the region, relies too much on water-intensive crops that consume vast amounts of water at a rate higher than geographic and environmental conditions are able to support.¶ An example of poorly planned, water-intensive agriculture is found in Yemen. Strategic economic changes led the country to greatly expand its cultivated and irrigated land, thereby increasing demand for water for agricultural purposes. In order to boost agriculture output and to meet social demands, Yemen switched from traditionally grown drought-resistant crops in the 1970s to more water-intensive crops such as citrus and banana. This was followed by a dramatic increase in the cultivation of Khat (or Qat), another water-intensive plant with a leaf that is chewed as a stimulant in Yemeni culture. Another unmanageable factor was Yemen’s population surge. The Yemeni population has more than doubled since 1975, and it has grown approximately 35 percent since 1994, and continues growing,[7] even though Yemen is the third driest country in the Middle East (Table 1), and the availability of water is very unlikely to increase.¶ Water activist, Lakis Polycarpou, suggests that measures at the national level changed Yemen’s agriculture to the point of unsustainability. Rising food prices and water scarcity were important factors in the social uprisings in this Middle Eastern country in the late 1990s and at the beginning of the last decade.¶ Despite the ousting of the Yemeni president and reforms in the Government, water scarcity and high food prices are most likely to remain a source of continued political unrest and possible armed struggle in the future.¶ Third, major shifts in food crop exports have a disrupting effect on the global food market. On one side, many food-crop exporting countries outside the USCENTCOM AOR are shifting their agriculture production to alternative fuel. This shifts massive amounts of water to produce fuel-crops, thereby reducing production and export of food crops. This large-scale shift reduces the available water for food production and increases food prices in the world market. On the other side, some countries have made major shifts in their strategic planning in order to balance their own water supply deficits, causing a similar effect.¶ For example in 2009, the U.S. shifted production of 119 million tons of grain (about one quarter of its 416 million-ton harvest) to produce ethanol. This crop production could be used to feed 350 million people for one year. As another example, the world’s second largest rice provider, India, banned the export of rice, wheat flour and other agricultural products.¶ This change caused a decline in India’s rice export by 4.8 million tons to the international market in 2008 and solved its dependence on exports, but it simultaneously caused a rise in food prices that directly affected Middle Eastern buyers.¶ HOW DANGEROUS?¶ Water scarcity alone may not be a threat to national and regional peace and security, but if combined with other factors, it may become one of the main causes for state failure or even interstate war. These conditions may include poverty, social tensions, environmental degradation, ineffectual leadership, and weak political institutions.[8]¶ Water, like all natural resources, has three major characteristics. First, it is embedded in a transnational, social, and economic space, and it may generate conflicts among peoples and within and among countries. Second, it is subject to increasing scarcity, and its consumption and use may be complicated by unequal distribution or environmental problems creating unrest within a country’s boundaries and/or with its neighbors. Third, water is often used symbolically to promote national identity or for ideological, social, and political purposes.[9]¶ History is full of examples in which water has been used as a symbol to boost national identity, and it has been politicized to rally popular support, many times for rather unrelated causes. Ironically, history also shows examples in which water conflicts have produced water-sharing agreements.[10]¶ A natural consequence of a country building a dam upstream a river is the shortage of water for the downstream countries when it is used for irrigation before it reaches the outlet. Climate change, global warming, and poor water management are trends that make water increasingly scarce.¶ AREAS OF WATER CONFLICT¶ There are five major transnational river basins in the USCENTCOM AOR that have a disputed history: the Jordan River Basin, the Tigris-Euphrates Basin, the Amu Darya-Syr Darya Basin, the Indus River Basin, and the Nile River Basin. Most of these conflicts have not been resolved and remain sources of instability in the region.¶ Existing bilateral and multilateral agreements among riparian nations – countries sharing the river basin – help prevent disputes from turning into armed struggle, but conflicts still remain and governments must monitor and apply the appropriate diplomatic treatment to maintain peace in the region.¶ Jordan River Basin. Since the 1950s, the Jordan River Basin has been a source of conflict among Israel, the West Bank, Lebanon, Syria and Jordan. The main issue has been the extraction of water for irrigation purposes and the effect that it has on the downstream riparian nations. Israel uses the greatest amount of water available in the Basin, followed by Jordan and Syria. The Israeli-occupied West Bank uses the smallest amount. Disagreements among riparian parties are still the primary source of tensions. Escalating tensions in the 1960s between Israel and its neighbors over the exploitation of the Jordan River Basin contributed to the 1967 Six-Day War. In 1964, Israel bombed the headwaters of the Dan River on the Jordan River, at Tell el-Qadi, in a dispute with Syria about sovereignty over the source of the Dan. Later in 1965 and 1966, both countries exchanged fire over a Syrian plan to divert the Jordan River headwaters (Hasbani and Banias rivers) and presumably preempt Israel’s National Water Carrier, an Israeli project aimed at integrating all major water projects into a national grid. Syria halted construction of its diversion in July 1966. Finally, in 1967, Israel destroyed the Arab diversion works during the Six-day War; it occupied the West Bank and the Golan Heights.[11]¶ In this case, the water dispute was only a contributing factor and it combined with political, religious, economic and territorial disputes. Nonetheless, the patterns of water use have not changed significantly and there is still no formal agreement that addresses the issue to the full satisfaction of all parties. The water conflict in the Jordan River Basin continues to be a source of political instability in the region and demands attention from the international community and regional actors in order to prevent it from escalating to more dangerous levels.¶ Tigris/Euphrates Basin. The Tigris and Euphrates rivers originate in Turkey, and their waters are shared by Syria and Iraq. All three countries have built dams on the rivers for purposes of agriculture, hydroelectric power, and industrialization. Syria obtains approximately 85 percent of its renewable water supply from the Basin, while Iraq obtains 100 percent; Turkey is the least dependent on the rivers. The dams on the Turkish side however, prevent a portion of the water from flowing downstream to the warmer, drier countries. Turkey’s Southeastern Anatolia Project (GAP in Turkish) is an ambitious multi-sector development project intended to build 22 dams, 19 power plants, and irrigation schemes. It also plans to divert water from these rivers into the Harran field to irrigate some 1.7 million hectares of land.¶ Controversy sparked over the consequences for downstream Syria and Iraq. Turkey proposes a solution with a needs-based approach that calculates the amount of water to be needed by each country, to assign the appropriate proportional quotas. Syria and Iraq, in turn, propose a mathematical formula that will calculate demand versus supply, in order to reach a further agreement over the remaining surplus (in the case that supply exceeds demand) in an equitable matter. However, external factors have complicated the prospects of a multilateral agreement. Turkey’s closing relations with Israel has prompted improved relations between Syria and Iraq to assume a united front.¶ Amu Darya/Syr Darya River Basin. Water provided by these two rivers is a vital factor for the economies in Central Asia and a possible source of conflict. These two rivers flow from Kyrgyzstan and Uzbekistan into the Aral Sea, feeding the national economies of Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, and Kazakhstan. In the 1960s, the Soviet Union’s central government managed water from these rivers. In the summer, upstream republics Kyrgyzstan and Tajikistan released water from their lakes to downstream republics of Kazakhstan, Uzbekistan, and Turkmenistan for irrigation and hydroelectric power generation. In return, during the winter – when it was not practical to release water –the downstream republics provided those upstream with gas and coal to generate electricity. After the collapse of the Soviet Union, national interests took hold as administrational boundaries became national boundaries in 1991. After several disputes over the previous arrangements, the five countries signed the Almaty Agreement in 1992, which basically kept the water quotas of the Soviet era in place. The issue appeared to be settled, but riparian Afghanistan, which was largely ignored by Soviet interests and left out of the Almaty Agreement, has now emerged.[12]¶ Water use still remains a source of contention in this region, and it raises concerns among the riparian countries over losing the water resources to meet the demands of their agricultural sectors and growing populations.¶ Indus River Basin. Water management in the Indus River Basin has been the source of conflict between India and Pakistan. Extending for about 1,800 miles, the river flows through China (2 percent), India (5 percent) and Pakistan (95 percent). The Indus and its tributaries together are considered to make up one of the largest irrigation canals in the world. The Basin provides water to millions of people in northwestern India and Pakistan. Both countries have built dams and canals to provide hydropower and irrigation. As a result, these projects have dried up stretches of the river and caused displacements of people, contributing to the destruction of the ecosystem in the Indus plain. Pakistan and India signed the Indus Water Treaty (IWT) in 1960, which is the main legal instrument that binds both countries’ water management of the river, but controversy over the Baglihar Dam has sparked disputes in which Pakistan claims that India is exceeding the Treaty’s assigned quotas. Although the IWT has proven to serve as an effective tool to resolve it, the issue is subject to politicization and manipulation by both parties and remains a source of tension.¶ Nile River Basin. The Nile's waters have been a source of conflict in East Africa and the Horn of Africa for many decades. Riparian nations are Uganda, Sudan, South Sudan, Ethiopia, Kenya, and Egypt. Egypt and Sudan have traditionally been the primary users of Nile water. Political instability and poverty in the other riparian countries have made it difficult to develop and exploit its waters. In February 1999, after years of conflict, the water ministries of the Nile’s nine riparian countries officially launched the Nile Basin Initiative in an attempt to “develop the river in a cooperative manner, share substantial economic benefits, and to promote regional peace and security.”¶ THE PROBLEM IN AFGHANISTAN¶ Besides the water-related issues in the major river basins, there is the potential that U.S. efforts to bolster the economic development of Afghanistan may be hampered by the country’s water scarcity. The U.S. is assisting the Afghan Government to exploit the country’s vast mineral and energy resources (identified by the U.S. Geological Service, among other sources) as well as constructing a railroad and highway network to increase regional trade opportunities and create jobs. However, mining requires two important elements that are very scarce in this war-torn country: energy and water.¶ As noted in Table 1, Afghanistan is already a water-scarce country with a capacity to withdraw 779 cubic meters of renewable freshwater per person, per year (well below the 1,000 m3 water scarcity threshold). Despite years of work performed by the international community, only 46 percent of the Afghan population has access to an improved water source.[13]¶ Additionally, almost three decades of war have left a poorly maintained and badly damaged power grid in Afghanistan. As of June 2011, only 36 percent of the population had access to electricity. Without sustained international aid, the Afghan Government will be incapable of delivering the electric generation required to support its mining projects.¶ A risk from mining is contamination of the existent water resources with severe consequences for the population. Afghanistan’s economic situation prevents it from undertaking construction of large power producing plants and, as described above, a landlocked Afghanistan finds it difficult to claim riparian rights to build dams along the Amu Darya River.¶ Adding to the complexity of the water scarcity problem, the Afghan Government has been unable to organize national efforts to ensure successful water management. The Ministry of Energy and Water claims it has jurisdiction over national hydropower projects; the Ministry of Agriculture, Irrigation, and Livestock also claims such jurisdiction when it comes to the use of the water; the Ministry of Mines claims such jurisdiction by virtue of its cognizance over the country’s underground water resources. To date, an appointed inter-agency commission has not provided a successful policy for water management at a provincial or national level.¶ Given the size of the mining reserves, and the New Silk Road Initiative (NSRI)[14] planned to boost Afghanistan’s economy, water scarcity in this country is an important issue to resolve if it is to succeed in developing economically and integrating into the regional economy.

