

## Chapter 7

# The Future of Nuclear Weapons, Arms Control, and a New Paradigm in Great Power Strategic Deterrence?

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*The chapter reviews the status of Great Power strategic deterrence postures, their nuclear weapons arsenals, and their perspectives on the future role for nuclear arms control and nonproliferation. It establishes the trajectory of Great Power activities during the early 2020s that have called into question long-standing notions of global nuclear strategic deterrence and nonproliferation—increasing the risk of Great Power nuclear war to the highest it has been since the Cold War. The chapter explains how Russia’s nuclear weapons modernization, drills, and threats to use them in the Ukrainian conflict; China’s ambitious nuclear weapons development programs and rejection of strategic nuclear arms control talks; the American nuclear weapons modernization program; and the Golden Dome missile defense initiative all play a role in challenging the framework of agreements, institutions, rules, and the taboo that has prevented the use of nuclear weapons for 80 years. It establishes that the challenge of deterring strategic attack—nuclear or conventional—faces unprecedented complications because of the new geostrategic reality of a three-peer Great Power nuclear landscape that at mid-decade is increasing the risks of Great Power arms racing and crisis instability. The chapter concludes with an explanation of how the second Trump administration’s pursuit of the elusive goal of a nationally integrated Golden Dome of missile defense will challenge the long-standing paradigm of nuclear deterrence by retaliation while not yet replacing it with a framework of nuclear deterrence by denial. Whether or not it overcomes technological uncertainties and bureaucratic risk, the very process of seeking an American Golden Dome could, at least for a time, place at risk the Chinese and Russian high strategic objectives of a secure second-strike nuclear arsenal and unquestioned parity with America at the high table of Great Powers. Something will have to give: either a dramatic and destabilizing nuclear arms race with extraordinary costs will ensue, or the three countries will need to fashion viable arms control arrangements that stabilize nuclear weapons risks and rationalize nuclear arsenal costs. Although not yet at a new paradigm in Great*

*Power strategic deterrence in 2025, the three-sided nuclear weapons modernization buildup where deterrence by denial is being seriously explored by one of the Great Powers seems likely to become the catalyst for a new era of nuclear arms racing, greater crisis instability, and perhaps a new genre of nuclear arms control.*

## **Introduction**

From Hiroshima in 1945 to the 2023 movie *Oppenheimer*, fears of a nuclear mushroom cloud have colored the background of global strategic thinking. Fears of “loose nukes” proliferating from the Soviet Union at the end of the Cold War were followed by war-on-terror fears of rogue states or militant organizations acquiring and using a small number of nuclear weapons against the established countries of the international system. In the background, these fears of the mid-1990s through the 2010s were juxtaposed against a paradigm of strategic nuclear deterrence that was remarkably stable. That stability—largely established between the United States and the Soviet Union during the Cold War and extended through bilateral and some multilateral nuclear weapons and materials treaties and protocols—coalesced around three main elements: deterrence norms against nuclear weapons use, treaties and protocols constraining the growth of standing nuclear arsenals and their proliferation to new states, and the absence of strategically destabilizing alternative weapons.

The first nuclear era generated a deterrence paradigm that benefited from high costs to join and correspondingly low numbers of entrants in the global nuclear weapons club. After a short period in the 1950s when the United States relied on nuclear weapons to deter Soviet conventional military advantage, the first nuclear era developed during the 1960s and retained relevance through the 2010s. Its small number of participants gradually agreed on several basic strategic deterrence norms, which were anchored by the view that nuclear weapons mattered mainly to deter the use of a rival’s nuclear weapons. The norms also held that meaningful defenses against strategic nuclear attack were unreliable, incredibly expensive, and prone to encourage a nuclear arms race to acquire sufficient offensive weapons for an assured secured second strike. The technologically unsuccessful and exceptionally expensive Reagan administration missile defense program known as the Strategic Defense Initiative (SDI) in the 1980s was an exception that reinforced the norms. Bilateral and multilateral nuclear arms control and nonproliferation treaties built from these foundational norms bound nuclear weapons states—and especially the United States and Soviet Union—to production limits and proliferation constraints that assured dominance by the early nuclear weapons states and limited (at least to an extent) what had become incredibly expensive and destabilizing superpower nuclear weapons programs. Finally, the strategic deterrence paradigm of the first nuclear era evolved during a technological reality that no alternative strategic weapons posed the high degree of risk to rapid use and strategically significant damage found in nuclear weapons and their land, air, and sea delivery systems.<sup>1</sup>

A second nuclear era overlapped the first beginning in the 1990s but did not supplant the basic nuclear deterrence paradigm. Nonnuclear states began to flout nonproliferation norms to procure nuclear weapons for reasons beyond mere deterrence against other nuclear weapons. India and Pakistan tested nuclear weapons and put them into service with

regional delivery systems from a mixture of religious, cultural, and national pride motivations and a resolve to use them irrespective of casualties or structural damage to deny the other any substantial territory or reputational gains. Iran, North Korea, and Iraq, among others, sought nuclear weapons to legitimize and protect their regimes, often bragging about their programs despite global disapprobation and frequent sanctions. Despite this notable change, the deterrence norms established late in the Cold War's first nuclear era remained dominant because the latticework of nuclear weapons treaties and protocols remained in place, and no technological alternatives appeared to nuclear weapons threatening strategic surprise and strategically damaging consequences.

But then a new geostrategic era featuring a return of Great Power Competition in the late 2010s ushered in a third nuclear era featuring profound changes. Most notably, this era rested on a new geostrategic reality: the emergence of three, rather than two, global nuclear peer adversaries.<sup>2</sup> It also confirmed substantive adjustments to the three main elements underpinning the original nuclear strategic deterrence paradigm. The Great Powers began discussing the use of nuclear weapons in limited, regional wars to secure political aims. The framework of nuclear arms control treaties, nonproliferation agreements, and confidence-building measures built during the bipolar era largely collapsed. Finally, technological advances in hypersonic directed-energy weapons, cyberattack techniques, and space-based projectiles introduced new methods for rapid and meaningful strategic damage against a Great Power rival (or another state).<sup>3</sup>

Headlines in the early 2020s brought the specter of nuclear war once again into the public eye, most notably with Russian President Vladimir Putin's promises to subdue Ukraine with more than just conventional arms.<sup>4</sup> Over the last decade, Russia has nearly completed modernizing and expanded its strategic nuclear and nonnuclear forces while removing itself from most of the arms control agreements forged from the late 1960s through the early 1990s. The United States fully committed itself to an expansive modernization and upgrade of its strategic nuclear triad that had been promised but unfulfilled since 2010 as its prospects for meaningful reciprocal nuclear arms control receded and the strategic implications of Russia's extensive nuclear weapons modernization efforts became clear. Then China set out on an unprecedented increase in both the quantity and quality of its nuclear forces without a willingness to entertain nuclear arms control negotiations with either of its Great Power rivals. The growth and modernization of Great Power strategic nuclear forces paralleled new incentives for non-Great Powers to acquire and entertain the possibilities of nuclear weapons use in war. France and the United Kingdom retain their individual nuclear forces. India and Pakistan threatened the use of nuclear weapons against the other and reportedly postured for such an exchange during the 4-day "near war" of May 2025. North Korea continued to test its missiles and potentially expand its nascent nuclear arsenal. Iran and Israel exchanged nonnuclear missiles, drones, and aircraft raids, culminating with the June 2025 U.S. B-2 and Tomahawk cruise missile strikes that severely damaged the Iranian nuclear program in an effort to deny the Islamic Republic in Tehran the bomb.

The trends are unsettling. They suggest that the historical norms downplaying the possible use of nuclear weapons for battlefield gains and limiting both the vertical growth of standing nuclear arsenals and their horizontal proliferation to new states have become irrelevant. But such a conclusion may be premature. The logic of strategic deterrence in our

third nuclear age may yet exhibit a two-fold rationale relatively consistent to that of the first age: the costs to defend against a strategically significant nuclear attack by any one Great Power against another may again prove prohibitive despite advances in technology; and the existential risks of reckless use of nuclear weapons by newly acquiring states may be so substantial that the Great Powers must ultimately forge a new set of nuclear arms control efforts to sustain strategic stability at nonprohibitive cost. Arms race stability and nuclear crisis stability—key positive outcomes of the original nuclear strategic deterrence paradigm—may prove feasible in this new era of three Great Powers only when a new framework of nuclear arms control evolves as an active partner with other security efforts to reduce the growing potential of nuclear weapons use by them or between them—thereby preserving an 80-year-old nuclear taboo that has prevented nuclear warfighting.<sup>5</sup>

This chapter offers an assessment of the role of strategic nuclear weapons, nonnuclear strategic weapons (NNSWs), and theater nuclear weapons in the evolving global Great Power competition between the United States, China, and Russia. It reviews the historical construct of strategic deterrence linked to nuclear weapons and how that construct has changed in important ways over the past few years. The chapter then assesses Great Power strategic preferences regarding the potential use of nuclear weapons at the global or regional levels and their level of commitment to nuclear nonproliferation. It reviews the Great Power nuclear arms inventories, contrasting the dynamism in nuclear weapons arsenal developments during the early 2020s with the relative decline of nuclear arms control as a tool to manage the risks of nuclear war. The chapter concludes with an evaluation of the most likely interplay between strategic deterrence, nuclear weapons use at the global or regional levels, and the role for arms control in Great Power strategic deterrence and nuclear nonproliferation strategies during the remainder of the decade.

