# Contention 1 is Nuclear Proliferation

#### **The growth of nuclear power causes proliferation – no safeguards solve**

**Ferguson** **‘7** Charles D. Ferguson Scientific Consultant, Fellow for Science and Technology, The James Martin Center for Nonproliferation Studies (November 30th 2007 “Proliferation Risks of Nuclear Power Programs” ), NTI. https://www.nti.org/analysis/articles/risks-nuclear-power-programs/

Introduction: The Clear and Present Danger of Nuclear Proliferation Risks

While for more than fifty years the problem of using peaceful nuclear power to fuel nuclear weapons programs has threatened international security, in recent years four issues have brought renewed attention to proliferation dangers from states and non-state groups. First, the increasing real and perceived threats of nuclear terrorism after September 11, 2001, raised concerns that terrorist groups could potentially obtain nuclear explosive materials from either civilian or military nuclear programs. Second, the revelations by an Iranian dissident group at a press conference in August 2002 of Iran's progress in enriching uranium and building a nuclear research reactor that could produce plutonium – two activities that could also fuel weapons programs – demonstrated the shortcoming of traditional nuclear safeguards in detecting these activities. Although it is uncertain whether Iranian political leaders will decide to order production of nuclear weapons, it is clearer that Iran is nearing a break-out capability to make nuclear weapons materials because of the ongoing uranium enrichment program. Third, the unveiling in December 2003 of the A. Q. Khan nuclear black market showed the leakiness of many governments' export controls in stopping the flow of weapon-usable nuclear technologies.

Finally, the buzz about a nuclear power renaissance has stimulated about two dozen countries to renew or express new interest in nuclear energy for peaceful purposes. These peaceful activities might serve as a cover for weapons programs for some of these countries. Currently, 31 countries use about 440 commercial nuclear reactors to generate about 16 percent of the world's electricity. Concerns about energy security and global warming could spur a significant increase in nuclear energy use in the coming decades. (Nuclear energy emits very few greenhouse gases, which contribute to global warming.) If greater national and international efforts are not focused on increasing controls on sensitive nuclear technologies, this potential boost in nuclear power could increase dangers in the three threats of black markets, latent state-level weapons programs, and terrorist acquisition of nuclear explosive materials.

To better understand what these developments portend for international security, this issue brief will explain the dual-use dilemma of the nuclear fuel cycle and discuss proposals to control the proliferation risks of nuclear power programs.

#### **Nuclear power is useless and dangerous – their ev is industry propaganda**

**IPPNW 19** (IPPNW – Nobel Prize winning int’l organization of medical professionals for the prevention of nuke war. 60 countries have national participating bodies.)“How Nuclear Power Powers the Bomb” German Affiliate of IPPNW International Physicians for the Prevention of Nuclear War, [MT]

The civilian use of nuclear power began with the “Atoms for Peace” speech by US President Eisenhower before the UN General Assembly in 1953 in which he said “The United States knows that peaceful power from atomic energy is no dream of the future” and announced that nuclear fission, which will forever be associated with the horrendous bombings of Hiroshima and Nagasaki, could be a blessing and solve all mankind’s energy problems through the use of nuclear power plants.1 Governments and the nuclear industry have carefully concealed and denied any links between civil and military nuclear programmes, implying that there are two, carefully separated nuclear production cycles—a military one and a civil one.

A closer look at the global nuclear industry shows a different picture: nuclear-weapon states dominate current investments in nuclear energy. China is leading the way, while the other nuclear weapon states Russia, India, Pakistan, France, the UK and the USA also have active nuclear power plant projects.2 Russia also has plans to build, finance and operate nuclear power plants in Belarus, Bangladesh, Turkey and Hungary, while France is constructing nuclear power plants in Finland and the UK.

Only a **few states without nuclear weapons programmes operate substantial civil nuclear energy programmes**: Japan, South Korea, Canada, Sweden, Germany, Belgium, Taiwan and Switzerland. However, these countries have had military nuclear programmes in the past (such as Sweden, Taiwan or Switzerland), kept the door towards military nuclear programmes open (such as Germany, South Korea or Japan) or are de facto nuclear-weapon states under the nuclear-sharing agreement of NATO and closely involved with the nuclear industries of other NATO states (such as Belgium).

**Of the 25 countries that are currently building or officially planning to build nuclear reactors, 23 either have nuclear weapons** or have shown an interest in their development. Only Finland and Hungary had no ambitions to build nuclear weapons and yet invested in civil nuclear energy, while **states with nuclear ambitions** such as Saudi Arabia, the United Arab Emirates, Turkey or Iran are suspected of **pursu**ing **civil nuclear programmes with the main aim to develop military nuclear capabilities.** Saudi crown prince Mohammad bin Salman announced in an interview with Reuters in 2018: “If Iran has a nuclear bomb, we will develop a nuclear bomb as soon as possible”.3 In view of the termination of the nuclear agreement with Iran and Iran’s current announcement to resume uranium enrichment, this could mean a dangerous escalation of the rivalry between Iran and Saudi Arabia.

Nuclear energy as a solution to the energy problems of the 21st century?