#### Russian treaty obligations guarantee Central Asian escalation

Blank 2k (Stephen, Prof. Research at Strategic Studies Inst. @ US Army War College, “U.S. Military Engagement with Transcaucasia and Central Asia”, [www.strategicstudiesinstitute.army.mil/pdffiles/pub113.pdf](http://www.strategicstudiesinstitute.army.mil/pdffiles/pub113.pdf))

Washington’s burgeoning military-political-economic involvement seeks, inter alia, to demonstrate the U.S. ability to project military power even into this region or for that matter, into Ukraine where NATO recently held exercises that clearly originated as an anti-Russian scenario. Secretary of Defense William Cohen has discussed strengthening U.S.-Azerbaijani military cooperation and even training the Azerbaijani army, certainly alarming Armenia and Russia. 69 And Washington is also training Georgia’s new Coast Guard. 70 However, Washington’s well-known ambivalence about committing force to Third World ethnopolitical conflicts suggests that U.S. military power will not be easily committed to saving its economic investment. But this ambivalence about committing forces and the dangerous situation, where Turkey is allied to Azerbaijan and Armenia is bound to Russia, create the potential for wider and more protracted regional conflicts among local forces. In that connection, Azerbaijan and Georgia’s growing efforts to secure NATO’s lasting involvement in the region, coupled with Russia’s determination to exclude other rivals, foster a polarization along very traditional lines. 71 In 1993 Moscow even threatened World War III to deter Turkish intervention on behalf of Azerbaijan. Yet the new Russo-Armenian Treaty and Azeri-Turkish treaty suggest that Russia and Turkey could be dragged into a confrontation to rescue their allies from defeat. 72 Thus many of the conditions for conventional war or protracted ethnic conflict in which third parties intervene are present in the Transcaucasus. For example, many Third World conflicts generated by local structural factors have a great potential for unintended escalation. Big powers often feel obliged to rescue their lesser proteges and proxies. One or another big power may fail to grasp the other side’s stakes since interests here are not as clear as in Europe. Hence commitments involving the use of nuclear weapons to prevent a client’s defeat are not as well established or apparent. Clarity about the nature of the threat could prevent the kind of rapid and almost uncontrolled escalation we saw in 1993 when Turkish noises about intervening on behalf of Azerbaijan led Russian leaders to threaten a nuclear war in that case. 73 Precisely because Turkey is a NATO ally, Russian nuclear threats could trigger a potential nuclear blow (not a small possibility given the erratic nature of Russia’s declared nuclear strategies). The real threat of a Russian nuclear strike against Turkey to defend Moscow’s interests and forces in the Transcaucasus makes the danger of major war there higher than almost everywhere else. As Richard Betts has observed, The greatest danger lies in areas where (1) the potential for serious instability is high; (2) both superpowers perceive vital interests; (3) neither recognizes that the other’s perceived interest or commitment is as great as its own; (4) both have the capability to inject conventional forces; and, (5) neither has willing proxies capable of settling the situation.