## **Strategic Deterrence in Context**

### **Strategic Deterrence, Nuclear Weapons, and Extended Nuclear Deterrence**

At its basic level, deterrence is an intentional act or set of actions aimed to influence adversaries' decisionmaking so that they choose restraint over aggression.<sup>6</sup> Deterrence is widely defined as any use of threats (implicit or explicit) or limited force intended to dissuade an actor from taking an action (i.e., maintain the status quo).<sup>7</sup> Deterrence does not necessarily require military superiority, although the military instrument is normally involved.<sup>8</sup> Deterrence tends to be distinguished from defense or the use of comprehensive armed force in wartime. It is most likely to be successful when a prospective attacker believes that the probability of success is low (deterrence by denial) or the retaliatory costs after the attack will be high (deterrence by punishment).<sup>9</sup> Classic studies of deterrence over history suggest that strategies of deterrence by denial are inherently more reliable than strategies of deterrence by punishment.<sup>10</sup> Steps taken to deny, such as placing significant military capabilities directly in the path of an aggressor, are both obvious and clear, while the defender's willingness to impose meaningful punishments may be uncertain and doubted by an aggressor. Deterrence challenges thus revolve around the credible communication of threats and assurance.<sup>11</sup>

Although deterrence theory developed during the Cold War nuclear era from 1947 to 1991, the framework of basic deterrence evolved over centuries. Recurring and iterative debate about what is to be deterred and how to deter remains extant in the discussion about nuclear weapons, but it has focused for more than 80 years on the central problem of deterring the use of nuclear weapons because of the catastrophic consequences they portend. A basic misconception about nuclear deterrence is that it somehow prevents a rival from taking any adverse action.<sup>12</sup> Threatening nuclear retaliation against lesser provocations has not proven credible during the nuclear era. Instead, approaches based on deterrence by denial tend to hold more promise. A Great Power that relies too much on nuclear deterrence risks not investing enough in capabilities needed to deter other security threats and strategic provocations.<sup>13</sup>

Contemporary nuclear deterrence partially hinges on the exceptional nature of nuclear weapons. American strategist Herman Kahn wrote in the 1950s that “there is a genuine distinction between nuclear and chemical explosions. The fact that very low-yield nuclear weapons could be developed which would render this distinction fuzzy and vague does not change this.”<sup>14</sup> Nuclear weapons are extraordinarily destructive and require extremely expensive manufacturing processes for both their warheads and their delivery means. The hyperdestructive nature of strategic nuclear weapons meant that deterrence by denial became a losing proposition. The defender could not afford to have even a few aggressor nuclear warheads reach their targets without suffering catastrophic damage. Also, the costs to build an impenetrable nuclear weapons defense against bomber and, later, missile delivery systems quickly became prohibitive. Deterrence by punishment became the remaining nuclear deterrence option and generated the paradox of mutually assured destruction (MAD): to reduce the risk of nuclear war, each protagonist must accept the assured second nuclear strike of the other as necessary for deterrence and agree not to put that second strike at risk from an overwhelming first-strike capability and/or effective nuclear defense architecture. The United States, Soviet Union, and later China largely accepted the logic of MAD. Its paradox is ironically credited with eight decades of nuclear weapons non-use, whether non-use is simply a “tradition” or has risen to the level of a full-blown “taboo.”<sup>15</sup>

Some early nuclear weapons analysts hoped that nuclear weapons could discourage not only major wars between nuclear powers, but also lesser provocations between them and between other states with nuclear arms. The nuclear age has not played out this way.<sup>16</sup> States continue to engage in high-intensity armed conflict despite the risks of nuclear war—most notably, four times between India and Pakistan since both declared nuclear weapons status in 1998.<sup>17</sup> Nuclear weapons, however, seem to have contributed directly to two limited but critical stabilizing outcomes: deterring nuclear or other major strategic attacks against a Great Power, and deterring direct, state-on-state war of any form between the modern Great Powers.<sup>18</sup>

Scholars and practitioners have come to view nuclear weapons as capable of deterring activities only at the higher end of the spectrum of conflict. Nuclear weapons may place an upper limit on escalation from lower-level activities, but they do not contribute directly to the deterrence of those activities in the first place. By themselves, nuclear weapons do not appear to deter activities such as cyberattacks, terrorism, limited territorial disputes, the

provision of massive military aid to allies or partners, or other “hybrid” warfare techniques, for example, but they may contribute to how far these activities escalate.<sup>19</sup>

The U.S. policy of extended deterrence was born of the overwhelming conventional threat posed to Western Europe by the Soviet Union at the dawn of the Cold War in the late 1940s. In the early 21<sup>st</sup> century, more than 30 countries are protected by the U.S. extended nuclear deterrence umbrella.<sup>20</sup> The policy of extended deterrence remains a key component of the security strategy of the United States. The 2022 Nuclear Posture Review released by the Biden administration affirms the U.S. commitment to extended deterrence, stating that the United States would “[ensure] our strategic deterrent remains safe, secure, and effective, and our extended deterrence commitments remain strong and credible.”<sup>21</sup>

The historical complexities of strategic deterrence in an era where nuclear weapons were the undisputed king of strategic weapons are growing even more convoluted in the 2020s. Today, newer, increasingly destructive nonnuclear munitions aboard exceptionally speedy, precise, and mass-produced delivery systems—including but not limited to hypersonic missiles, hypervelocity projectiles, and directed-energy weapons—enable the delivery of devastating global and theater strategic effects. The rapid evolution of these nonnuclear strategic weapons has encouraged scrutiny about the future of nuclear weapons in deterrence and warfighting. At the same time, the Great Powers are expanding and modernizing their nuclear weapons stockpiles in a manner not witnessed since the Cold War. Simultaneously, the framework of bilateral and multilateral arms control and nonproliferation arrangements providing meaningful constraints on nuclear weapons has basically collapsed. Only the Russian-American New Strategic Arms Reduction Treaty (New START; nonrenewable and scheduled to expire in February 2026) and the Nuclear Nonproliferation Treaty (NPT) remain relevant in 2025.<sup>22</sup> The implications of a growing nuclear weapons arms race and the collapse of nuclear arms control contribute to a new, complex paradigm for strategic deterrence concurrently with NNSWs emerging and becoming relevant to the discussion. The implications of emerging NNSWs and a withered nuclear arms control framework will be sketched in the next two segments.

### **Nonnuclear Strategic Weapons and Strategic Deterrence**

In recent years, the development and proliferation of NNSWs have progressed significantly. NNSWs are nonnuclear weapons that analysts assess can produce major impacts generating strategic outcomes in the event of armed conflict.<sup>23</sup> The 2022 U.S. Nuclear Posture Review stated that for the foreseeable future, Washington believes that nuclear weapons will continue to provide a unique deterrent effect unmatched by other elements of U.S. power.<sup>24</sup> Nonetheless, NNSW advances continue to close the gap between conventional and nuclear weapons and create an environment where strategic weapons are more usable politically, and therefore on the battlefield. NNSWs also are often forward-deployed, with authorization procedures taking place at much lower levels of military command.<sup>25</sup>

A steadily increasing number of states now deploy potential NNSWs, including growing arsenals of conventional precision-strike capabilities, electronic, laser, anti-satellite, and cyber weapons, as well as missile defense capabilities that may be used in strategic functions.<sup>26</sup> Ukraine, for example, has developed a Flamingo missile—a cruise missile with a 3,000-kilometer range and a 1,150-kilogram conventional warhead—that is capable of

strategic effects against Russia should Ukraine be able to scale up production.<sup>27</sup> All of the Great Powers have NNSW programs that are advanced and active. China has been pursuing nonnuclear strategic weapons advancements as part of its broader strategy to overmatch U.S. military forces with ventures including space-based weapons, a massive hydrogen fireball weapon, and cyberspace mass destruction systems.<sup>28</sup> Evidence suggests that Chinese leaders believe that employment of long-range strike nonnuclear weapons can undermine the will of their opponents to resist at the strategic level, and thus that these weapons are a potentially effective way to subdue Beijing's enemies, including the United States.<sup>29</sup> The United States has developed an array of nonnuclear massive ordnance penetrator bombs and special conventional missile warheads over the years, and on occasion publicly stated a willingness to use such NNSWs as part of a response to inflict "catastrophic consequences" against a rival willing to violate the taboo against nuclear weapons use.<sup>30</sup>

In Russian theory and practice, nuclear and nonnuclear (conventional) deterrence are inextricably linked. During the quarter-century of rule by Vladimir Putin, Russian military doctrine has prioritized a flexible package of military capabilities, with nonnuclear strategic systems complementing nonstrategic and strategic nuclear weapons.<sup>31</sup> China and Russia both worry about the threat American and European conventional precision-strike capabilities and other NNSWs may pose to their nuclear deterrent.<sup>32</sup> More recently, Western countries have become concerned about the growth of Russian precision-strike capabilities as part of a preemptive countervalue strike against key socioeconomic targets in Europe intended to destroy the North Atlantic Treaty Organization (NATO)'s warfighting potential at the outset of a conflict.<sup>33</sup>

These and other security concerns about proliferating NNSWs have produced an expansion in many nuclear states' articulated purpose for nuclear weapons—moving beyond deterring nuclear strikes or other mass-casualty weapons such as those using biological and chemical substances. The expansion involves explicit assertion of Great Power willingness to use nuclear weapons in retaliation to all forms of strategic attack, including in response to those featuring nonnuclear technologies comprising NNSWs.<sup>34</sup> Although not a real expansion of past U.S. nuclear weapons retaliatory policy, the 2018 and 2022 Nuclear Posture Reviews—from the first Trump administration and the Biden administration, respectively—intimated American willingness to deter emerging NNSW technologies with nuclear weapons.<sup>35</sup> Russia has been more direct in telegraphing its intent to broadly apply nuclear weapons for deterrence. Moscow's 2020 Basic Principles of State Policy of the Russian Federation on Nuclear Deterrence explicitly states that it would seek to deter strike weapons in outer space, high-precision NNSWs, hypersonic weapons, unmanned aerial vehicles, and directed-energy weapons with nuclear weapons.<sup>36</sup>

### **Strategic Deterrence, Nonproliferation, and Arms Control**

For more than 50 years, nuclear arms control has been used to enhance strategic deterrence, inhibit nuclear weapons arsenals intended for regional warfighting, and limit the prospects of nuclear weapons proliferation. From the late 1960s, U.S. and Soviet (later Russian) leaders used bilateral agreements regarding the size, composition, location of, and transparency into their nuclear weapons arsenals as a way to limit—and even reduce—enormous arsenals of nuclear warheads, their delivery means, and the systems designed

to deter their use.<sup>37</sup> By the early 2000s, bilateral limitations on strategic nuclear weapons arsenals included the START III framework and the Strategic Offensive Reduction Treaty (SORT) that together constrained U.S. and Russian deployed strategic nuclear arsenals to between 1,700 and 2,000 total warheads for each side, complemented by intrusive monitoring and verification procedures. It also featured the strategic Anti-Ballistic Missile (ABM) Treaty, in force since 1972, constraining missile defenses against strategic nuclear weapons to just a few sites, limiting interceptors to preserve mutual second-strike capability, and inhibiting costly nuclear arms racing to preserve strategic second-strike stability.<sup>38</sup> The 1987 Intermediate-Range Nuclear Forces (INF) Treaty also remained in force at the turn of the century. It mandated the United States and Russia possess no ground-launched ballistic or cruise missiles with ranges between 500 and 5,500 kilometers. The INF Treaty applied globally to the two superpowers and had no expiration date.<sup>39</sup> The technical complexity associated with generating low-yield nuclear warheads and mating them with intermediate-range ballistic and cruise missiles made the INF Treaty a barrier to regional nuclear warfighting through the early 2000s.