Supporters of nuclear energy often argue that only nuclear power can meet the energy needs of the 21st century and at the same time offer a solution to the impending climate catastrophe by replacing fossil fuels. Since the 1950’s, nuclear technology has been aggressively marketed as a solution to all energy problems. “Energy too cheap to meter” was the initial sales motto of the nuclear industry. Today, 60 years later, we know that these promises have never been fulfilled and that nuclear power is, in fact, the most heavily subsidised form of energy. Nuclear power plants cannot hold their own without massive state intervention—even without considering the lack of adequate insurance payments and the costs of renaturalization of uranium mining sites, the decommissioning of nuclear power plants or the treatment, storage and safeguarding of the massive amounts of nuclear waste for hundreds of thousands of years.4,5

Since the nuclear catastrophes of Three Mile Island in 1979, Chernobyl in 1986 and Fukushima in 2011, the civil nuclear industry has been in decline worldwide. The disproportionate safety risks can no longer be denied and the human rights violations and ecological damage caused by uranium mining can no longer be concealed. Studies have shown that even without major accidents, the risk of radiation-related illnesses to workers in nuclear facilities increases.6 It is well established that nuclear power is not competitive on the free market in light of the rise of renewable energy generation and that the costs of nuclear waste management will continue to burden future generations of taxpayers. The 2018 press release from the World Association of Nuclear Operators, which claims substantial ‘new build’ progress, was punctured significantly by independent researchers, largely on the cultural background of the commercial thinking which tends to favour operational profits and negate safety considerations.7,8

While new technologies usually become more efficient and cheaper over time, the opposite trend has emerged for nuclear power: the production of one watt of energy by solar or wind power has become continuously cheaper in recent years, while the production of one watt of energy by nuclear power has become more expensive over the same period—in part due to increased safety regulations after the three major civil nuclear disasters. Moreover, solar and wind power have long since overtaken nuclear power in terms of installed capacity and produce only half and one-sixth of the CO2 emissions of nuclear power plants, considering the entire life cycle of the plants and fuels.9

In 2018, human civilization generated about 26,600 TeraWatt hours or 2,300 megatonnes of oil equivalent (mtoe) of electricity each year. About 10% of this comes from nuclear energy, 16% from hydroenergy and 9% from renewables, with combustibles (mainly natural gas and coal) making up the remaining 65%. But the world’s total annual energy demand is about 14,000 mtoe, nearly 80% coming from carbon-generating combustibles. Nuclear, at 230 mtoe, meets only 1.5% of total energy demand.10 In order to play a more substantial role in mitigating climate change, electricity generation would have to be vastly expanded. MIT scientists calculated that in order for nuclear power to make a relevant contribution towards addressing the climate catastrophe, two nuclear power plants would have to be connected to the grid every month for the next 50 years.11 This is a wholly unrealistic proposal, considering that the number of operating nuclear reactors has stayed fairly constant since 1989 and major nuclear countries like France, the UK or the US are currently constructing only 1 new reactor each, while other nuclear countries like Germany, Japan or South Korea have stopped construction of any new nuclear projects. An expansion of renewable energies on this scale is entirely feasible, however.

Compared to nuclear energy, renewables offer far greater flexibility and cost advantages, with new technologies such as wave and geothermal energy generation waiting in the wings. Nuclear advocates state that technological breakthroughs are possible, pointing especially to the development of small modular reactors (SMR) based on the designs of naval military reactors, but the problems of waste and security remain—as starkly shown by the eight decommissioned UK Royal Navy nuclear submarines waiting in Devonport docks to be defueled, some since the mid-2000s, while another 11 which are defueled are still significantly contaminated by residual radioactivity.12 But despite the lack of effects on the climate crisis, economic disadvantages, detrimental ecological and health effects and staggering safety issues, a number of states are sticking to nuclear energy and are even investing in the development of new generations of nuclear reactors. Why do they do this?

The obvious answer is the capacity to develop military nuclear capabilities. For states which do not yet have nuclear weapons, promoting a civilian nuclear energy programme in order to acquire nuclear weapons makes sense. But why do states like France, the UK and the USA, which already have several hundreds or thousands of nuclear weapons and substantial quantities of fissile materials such as highly enriched uranium and plutonium still need civilian nuclear energy programmes? To answer this question, it is necessary to take a closer look at the close links between the civil and military use of nuclear technology: Common nuclear infrastructure Both nuclear weapons and nuclear power plants need the same fissile materials—primarily enriched uranium—and the technologies to extract and process them. From uranium mining to the chemical processing of uranium ore, uranium enrichment, transportation, storage and safeguarding, both civil and military nuclear industries rely on the same nuclear infrastructure. In most nuclear countries, it is therefore the same state companies, authorities or ministries that uphold and develop this infrastructure —most often both for military and civil nuclear programmes.

The expansion of an extensive nuclear infrastructure for civil nuclear energy programmes makes it much easier and, above all, cheaper for a country to pursue military nuclear programme. Already in 1946, an official report by the US government warned that the infrastructure for civilian and military nuclear technology was largely interchangeable and interdependent, posing a substantial risk for the proliferation of nuclear weapons through the development of a nuclear energy infrastructure.13

In the end, the main difference between civil and military nuclear programmes lies in the degree of uranium enrichment: since the high-energy isotope uranium-235 is only contained to a very small extent in uranium ore (0.7%), a higher proportion of uranium-235 must be achieved in order to enable a nuclear chain reaction. This requires enrichment, usually in centrifuges. For atomic fuel rods, uranium needs to be enriched to a proportion of 3–5% of uranium-235. For an atomic warhead, an enrichment degree of 90% is required. The technical step from a civilian to a military nuclear program is thus ultimately a question of the number and the performance of centrifuges. With a functioning civilian nuclear programme, the essential steps towards constructing a nuclear bomb have already been achieved.