#### Indo-Pak water conflict goes nuclear

Zahoor ‘11

(Musharaf, is researcher at Department of Nuclear Politics, National Defence University, Islamabad, “Water crisis can trigger nuclear war in South Asia,” <http://www.siasat.pk/forum/showthread.php?77008-Water-Crisis-can-Trigger-Nuclear-War-in-South-Asia>, AM)

South Asia is among one of those regions where water needs are growing disproportionately to its availability. The high increase in population besides large-scale cultivation has turned South Asia into a water scarce region. The two nuclear neighbors Pakistan and India share the waters of Indus Basin. All the major rivers stem from the Himalyan region and pass through Kashmir down to the planes of Punjab and Sindh empty into Arabic ocean. It is pertinent that the strategic importance of Kashmir, a source of all major rivers, for Pakistan and symbolic importance of Kashmir for India are maximum list positions. Both the countries have fought two major wars in 1948, 1965 and a limited war in Kargil specifically on the Kashmir dispute. Among other issues, the newly born states fell into water sharing dispute right after their partition. Initially under an agreed formula, Pakistan paid for the river waters to India, which is an upper riparian state. After a decade long negotiations, both the states signed Indus Water Treaty in 1960. Under the treaty, India was given an exclusive right of three eastern rivers Sutlej, Bias and Ravi while Pakistan was given the right of three Western Rivers, Indus, Chenab and Jhelum. The tributaries of these rivers are also considered their part under the treaty. It was assumed that the treaty had permanently resolved the water issue, which proved a nightmare in the latter course. India by exploiting the provisions of IWT started wanton construction of dams on Pakistani rivers thus scaling down the water availability to Pakistan (a lower riparian state). The treaty only allows run of the river hydropower projects and does not permit to construct such water reservoirs on Pakistani rivers, which may affect the water flow to the low lying areas. According to the statistics of Hydel power Development Corporation of Indian Occupied Kashmir, India has a plan to construct 310 small, medium and large dams in the territory. India has already started work on 62 dams in the first phase. The cumulative dead and live storage of these dams will be so great that India can easily manipulate the water of Pakistani rivers. India has set up a department called the Chenab Valley Power Projects to construct power plants on the Chenab River in occupied Kashmir. India is also constructing three major hydro-power projects on Indus River which include Nimoo Bazgo power project, Dumkhar project and Chutak project. On the other hand, it has started Kishan Ganga hydropower project by diverting the waters of Neelum River, a tributary of the Jhelum, in sheer violation of the IWT. The gratuitous construction of dams by India has created serious water shortages in Pakistan. The construction of Kishan Ganga dam will turn the Neelum valley, which is located in Azad Kashmir into a barren land. The water shortage will not only affect the cultivation but it has serious social, political and economic ramifications for Pakistan. The farmer associations have already started protests in Southern Punjab and Sindh against the non-availability of water. These protests are so far limited and under control. The reports of international organizations suggest that the water availability in Pakistan will reduce further in the coming years. If the situation remains unchanged, the violent mobs of villagers across the country will be a major law and order challenge for the government. The water shortage has also created mistrust among the federative units, which is evident from the fact that the President and the Prime Minister had to intervene for convincing Sindh and Punjab provinces on water sharing formula. The Indus River System Authority (IRSA) is responsible for distribution of water among the provinces but in the current situation it has also lost its credibility. The provinces often accuse each other of water theft. In the given circumstances, Pakistan desperately wants to talk on water issue with India. The meetings between Indus Water Commissioners of Pakistan and India have so far yielded no tangible results. The recent meeting in Lahore has also ended without concrete results. India is continuously using delaying tactics to under pressure Pakistan. The Indus Water Commissioners are supposed to resolve the issues bilaterally through talks. The success of their meetings can be measured from the fact that Pakistan has to knock at international court of arbitration for the settlement of Kishan Ganga hydropower project. The recently held foreign minister level talks between both the countries ended inconclusively in Islamabad, which only resulted in heightening the mistrust and suspicions. The water stress in Pakistan is increasing day by day. The construction of dams will not only cause damage to the agriculture sector but India can manipulate the river water to create inundations in Pakistan. The rivers in Pakistan are also vital for defense during wartime. The control over the water will provide an edge to India during war with Pakistan. The failure of diplomacy, manipulation of IWT provisions by India and growing water scarcity in Pakistan and its social, political and economic repercussions for the country can lead both the countries toward a war. The existent A-symmetry between the conventional forces of both the countries will compel the weaker side to use nuclear weapons to prevent the opponent from taking any advantage of the situation. Pakistan's nuclear programme is aimed at to create minimum credible deterrence. India has a declared nuclear doctrine which intends to retaliate massively in case of first strike by its' enemy. In 2003, India expanded the operational parameters for its nuclear doctrine. Under the new parameters, it will not only use nuclear weapons against a nuclear strike but will also use nuclear weapons against a nuclear strike on Indian forces anywhere. Pakistan has a draft nuclear doctrine, which consists on the statements of high ups. Describing the nuclear thresh-hold in January 2002, General Khalid Kidwai, the head of Pakistan's Strategic Plans Division, in an interview to Landau Network, said that Pakistan will use nuclear weapons in case India occupies large parts of its territory, economic strangling by India, political disruption and if India destroys Pakistan's forces. The analysis of the ambitious nuclear doctrines of both the countries clearly points out that any military confrontation in the region can result in a nuclear catastrophe. The rivers flowing from Kashmir are Pakistan's lifeline, which are essential for the livelihood of 170 million people of the country and the cohesion of federative units. The failure of dialogue will leave no option but to achieve the ends through military means.