Finally, the NPT, which entered into force in March 1970 and was extended indefinitely in 1995, remained conspicuous in the early 2000s—a three-pillar treaty calling on the original five nuclear weapons states to lead the way in the pursuit of general and complete disarmament in exchange for nonnuclear weapons states' signatories to forego nuclear weapons development or acquisition.<sup>40</sup> Only South Sudan, India, Israel, and Pakistan remained outside the NPT, making it the most universal of all the nuclear weapons arms control protocols of the nuclear era. Although imperfect in implementation—especially in the cases of Iran and North Korea—the NPT entered the new millennium as a noteworthy example of global cooperation in the pursuit of reduced risks from nuclear weapons acquisition or their use. Together, the arms control treaties, both bilateral and multilateral, generated a framework that reinforced a basic taboo against the proliferation of nuclear weapons, their use to intimidate or coerce nonnuclear states, and their use in warfighting.

This entire framework began to wobble in 2002—first, at the strategic level. That year, the United States withdrew from the ABM Treaty to pursue forward-postured antimissile defenses against nuclear weapons attacks feared increasingly possible by third-party states, such as Iran and North Korea, and by potential nonstate actors—especially terrorist groups.<sup>41</sup> Russia opposed this American unilateral action. Its new president, Vladimir Putin, observed that Russia's frustration meant that it must explore a concept of nuclear deterrence policy first contemplated in late 1990s after the Kosovo crisis—a concept featuring a renewed focus on tactical nuclear weapons and their use in regional warfighting, even against a nonnuclear state if Moscow deemed it to be acting jointly with a nuclear weapons state to threaten Russian territory, forces, or strategic interests.<sup>42</sup> Hard bargaining between Moscow and Washington enabled bilateral agreement to the New START Treaty, which replaced SORT in 2011 and further limited Russian and U.S. deployed warheads to a limit of 1,550 by 2018.<sup>43</sup> But New START's ultimate success was argued as evidence of strategic arms control's creeping failure. For New START opponents, Moscow agreed to the treaty only because it was sufficiently vague to give top cover for Vladimir Putin's deliberate program to rebuild what had withered into a very small strategic nuclear force without meaningful constraints on multiple independent re-entry vehicles or an array of other potentially de-

stabilizing strategic nuclear delivery systems.<sup>44</sup> Strategic arms control remained by 2020, but in a threadbare status.

The arms control bulwark against Great Power theater nuclear warfighting similarly atrophied during the early 2000s before collapsing around 2020. Arms control analysts observed for years that the INF Treaty lacked serious credibility before 2010, in large measure because of Putin's secretive mid-2000s development of a new intermediate-range nuclear cruise missile known as the 9M729 that specifically violated the treaty's prohibitions. The United States went public with its complaints against Russia in 2014 after repeated Russian denials of its existence, ultimately withdrawing from INF in 2019 when, after years of complaints, Putin declined to halt the program.<sup>45</sup> The end of INF ended Great Power formal arms control to constrain regional nuclear warfighting.

Finally, the NPT norm against nuclear weapons proliferation came under increasing duress during the first two decades of the 21<sup>st</sup> century. The NPT produced many stellar achievements during and after the Cold War. Among these achievements were those that saw potential nuclear proliferators such as Australia, Canada, West Germany, Japan, Sweden, and Switzerland become true champions of nonproliferation efforts and supporters of International Atomic Energy Agency (IAEA) global nonproliferation safeguards and influenced countries such as South Africa, Brazil, Argentina, Ukraine, Belarus, and Kazakhstan to either abandon promising nuclear programs with weapons potential or voluntarily relinquish standing nuclear arsenals.<sup>46</sup> But NPT arguably has become tarnished as a regime of double standards in the past 20 years. Three states, including India and Pakistan, acquired nuclear weapons while they were NPT nonsignatories, embittering those states (such as Iran and North Korea) that signed onto the NPT framework and coloring NPT as merely a regime for managing a status quo bias in favor of nuclear weapons states, irrespective of the legitimacy of their pathway there.<sup>47</sup>

As of 2025, the entire nuclear arms control framework—strategic, theater/tactical, and nonproliferation—is at an inflection point.<sup>48</sup> Will it remain in retreat? Can it be updated and triangulated to enhance deterrence against the global or regional use of nuclear weapons? Will the NPT remain in force, and, if so, how will the Great Powers choose to enforce it: with inspections and sanctions, or with selective nonnuclear armed strikes to delay or destroy new weapons programs? These critical questions must be answered while considering the standing policies and perspectives held by the Great Powers about the utility and proper role of nuclear weapons in their global rivalry, key regional confrontations, and in the context of a greater number of nuclear-armed countries.

A review of Great Power perspectives and proclamations about nuclear weapons, deterrence, nonproliferation, and arms control will follow in the next section. This section also will describe the scope and trajectory of Great Power nuclear weapons and NNSW modernization programs. It also will sketch the views held by each Great Power about the promise and peril of trilateral strategic nuclear arms control and multilateral nonproliferation.

### **Great Powers Today on Strategic Deterrence, Nuclear Modernization, and Arms Control**

In 2025, the three Great Powers hold different perspectives and policies regarding the utility of nuclear weapons as tools for deterrence, warfighting, and national legitimacy. In general

terms, Chinese and American perspectives and proclamations during the early 2020s are ambiguous about prospective nuclear weapons use, and perhaps intentionally so. Russia, on the other hand, has been far more assertive and certain about its view that nuclear weapons have a key role to play in defense of the Russian state at a global and a regional level. Russia has referenced nuclear weapons as a potential warfighting instrument, allowing Moscow to “escalate to de-escalate.” Russia has frequently declared this positivist perspective on nuclear weapons utility and threatening use, though not yet acting on those public statements. It is important to establish the divergent Great Power policies and perspectives about nuclear weapons utility for strategic war and for regional war, their legitimacy in wider proliferation, and the role for arms control in reducing the risks of either of these outcomes.

### **Russian Perspectives, Activities, and Implications**

Unique among the three Great Powers, Russia transparently declares that nuclear weapons are useful as a deterrent against rival nuclear attacks into the motherland, an important capability for regional warfighting, and a legitimate threat to coerce desired outcomes from especially nonnuclear regional countries. Questions about Russia’s commitment to the legacy global nuclear regime were largely resolved in a negative manner between 2022 and 2025 as the war in Ukraine prompted a significant recalibration of Moscow’s adherence to established international rules and norms governing nuclear technology oversight, weapons dispositions, and nonproliferation.<sup>49</sup> Since 2022, Russia has actively diluted its support for nuclear nonproliferation in several conspicuous ways and simultaneously signaled skepticism about the value of nuclear arms control on any level in the future.

Russia last updated its official nuclear deterrence and utilization policy through an executive order in 2024, moving it beyond the 2020 edition. This new order established five specific conditions for nuclear weapons use. Two went beyond Moscow’s previously existing plans for nuclear weapons launch in the event of a confirmed ballistic missile attack toward Russia or its allies; an attack with other types of weapons of mass destruction or NNSWs against Russia, its allies, or its military forces outside of Russia; or actions taken that would disable or disrupt Russia’s ability to utilize its nuclear weapons.<sup>50</sup> The 2024 order added Russian criteria for potential nuclear use in the event of adversary aggression against Russia or Belarus that would constitute a critical threat to their sovereignty or territory, and upon evidence of the massive launch of air and space attack means determined as destined to cross into the borders of Russia. Putin’s update expanded the legitimacy of nuclear weapons in both a strategic and a regional context.<sup>51</sup> The incorporation of criteria for nuclear retaliation in the event of a perceived massive space attack or one by rival hypersonic nonnuclear weapons expanded Moscow’s nuclear deterrent posture in the strategic context.

The 2024 document’s specific threat of nuclear weapons use in the event of a sovereignty or territory threat featuring conventional weapons added a degree of specificity to Russian plans for tactical weapons use in its special area of interest: western Eurasia. That threat reinforced Western analyst views that Russia had a strategic framework for conflict escalation featuring an “escalate to de-escalate” approach that would turn to nuclear weapons use early in an armed clash to raise adversary expected costs above anticipated benefits.<sup>52</sup> The 2024 document was released in the context of the Russo-Ukrainian war, which featured more than 200 cases where Russian leaders referred to the possible use of nuclear weapons.<sup>53</sup> As

the conventional war expanded, so did Russian nuclear threats. So too did Russian regional military drills involving tactical nuclear weapons—inside and outside Russia, including in Belarus.<sup>54</sup> Notwithstanding that the leaders of China and India seemed to have successfully warned off Putin from making good on these regional nuclear threats, Russian activities indicate that it sees increasing utility to threatening the use of nuclear weapons early in a conflict to coerce military and political concessions.<sup>55</sup> Russian threats increase the potential for miscalculation and the manner in which Moscow and its adversaries might accelerate up the escalation ladder from conventional to tactical nuclear and then to general nuclear warfare.

Russia has been building a nuclear weapons force necessary to enable this national strategy since shortly after Vladimir Putin came to power. Twenty years later, the targeted nuclear weapons modernization program conceived by Putin in the early 2000s and prioritized by Russia during the late 2010s and early 2020s bore fruit with a reinvigorated nuclear weapons triad. Russia's strategic nuclear overhaul featured development of the SS-X-29 (Sarmat) heavy intercontinental ballistic missile (ICBM), the SS-27 Mod 2 (Yars) ICBM, and the *Dolgorukiy* (Borei)-class ballistic-missile submarine (SSBN).<sup>56</sup> Most of Russia's strategic nuclear warheads were, by the early 2020s, deployed on its ICBMs, and Russia can fit most of its ICBMs and all of its submarine-launched ballistic missiles (SLBMs) with multiple warheads on each missile.<sup>57</sup> At mid-decade, Russia claimed that its nuclear force modernization produced weapons numbers that remained roughly in line with its bilateral nuclear arms control agreements with the United States, especially New START. As of 2025, Russia has around 1,718 deployed nuclear warheads based on a triad of strategic delivery vehicles consisting of roughly 330 ICBMs, 12 SSBNs with 192 SLBMs, and 58 strategic bombers.<sup>58</sup> There is some uncertainty in these numbers, however, since Russia has not exchanged official data with the United States about the structure of its strategic nuclear forces since its 2023 suspension of participation in New START to protest Ukraine war-related Western sanctions.<sup>59</sup>