#### **Nuclear proliferation causes nuclear war---MAD AND rationality don’t prevent it.**

#### **[Matthew Kroenig 15. Associate Professor and International Relations Field Chair, Department of Government Georgetown University, Nonresident Senior Fellow, Brent Scowcroft Center on International Security. 01/02/2015. “The History of Proliferation Optimism: Does It Have a Future?” Journal of Strategic Studies, vol. 38, no. 1–2, pp. 98–125.] [RL 20]**

#### 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 will be a catastrophic nuclear war. To date, nuclear weapons have only been used in warfare once. In 1945, the United States used nuclear weapons on Hiroshima and Nagasaki, bringing World War II to a close. Many analysts point to the 65-plusyear 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 simply because they have not been used for some time. 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 dotcom bubble bursting later in the decade and the Great Recession of the late 2000s.48 This author, for one, would be surprised if nuclear weapons are not used again sometime in his 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 preventive nuclear strike to disarm Iran’s nuclear capabilities. 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 them or lose them pressures. That is, in a crisis, 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.49 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. Fortunately, there is no historic evidence of this dynamic occurring in a nuclear context, but it is still possible. In an 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, however, when both sides have secure, second-strike capabilities, there is still a risk of nuclear war. Rational deterrence theory assumes nuclear-armed states are governed by rational leaders who 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. Iran’s theocratic government, despite its inflammatory rhetoric, has followed a fairly pragmatic foreign policy since 1979, but it contains leaders who hold millenarian religious worldviews and could one day ascend to power. We cannot rule out the possibility that, as nuclear weapons continue to spread, some leader somewhere 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 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 nucleararmed adversaries. Leaders might, therefore, choose to launch a limited nuclear war.50 This strategy might be especially attractive to states in a position of conventional inferiority that might have an incentive to escalate a crisis quickly to the nuclear level. During the Cold War, the United States planned to use nuclear weapons first to stop a Soviet invasion of Western Europe given NATO’s conventional inferiority.51 As Russia’s conventional power has deteriorated since the end of the Cold War, Moscow has come to rely more heavily on nuclear weapons in its military 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 US superpower in a possible East Asia contingency. Second, as was also discussed above, leaders can make a ‘threat that leaves something to chance’. 52 They can initiate a nuclear crisis. By playing these risky games of nuclear brinkmanship, states can increase 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 nearly led to war.53 When we think about future nuclear crisis dyads, such as Iran and Israel, with fewer sources of stability than existed during the Cold War, we can see that there is a real risk that a future crisis could result in a devastating nuclear exchange. 3 t e

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#### **Two Links into Nuclear Escalation**

#### **1st – Developing nukes causes nuc terror**

Stephen J. **Cimbala** **20**, Professor of Political Science Penn State University, "The United States, Russia and Nuclear Peace",

The problem of containing **prolif**eration among “rogue” or other state actors was actually a two part one. The first part was what to do with additional states having become nuclear capable. The second aspect was the valid concern that **rogue** **nuc**lear **powers** might pass nuclear technology or know-how to non-state actors, including **terrorists**. It was known, for example, that **al-Qaeda** even before 9/11 had **attempted to acquire** nuclear weapons grade material. The United States and other countries with large coastlines and national territories were vulnerable to various attacks by weapons of mass destruction (WMD), including chemical, biological, radiological or nuclear weapons. Optimists about the probable consequence of further nuclear weapons spread among states might argue, as some have done, that deterrence would still work in the future as it presumably had done during the Cold War. The optimism was very much based on after-the-fact **hindsight** that we survived the Cold War without accidentally or deliberately setting off a US-Soviet nuclear exchange leading to a global catastrophe. Persons living through the Cold War and its various crises, especially the Cuban missile crisis, had a somewhat less deterministic view about the success of deterrence. **Even if** Cold War deterrence was as overdetermined as optimists supposed, **deterring terrorists** and other non-state actors from **nuclear adventurism** was **another task** altogether.

#### **Nuclear terror would kill millions.**

#### **2nd – Countries**

#### **Prolif escalates to global conflict**

**Kroenig, Professor of Foreign Affairs, 16**

(Matthew; at Georgetown University, June, “Approaching Critical Mass: Asia's Multipolar Nuclear Future,” ) NJR