Middle east war escalates and goes nuclear

**Steinbach ‘02**

(John, Center for Research on Globalization, 3-3, http://www.globalresearch.ca/articles/STE203A.html)

Meanwhile, the existence of an arsenal of mass destruction in such an unstable region in turn has serious implications for future arms control and disarmament negotiations, and even the threat of nuclear war. Seymour Hersh warns, "Should war break out in the Middle East again,... or should any Arab nation fire missiles against Israel, as the Iraqis did, a **nuclear escalation**, once unthinkable except as a last resort, would now be a strong probability."(41) and Ezar Weissman, Israel's current President said "The nuclear issue is gaining momentum(and the) next war will not be conventional."(42) Russia and before it the Soviet Union has long been a major(if not the major) target of Israeli nukes. It is widely reported that the principal purpose of Jonathan Pollard's spying for Israel was to furnish satellite images of Soviet targets and other super sensitive data relating to U.S. nuclear targeting strategy. (43) (Since launching its own satellite in 1988, Israel no longer needs U.S. spy secrets.) Israeli nukes aimed at the Russian heartland seriously complicate disarmament and arms control negotiations and, at the very least, the unilateral possession of nuclear weapons by Israel is enormously destabilizing, and dramatically lowers the threshold for their actual use, if not for all out nuclear war. In the words of Mark Gaffney, "... if the familar pattern(Israel refining its weapons of mass destruction with U.S. complicity) is not reversed soon- for whatever reason- the deepening Middle East conflict could trigger a world conflagration." (44)

#### No diplomacy or institutions

Adam Radin 10, masters in security studies from the naval postgraduate school, “the security implications of water: prospects for instability or cooperation in south and central asia”, March, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA518674>

Water, an issue so important to numerous facets of each state’s economy and overall stability, must not be left to loosely observed and nonbinding agreements. Tajikistan has even gone as far as to appeal to the United Nations General Assembly to focus on the “Central Asia water dilemma.”142 In a region that is still developing, and where the government’s survival rely more on its relations with it people versus its regional neighbors, domestic needs will continue to trump international cooperation. As Linn notes in his plan, the need for global actors to take an active role is likely needed in order for sustained cooperation. Additionally, this also provides an opportunity for Russia to actively insert itself through diplomacy and infrastructural investments, seeing that they still consider the CARs under their sphere of influence.143

The chapter presents a contrasting case study to South Asia, as in Central Asia water is not viewed as a regional security issue, but in terms of fulfilling short-term domestic needs. Without the looming threat of conflict or significant retribution from regional neighbors, cooperation is consistently undervalued and abandoned once domestic pressures increase. The problem with this pattern is that resources will likely continue to deteriorate and the CARs will continue to be dependent on each other to provide water and energy. Without sustained and flexible cooperation, the region at the very least will see greater stresses on government to provide for their populations, leading to domestic and potential regional instability.

#### Only SMRs solve – scalable desalination

Palley 11 (Reese Palley - 1945-1949 The New School for Social Research¶ 1949-1952 The London School of Economics. Writer and historian)

(*The Answer: Why Only Inherently Safe, Mini Nuclear Power Plants Can Save Our World.* Pg. 168-171)

Desalinization and World Water Shortage

In 1990 Florida, Georgia, and Alabama began fighting over scarce water rights from increasingly scarce sources. After twenty years of fighting over the water from Lake Lanier, the sole source of most of the potable water for Atlanta, the city lost a federal court decision and now faces the daunting task of finding six hundred million gallons of potable water a day that just might not exist.

This is far from an isolated case in the United States, as states and municipalities are loading increas¬ing demands on limited supplies of water. The battle in the West has so far been contained within the courts.

The third world has long been rent in recent droughts, by the search for water. In subsistence economies, on marginal land water is not a convenience but a matter of life and death. As a result small wars have been fought, rivers diverted, and wells poisoned in what could be a warning of what is to come as industrialized nations begin to face failing water supplies.

Quite aside from ,the demand for potable water is the dependence of enormous swaths of industry and agriculture on oceans of water used for processing, ena¬bling, and cleaning a thousand processes and products. It is interesting to note that fresh water used in both industry and agriculture is reduced to a nonrenewable resource as agriculture adds salt and industry adds a chemical brew unsuitable for consumption.

More than one billion people in the world already lack access to clean water, and things are getting worse. Over the next two decades, the average supply of water ^per person will drop by a third, condemning millions of people to waterborne diseases and an avoidable prema¬ture death.81

So the stage is set for water access wars between the first and the third worlds, between neighbors down-stream of supply, between big industry and big agricul¬ture, between nations, between population centers, and ultimately between you and the people who live next door for an already inadequate world water supply that is not being renewed. As populations inevitably increase, conflicts will intensify.82

It is only by virtue of the historical accident of the availability of nuclear energy that humankind now has the ability to remove the salt and other pollutants to supply all our water needs. The problem is that desali¬nation is an intensely local process. Some localities have available sufficient water from renewable sources to take care of their own needs, but not enough to share with their neighbors, and-it is here that the scale of nuclear energy production must be defined locally.

Large scale 1,000 MWe plants can be used to desal¬inate water as well as for generating electricity. However we cannot build them fast enough to address the prob¬lem, and, if built they would face the extremely expen¬sive problem of-distributing the water they produce. Better, much better, would be to use small desaliniza-tion plants sited locally.

Beyond desalination for human use is the need to green some of the increasing desertification of vast areas such as the Sahara. Placing twenty 100 MWe plants a hundred miles apart along the Saharan coast would green the coastal area from the Atlantic Ocean to the Red Sea, a task accomplished more cheaply and quickly than through the use of gigawatt plants.83 This could proceed on multiple tracks wherever deserts are avail¬able to be reclaimed.

Leonard Orenstein, a researcher in the field of desert reclamation, speculates:

If most of the Sahara and Australian outback were planted with fast-growing trees like eucalyptus, the forests could draw down about 8 billion tons of carbon a year—nearly as much as people emit from burning fossil fuels today. As the forests matured, they could continue taking up this much carbon for decades.84

The use of small, easily transported, easily sited, and walk away safe nuclear reactors dedicated to desali-nation is the only answer to the disproportionate distri¬bution of water resources that have distorted human habitation patterns for millennia. Where there existed natural water, such as from rivers, great cities arose and civilizations flourished. Other localities lay barren through the ages. We now have the power, by means of SMRs profiled to local conditions, not only to attend to existing water shortages but also to smooth out dispro¬portionate water distribution and create green habita¬tion where historically it has never existed.

The endless wars that have been fought, first over solid bullion gold and then over oily black gold, can now engulf us in the desperate reach for liquid blue gold. We need never fight these wars again as we now have the nuclear power to fulfill the biblical ability to "strike any local rock and have water gush forth."