Reports in 2025 indicate that Moscow's nuclear modernization efforts have been arrested at least in some manner by two implications of the Russo-Ukrainian War: Western financial sanctions have constrained necessary capital investments, and the design and manufacturing of new nuclear weapons systems and upgrades to existing systems had been ongoing before the war by Ukrainian personnel and plants. In addition, Putin has shifted his defense armaments' efforts toward conventional systems that could have dual use.<sup>60</sup> These domestic economic constraints may underpin Putin's late September 2025 announcement that Moscow will adhere to New START nuclear arms limits for one more year without any negotiated successor—thereby retaining the weapons limits and continuing Russia's 2023 suspension of participation in New START's verification protocols—while urging the United States to follow suit in order to avoid a strategic arms race.<sup>61</sup> Despite these recent dynamics, more than a decade of concentrated modernization by Putin has made his strategic nuclear weapons forces the most modern and numerous in the world.<sup>62</sup>

Over the same period, Russia also has extended and enhanced a variety of dual-capable special strategic systems (which are able to use conventional or nuclear warheads), including precision strike missiles of various ranges and modes of launch, that are not limited by any arms control agreements. It also has produced several lower-yield nuclear warheads

and delivery mechanisms such as hypersonic glide vehicles, enabling their use as nonstrategic nuclear weapons with regional and tactical utility. As of 2025, the Russian military is estimated to have between 1,000 and 2,000 nonstrategic nuclear warheads, although some sources suggest it may actually be far greater.<sup>63</sup> Recognizing these theater weapons as designed to overcome U.S./NATO missile defenses and conventional military superiority, the United States has attempted to negotiate limits on these nonstrategic nuclear systems, only to have the offers rebuffed by Moscow.<sup>64</sup> Frustrated by what it perceived to be Moscow's violation of the INF Treaty as a result of its growing nonstrategic nuclear weapons and mid-range delivery systems limits during the 2010s, the first Trump administration withdrew the United States from INF in 2018. Russia's rather calm reaction to this U.S. withdrawal suggested that it did not feel disadvantaged in Europe from the collapse of INF and that Moscow's strategists envisioned a potential need to deploy its own INF-range missiles in Asia, where the military has long trained for the contingency of war with China.<sup>65</sup>

Russia's commitment to nuclear nonproliferation and arms control also diminished markedly in the early 2020s.<sup>66</sup> It took actions in the 2022 NPT review conference to isolate the United States rather than continue the decades-long tradition of nuclear weapons states' coordinating actions in order to refine and extend the NPT.<sup>67</sup> Its 2023 Russian Foreign Policy Concept devalued nuclear nonproliferation while touting the virtues of nuclear deterrence for strategic stability—a notable shift from past posture.<sup>68</sup> Russia suspended its adherence to the New START treaty in February 2023, protesting Western support for Ukraine and calling into question its commitment to nuclear restraint at the geostrategic level.<sup>69</sup> Russia also withdrew its ratification of the Comprehensive Nuclear Test Ban Treaty in 2023, and its foreign ministry spokesman later stated that Russia was ready to resume testing if necessary, accusing the United States of preparing to test as well.<sup>70</sup> Moscow then withdrew from the Proliferation Security Initiative in 2023.<sup>71</sup>

Overall, Russia's national security interests and external policy actions in the early 2020s indicated that Moscow had settled on a nuclear weapons strategy that affirms the weapons' coercive value for an array of deterrence initiatives, values tactical nuclear weapons as a potential means of warfighting in order to “escalate to de-escalate,” and is at best indifferent and at worst passively uncooperative in international arms control endeavors. This relatively well-established, independent posture on strategic deterrence and nuclear weapons utility puts Russia at odds with its Great Power rivals and indicates the grave challenges that the Great Powers face to calm nuclear risks by tacit restraints or explicit arms control agreements now and for the remainder of the decade.

### **American Perspectives, Activities, and Implications**

As of early 2025, America's declaratory policy on nuclear weapons and strategic deterrence remained that their fundamental role was to deter nuclear attack against the United States, its allies, or partners, and that the use of nuclear weapons would only be considered in extreme circumstances to defend the vital interests of the United States, its treaty allies, and partners.<sup>72</sup> That policy further declared that nuclear weapons would deter all forms of strategic attack to include “high-consequence attacks of a strategic nature using nonnuclear means.”<sup>73</sup> This deterrence posture applied to the strategic level, but the Biden-era declarations also stated that United States would retain the capability to threaten or

actually employ nuclear weapons to deter limited nuclear attacks from adversaries in a regional conflict. The declarations also sustained the U.S. commitment not to threaten the use of—or actually use—nuclear weapons against nonnuclear signatories to the NPT that remained in good standing.<sup>74</sup> In broadest terms, U.S. nuclear policy preferences since the end of the Cold War, although never renouncing nuclear first use, have emphasized deterrence of adversary nuclear use or retaliation against that use with America's unique arsenal of NNSWs, an approach Washington believed could help sustain the "nuclear taboo."<sup>75</sup> This preference came under increasing duress in the early 2020s as Russian and Chinese nuclear arsenals grew more robust and began to threaten America's credibility to deter use or retaliate in the event they were used.

A big part of America's growing worries over nuclear deterrence and weapons use stemmed from treaty obligations and policy promises that extended nuclear deterrence to over 30 U.S. allies and partners. American extended deterrence continues to assure these countries that the United States will come to their aid, including potentially by using U.S. nuclear weapons, if they are attacked. The periodic 2010, 2018, and 2022 U.S. Nuclear Posture Reviews argued for strengthening extended deterrence and posited that such deterrence supported U.S. nuclear nonproliferation goals. The 2022 Nuclear Posture Review stated:

*Allies must be confident that the United States is willing and able to deter the range of strategic threats they face, and mitigate the risks they will assume in a crisis or conflict. . . . Extended nuclear deterrence contributes to U.S. nonproliferation goals by giving Allies and partners confidence that they can resist strategic threats and remain secure without acquiring nuclear weapons of their own.*

But by the early 2020s, the declared theater nuclear use policy of Russia and the unstated but increasingly possible move of China toward a nuclear arsenal optimized for intimidation of America's regional allies and theater nuclear war against the United States encouraged more energetic American movement toward a modernized strategic nuclear weapons force and theater strategic weapons options. A program of American nuclear triad updates was initiated in the early 2010s during the Obama administration, although without a great degree of enthusiasm or commitment to robust funding.<sup>76</sup> For almost a decade, America's nuclear modernization progress was halting. For example, the first Trump administration advanced and better funded modernization programs to rebuild American strategic and tactical nuclear systems, including the low-yield sea-launched nuclear cruise warhead (SLCM-N). The Biden administration then planned cancellation of the SLCM-N as unnecessary given American nonnuclear theater strike alternatives, but the U.S. Congress rejected the proposed cancellation and mandated in the 2024 and 2025 budgets that SLCM-N be prioritized.<sup>77</sup> During the early 2020s, the United States slowly augmented funding for its long-planned, wide-ranging nuclear weapons modernization program that will ultimately see every nuclear delivery system—ground, sea, and air—replaced with newer versions over the coming decades.<sup>78</sup> Given the budgetary proposals of the Trump administration during 2025, America's nuclear modernization could now see accelerating developments in early 2026. The total cost of this modernization could reach over \$1.5

trillion.<sup>79</sup> On the other hand, President Donald J. Trump suggested shortly after taking office in 2025 that he would seek a meeting with Chinese President Xi Jinping and Russian President Putin to discuss slicing all three countries' military budgets in half and capping nuclear arsenals.<sup>80</sup>

The United States publicly declared in May 2023 that it had 1,419 nuclear warheads assigned to 662 deployed ballistic missiles and heavy bombers.<sup>81</sup> This remained below its New START commitment of no more than 1,550 warheads. Of the deployed warheads, U.S. government figures from 2022 and 2023 reported that approximately 400 were on ICBMs, 980 were on SLBMs, and about 40 were located at bomber bases in the United States.<sup>82</sup> This is a slightly higher number—by about 70—than recorded in 2017.

The current ICBM fleet of about 400 deployed Minuteman IIIs will be replaced by the Sentinel ground-based strategic deterrent, some 659 missiles with 400 deployed to maintain the New START limit.<sup>83</sup> *Ohio*-class submarines are each capable of carrying 20 Trident SLBMs. The United States is on track to replace the *Ohio*-class with 12 *Columbia*-class submarines capable of carrying 16 missiles each. The New START treaty limits SLBMs and their submarines to a maximum of 240 launchers and around 1,000 warheads. So the modernized U.S. SLBM fleet will field nuclear warheads at numbers well below New START limits. The aging U.S. strategic bomber fleet, consisting of 74 B-52H, 45 B-1, and 19 B-2A aircraft, is on the way to being replaced by 100 B-21 bombers. B-21 fielding should commence in the late 2020s, reaching initial operating capability in 2027 and forecast for completion by 2040, at which point the B-21s will fully replace the B-1 and B-2A fleets.<sup>84</sup> The B-2A fleet—with an average age of nearly 30 years—will be fully retired in 2032, with the B-1 fleet following in 2040. However, many of the multipurpose B-52H strategic bombers are anticipated to get another lease on life, with modifications to the B-52J variant enabling the platform to continue in service through the 2050s—100 years since its first fielding.<sup>85</sup> Along with these changes, many of which are already behind schedule and over budget, the American nuclear command and control system, which is largely still based on pre-1990s technology, will also be upgraded to support the National Command Authorities requirements.<sup>86</sup> Prodded by Congress, the Biden administration and now the second Trump administration are developing a low-yield warhead for a submarine-launched ballistic cruise missile (SLBM-N) that could achieve initial operational capability by 2034.<sup>87</sup>

America's positioning for regional deterrence and potential warfighting also has expanded notably in the early 2020s and will continue to do so. This is true in Europe and in the Indo-Pacific. After decades with almost no land-based, forward-positioned midrange ballistic or cruise missiles, the United States began exercises in 2024—in the Philippines and Japan—of the mobile Typhon intermediate-range ballistic missile (IRBM) featuring a Tomahawk cruise missile with a 2,000-kilometer range. Although developed for the Typhon with a conventional warhead for the mission of deep, precision-strike theater interdicting fires, past versions of the American Tomahawk were designed to carry a nuclear warhead, and Chinese military planners may be wary about this potential into the future. The United States also announced plans to start deploying into Germany Typhon IRBM weapons by early 2026, including SM-6 and Tomahawk missiles, as well as new hypersonic missiles capable of hitting into Russia with very destructive precision conventional fires.<sup>88</sup>

Traditional American support for a treaty-led, multinational organization–managed nuclear nonproliferation regime is no longer assured in mid-2025. While the Biden administration attempted to shore up the NPT regime and related multilateral nonproliferation activities from 2021 to 2024, the second Trump administration quickly picked up where it left off with its first-term skepticism about nuclear nonproliferation treaties and regimes. President Donald J. Trump personally demonstrated a curious mix of interest in nuclear disarmament and deep skepticism toward multilateral agreements or organizations like the IAEA as an appropriate means to achieve nuclear nonproliferation. At a basic level, the Trump 2.0 nonproliferation approach for the remainder of the decade likely will emphasize U.S. nuclear dominance and favor transactional initiatives—bilateral and unilateral—to halt nuclear proliferation to certain countries. Trump may seek to halt proliferation the way he approached North Korea from 2017 to 2019—with initial threats of overwhelming American attack followed by personal diplomacy to secure a bilateral understanding that alleviates some, but not all, the elements of the nonnuclear state’s violations. Or Trump may do as he did with Iran in June 2025. Then, he warned Tehran that decisive action would take place if Iran did not give up its nuclear weapons program and then took significant military action (in coordination with Israel) to set back Iran’s nuclear enrichment program in a manner that secured at least short-term nonproliferation goals. Should it be sustained, this new American approach toward nuclear nonproliferation will leave little space for multilateralism or extended coordination with the other Great Powers. As with Iran, the new approach may produce some noteworthy outcomes but is equally likely to prove unsustainable after the man himself or his administration are gone.