The most important reason to be concerned about nuclear weapons in Asia, of course, is the threat that nuclear weapons might be used. To be sure, the use of nuclear weapons remains remote, but the probability is not zero and the consequences could be catastrophic. The subject, therefore, deserves careful scrutiny. Nuclear use would overturn a 70-year tradition of nonuse, could result in large-scale death and destruction, and might set a precedent that shapes how nuclear weapons are viewed, proliferated, and postured decades hence. The dangers of escalation may be magnified in a multipolar nuclear order in which small skirmishes present the potential to quickly draw in multiple powers, each with a finger on the nuclear trigger. The following discussion will explore the logic of crisis escalation and strategic stability in a multipolar nuclear order.14 First and foremost, the existence of multipolar nuclear powers means that crises may pit multiple nuclear-armed states against one another. This may be the result of formal planning if a state’s strategy calls for fighting multiple nuclear-armed adversaries simultaneously. A state may choose such a strategy if it believes that a war with one of these states would inevitably mean war with both. Alternatively, in a war between state A and state B, state A may decide to conduct a preventive strike on state C for fear that it would otherwise seek to exploit the aftermath of the war between states A and B. Given U.S. nuclear strategy in the early Cold War, for example, it is likely that a nuclear war between the United States and the Soviet Union would have also resulted in U.S. nuclear attacks against China, even if China had not been a direct participant in the precipitating dispute. In addition, conflicts of interest between nuclear powers may inadvertently impinge on the interests of other nuclear-armed states, drawing them into conflict. There is always a danger that one nuclear power could take action against a nuclear rival and that this action would unintentionally cross a red line for a third nuclear power, triggering a tripartite nuclear crisis. Linton Brooks and Mira Rapp-Hooper have dubbed this category of phenomena the “security trilemma.”15 For example, if the United States were to engage in a show of force in an effort to signal resolve to Russia, such as the flushing of nuclear submarines, this action could inadvertently trigger a crisis for China. There is also the issue of “catalytic” war. This may be the first mechanism by which Cold War strategists feared that multiple nuclear players could increase the motivations for a nuclear exchange. They worried that a third nuclear power, such as China, might conduct a nuclear strike on one of the superpowers, leading the wounded superpower to conclude wrongly that the other superpower was responsible and thereby retaliate against an innocent state presumed to be the aggressor. This outcome was seen as potentially attractive to the third state as a way of destroying the superpowers and promoting itself within the global power hierarchy. Fortunately, this scenario never came to pass during the Cold War. With modern intelligence, reconnaissance, and early warning capabilities among the major powers, it is more difficult to imagine such a scenario today, although this risk is still conceivable among less technologically developed states. In addition to acting directly against one another, nuclear powers could be drawn into smaller conflicts between their allies and brought face to face in peak crises. International relations theorists discuss the concept of “chain ganging” within alliance relationships, the dangers of which are more severe when the possibility of nuclear escalation is present.16 Although this was a potential problem even in a bipolar nuclear order, the more nuclear weapons states present, the greater the likelihood of multiple nuclear powers entering a crisis. A similar logic suggests that the more fingers on the nuclear trigger, the more likely it is that nuclear weapons will be used. Multipolar nuclear crises are not without historical precedent.17 Several Cold War crises featured the Soviet Union against the United States and its European nuclear-armed allies, Britain and later France. The 1973 Arab-Israeli War involved the United States, the Soviet Union, and a nuclear-armed Israel. The United States has been an interested party in regional nuclear disputes, including the Sino-Soviet border war of 1969 and several crises in the past two decades on the Indian subcontinent. Indeed, many of these crises stand out as among the most dangerous of the nuclear era.

#### **3rd – Non-Governmental Organizations**

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#### **There are numerous ways a successful non-state attack would] lead to inadvertent state-lead war – 7 scenarios**

**Hayes** **18’** Peter Hayes, "NON-STATE TERRORISM AND INADVERTENT NUCLEAR WAR", NAPSNet Special Reports, January 18, 2018, https://nautilus.org/napsnet/napsnet-special-reports/non-state-terrorism-and-inadvertent-nuclear-war/

These many types of terrorist nuclear attack present states with starkly different potential damage, greater possible ambiguity or even opacity in terms of precursor indicators as well as identity of the perpetrator. Any of these types of attack may affect nuclear-armed states in unpredictable ways with respect to their own nuclear use decisions at times when inter-state conflict may be more or less likely. These various types of attack by non-state actors reduce into three basic categories of threat and use, as follows:

1. Credible threat of either nuclear detonation or radiological attack with possible massive damages
2. Actual or sub-critical nuclear detonation
3. Actual spent fuel or reactor attack with substantial radiological release.

In turn, such categories of terrorist attack might be realized in or against one or more types of targeted state, viz, a nuclear armed state, a nuclear umbrella state that receives nuclear extended deterrence from a nuclear armed state, or a non-nuclear weapons state which may or may not have nuclear fuel cycle facilities in and/or fissile material stored on its territory. (Thus, the target may or may not be a state, a state agency, or a state facility—it might be a civilian target such as a company or a religious entity; but in this paper, all terrorist nuclear attacks are assumed to take place only in places controlled by functioning states).

Nuclear terrorism post-cold war: trigger for inadvertent nuclear war?

The possible catalytic effect of nuclear terrorism on the risk of state-based nuclear war is not a simple linkage. The multiple types and scales of nuclear terrorism may affect state-nuclear use decisions along multiple pathways that lead to inadvertent nuclear war. These include:

1. Early warning systems fail or are “tripped” in ways that lead to launch-on-warning
2. Accidental nuclear detonation, including sub-critical explosions.
3. Strategic miscalculation in crisis, show of force
4. Decision-making failure (such as irrational, misperception, bias, degraded, group, and time-compressed decision-making)
5. Allied or enemy choices (to seek revenge, to exploit nuclear risk, to act out of desperation)
6. Organizational cybernetics whereby a nuclear command-control-and communications (NC3) system generates error, including the interplay of national NC3 systems in what may be termed the meta-NC3 system.
7. Synchronous and coincident combinations of above.[[4]](https://nautilus.org/napsnet/napsnet-special-reports/non-state-terrorism-and-inadvertent-nuclear-war/#_ftn4)

Exactly how, where, and when nuclear terrorism may “ambush” nuclear armed states already heading for or on such a path to inadvertent nuclear war depends on who is targeting whom at a given time, either immediately due to high tension, or generally due to a structural conflict between states. Nuclear armed states today form a complex set of global threat relationships that are not distributed uniformly across the face of Earth. Rather, based on sheer firepower and reach, the nine nuclear weapons states form a global hierarchy with at least four tiers, viz:

Tier 1: United States, clear technological supremacy and qualitative edge.

Tier 2: Russia, China, global nuclear powers and peers with the United States due to the unique destructive power of even relatively small nuclear arsenals, combined with global reach of missile and bomber delivery systems, thereby constituting a two-tiered global “nuclear triangle” with the United States.

Tier 3: France, UK, NATO nuclear sharing and delivery NATO members (Belgium, Germany, Italy, the Netherlands and Turkey) and the NATO and Pacific nuclear umbrella states (Japan, South Korea, Australia) that depend on American nuclear extended deterrence and directly and indirectly support US and US-allied nuclear operations even though they do not host nor deliver nuclear weapons themselves.

Tier 4: India, Pakistan, Israel, DPRK.