#### Key to deescalate conflicts

Palley ‘11

Reese Palley, The London School of Economics, 2011, The Answer: Why Only Inherently Safe, Mini Nuclear Power Plans Can Save Our World, p. 168-71

The third world has long been rent in recent droughts, by the search for water. In subsistence economies, on marginal land, water is not a convenience but a matter of life and death. As a result small **wars have been fought, rivers diverted, and wells poisoned in what could be a warning of what is to come as industrialized nations begin to face failing water supplies.** Quite aside from the demand for potable water is the dependence of enormous swaths of industry and agriculture on oceans of water used for processing, enabling, and cleaning a thousand processes and products. It is interesting to note that fresh water used in both industry and agriculture is reduced to a nonrenewable resource as agriculture adds salt and industry adds a chemical brew unsuitable for consumption. More than one billion people in the world already lack access to clean water, and things are getting worse. Over the next two decades, the average supply of water per person will drop by a third, **condemning millions** of people **to** waterborne **diseases** and an avoidable premature death.81 So **the stage is set for water access wars between** the **first and the third worlds**, between **neighbors** downstream of supply, between **big industry** and big agriculture, between **nations**, between **population** centers, and ultimately between you and the people who live next door for an already inadequate world water supply that is not being renewed. **As populations inevitably increase, conflicts will intensify**.82 It is only by virtue of the historical accident of the availability of nuclear energy that humankind now has the ability to remove the salt and other pollutants to supply all our water needs. The problem is that **desalination is an intensely local process**. Some localities have available sufficient water from renewable sources to take care of their own needs, but not enough to share with their neighbors, and it **is here that the scale of nuclear energy production must be defined locally.** Large scale 1,000 MWe plants can be used to desalinate water as well as for generating electricity However we cannot build them fast enough to address the problem, and, if built they would face the extremely expensive problem of distributing the water they produce. Better, much better, would be to use small desalinization plants sited locally. Beyond desalination for human use is the need to green some of the increasing desertification of vast areas such as the Sahara. Placing twenty 100 MWe plants a hundred miles apart along the Saharan coast would green the coastal area from the Atlantic Ocean to the Red Sea, a task accomplished more cheaply and quickly than through the use of gigawatt plants.83 This could proceed on multiple tracks wherever deserts are available to be reclaimed. Leonard Orenstein, a researcher in the field of desert reclamation, speculates: If most of the Sahara and Australian outback were planted with fast-growing trees like eucalyptus, the forests could draw down about 8 billion tons of carbon a year—nearly as much as people emit from burning fossil fuels today. As the forests matured, they could continue taking up this much carbon for decades.84 **The use of small, easily transported**, easily **sited**, and walk away **safe nuclear reactors dedicated to desalination is the only answer** to the disproportionate distribution of water resources that have distorted human habitation patterns for millennia. Where there existed natural water, such as from rivers, great cities arose and civilizations flourished. Other localities lay barren through the ages. We now have the power, by means of SMRs profiled to local conditions, not only to attend to existing water shortages but also to smooth out disproportionate water distribution and create green habitation where historically it has never existed. **The endless wars that have been fought**, first over solid bullion gold and then over oily black gold, **can now engulf us in the desperate reach for liquid blue gold. We need never fight these wars again as we now have the nuclear power to fulfill the** biblical **ability to “strike any local rock and have water gush forth**.”

#### It’s economically viable

Gamini Seneviratne 7, Nuclear News’s Vienna Correspondent, “Research projects show nuclear

desalination economical”, April, <http://www.ans.org/pubs/magazines/nn/docs/2007-4-3.pdf>

The desalination of seawater using nuclear power is cost-effective compared with other primary energies, according to researchers in 10 countries who have studied various options at specific sites in their own countries. Their findings show nuclear to be at least **competitive in all cases**.

Researchers from Argentina, China, Egypt, France, India, Korea, Pakistan, Russia, Syria, and the United States focused on the economics of producing potable water by using various desalination technologies and energy sources at particular sites. The participants followed an agreed procedure throughout a coordinated research project (CRP), Economics of Nuclear Desalination— New Developments and Site-specific Studies, set up by the International Atomic Energy Agency. The findings of the studies, carried out over three years and ending in November 2006, are included in a technical document (IAEA-TECDOC) already at the printer.

“There is a dire shortage of fresh water for drinking in many countries already, and when you realize that 70 percent of the planet is covered with water but only 2.5 percent of that is fresh water, it is hardly surprising,” Ibrahim Khamis, who heads the IAEA’s desalination unit, told Nuclear News. He added that 70 percent of that fresh water is frozen in the polar icecaps and Greenland, and most of the rest is in soil moisture, inaccessible underground aquifers, or comes as heavy rain that is difficult to capture. “So only some 0.008 percent, about 70 000 km3, is readily available, and even that is very unevenly distributed.”

According to Khamis, recent statistics show 2.3 billion people living in water stressed areas, 1.7 billion of them in areas where the availability is on average less than 1000 m3 a year. Given human population growth and the increasing demands of industry and agriculture, the projections point to a continuously worsening situation, **even if the effects of global warming are not taken into account**. Khamis said he foresaw a time when nuclear power will be sought for desalination rather than for electricity generation, at least in some specific regions of the world such as the Middle East. “You can live without electricity for quite a long time; without water, only a matter of days.” The U.S. study, which was undertaken by Argonne National Laboratory (ANL), notes that “the need for fresh water, high-purity water, and other grades of water for various domestic, industrial, and agricultural applications is ever increasing in the United States.” Demand is driven mainly by population, as well as continuous economic and technological growth, and it is predicted that more than an additional 60 billion m3 of water a year will be needed for municipal and light industrial uses by the year 2020. An additional 11–19 liters per day per person will be needed to generate hydrogen, should transportation be based mainly on hydrogen-powered vehicles in the future. “Cogeneration of water and power could offer a major portion of the additional water needed, in addition to providing much needed energy for maintaining sustainable development and growth,” the ANL report says.

The IAEA report says that desalinating seawater is not the only solution under discussion for remedying the water scarcity, but it is an important one. There are essentially two methods: distillation using heat, and the use of membranes and electricity directly. The two main distillation modes, known as multistage flash (MSF) and multieffect distillation (MED), both involve heating seawater to produce steam, followed by evaporation, condensation, and, finally, pure water collection. The method using membranes, which is called reverse osmosis (RO), uses electricity to create a pressure differential across a semipermeable membrane, allowing fresh water to pass through to the low-pressure side, and leaving salty seawater on the high-pressure side.

Desalination plant capacity worldwide is close to 40 million m3 today, mostly by distillation using fossil energy, and mostly in the Middle East and North Africa. Nuclear desalination has so far been exclusively for use within the nuclear power plants themselves, except at the Soviet-built BN-350 fast reactor in Aktau, Kazakhstan, which supplied potable water to local communities until it was shut down in 1999.