The Biden administration’s 2022 Nuclear Posture Review asserted that arms control and reducing the role of nuclear weapons remained the most effective ways to prevent nuclear use, despite Russia’s and China’s ongoing rejection of arms control and elevation of nuclear weapons.<sup>89</sup> It remains unclear precisely how a second Trump administration will approach nuclear arms control. What is clear is that any such arms control ventures will need to align with Trump’s promise to greatly enhance American nuclear deterrence by denial, a commitment underscored by his May 2025 announcement that the United States would seek to employ within 3 years a “Golden Dome” national air and missile defense shield.<sup>90</sup> There were early indicators that President Trump would like to convene a Great Power meeting to generate sweeping cuts to all three Great Power military budgets, including those for nuclear weapons, and that he would like to see a successor agreement to New START between Russia and the United States remain beyond February 2026.<sup>91</sup> However, the second Trump administration cannot be mistaken for one that will forsake its quest for the United States to be at the top of the pack in nuclear and conventional military stature to secure arms control. If Beijing and Moscow can navigate around this America First 2.0 imperative, there may be some scope for limited nuclear arms control or confidence-building activities between the Great Powers during the remainder of the decade.

### **Chinese Perspectives, Activities, and Implications**

Longstanding Chinese policy states that China will never be the first to use a nuclear weapon in a conflict and will use them only in retaliation for a nuclear attack. Thus, China has been a no first use (NFU) nuclear weapons state. For decades, China has sought to build and

maintain a credible nuclear second-strike capability (that is, the ability to launch a devastating nuclear retaliation after absorbing a disarming first strike).<sup>92</sup> It has done so to secure a relationship of mutual vulnerability with the United States.<sup>93</sup> Obvious since 2021 reporting by Western security analysts, recent Chinese efforts to develop more nuclear options, including longer midrange ballistic missiles and theater nuclear weapons, have suggested to some that China may be moving toward limited first use as part of an evolving military strategy of “active defense.” China has never stated that it is contemplating a move away from its NFU policy, even in the face of ratcheting tensions with the United States in the Western Pacific. Moreover, respected Western analysts of Chinese strategy, including the U.S. Defense Intelligence Agency, do not believe that China’s rhetoric about moving toward a more “active national defense” is indicative of a turn away from NFU. Instead, they assess that the new Chinese language remains consistent with a strategy of “striking only after the enemy has struck.”<sup>94</sup> China’s conspicuous program of nuclear weapons buildup may be more robust, hardened, and mobile, but it remains consistent with a posture designed for countervalue targeting (holding adversary population centers at risk of retaliation), not counterforce targeting (focused on successfully hitting adversary nuclear weapons locations).<sup>95</sup> In short, while China may be acting on perceived threats to make shifts upward in its nuclear force posture, it is not yet abandoning its nuclear strategy of deterrence by assured retaliation—a variant of MAD.<sup>96</sup> China may yet review and alter this strategy as it grows its nuclear arsenal, but that seems unlikely before the end of the decade.

The conclusion about continuity in China’s strategic nuclear deterrence strategy has implications for its theater deterrence and warfighting prospects in the Indo-Pacific. Unlike Russia in the European context, China is not today considering an “escalate to de-escalate” strategy for potential conflict with the United States in the Indo-Pacific.<sup>97</sup> China’s recent proliferation of midrange ballistic missiles that are dual-capable (capable of carrying a nuclear or a conventional warhead) does not yet indicate that it is resolved to go nuclear in a theater fight with the United States. Instead, these missiles are just as, if not more, likely to remain below the nuclear threshold, as most are reportedly armed with conventional warheads.<sup>98</sup> Should China become more concerned that the United States is moving toward a first strike capable of eviscerating the People’s Liberation Army’s assured nuclear second strike—including with America’s new in-theater midrange, conventionally armed cruise missiles—then China could arm more of its intermediate-range missiles with nuclear warheads but most likely in a bid to retaliate with a theater nuclear strike, not to initiate a theater nuclear war. As of 2025 and likely through the end of the decade, the dynamics between China and the United States in the Indo-Pacific create conditions where China will be wary of initiating the use of nonstrategic nuclear weapons in a fight but increasingly postured to respond with a limited tactical nuclear strike should the United States initiate one.<sup>99</sup> After 2030, however, this incentive structure could flip as Beijing culminates fielding of a greatly enhanced array of tactical nuclear use options and missile defense systems.

The early 2020s saw China take incontrovertible actions demonstrating that it means to ascend to a nuclear power on a global par with Great Power competitors Russia and the United States. China’s initiatives included the first moves to expand beyond its longstanding land-based ICBM force into one with globally capable sea- and air-based nuclear forces.<sup>100</sup> In doing so, China has presented the United States and its allies and partners with a new,

or at least more obvious, dual nuclear problem. Since its initial nuclear test in October 1964 and until recently, China has held a relatively small nuclear deterrent, and this aligned with Beijing's strategic posture (sketched in detail above) that featured a defensive or second-strike set of nuclear capabilities in line with its stated NFU policy.

In 2025, China embarked on an overt and rapid nuclear arms expansion. Its number of deployed warheads grew from about 200 in 2020 to 600 in 2024, with an estimated 1,000 possible by 2030 and 1,500 by 2035.<sup>101</sup> Even though China has no obligation to conform, this trajectory would put it at the cusp of the upper limits for U.S. and Russian deployed nuclear warheads under the bilateral New START slated to remain in force through February 2026. Perhaps the most imposing development was the Chinese DF-41 ICBM, 16 of which were first publicly paraded in 2019. The DF-41 is a solid-fuel, 3-stage rocket capable of mounting on a mobile launcher and able to deliver 10 independently targeted nuclear missiles anywhere in the world. China's leap-ahead from liquid-fueled, static DF-5B nuclear ICBMs was punctuated in 2021 with announcements by Western experts that China was dramatically expanding the number of its ICBM silos, with a projected 350 to 400 static and mobile ICBM launcher silos spread out over 3 separate missile fields likely by the early 2030s.<sup>102</sup> China also began moving to strengthen its six-boat SSBN force into one that now regularly conducts operational patrols. However, at mid-decade, China's SLBMs do not have enough range to be able to target the entire continental United States, and its fleet technology is "noisy" by modern standards, making Chinese subs easy to track in open water. Thus, it is unlikely that China's SLBM force would survive long in a serious conflict with the United States, and this deficiency will not be rectified for several years.<sup>103</sup> The nascent air leg of China's aspirational nuclear triad—its bomber force—is a relatively new addition to its strategic nuclear delivery options. As of the mid-2020s, China has no intercontinental range bomber and only began developing a prototype around 2020 and thus is unlikely to field any viable platform during the remainder of the decade. A portion of People's Liberation Army Rocket Force (PLARF) nuclear element is now kept on alert status, and it appears to be shifting to a launch-on-warning doctrine.<sup>104</sup> This nuclear weapons buildup by China constitutes a major shift in China's nuclear posture, which was previously based on a "lean and effective" land-based nuclear force focused exclusively on deterring nuclear threats. As mentioned earlier, China has not announced any change from its NFU nuclear policy or articulated an endstate to its nuclear buildup. Yet the dramatic buildup in its strategic nuclear weapons profile is generating a historic change in the nuclear balance between the Great Powers—moving the strategic deterrence framework and the nuclear arms control dynamic from a bilateral to a trilateral one.<sup>105</sup>

At the same time, the Chinese military continued pushing the frontier of nonnuclear strategic weapons during the early 2020s with activities aimed to accelerate these programs in the coming half-decade. The PLARF operates an extensive array of conventional ballistic missiles and ground-launched cruise missiles, which are capable of precision strikes at ranges up to 4,000 kilometers—optimized for theater tactical use. Among these missiles, China has about 250 DF-26 IRBMs (4,000-mile range) and an uncertain number of the new medium-range DF-17 missiles (1,500-mile range), which can carry a hypersonic glide vehicle with an enhanced ability to penetrate regional missile defenses.<sup>106</sup> Especially true for its DF-26, China's midrange ballistic missile fleet is worrisomely "entangled," meaning these

missiles can fire either a nuclear or a conventional warhead, and is mobile, meaning the missiles can be mounted on a wheeled chassis and moved from location to location.<sup>107</sup> This increases the likelihood that a conventional weapons battle between China and the United States could escalate (“go nuclear”) if conventional U.S. strikes target Beijing’s nuclear IRBM launchers thinking they were hitting the conventional ones. China may also be developing a conventionally armed ICBM. The PLARF likely also controls other missile-based strategic capabilities, such as China’s direct-ascent anti-satellite weapons and the anti-ship ballistic missile versions of the DF-21 and DF-26 missiles.<sup>108</sup>

All told, if China’s nuclear buildup continues its current trajectory, the United States will face two truly nuclear peer adversaries for the first time soon after the turn of the decade.<sup>109</sup> Should the Sino-Russian strategic friendship continue through that time, then these global nuclear powers together could pose qualitatively new threats of opportunistic regional aggression under their respective nuclear umbrellas.<sup>110</sup>