The first two tiers constitute the global nuclear threat triangle that exists between the United States, Russia, and China, forming a global nuclear “truel.” Each of these states targets the others; each represents an existential threat to the other; and each has a long history of mutual nuclear threat that is now a core element of their strategic identity.

Tier three consists of states with their own nuclear force but integrated with that of the United States (even France!) that expand the zone of mutual nuclear threat over much of the northern and even parts of the southern hemisphere; and states that host American nuclear command, control, communications, and intelligence systems that support US nuclear operations and to whom nuclear deterrence is “extended” (if, for example, Australia’s claim to having an American nuclear umbrella is believed). The fourth tier is composed of smaller nuclear forces with a primarily regional reach and focus.

Between most of these nuclear armed states and across the tiers, there are few shared “rules of the road.” The more of these states that are engaged in a specific conflict and location, the more unpredictable and unstable this global nuclear threat system becomes, with the potential for cascading and concatenating effects. Indeed, as the number of nuclear states projecting nuclear threat against each other increases, the notion of strategic stability may lose all meaning.

The emergence of a fifth tier—of non-state actors with the capacity to project nuclear threat against nuclear-armed and nuclear umbrella states (although not only these states)—is a critically important possible catalytic actor in the new conditions of nuclear threat complexity that already exist today. Such a layer represents an “edge of chaos” where the attempts by nuclear armed states to exert absolute “vertical” control over the use of nuclear weapons confront the potential of non-state entities and even individuals (insiders) to engage in “horizontal” nuclear terrorism, presenting radically different control imperatives to the standard paradigm of organizational procedures, technical measures, and safeguards of various kinds. This tier is like the waves and tides on a beach that quickly surrounds and then causes sand castles to collapse.

In 2010, Robert Ayson reviewed the potential linkages between inter-state nuclear war and non-state terrorism. He concluded: “…[T]hese two nuclear worlds—a non-state actor nuclear attack and a catastrophic interstate nuclear exchange—are not necessarily separable. It is just possible that some sort of terrorist attack, and especially an act of nuclear terrorism, could precipitate a chain of events leading to a massive exchange of nuclear weapons between two or more of the states that possess them.”[[5]](https://nautilus.org/napsnet/napsnet-special-reports/non-state-terrorism-and-inadvertent-nuclear-war/#_ftn5) How this linkage might unfold is the subject of the next sections of this essay.

Are non-state actors motivated and able to attempt nuclear terrorism?

A diverse set of non-state actors have engaged in terrorist activities—for which there is no simple or consensual definition. In 2011, there were more than 6,900 known extremist, terrorist and other organizations associated with guerrilla warfare, political violence, protest, organized crime and cyber-crime. Of these, about 120 terrorist and extremist groups had been blacklisted by the United Nations, the European Union and six major countries.[[6]](https://nautilus.org/napsnet/napsnet-special-reports/non-state-terrorism-and-inadvertent-nuclear-war/#_ftn6)

Some have argued that the technical, organizational, and funding demanded for a successful nuclear attack, especially involving nuclear weapons, exceeds the capacity of most of the non-state actors with terrorist proclivities. Unfortunately, this assertion is not true, especially at lower levels of impact as shown in Figure 1; but even at the highest levels of obtaining authentic nuclear weapons capabilities, a small number of non-state actors already exhibit the motivation and possible capacity to become nuclear-armed

**80 actual attacks have already happened**

**Hayes** **18’** Peter Hayes, "NON-STATE TERRORISM AND INADVERTENT NUCLEAR WAR", NAPSNet Special Reports, January 18, 2018, https://nautilus.org/napsnet/napsnet-special-reports/non-state-terrorism-and-inadvertent-nuclear-war/

**eighty actual, planned attacks on nuclear facilities** containing nuclear materials between 1961-2016[[13]](https://nautilus.org/napsnet/napsnet-special-reports/non-state-terrorism-and-inadvertent-nuclear-war/#_ftn13) as follows:

* 80 attacks in 3 waves (1970s armed assaults, 1990s thefts, post-2010, breaches)
* High threat attacks: 32/80 attacks posed substantial, verified threat of which 44 percent involved insiders.
* All types of targets were found in the data set—on reactors, other nuclear facilities, military bases leading Gary Ackerman and to conclude: “Overall, empirical evidence suggests that there are sufficient cases in each of the listed categories that no type of threat can be ignored.”[[14]](https://nautilus.org/napsnet/napsnet-special-reports/non-state-terrorism-and-inadvertent-nuclear-war/#_ftn14)

No region was immune; no year was without such a threat or attack. Thus, there is a likely to be a coincidence of future non-state threats and attacks with inter-state nuclear-prone conflicts, as in the past, and possibly more so given the current trend in and the generative conditions for global terrorist activity that will likely pertain in the coming decades.

Of these attacks, about a quarter each were ethno-nationalist, secular utopian, or unknown in motivation; and the remaining quarter were a motley mix of religious (11 percent), “other” (5 percent), personal-idiosyncratic (4 percent), single issue (2 percent) and state sponsored (1 percent) in motivation.

The conclusion is unavoidable that there a non-state nuclear terrorist attack in the Northeast Asia region is possible. The following sections outline the possible situations in which nuclear terrorist attacks might be implicated as a trigger to interstate conflict, and even nuclear war. Particular attention is paid to the how nuclear command, control and communications systems may play an independent and unanticipated role in leading to inadvertent nuclear war, separate to the contributors to inadvertency normally included such as degradation of decision-making due to time and other pressures; accident; “wetware” (human failures), software or hardware failures; and misinterpretation of intended or unintended signals from an adversary.