Currently, only India supplies nuclear desalinated water outside the plant site. Having earlier used MSF to get plant-use water, it has also integrated RO to the desalination unit at its Kalpakkam pressurized heavy-water reactor (PHWR) in Chenai, and it has begun (experimentally) supplying some water outside the power station. Pakistan has begun a similar project at its Karachi nuclear power plant (KANUPP) to couple a 1600 m3/day MED unit to the nuclear plant, which earlier operated a 454 m3/day RO facility for plant use.

Fresh water is needed for many purposes. Saudi Arabia alone already irrigates crops with desalinated water. A number of countries, notably Egypt, the Persian Gulf States, Israel, Jordan, and Libya, depend on the technology to maintain tourism. Khamis said **nuclear desalination has been held back by** two key factors: **economics, and the unavailability of reactors of appropriate size**.

The CRP addressed the former, comparing cost performance between reactor plus desalination method combinations. The perception that nuclear is less cost-effective than other energy sources was repudiated by the studies.

The report says that the country case studies “have shown that in general, the nuclear desalination costs can vary from $0.5 to $0.94/m3 for RO, from $0.6 to $0.96/m3 for MED, and from $1.18 to $1.48/m3 for MSF plants. All nuclear options are economically attractive as compared with the gas turbine combined-cycle–based desalination systems, as long as gas prices remain higher than $150/toe [metric tons oil equivalent] or $21/bbl [barrel].”

#### **Countries would adopt desalination.**

Crail and Lasky-Fink ’08, Peter Crail, nonproliferation analyst with the Arms Control Association (ACA), been cited in numerous global publications (economist, wsj, cnn, etc.), Jessica Lasky-Fink, nonprolif analyst with the ACA, “Middle Eastern States Seeking Nuclear Power,” http://www.armscontrol.org/act/2008\_05/MiddleEastEnergy

In recent years, more than a dozen states in the Middle East have expressed an interest in developing nuclear energy. These states have offered a number of official rationales for their interest, including powering water desalination plants, diversifying their energy industry in the face of increasing energy demands, and furthering economic and scientific development. The timing of this renewed interest, which coincides with suspicions regarding Iran's nuclear aspirations, suggests that security interests also provide a motivating factor for at least some states in the region.

States in the region have held an interest in developing nuclear energy, in particular for water desalination purposes, for more than a decade. Egypt proposed the construction of nuclear plants for desalination first in 1964, then again in 1974 and 1983. Cairo cancelled those plans due to safety concerns following the 1986 Chernobyl accident. Turkey has also considered the construction of nuclear plants since 1970. In addition, in 1996, Algeria, Egypt, Libya, Morocco, and Tunisia requested that the International Atomic Energy Agency (IAEA) conduct a feasibility study on nuclear desalination in North Africa.

Beyond the renewed interest in nuclear energy expressed by these states with prior nuclear energy pursuits, Bahrain, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, the United Arab Emirates (UAE), and Yemen have indicated their intent to develop nuclear energy.

### Plan

The United States federal government should remove restrictions preventing a parallel certification process for small modular reactors.

### 1AC – Solvency

#### Contention 3: Small Modular Reactors

#### Licensing is the biggest hurdle for small reactors now

Wheeler 11 (Brian Wheeler - Associate Editor of Power Engineering)

(February 11, “Small Modular Reactors Are "Hot"” proquest. Power Engineering. Volume 115. No. 2)

The distant timeframe is for numerous reasons. The plan is to build a SMR, start generating power and bring more online to form a larger nuclear plant, as needed. The SMRs are expected to be ready, as the DOE calls it, to "plug and play" when the reactor arrives on-site. Sounds simple? There are still obstacles that need to be defeated before the arrival of a commercial SMR. Licensing is the number one challenge at this point. The Nuclear Regulatory Commission established the Advanced Reactor Program in 2009 to focus on new licensing technologies. NRC is studying several pre-application reviews to identify possible technical issues, such as safety, security and emergency planning. The light water small reactors may be very similar to large designs, but they still must go through a separate licensing process. Vendors that engage the NRC early can resolve these technical issues. To address safety and security concerns, the small reactors will be built with post-9/11 safety concepts into the designs. NRC expects the first application submission by 2012. The funds for the research and development of the SMR could pose a problem as well. But the Obama administration has requested $38.9 million for the 2011 fiscal year budget for the development of SMRs. The DOE supports public and private partnerships to advance mature SMR designs and supports "research and development activities to advance the understanding and demonstration of innovative reactor technologies and concepts." Among other goals, in FY2011 the DOE plans to “solicit, select and award project(s) with industry partners for cost-sharing the U.S. NRC review of design certification document for up to two of the most promising light water SMR concept(s) for near-term licensing and deployment” and “develop recommendations, in collaboration with NRC and industry, for changes in NRC policy, regulations or guidance to license and enable SMRs for deployment in the U.S. And as the general public’s interest in energy continues to grow, so does the interest in SMRs, said Philip Moor, vice president of consulting and management firm High Bridge Associates. If approved, the funding towards the development of small reactors in the U.S. may play a part of the International Atomic Energy Agency’s estimate of between 49 to 97 SMRs built by 2030. Utilities may have more interest in SMRs once the NRC gains more expertise and the uncertainty of deploying these reactors in the U.S. can be addressed. And if the regulator approves any of the designs for licensing, the U.S. may see a stronger nuclear renaissance take place. As we have seen, some operators have scaled back or completely pulled out on plans to build new large reactors due to the cost. The ability to construct these reactors in factories could lead to lower costs and shorter construction times. Of course, the upfront capital to develop and engineer the facility is going to be needed. But after that, the reactors can be built in the controlled environment in repetition to lower cost, which could in return lead to more clean energy on the grid.

US nuclear policy is modeled – other countries will turn to SMRs

Jessica Lovering, Ted Nordhaus, and Michael Shellenberger are policy analyst, chairman, and president of the Breakthrough Institute, a public policy think tank and research organization, 9/7/2012 (http://www.foreignpolicy.com/articles/2012/09/07/out\_of\_the\_nuclear\_closet?page=full)

Nuclear has enjoyed bipartisan support in Congress for more than 60 years, but the enthusiasm is running out. The Obama administration deserves credit for authorizing funding for two small modular reactors, which will be built at the Savannah River site in South Carolina. But a much more sweeping reform of U.S. nuclear energy policy is required. At present, the Nuclear Regulatory Commission has little institutional knowledge of anything other than light-water reactors and virtually no capability to review or regulate alternative designs. This affects nuclear innovation in other countries as well, since the NRC remains, despite its many critics, the global gold standard for thorough regulation of nuclear energy. Most **other countries follow the NRC's lead when it comes to establishing new** technical and operational **standards for the design, construction, and operation of nuclear plants**.

What's needed now is a new national commitment to the development, testing, demonstration, and early stage commercialization of a broad range of new nuclear technologies -- from much smaller light-water reactors to next generation ones -- in search of a few designs that can be mass produced and deployed at a significantly lower cost than current designs. This will require both greater public support for nuclear innovation and an entirely different regulatory framework to review and approve new commercial designs.