China joined the NPT in 1992 as a nuclear weapons state and has voluntary IAEA safeguards on its civil reactors. China is also a participant in the Nuclear Suppliers Group, a multilateral control regime for nuclear-related exports, although it is not a member of the Missile Technology Control Regime. China continues to articulate in public that it will cooperate to “preserve and strengthen existing multilateral arms control, disarmament and nonproliferation institutions.”<sup>111</sup> China expressed regret that a bitter rift between Russia and the United States and Europe during the 2022 10<sup>th</sup> NPT Review Conference left that gathering unable to reach consensus for a final document, but vowed to continue support for the treaty and its enforcement means.<sup>112</sup> However, China’s prospects for deeper cooperation on enforcement of the NPT remain problematic at mid-decade and are likely to remain so in coming years. The Biden administration was unable to secure greater Chinese cooperation in NPT review initiatives or bilateral discussions on combined approaches to improved nonproliferation largely because of disagreements over China’s demands for U.S. acceptance of Chinese “core interests” in the western Pacific. The Trump administration used early 2025 international meetings on nonproliferation to single out China as conspicuously violating the spirit of NPT with its rapid ongoing nuclear weapons build-out.<sup>113</sup>

Similarly, China’s future in Great Power arms control appears challenging. Beijing has generally refused to engage in substantive discussions about its nuclear forces, doctrine, or policies with the United States.<sup>114</sup> A rift between China and the Biden administration grew from a contentious senior-level meeting in Alaska during March 2021, and U.S.-China arms control discussions went to the back burner for a time.<sup>115</sup> In November 2023, representatives from Beijing and Washington held their first arms control talks in 5 years but without major breakthroughs.<sup>116</sup> During 2023 and 2024, the United States continued to invite China to join Russia-U.S. bilateral talks on strategic arms limitations (the New START process), but Beijing demurred. With no major arms control outcomes with Beijing over its 4 years in office, the Biden administration gave way to the second Trump administration, which returned with an aim to again solicit China’s participation in trilateral nuclear disarmament talks with the United States and Russia. As it had done since the first Trump administration, China’s foreign ministry continued to state that it was “neither reasonable nor realistic” for China to participate in such talks.<sup>117</sup> The Chinese position is fueled by Beijing’s belief that it holds fundamentally different views of the proper role of nuclear policies and capabilities

and might engage in nuclear arms control limitation conversations with its Great Power competitors only once it achieves rightful parity in nuclear armaments—something now forecast to occur no earlier than 2035.<sup>118</sup> China's arms control self-constraints seem to mean that absent some great shock to the nuclear weapons order prior to 2035, such as an unanticipated collapse of Russia and the need for collaboration to safeguard Moscow's nukes or the like, Beijing will remain distant from nuclear arms control interactions with its fellow Great Powers.

### **Implications Combined: Growing Arms Race Instability and Crisis Instability**

The early 2020s established the conditions for a new Great Power strategic arms race as all three protagonists moved to modernize and expand their existing nuclear capabilities. By 2025, these conditions included the capture of a significant amount of U.S., Russian, and Chinese defense spending. None of the contemporary Great Powers has proven willing to accept the status quo nuclear weapons framework of the immediate post-Cold War world, and during the early 2020s, all were moving beyond that framework and onto a three-party nuclear weapons buildup.<sup>119</sup> Russia has led the global nuclear weapons modernization resurgence followed by China, albeit from a much lower starting point. Early to announce but late to make a serious financial and technological commitment, the United States by 2024 had committed to modernize or replace every component of its nuclear weapons triad, programmed to spend at least \$1.5 trillion over the next two decades to assure its nuclear deterrent remains durable at the New START declared weapons levels.<sup>120</sup> Adding to this momentum in 2025, the second Trump administration appears committed to a far more robust deterrence strategy—one that will support a larger nuclear triad, greater force diversity, and an expanded role of nuclear weapons in American security strategy.<sup>121</sup> Furthermore, the second Trump administration seems committed to development of a strategic missile defense system—the first effort of its kind in 40 years. This initiative appears to be one with significant implications for the dynamics of strategic deterrence, crisis stability, and arms race stability between the three Great Powers in coming years. Could this American strategic missile defense effort lead to a truly new strategic deterrence paradigm—one oriented around deterrence by denial rather than one wedded to MAD?

### **Strategic Nuclear Deterrence by Denial: A Paradigm Now Viable?**

The Cold War and post-Cold War MAD paradigm for strategic nuclear deterrence and stability was in many ways self-reinforcing, with or without arms control agreements. In large part, MAD made sense because even the nuclear Great Powers found that credible ballistic missile defense was technologically vexing, extraordinarily expensive, and inherently destabilizing to an assured second strike—and thus not a rational undertaking. The ABM Treaty between the United States and the Soviet Union in 1972 formalized the bilateral superpower understanding that strategic nuclear deterrence by denial was not possible at acceptable risk, and its underpinning logic remained operative even after the United States withdrew from the ABM Treaty in 2002 citing the need to pursue limited homeland ballistic missile defense against terrorists and rogue states bent on acquiring nuclear missiles in a post-9/11 world.<sup>122</sup>

As of 2025, Russia deploys only one antimissile system designed specifically to defend against ICBMs: the A-135 system deployed around Moscow. The A-135 is integrated with the Don-2N radar, which provides targeting data for 68 silo-based 53T6 Gazelle endo-atmospheric interceptors—mainly equipped with nuclear warheads—distributed at five sites around Moscow.<sup>123</sup> Russia is reportedly upgrading this system to an A-235 variant with a long-range exoatmospheric interception and layered medium- and short-range endoatmospheric ones. When fielded at some unknown future date, this A-235 system may be able to defend two Russian ICBM sites near Moscow as well as Moscow itself. Since 2021, Russia also has fielded the S-500 mobile air and missile defense system. Although the S-500 was primarily designed against IRBMs, early warning aircraft, and satellites in low-Earth orbit, Moscow claims that in February 2024, the system successfully intercepted a hypersonic test target representative of an ICBM reentry vehicle. The S-500 has suffered major production delays and only 1 prototype is known to be operational, with another 10 systems planned for fielding in 2022 not yet operational at the end of 2024.<sup>124</sup> Russia thus is not pursuing strategic nuclear deterrence by denial in the mid-2020s and does not have plans to change this posture that could be realized within the next decade. Russian strategic nuclear deterrence remains one anchored on punishment and an assured second-strike capability.

U.S. capabilities for strategic nuclear deterrence by denial were far more advanced than those of Russia and China in late 2024, and by early 2025, they were poised to take a major leap forward. In 2024, the U.S. strategic antimissile arsenal featured its ground-based midcourse defense system with both sensors and interceptors necessary to achieve a modest degree of missile defense coverage across much of the country. The United States also fielded a robust sea-based, midcourse missile tracking and intercept system, the Aegis, with a global deployment profile. Beginning in the late 2010s, the United States embarked on a program to modernize its space-based tracking of a variety of nuclear weapons delivery threats, including hypersonic glide vehicles.<sup>125</sup> Combined, these loosely coordinated antimissile defense components provided America with a rudimentary form of deterrence by denial against the small but growing nuclear arsenal of North Korea. These components were not viewed at the time in Moscow or Beijing as posing serious risks to their nuclear second-strike credibility.

Then in early 2025, President Trump announced that the United States would pursue a “Golden Dome” comprehensive ballistic missile defense system for America and Canada over an ambitious 3-year program featuring at least a \$175 billion price tag.<sup>126</sup> The Golden Dome program aims to provide a next-generation missile defense shield to defend U.S. citizens and critical infrastructure and to guarantee retention of a U.S. second-strike capability in case of an adversary attack.<sup>127</sup> It appears aimed to integrate an array of current U.S. anti-ballistic missile programs—those featuring endoatmospheric and exoatmospheric intercept technologies—under a single acquisition and targeting infrastructure along with an expanded array of tracking and interceptor options in space and on the ground. It signaled a significant shift in U.S. missile defense aspirations, aiming for defense against ballistic, hypersonic, and advanced cruise missiles, and against other next-generation aerial attacks from peer, near-peer, and rogue adversaries.<sup>128</sup>

If it were to achieve its ambitious aims, an American Golden Dome could excite fears in Russia and China that their strategic deterrent of an assured second strike was at risk. In turn, this could generate a three-party redux of the two Cold War periods—during the 1960s and the 1980s—when bilateral Soviet-American nuclear first-strike incentives spiked and costly nuclear arms races began in response to fears that one of the competitors would build a successful missile defense “shield.”<sup>129</sup> The risks of such a redux—with a future period of great strategic nuclear crisis instability and extremely expensive arms racing—appear real, although unlikely to emerge imminently.<sup>130</sup> Golden Dome skeptics have challenged its technical feasibility, questioning many of the known program technological assumptions and observing the many bureaucratic hurdles it will confront. Among these hurdles, critics have noted that many of the radars necessary for the Golden Dome systems architecture use the 3.1–3.45 gigahertz band of the electromagnetic spectrum, which was targeted to be auctioned off to telecommunications companies.<sup>131</sup> If the United States pursues its Golden Dome program despite the sobering technological challenges and high price tag, then the incentives for Great Power arms racing—on Earth and in space—and the return of Russian and Chinese fears that they need to use nuclear weapons early in a crisis or risk too many of them being shot down (crisis instability) are likely to emerge by some time in the 2030s.<sup>132</sup>

As of the mid-2020s, China has no anti-ICBM missile systems, even though it is moving quickly to develop several capabilities for midrange and short-range missile defense. China appears to be exploring a future strategic anti-nuclear missile defense system in overlap with its anti-satellite (ASAT) program, to which it gives higher priority than it does missile defense. China’s missile defense progress continues to rely on Russian technology and expertise in developing both its interceptors and sensor architecture.<sup>133</sup> Chinese ASAT/anti-ballistic missile testing has made strides in exoatmospheric interception with hit-to-kill technology, but it has a lot of work to do to develop a robust sensing and data processing system and to train the cadre of professionals necessary to generate a real strategic capability.<sup>134</sup> Like Russia, China is postured for strategic nuclear deterrence by punishment in 2025 and for many years to come.

Alone among the nuclear Great Powers, and despite daunting challenges and fraught prospects, the United States in 2025 has committed to try and break out from the paradigm of strategic deterrence by punishment and move to one of deterrence by denial. The viability of this new paradigm remains in question but, should the New START Treaty lapse without replacement, all three Great Powers will face unshackled decisions about whether to indulge in a costly and destabilizing arms race to preserve a second-strike nuclear retaliation capability while contemplating the need to commit time and treasure to develop robust national Golden Dome antimissile systems of their own.