Regional pathways to interstate nuclear war

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#### **Perception makes timeframe immedate and miscalc scenarios infinte – even if they don’t go far enough other states perceive it and miscalculate. Fog of war, use-it-or-lose-it, nuclear catalysis, and misunderstandings TKO all of their defense.**

#### **Johnson 21** [Dr. James Johnson, Assistant Professor in the School of Law and Government at Dublin City University and a Non-Resident Fellow with the Modern War Institute at West Point. (“‘Catalytic nuclear war’ in the age of artificial intelligence & autonomy: Emerging military technology and escalation risk between nuclear-armed states,” Journal of Strategic Studies, pg. 18-21, DOI: 10.1080/01402390.2020.1867541) \*Typo corrected---brackets denote a change. \*\*Footnotes added after referent paragraphs---marked by brackets]

#### In the context of AI and autonomy, particularly information complexity, misinformation, and manipulation, rationality-based **deterrence** logic appears an increasingly **untenable** proposition**.** In sum, the combination of increased **speed, compressed decision-making** timeframes, complex and interdependent command and control mechanisms**, and** increasing levels of AI-enabled NC3 **automation** and human-machine interactions **increases** the possibility of sparking a **cascading** set of **errors** (human or machine), reinforcing feedback-loops that could ultimately **lead to** an accidental **nuclear exchange.** Furthermore, because there is so much redundancy built into modern NC3 systems, scenarios involving accidental nuclear war as a result of a single technical error or malfunction is less threatening, compared to the simultaneous coalescence of **multiple failures in a rapid and unpredictable and reverberating fashion** – where malfunctions in [one] once system are prone to cause alarms in others.94 In particular, if they are **compounded by** organizational failures, ambiguous information, misperceptions, or **excessive trust** in technology, which may lead human operators cognitively offloading judgment to AI algorithms without fully understanding its limitations – also known as ‘automation bias.’95 Such **automation bias** – especially in human-machine interactions – could also **mean** that both false negatives and **false positives go unnoticed** (or are discarded) because the operators are overconfident in systems augmented with advanced technology such as AI.96 This problem-set is compounded **during a crisis when stress, fatigue, information overload,** and commingled (nuclear and conventional) systems encounter a priori situations between asymmetric nuclear rivals, **thicken**ing the **‘fog of war**’ – the inevitable uncertainties, misinformation, or even breakdown of organized units, which influences warfare – **resulting in irrevocable actions, when use-or-lose-t**hem becomes the only option.97 [Footnotes] 94. Most nuclear-armed states possess modern NC3 structures with inbuilt redundancies, coupled with robust internal ballistics, mechanical arming, and other safety-related mechanisms and protocols. In some cases (i.e., North Korea and Pakistan), however, national NC3 systems may not be rigorously and continuously tested and not function coherently or reliably in functional performance under stress. These NC3 systems are also considered insufficiently redundant and lack clear lines of responsibility and accountability. Peter Hayes, Binoy Kampmark, Philip Reiner, and Deborah Gordon, ‘Synthesis Report, NC3 Systems and Strategic Stability: A Global Overview’, NAPSNet Special Reports, 5 May 2019, https://nautilus.org/?p=97769 95. On ‘automation bias’ see, Linda J Skitka, Kathleen L Mosier, and Mark Burdick, ‘Does Automation Bias Decision-Making?’ International Journal of Human-Computer Studies 51, no. 5 (1999), pp.991–1006; and Mary L. Cummings, ‘Automation Bias in Intelligent Time-Critical Decision Support Systems’, AIAA 1st Intelligent Systems Technical Conference, 2004, pp.557–562. On technology and ‘organizational failure’ see, Bent Natvig, “Accidental Nuclear War Considered from the Area of Reliability of Large Technological Systems, in Inadvertent Nuclear War, eds., Hakan Wilberg, Ib Damgaard Petersen, and Paul Smoker (New York, NY: Pergammon Press, 1993), pp.55–69. 96. Michael C. Horowitz, Paul Scharre, and Alexander Velez-Green, ‘A Stable Nuclear Future? The Impact of Autonomous Systems and Artificial Intelligence’, arXiv, December 2019. 97. Militaries today have already begun developing AI solutions to substitute human prediction to deal with information overload – or the so-called ‘ISR revolution.’ See, Keith Dear, ‘Artificial Intelligence and Decision-Making’, The RUSI Journal, 164:5–6, (2019), pp.18–25; and Yang Feilong and Li Shijiang ‘Cognitive Warfare: Dominating the Era of Intelligence’, PLA Daily, 19 March 2020. [End Footnotes] Nuclear multipolarity **In a multipolar** world nuclear **order** with competing and contested strategic dyads – India-Pakistan, U.S.-Russia, U.S.-North Korea, U.S.-China, and perhaps India-China – with weak mechanisms for de-escalation, doctrinal opacity, and questionable attitudes towards nuclear restraint, the potential **risk of nuclear catalysis increases.**98 The emergence of nuclear multipolarity in the Second Nuclear Age has created multifaceted escalation pathways to a nuclear confrontation involving an expanding number of nuclear-armed poles, compared with bipolarity during the Cold War.99 Kenneth Waltz, the founder of structural realism, argued that while nuclear weapons served as a stabilizing force during the Cold War-era, however, ‘increased numbers of actors increase levels of systemic uncertainty … rising uncertainty heightens potential miscommunication and conflict. Bipolarity [compared to multipolarity] is, therefore, the most stable form of international power distribution.’100 This multipolarity is essential because each state will choose a different response to the new choices emerging in the digital age.101 **Competing states making decisions under the nuclear shadow will be more inclined to assume the worst** of others’ intentions, especially in situations where the legitimacy of the status quo is contested (i.e., maritime Asia). [Footnotes] 98. Paul Bracken, The Second Nuclear Age: Strategy, Danger, and the New Power Politics (New York: Times Books, 2012); and Michael Krepon, ‘Can Deterrence Ever Be Stable?’ Survival 57, no. 3 (2015), pp.111-32. 99. Bracken, The Second Nuclear Age: Strategy, Danger, and the New Power Politics. 100. Kenneth N. Waltz, Theory of international politics (Reading, MA: Addison-Wesley, 1979), p.168. 101James Johnson, “Artificial Intelligence in Nuclear Warfare: A Perfect Storm of Instability? The Washington Quarterly 43:2 (2020), pp.197-211 101. James Johnson, “Artificial Intelligence in Nuclear Warfare: A Perfect Storm of Instability? The Washington Quarterly 43:2 (2020), pp.197-211. [End Footnotes] Against the backdrop of existing tensions – especially a limited or proxy conflict or other crisis – between nuclear-armed adversaries (U.S.-China; U.S.- Russia; India-Pakistan; or U.S.-North Korea), therefore, an act of terrorism or other nefarious non-state action would create additional incentives for political leaders to assume the worst of the other’s intentions. Besides, the victim of a non-state or terrorist attack (e.g., cyber, disinformation, or drone swarm attack102) would likely be under intense domestic political pressure to attribute blame swiftly and retaliate against the perpetrator – or aiders and abettors in case of a proxy actor.103 During a tense situation, when prudent and careful planning can run aground against the fog and friction of reality, misperception and miscalculation may generate temptations for pre-emption with potentially catalytic effects.104 According to the offensive realist scholar John Mearsheimer, ‘as long as the system remains anarchic, states will be tempted to use force to alter an unacceptable status quo.’105 The **other side could easily perceive one state’s efforts to enhance its strategic forces’ survivability with state-of-the-art dual-use technology like AI as a potential threat** to its ability to survive and respond to a nuclear first strike – or second-strike capability.106 [Footnotes] 102. Drone swarming, as a robotics field, considers large groups of robots typically operate autonomously and coordinate their behavior through decentralized command and control. Working as a collective, the swarm can, in theory, perform both simple and complex tasks in a way that a single robot would be unable to do, thus increasing the robustness and flexibility of the swarm group as a whole. See, Andrew Ilachinski, AI, Robots, and Swarms, Issues, Questions, and Recommended Studies, Center for Naval Analysis, January 2017, p.108; and Iñaki Navarro and Fernando Matía, ‘An Introduction to Swarm Robotics’, International Scholarly Research Notices (2013) DOI:10.5402/2013/608,164 103. The question of how other nuclear-armed states – especially allies and partners of the competitive dyad – **might respond to a non-state against another member of that group – e.g., NATO states covered by Article 5**. Ayson, ‘After a Terrorist Nuclear Attack: Envisaging Catalytic Effects’, pp.584–585. 104. Conversely, the discovery of an adversary’s attempt to degrade a state’s nuclear forces or attendant systems would heighten mistrust and tension in future nuclear crises, indirectly contributing to escalation risks. See, Gartzke and Lindsay, ‘Thermonuclear Cyberwar’, pp.37–48. 105. John J. Mearsheimer, Conventional Deterrence (Ithaca, NY: Cornell University Press, 1984), p.210. 106. Thomas J. Christensen, ‘The Meaning of the Nuclear Evolution: China’s Strategic Modernization and U.S.-China Security Relations’, Journal of Strategic Studies 35, no. 4 (August 2012), pp.467-71. [End Footnotes] Authoritarian states may perceive an adversary’s intentions very differently from a democratic one.107 The belief that a regime’s political survival or legitimacy is threatened might cause leaders to consider worst-case scenario judgments and behave in a manner predicted by offensive realist scholars.108 Conversely, non-democratic leaders operating in closed political systems such as China, Russia, or North Korea may exhibit a higher degree of confidence (or overconfidence) in their ability to respond to perceived threats in world politics.109 Bias assessments from a non-democratic regime’s (or ‘Stasi’ type) intelligence services might reinforce a leader’s faith – or a false sense of security – in their diplomatic skill and maneuverability.110 [Foonotes] 107. James Johnson, ‘Delegating Strategic Decision-Making to Machines: Dr. Strangelove Redux?’ Journal of Strategic Studies (2020) DOI: 10.1080/01402390.2020.1759038 108. John J. Mearsheimer, ‘The Gathering Storm: China’s Challenge to US Power in Asia’, The Chinese Journal of International Politics, Volume 3, Issue 4 (Winter 2010), pp.381-396. 109. For example, see, Yang Yaohui, ‘A Vision of a New Kind of Combat Systems’, PLA Daily, 20 June 2020, http://www.81.cn/theory/2019-06/20/content\_9534942.htm; and Yang Feilong and Li Shijiang ‘Cognitive Warfare: Dominating the Era of Intelligence’, PLA Daily, 19 March 2020. 110. Keren Yarhi-Milo, Knowing the Adversary (Princeton NY: Princeton University Press, 2014), p.250. [End Footnotes]

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<https://thebulletin.org/2020/08/counting-the-dead-at-hiroshima-and-nagasaki/>

Wellerstein 2020: “nuclear weapons have killed 200k alone in japan via two bombs”.

# C2 - Waste

**There is no plan to solve waste**

**Clifford**, Cat (December 18, 2021), "Nuclear Waste: WHY There's No Permanent Nuclear Waste Dump In U.S.", CNBC,

https://www.cnbc.com/2021/12/18/nuclear-waste-why-theres-no-permanent-nuclear-waste-dump-in-us.html?msockid=3293344b335b6375108d210c327b621d. Accessed on March 27, 2025.