In the meantime, developing countries will continue to build traditional, large nuclear power plants. But time is of the essence. With the lion's share of future carbon emissions coming from those emerging economic powerhouses, the need to develop smaller and cheaper designs that can scale faster is all the more important.

#### **Parallel certification necessary to streamline the licensing process.**

Campagna and Govers ’10, Mark S. Campagna, 25 years of experience in the nuclear field, fmr naval officer in control of nuclear powered warships, nuclear project engineer, and Richard A. Govers, Senior VP at the Chamberlain Group, “Utilization of NRC Manufacturing License for Small Modular Reactors,” American Nuclear Society

6.0 RECOMMENDATIONS

1. Additional regulatory guidance is needed. The NRC should clarify the means to cooperate with the DOE and U.S. Departments of Commerce, Defense, Treasury, and State perhaps resulting in a new Regulatory Guide (RG) that combines the aspects of 10 CFR 110 (export of material) and (DOE) 10 CFR 810 (export of technology) rules, given the increased interest in exporting small modular reactor technology globally. A good interim solution would also be development of a related task force to develop a Nuclear Energy Institute (NEI)–style guideline that could more efficiently evolve into an NRC RG. This approach enables thorough review and update of priorities with respect to relevant documentation.

2. Design Centered Working Group (DCWG)–style collaboration should examine relevant federal precedent(s). A new American Nuclear Society (ANS)–sponsored DCWG should further investigate other analogous industries (e.g., aircraft and weapons) that manufacture and export high-technology equipment for precedents, in parallel with further study. The DCWG could also be an NEI Working Group. A DCWG would enhance visibility and establish accountability of NEI members, including utilities. The ANS can continue to plan or initially set up the DCWG, but there are limits as to what can be accomplished with volunteer support.

3. Use DCWG Forum to optimize certification pathway(s). A post-June 2010 ANS-sponsored Technical Working Group/DCWG should further examine the ML for small modular reactor designs. This evaluation should include a critical integrated review of viable alternate certification and approval pathways, including DCs, MLs, combined OLs, SDAs, CPs, and common (10 CFR 52, Appendix N) OLs.

4. Consider a parallel certification path; near-term exemptions/waivers along with rule changes. The NRC should establish a parallel path whereby near-term exemptions or waivers can be granted for small modular reactor lead-launch clients while in pursuit of rule change process improvements. The small modular reactor industry should pursue a petition for rulemaking to provide additional flexibility and certainty to the ML process for small modular reactor projects. Such revisions will enhance the effectiveness of standardization by better matching the ML process to the commercial/business needs of small modular reactors manufactured and assembled for delivery, essentially ready to use at a prepared site.

#### Expedites construction time to 3 years.

Locatelli and Mancini 10 (Giorgio Locatelli and Mauro Mancini - Politecnico di Milano, Dept. Management, Economics and Industrial Engineering)

(11/13/10 “The role of the reactor size for an investment in the nuclear sector: An evaluation of not-financial parameters” http://www.sciencedirect.com/science/article/pii/S0149197010001575)

9. Time-to-market

Time-to-market is the time required to license and build planned NPPs, and so to sell the first MWh to the electric system. It limits the opportunities created by the broad-scale deregulation of many electricity markets in the world (U.S. DOE, 2001).

Licensing time. Since all the SMRs in the same site are identical, it is oblivious that the same steps in the licensing process, after the first unit, become redundant. Licensing time for an SMR NOAK (Nth-Of-A-Kind), in a certain site, will be shorter than an LR (Mancini et al., 2009). On the contrary, it is equal considering the FOAK unit of SMRs and LRs. Since the first MWh will be sold after the delivery of the FOAK, the licensing time is not a differential part of LRs’ and SMRs’ time-to-market.

Construction time. The differential part of time-to-market is the construction timeframe: it includes the pre-construction and site preparation activities, plant construction (from first concrete to fuel load), fuel load and pre-operational testing.

Site preparation and procurement for an LR take 1.5 years, while field installation and pre-operational tests take 3.5 years: the total construction time for an LR is five years, considering the most common design installed worldwide ( [U.S. DOE, 2005], [World Nuclear Association, 2009], [Nuclear Industry Association, 2008], [Oxford Economics, 2008] and [INEEL, 2004]). On the other side, construction of a Deliberately SMR takes three years ( [U.S. DOE and GIF IV, 2002], [World Nuclear Association, 2009] and [U.S. DOE, 2001]). So SMRs predate the sale of the first MWh of two years.

Time-to-market is differential and promotes the SMR choice.

#### Streamlining bureaucratic licensing transforms the nuclear industry – the market is strong enough to support SMRs.

Spencer 11 (Jack Spencer is Research Fellow in Nuclear Energy in the Thomas A. Roe Institute for Economic Policy Studies)

(2/15/11 “Is the President’s Small Reactor Push the Right Approach?” http://blog.heritage.org/2011/02/15/is-the-presidents-small-reactor-push-the-right-approach/)

Establishing a Regulatory Framework

The Obama budget essentially acknowledged the regulatory problem in his budget, which requests $67 million for DOE to work on licensing technical support for small light water reactors. While the intent is correct, the approach is wrong. The Administration is relying on the same bureaucratic, taxpayer-funded process that is stifling large reactor certification when it should use this opportunity to establish a new, more efficient licensing pathway.

Instead of paying for DOE bureaucrats to get in the way of commercial progress, the Administration should commit to ensuring that the U.S. Nuclear Regulatory Commission is fully equipped and prepared to regulate new reactor designs. This should include high-temperature gas-cooled reactors and liquid-metal-cooled fast reactors as well as small light water designs. This would provide a strong regulatory foundation for each of the expected design certification applications. The DOE should have no role in the process. If a company wants to get its reactor design certified for commercial use in the U.S., it should be able to go straight to the NRC for that service.

Such an approach would substantially decrease the risk associated with getting designs certified, which in turn would alleviate the need for public support. Then, instead of seeking taxpayer funds to offset regulatory risk, reactor designers could develop investors to support the certification process.

Build the Framework and They Will Come

Nuclear energy is already clean, safe, and affordable. Introducing small reactors could make it transformational. But the federal government should not drive the process. It should be supported by the market. If the underlying technology is as strong as many of us believe it to be, the federal government needs only to provide a predictable, stable, efficient, and fair regulatory environment. The rest will happen on its own—or it won’t.