## **Great Power Futures in Nuclear Weapons, Arms Control, and Strategic Deterrence**

### **Geostrategic Deterrence and Arms Control**

As reiterated earlier in the chapter, the last vestiges of negotiated constraints on Great Power strategic nuclear weapons arsenals were in jeopardy at mid-decade. The New START bilateral agreement between the United States and Russia, last renewed in early 2021, remained

suspended by Russia, lacked serious diplomatic attention, and at best seemed to be drifting toward just another year of limited U.S.-Russian adherence to numeric limitations without verification protocols beyond February 2026.<sup>135</sup> The end of New START would create a situation not seen for more than 50 years: no formal Great Power strategic nuclear arms control treaty covering offensive or defensive systems would exist to curb a strategic weapons arms race that could prove enormously expensive and destabilizing.<sup>136</sup> Although Vladimir Putin hinted in August 2025 and then stated in September 2025 that he would continue to abide by New START for another year, there remained no evidence in 2025 that serious negotiations over a successor for New START with the all-important verification protocols absent since 2023 were taking place between Moscow and Washington.<sup>137</sup> Analysts note that the Russo-Ukrainian War has “continued to impede the resumption of bilateral strategic stability dialogue” between the United States and Russia.<sup>138</sup>

China remains the more worrisome overall global Great Power threat to future American security and deterrence.<sup>139</sup> China’s declared policy is that it remains unwilling to participate in bilateral or multilateral strategic nuclear arms control initiatives—including an expanded New START or some successor.<sup>140</sup> Under Communist Party General Secretary Xi, China’s aspiration to achieve global near-peer status with the United States and Russia is clear.<sup>141</sup> One can interpret China’s resistance to Great Power nuclear arms control in this context. Beijing desires both a strategic nuclear arsenal similar to those of its Great Power rivals and U.S. recognition of at least some of its core security demands before entertaining a project of arms control negotiations with the United States and Russia.<sup>142</sup> Beijing’s strategists tend to view all U.S. arms control initiatives as a means to restrain China.<sup>143</sup> Thus, basic Chinese strategic aims for nuclear weapons make it difficult to see Beijing engaging in meaningful strategic nuclear arms control in the near future absent some truly unanticipated geostrategic change.<sup>144</sup>

So, too, for Russia. Moscow remains committed to its strategic nuclear modernization despite the drag on progress related to its requirements for the Ukraine war.<sup>145</sup> At the very least, the Putin regime remains committed to the maintenance of strategic nuclear parity with the United States.<sup>146</sup> Russian military and civilian leaders have pronounced nuclear arms control “a thing of the past” over the past few years, citing the purportedly hostile actions perpetrated against Russia in Ukraine and globally by the United States and its Western partners.<sup>147</sup> At the same time, Ukraine war resource drain may inspire a Russian rethink about strategic nuclear arms control. As the Peterson Institute for International Economics observed in mid-2025, Russia may ultimately conclude—as it has in the past when confronted with a daunting, expensive nuclear arms race with a Great Power rival—that “neither monetary nor fiscal policy can deliver the deep structural economic transformation that genuine reforms and investment-driven growth can achieve.”<sup>148</sup> Moscow may again find that nuclear arms negotiations along with economic talks have become a fairly good investment given the right mix of incentives.

In this vein, the Trump administration’s Golden Dome missile defense initiative has the potential to influence future strategic nuclear arms control discussions with both Russia and China. The prospect of Golden Dome—if it is realized in anywhere close to the 3-year timeline forecast by the Trump administration and is able to overcome the extensive skepticism among technological experts—could generate an impetus for the three Great Powers

to negotiate limits on such strategic nuclear deterrence by denial efforts and then on the offensive capabilities they are designed to defeat.<sup>149</sup> This could mirror the process witnessed during the Cold War when the Lyndon Johnson administration and then the Richard Nixon administration moved to engage the Soviet Union in arms control discussions to restrain costly reciprocal offensive and defensive nuclear weapons initiatives and ultimately generated the ABM Treaty and the Strategic Arms Limitation Treaty I.<sup>150</sup>

Taken together, the modernization of U.S. offensive nuclear forces and the commensurate upgrading of the nuclear strategic defense infrastructure for the Golden Dome missile defense initiative may signal that the United States is fully committed to compete against its Great Power rivals for strategic nuclear overmatch in the absence of meaningful nuclear arms control. Offers to extend nuclear arms control with Russia and to initiate such a dialog with China could assist in advancing nuclear stability among these competing states as well as open possibilities for other related discussions on a range of security and economic issues—even though these conditions may not present themselves until the early 2030s.

In the near term, the question of a New START looms large for Moscow and Washington—and this remains true despite the September 2025 offer by Vladimir Putin to adhere to its limits until February 2026. Critics who argue against its replacement insist that it is irrelevant and even dangerous to the dawning new world of three heavily armed strategic nuclear weapons states.<sup>151</sup> Proponents counter that even in the face of a growing Chinese arsenal that is not subject to treaty limits, generating a successor bilateral nuclear arms control framework like New START makes sense because China will not rival the United States or Russia in terms of deployed warheads for at least another decade, and the United States would still have enough force flexibility to delay that outcome. They also observe that a residual U.S.-Russia arms control regime is probably a necessary condition for any future arms control arrangements with China.<sup>152</sup>

While the future of nuclear arms control after New START remains uncertain, what is clear is that unless Russia and the United States choose to generate a successor framework, future strategic nuclear arms control interactions will need to start from scratch and likely will do so under the shadow (and all the associated negative incentives) of an unprecedented three-party offense-defense nuclear weapons arms race.

### **Deterring Nuclear Weapons Use in Regional Wars and Arms Control**

The regional nuclear warfighting threats made by Russia during the 3-year Ukraine war and the sobering implications from China's rapid nuclear weapons expansion for theater nuclear use in the event of an Indo-Pacific war pose unique and multiplying challenges to the United States and its regional allies. Some recent events indicate that China may remain wary of using nuclear weapons in pursuit of regional aims. In the fall of 2022, reports surfaced that Xi warned Putin against Russian tactical nuclear weapons use to reverse Russian battlefield setbacks against Ukraine.<sup>153</sup> Separate reports indicated that Prime Minister Narendra Modi of India also may have cautioned Putin against the use of tactical nuclear weapons, expressing grave concerns for the implications of such use on the global nuclear taboo.<sup>154</sup> Russian nuclear threats were decried directly by President Joseph R. Biden, Jr., from 2022 to 2024 with reference to American mutual defense obligations under Article V of the NATO Charter but never explicitly threatening nuclear weapons

retaliation to a Russian first use. But new Russian bluster about nuclear warfighting options was met in early 2025 by the Trump administration first with silence and then, in August 2025, direct American nuclear countermoves when President Trump publicly announced the repositioning of unidentified U.S. SLBM submarines as a deterrent response to former Russian President Dmitri Medvedev's latest in a series of nuclear weapons threats linked to the Russo-Ukrainian War.<sup>155</sup>

Although the future of the transatlantic Alliance—and the extended American nuclear deterrence integral to it—remains uncertain, only a U.S. exit from NATO or a total withdrawal of U.S. nuclear weapons from Europe would ramp up the risks of a Great Power nuclear exchange there.<sup>156</sup> Given President Trump's late June 2025 NATO summit pronouncements, neither of these possibilities appear imminent in 2025, although not impossible at some future date.<sup>157</sup> In part, the American commitment to extended nuclear deterrence in Europe includes an understanding that the strategic risk of removing U.S. nuclear forces or abandoning extended nuclear deterrence there could open the door for indigenous nuclear proliferation in Germany and Poland, a prospect certain to aggravate Moscow, excite worries in France and Britain, and generate enormous instability and insecurity across the Continent.<sup>158</sup> Although Russia disdains the American commitment to Europe epitomized by extended deterrence, Moscow will continue to find the depth of this American nuclear commitment a difficult one to test directly. This seems even more likely should the United States follow through on its planned forward deployment of midrange Tomahawk cruise and hypersonic ballistic missiles in Europe beginning in 2026. Russia seems far more likely to continue an approach attempting bilateral nuclear coercion and intimidation for political gains through nuclear diplomacy and public messaging against specific European countries.

In the Indo-Pacific, the prospect for a war between Great Powers China and the United States continues to grow more ominous.<sup>159</sup> China's growing arsenal of nuclear-capable ballistic and cruise missiles has been ratcheting up tensions and worries of a war involving nuclear weapons. Beijing fears a surprise U.S. NNSW attack to disable its nuclear deterrent, and Washington views China's regional nuclear-capable missile arsenal as a formidable threat to the legitimate American security presence across the Western Pacific.

Faced with China's buildup and its uncertain nuclear weapons use doctrine, the United States re-upped America's extended nuclear deterrence across the region during the early 2020s, with special attention to Japan, South Korea, and Australia.<sup>160</sup> The United States also began more visible moves to display American strategic nuclear assets and more capable, longer-range nonnuclear weapons in the region. The Biden administration increased the rotational presence of nuclear-capable assets around the Korean Peninsula and pledged to Seoul that it would provide "regular visibility of strategic assets" to deter North Korean provocation. This promise led to a U.S. Navy *Ohio*-class ballistic missile submarine making a port call in South Korea in 2023, the first of its kind since the 1980s. Beginning in 2018 and accelerating since 2022, the United States has flown its strategic bomber fleet more regularly around the Indo-Pacific for both exercises and strategic messaging.<sup>161</sup> Finally, it has fitted a limited number of new low-yield nuclear warheads, the W76-2, onto its Pacific fleet subs in recent years.<sup>162</sup>

The nuclear weapons posturing and modernization of all three Great Powers in their main regions of geostrategic competition both fuels the imperative for competitive, costly nuclear arms racing to sustain credible deterrence, and embeds higher risks of escalation from crisis to nuclear exchange at each level of the so-called escalation ladder.<sup>163</sup> As these dynamics unfold, the prospects for deliberate or accidental Great Power nuclear weapons exchange increase proportionally, although they appear to be relatively low for the next half-decade as modernization dynamics evolve. In these unsettled conditions, the opportunity for modernized arms control may emerge. The expansion of Great Power regional nuclear deterrent and warfighting options (and their associated costs) could inspire a new, trilateral arms control effort to reduce regional nuclear threats in Europe and the Indo-Pacific.<sup>164</sup> For these risk-reduction initiatives to emerge, it seems likely that each Great Power's calculus of the high costs of a regional nuclear weapons arms race will need to overcome the exceptional degree of strategic mistrust by each at present of any form of verifiable regional nuclear arms control.