The federal government has a fund of $44.3 billion earmarked for spending on a permanent nuclear waste disposal facility in the United States. It began collecting money from energy customers for the fund in the 1980s, and the money is now earning about $1.4 billion in interest each year. But plans to build a site in Yucca Mountain, Nevada, were scuttled by state and federal politics, and there’s been a lack of political will to find other solutions. The result is that **the U.S. does not have the infrastructure to dispose of radioactive nuclear waste** in a deep geologic repository, where it can slowly lose its radioactivity over the course of thousands of years without causing harm.

**Thats for a good reason-->there is literally nowhere to put it. And empirically all progress has failed. Winkie 25 reasons**

Winkie, Davis (March 1, 2025), "Texas Doesn't Want The Nation's Nuclear Waste. Supreme Court Weighs In", USA Today,

https://www.usatoday.com/story/news/politics/2025/03/01/supreme-court-nuclear-waste-storage/80356576007/. Accessed on March 27, 2025.

**Nobody wants to live near nuclear waste.** The Supreme Court mulls where to put it Texas is taking a fight over the country's nuclear waste to the Supreme Court. **The issue, a Not In My Backyard dilemma involving toxic radioactive nuclear waste, has been swirling for decades.** The latest flashpoint, which hits the Supreme Court on Wednesday, involves a proposed storage site in West Texas. **A law passed in 1982 was supposed to have created a permanent dumping ground for nuclear power plant waste − considered dangerous for thousands of years after its produced. Four decades later, no permanent solution exists.** The court will hear a challenge to the government’s ability to license private companies to temporarily store that spent nuclear fuel. Texas and private companies want to be able to sue over that. **Texas and local landowners that don’t want the storage sites in their backyard sued to block the Nuclear Regulatory Commission from approving a facility in Andrews County**, Texas, near the state’s border with New Mexico. They argue the commission lacks authority to permit the storage facility, which sits far away from any of America’s nuclear reactors.

L-Affirming necessitates waste→every new plant that’s created produces exponential amount

**Affirming means more waste**

**Macfarlane**, Allison (March 6, 20**23**), "Nuclear Waste Is Piling Up. Does The U.S. Have A Plan?", Scientific American,

https://www.scientificamerican.com/article/nuclear-waste-is-piling-up-does-the-u-s-have-a-plan/. Accessed on March 27, 2025.

The National Academies report tells us that **new or advanced reactor designs—the hoped-for saviors of the nuclear industry—will not save us** from the need to build geologic repositories, deep-mined facilities for permanent nuclear waste disposal. In some cases, these **new reactors may make it worse by creating more waste that’s more costly to manage, new kinds of complex waste, or just more waste, period.**

**Specifically Schwartz 22 reports**

Mark Shwartz (May 30, 2022), "Small Modular Reactors Produce High Levels Of Nuclear Waste", Stanford University,

https://news.stanford.edu/stories/2022/05/small-modular-reactors-produce-high-levels-nuclear-waste. Accessed on March 27, 2025.

Nuclear reactors generate reliable supplies of electricity with limited greenhouse gas emissions. **But a nuclear power plant that generates 1,000 megawatts of electric power also produces radioactive waste that must be isolated from the environment for hundreds of thousands of years.** Furthermore, the cost of building a large nuclear power plant can be tens of billions of dollars. Small modular reactors are about 1/10 to 1/4 the size of a traditional nuclear energy plant due to compact, simplified designs. (Image credit: Idaho National Laboratory) To address these challenges, **the nuclear industry is developing small modular reactors** that generate less than 300 megawatts of electric power and can be assembled in factories. **Industry analysts say these advanced modular designs will be cheaper and produce fewer radioactive byproducts than conventional large-scale reactors.**  **But** a study published May 31 in Proceedings of the National Academy of Sciences has reached the opposite conclusion. “Our results show that most **small modular reactor designs will actually increase the volume of nuclear waste in need of management and disposal, by factors of 2 to 30 for the reactors in our case study**,” said study lead author Lindsay Krall, a former MacArthur Postdoctoral Fellow at Stanford University’s Center for International Security and Cooperation (CISAC). “These findings stand in sharp contrast to the cost and waste reduction benefits that advocates have claimed for advanced nuclear technologies.”

**Overall Vigilarolo quantifies**

Vigliarolo, Brandon (June 2, 2022), "Small Nuclear Reactors Produce '35X More Waste' Than Big Plants", The Register, ,

https://www.theregister.com/2022/06/02/nuclear\_reactors\_waste/. Accessed on March 27, 2025.

UPDATED Mini **nuclear reactors that are supposed to usher in an era of cheaper and safer nuclear power may generate up to 35 times more waste to produce the same amount of power as a regular plant**, according to a study. A team of researchers at Stanford University and the University of British Columbia came to this conclusion after studying a design from each of three small modular reactor (SMR) manufacturers: NuScale Power, Toshiba, and Terrestrial Energy. The study, published this week, found that not only did those particular SMR approaches generate five times the spent nuclear fuel (SNF), 30 times the long-lived equivalent waste, and 35 times the low and intermediate-level waste (LILW), **their waste is also more reactive, therefore more dangerous and consequently harder to dispose of**.

Advancements don’t help.

Stanford 22’ https://news.stanford.edu/stories/2022/05/small-modular-reactors-produce-high-levels-nuclear-waste

“Small modular reactors make more waste”

Martin 25’ states

https://www.webmd.com/cancer/radiation-sickness-facts

In one incident, many of over 250,000 died due to radiation sickness.