#### SMRs rejuvenate the nuclear industry by resolving financing challenges.

Davenport 12 [Coral, energy and environment correspondent – The National Journal, Cleaner Energy, Beyond the Horizon April 19, 2012 The National Journal, Lexis]

However, many of the nation's nuclear power reactors will reach retirement age in the coming decades, and there are no plans to replace them. The biggest challenge in building a nuclear-power plant is financing: It can take up to $10 billion and six years to build a plant, compared with less than half that time and cost to build a natural-gas facility. Some of that cost is for construction, and some of it is for higher rates of insurance and liability in the wake of the Fukushima nuclear disaster in Japan. Either way, the nuclear-power industry says that Wall Street isn't interested in investing in new plants, and the result is a freeze on getting this major source of new zero-carbon power onto the electric grid for the foreseeable future. But what if a nuclear-power plant wasn't so expensive to build? Small modular reactors might solve that problem. Companies such as Northrup Grumman and Babcock & Wilcox have developed plans to mass-produce small, identical modular nuclear reactors that could be built for a fraction of the cost of existing plants. Two main factors drive the cost of a nuclear power plant: size and on-site construction. A typical nuclear power plant is massive and produces enough electricity to power a city (about 1 million homes). On-site construction of such a project requires billions of dollars, reams of paperwork, and years of regulatory hurdles. So engineers have designed nuclear plants that are one-third the size of a typical plant and can be cheaply mass-produced and delivered to various sitesmuch like the savings on prefabricated houses. Mass-producing small plants would cut down on the price and make low-carbon nuclear power available to rural communities that can't consider it otherwise. Electric utilities could customize the size of the plants, ordering multiple reactors and getting a discount for a two-pack, four-pack, or six-pack of identical reactors that would work together. Or a power company could just order premade plug-and-play reactors as its service population grows. The modular reactor designs include key improvements over older nuclear plants: They have advanced safety systems, allowing them to operate for up to three days in the case of power outage and thus offer better prevention against a Fukushima-style meltdowns; they also will be able to burn and reuse parts of the spent nuclear fuel, cutting down on nuclear waste. For now, however, these designs remain on the drawing board. To get a small modular plant plugged into the grid, a utility will first have to pay up to $500 million for the design to be approved and permitted by the Nuclear Regulatory Commissionabout a five-year process.

#### Cheap natural gas won’t block SMR commercialization

Marston 12 (Theodore U. Marston PHD. – Principal @ Marston Consulting. Board of Managers, Idaho National Laboratory. Formerly DOE NERAC Generation IV Oversight Committee 2001-2002)

(March 2012, “Status of Small Modular Light Water Reactors in the US” in “The Nuclear Decarbonization Option: Profiles of Selected Advanced Reactor Technologies”

The primary economic challenge to the commercialization of smLWRs is whether the electricity production costs are (1) affordable and (2) competitive with other forms of generation. With regard to affordability, smLWRs offer potential optionality to the US electric utilities, when the only real options for large generation additions are gas fired, coal fired or large nuclear plants. SmLWRs, being smaller and modular, potentially offer a more manageable nuclear option. SmLWRs are more ‘affordable’, i.e. less of a fiscal risk. They can be deployed in much smaller increments, matching the utilities’ load growths better and reduce the ‘single shaft’ generation risk to an acceptable level.

Competing with other forms of electricity generation is a much greater challenge today. Vast amounts of natural gas are being discovered across the US in so-called tight gas (shale) deposits, resulting in cheap and abundant natural gas. The current spot market price of natural gas is less than $3.00/MMBTU. Carbon restraints (taxes or credits), which would improve the competitiveness of smLWRs, appear unlikely to arise in the near future. However it is expected that carbon emissions from large stationary sources will be reduced systematically over time one way or another, and US utilities are very interested in reducing their ‘carbon footprints’. If the economics of the smLWRs are what some of the designs claim, there is a real chance to compete with natural gas fired plants, particularly when carbon constraints are in place. The cost competitiveness of smLWR depend heavily on achieving the following opportunities:

l Streamline design and manufacturing are necessary to offset the economies of scale of other generation options, particularly nuclear plants. ALWRs are becoming larger and larger due to the economies of scale. The only prospect to reverse this effect for the smaller smLWRs is to streamline the shop fabrication of the NSSS and other modules, ship them to the site and install them rapidly. The requisite quality standards must be maintained throughout the entire process.

l Modularity of the smLWRs provides the opportunity to transform how we design, build, operate and decommission nuclear power plants.

l Reduce construction time by modularization and construction efficiencies

l SMRs do not require loan guarantees. This sets the smLWR apart from the larger ALWR, which currently benefit from federal loan guarantees, especially for regulated utilities. Experience shows the loan guarantee process to be a protracted and expensive affair, requiring the expenditure of significant political and fiscal capital.

#### And, SMRs are super safe – accidents, attack, disasters

Rosner and Goldberg 11 (Robert Rosner, Professor, Departments of Astronomy and Astrophysics, and Physics, and the College; Senior Fellow @ UChicago. Stephen M. Goldberg is Special Assistant to the Director at Argonne National Laboratory)

(November 2011. Energy Policy Institute at Chicago The Harris School of Public Policy Studies “Small Modular Reactors – Key to Future Nuclear Power Generation in the U.S.” https://epic.sites.uchicago.edu/sites/epic.uchicago.edu/files/uploads/EPICSMRWhitePaperFinalcopy.pdf)

While the focus in this paper is on the business case for SMRs, the safety case also is an important element of the case for SMRs. Although SMRs (the designs addressed in this paper) use the same fuel type and the same light water cooling as gigawatt (GW)-scale light water reactors (LWRs), there are significant enhancements in the reactor design that contribute to the upgraded safety case. Appendix A provides a brief overview of the various technology options for SMRs, including the light water SMR designs that are the focus of the present analysis.

Light water SMR designs proposed to date incorporate passive safety features that utilize gravity-driven or natural convection systems – rather than engineered, pump-driven systems – to supply backup cooling in unusual circumstances. These passive systems should also minimize the need for prompt operator actions in any upset condition. The designs rely on natural circulation for both normal operations and accident conditions, requiring no primary system pumps. In addition, these SMR designs utilize integral designs, meaning all major primary components are located in a single, high-strength pressure vessel. That feature is expected to result in a much lower susceptibility to certain potential events, such as a loss of coolant accident, because there is no large external primary piping. In addition, light water SMRs would have a much lower level of decay heat than large plants and, therefore, would require less cooling after reactor shutdown. Specifically, in a post-Fukushima lessons-learned environment, the study team believes that the current SMR designs have three inherent advantages over the current class of large operating reactors, namely:

1. These designs mitigate and, potentially, eliminate the need for back-up or emergency electrical generators, relying exclusively on robust battery power to maintain minimal safety operations.

2. They improve seismic capability with the containment and reactor vessels in a pool of water underground; this dampens the effects of any earth movement and greatly enhances the ability of the system to withstand earthquakes.

3. They provide large and robust underground pool storage for the spent fuel, drastically reducing the potential of uncovering of these pools.

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