### **Nuclear Weapons Proliferation and Arms Control**

China, Russia, and especially the United States must also consider the potential for an accelerated pace of horizontal nuclear weapons proliferation in this evolving new era of strategic deterrence. Despite the setback that Iran's program suffered from Israeli and American bombing in June 2025, some experts postulate that the regime's commitment to acquisition of a nuclear bomb will further harden, making it the most likely country to join the nuclear weapons club this decade.<sup>165</sup> Other emerging possibilities include Arab States in reaction to a possible Iranian weapon as well as Japan, South Korea, Germany, and Poland, all with concerns over the reliability of extended nuclear deterrence from the United States.<sup>166</sup>

Although the NPT and its multilateral enforcement arm of the IAEA remain formally in place and rhetorically accepted by the three Great Powers, recent Great Power activities indicate that this framework is fragmenting, as two of the Great Powers—Russia and the United States—have begun taking independent unilateral actions to attain their own security and nonproliferation aims.

Russia pursued its own autonomous, non-NPT-related nuclear nonproliferation (and proliferation) activities in the early 2020s. Put less charitably, Western analysts and military and civilian defense leaders have stated that since 2022, Russia has fostered nuclear proliferation with North Korea, Iran, and China to further its military objectives.<sup>167</sup> Russian activities may have included nuclear technology transfers from Moscow to North Korea and Iran and the supply of highly enriched uranium through China to unclear final destinations.<sup>168</sup> As already noted, Russia blocked consensus at the NPT Review Conference in 2022 and then withdrew from the Proliferation Security Initiative in 2023. Russia's abandonment of its longstanding support for multinational nonproliferation principles is destabilizing by reducing serious consequences of nonnuclear state pursuit of nuclear weapons and underwriting self-interested nuclear proliferation around the globe.<sup>169</sup>

During the first Trump administration, the United States walked away from the multilateral nonproliferation treaty with Iran known as the Joint Comprehensive Plan of Action. In June 2025, the United States, in conjunction with Israel, conducted a precision military strike into Iran against targets Washington identified as critical to Iran's undeclared and

NPT-violating nuclear weapons program. In the wake of this strike, President Trump declared that the United States would not allow Iran to acquire a nuclear bomb, hinting that the United States might again take unilateral military action to destroy such a program if Iran did not permanently desist. These events signaled U.S. mistrust of the NPT-dominated nonproliferation framework and hinted at potential unilateral nonproliferation actions in the future.<sup>170</sup> The second Trump administration also has expressed skepticism about the continuation of extended American security guarantees, especially in This skepticism has encouraged several European states, along with South Korea, to publicly and privately debate—for the first time in decades—the acquisition of their own nuclear weapons. Such acquisition would have the potential to spur a tsunami of future nuclear weapons proliferation.<sup>171</sup>

China is not as obvious in its disregard for the NPT-driven nonproliferation regime but has also played a role. Its rapid nuclear weapons modernization program defies the third goal of the NPT regime: the move of nuclear weapons countries toward nuclear disarmament in tandem with efforts to curb nuclear proliferation.<sup>172</sup> Reportedly, Beijing began a fast breeder reactor program with Russian-provided highly enriched uranium in 2023. China also declines to disrupt local networks enabling offshore transfer of illicit nuclear weapons parts and precursors for North Korea.

In 2000, the five nuclear weapons states (China, France, Russia, United Kingdom, United States) reaffirmed their 1970 Nuclear Nonproliferation Treaty pledge to uphold an “unequivocal undertaking . . . to accomplish the total elimination of their nuclear arsenals.”<sup>173</sup> But in mid-2025, the salience of the NPT is growing less certain and the risks of proliferation excited by Great Power behaviors much greater. Great Power cooperation on nuclear nonproliferation remains formally established through the NPT and its multilateral, nonmilitary enforcement mechanism, but has faltered in practice in two high-profile cases involving North Korea and Iran. Thus, the NPT Review Conference of 2026 will be a crucial moment for the future of cooperative multilateral nuclear nonproliferation. After failed review conferences in 2015 and 2022, the NPT faces an existential moment in large measure because the Great Powers are accelerating and modernizing their nuclear arsenals while at the same time undertaking less cohesive or consistent steps to reduce the risks of unchecked nuclear proliferation.<sup>174</sup>

In mid-2025, the three Great Powers appear to be joined in an accelerating and increasingly costly nuclear arms race globally and regionally. Thus, the second Trump administration must grapple with difficult questions regarding the relevance of nuclear arms control to national security. What would it take to bring China and Russia to the negotiating table? Are trilateral arms control agreements feasible, given the disparities in arsenal size and composition among the parties? Can New START be revived before it terminates? Should future arms control frameworks include caps on nonstrategic nuclear weapons and emerging technologies? Should regional nuclear arms control negotiations between the three Great Powers emphasize limitations and transparency to reduce growing risks of rapid crisis escalation to a nuclear level? And perhaps most of all, how can the United States reconcile calls for defense budget reductions with new investments in missile defense systems like the Golden Dome?<sup>175</sup>

## Conclusion

The evolution of Russia's military nuclear weapons–use doctrine dating to 1999 and as expanded in 2020 and especially 2023 indicates that its program of nuclear modernization is in large measure driven by Vladimir Putin's intense desire to maintain overall parity with the United States and to underpin Russia's national prestige as a global Great Power. Modern Russian nuclear weapons form a linchpin of its strategic deterrence posture, compensate for inferior Russian conventional military forces, and demonstrate Putin's long-held conviction that a viable U.S. ballistic missile defense system constitutes a real future risk to the credibility of Russia's second-strike retaliatory capability.<sup>176</sup>

While the real reason for China's rapid nuclear buildup remains uncertain and may involve several motivations, at a minimum Beijing aims to maintain a survivable second-strike capability and affirm its undeniable place as a first-tier global Great Power. Thus, for the foreseeable future, China will respond vigorously to what it perceives as advances in U.S. offensive military strategic capabilities—nonnuclear and nuclear—and missile defense systems that jeopardize China's force sustainability or lock it into an inferior position versus the United States and Russia. China thus will remain reluctant to enter nuclear arms control negotiations *unless* they clearly affirm China's rightful place as a peer nuclear power and legitimize at least some of China's so-called core security interests in the Indo-Pacific region.<sup>177</sup>

The second Trump administration has placed assured strategic nuclear deterrence for the homeland at the top of its security agenda, anchoring that objective on the commitment to the Golden Dome missile defense initiative announced in early 2025. President Trump's Golden Dome initiative—as ambitious as the U.S. and Soviet ABM efforts in the 1960s and the U.S. SDI program of the 1980s—may prove unable to establish viable strategic deterrence by denial at acceptable cost. Thus, the longstanding paradigm of strategic nuclear deterrence by punishment seems most likely to remain in place during and after the period of Golden Dome development—but at an increasingly high financial cost and risk of crisis instability. Paradoxically, Golden Dome might ultimately generate sufficient leverage to initiate productive U.S. nuclear arms control discussions with Chairman Xi and President Putin. Finding a new framework for trilateral nuclear arms control agreements that could advance U.S. interests while also addressing Russian and Chinese concerns will be challenging, but the ominous alternative of a three-way nuclear offense-defense arms race accompanied by larger nuclear arsenals and greater crisis instability is a very unappealing alternative to be avoided before the dawn of the 2030s.<sup>178</sup>

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## Notes

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<sup>7</sup> Notably, deterrence is unlike compellence, which is the attempt to get an actor (such as a state) to take an action (i.e., alter the status quo). Both involve forms of coercion. Compellence has been characterized as harder to successfully implement than deterrence. See Thomas C. Schelling, *Arms and Influence* (New Haven: Yale University Press, 1966); Thomas C. Schelling, *The Strategy of Conflict* (Cambridge: Cambridge University Press, 1980); Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (New Haven: Yale University Press, 1996); Robert J. Art and Kelly M. Greenhill, *The Use of Force: Military Power and International Politics* (New York: Rowman & Littlefield Publishers, 2015).

<sup>8</sup> Mazarr, “Understanding Deterrence.”

<sup>9</sup> John J. Mearsheimer, *Conventional Deterrence* (Ithaca, NY: Cornell University Press, 1983); Andrea Grillo, “Denial or Punishment: Assessing Deterrence Effectiveness,” *Deep InSecurity*, November 4, 2024, <https://www.deepinsecurity.com/denial-or-punishment/>.

<sup>10</sup> Paul Huth and Bruce Russett, “Deterrence Failure and Crisis Escalation,” *International Studies Quarterly* 32, no. 1 (March 1988).

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<sup>16</sup> Brendan Rittenhouse Green, *The Revolution that Failed: Nuclear Competition, Arms Control, and the Cold War* (Cambridge: Cambridge University Press, 2022).

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<sup>19</sup> Post, “The Value and Limits of Nuclear Deterrence.”

<sup>20</sup> The North Atlantic Treaty Organization (NATO) was created as a nuclear alliance in 1949, with extended nuclear deterrence made credible by U.S. nuclear forces forward-deployed to NATO. In the 1950s, the U.S. nuclear umbrella expanded to include Australia, Japan, and South Korea, with U.S. nuclear weapons forward-deployed to South Korea, although fully under U.S. control and without NATO-style nuclear-sharing arrangements. See Department of State, Office of the Historian, *North Atlantic Treaty Organization (NATO), 1949*, <https://history.state.gov/milestones/1945-1952/nato>; Jennifer Bradley, “Preventing the Nuclear Jungle: Extended Deterrence, Assurance, and Nonproliferation,” *Joint Force Quarterly* 112 (1<sup>st</sup> Quarter 2024), <https://ndupress.ndu.edu/Media/News/News-Article-View/Article/3679143/preventing-the-nuclear-jungle-extended-deterrence-assurance-and-nonproliferation/>; Anya L. Fink, “U.S. Extended Deterrence and Regional Nuclear Capabilities,” IF12735 (Washington, DC: Congressional Research Service, March 12, 2025), <https://www.congress.gov/crs-product/IF12735>.

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<sup>22</sup> All other treaties and agreements limiting aspects of nuclear weapons activities and locations like the Comprehensive Test Ban Treaty, the Outer Space Treaty, the Underground Test Treaty, and others are either not signed by all the Great Powers or have been dismissed as irrelevant by one or more Great Power—and thus immaterial to nuclear arms control. See Mike Albertson, “Life After New START: Navigating a New Period of Nuclear Arms Control,” Arms Control Association, January/February 2025, <https://www.armscontrol.org/act/2025-01/features/life-after-new-start-navigating-new-period-nuclear-arms-control/>; “Nuclear Arms Control: The Most Relevant Treaties,” *Heinrich Boll Stiftung*, August 18, 2023, <https://web.archive.org/web/20240520181629/https://www.boell.de/en/2023/08/18/nuclear-arms-control-most-relevant-treaties>.

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