POLICY BRIEF

Niels Hegewisch (ed.)
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AI, Space, Nuclear Risks and Arms Control

Areas of cooperation between Europe and China

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Contents

Foreword

In an era characterized by accelerating technological change, heightened geopolitical tensions, and an escalating risk of unintended escalation, it is crucial that the most challenging security issues surrounding nuclear weapons remain at the forefront of discussions. This volume illustrates how constructive dialogue between Europe and China on multilateral arms control could provide new insights into emerging threats, while reinforcing the importance of transparency and international law.

Tobias Fella and Lucian Bumeder discuss the impact of artificial intelligence (AI) on the governance of nuclear weapons. They distinguish between the risks of accidental and inadvertent escalation arising from the integration of AI into nuclear command, control and communications systems. They both argue that, while the widely endorsed 'human in the loop' principle is necessary, it is insufficient. They recommend red team testing and multilateral discussions on AI risk in forums such as the G7, BRICS and SCO. They also recommend the institutionalization of AI risk dialogue within diplomatic and military-to-military exchanges.

Götz Neuneck analyses the weaponization of space and missile defense, as well as their wider implications for space security. He maps the rapid expansion of satellite constellations, anti-satellite (ASAT) capabilities, and kinetic space weapons. He also demonstrates how the loss of space-based early warning and communication systems could lead to nuclear miscalculation. He also proposes confidence-building measures and a multilateral ban on kinetic ASAT tests, as well as the establishment of transparent 'keep out' zones for essential space assets.

Oliver Meier highlights the growing danger posed to regional and global security by attacks on nuclear plants, as exemplified by recent incidents in Ukraine, Russia, Israel and Iran. He calls for continued efforts to improve the protection of civil nuclear facilities. To this end, he calls for the stronger implementation of existing humanitarian law provisions and the universal ratification of the Additional Protocol. He also argues that coordinated European and Chinese financial and technical support for the IAEA could reinforce norms against the militarization of civilian nuclear infrastructure.

Finally, Michael Staack examines the strategic use of a No First Use (NFU) pledge for nuclear weapons. By tracing the historical adoption of the pledge by China and its limited uptake elsewhere, he argues that a verifiable commitment to NFU—supported by de-alerting, separating warheads from delivery systems, and regular doctrinal dialogue—could lower nuclear thresholds, build trust among the P5, and create a platform for broader disarmament negotiations.

These articles are based on papers presented at a Sino-German conference on multilateral arms control held by the FES Beijing office and organized by FES Country Representative Sergio Grassi in November 2025. We would like to thank the authors for their rigorous research and for contributing to this collection with insights that highlight the important part played by German-Chinese cooperation in developing a robust, multilateral arms control framework.

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Artificial Intelligence (AI) Governance and Nuclear Weapons

Introduction

The integration of Artificial Intelligence (AI) into military and nuclear systems introduces both stabilizing and destabilizing dynamics. While major powers have pledged to maintain 'a human in the loop' for nuclear launch decisions – most notably reaffirmed by the 2024 Biden-Xi agreement – AI is increasingly shaping the information, communication, and command architectures surrounding nuclear deterrence.

This paper argues that:

1. Two distinct escalation risks – accidental and inadvertent – require differentiated governance approaches.

2. Maintaining human control over nuclear decisions is necessary but insufficient; AI in adjacent systems (ISR, missile defense, target generation) poses subtler risks of inadvertent escalation.

3. Effective AI governance must combine technological safeguards, political reassurance, and strategic dialogue that includes all nuclear-armed states.

Policy recommendations include operationalizing the 'human-in-the-loop' commitment in multilateral fora (G7, BRICS, SCO), promoting red teaming processes for testing cybersecurity effectiveness of AI-enabled nuclear systems, and institutionalizing AI risk discussions within both diplomatic and military-to-military exchanges.

Most state leaders are quite willing to declare they will ensure that they "keep a human in the loop" of nuclear launch decisions. This message is uncontroversial and popular for domestic audiences where large parts of the population have grown up with pop-cultural interpretations of this issue through the opening scene of *The Terminator* or, for the older generation, the ending of Stanley Kubrick's classic movie *Dr. Strangelove*. In both stories, humanity ends up in a disastrous situation caused by a nuclear war that occurs against the will of the state leaders who should have had command over their respective nuclear weapons. While the result is nuclear war in both cases, the pathways differ: Skynet (the intelligent machine in *The Terminator*) makes an autonomous decision directed against its human creators. This is a machine malfunction, and nuclear war occurs accidentally. The 'Doomsday Machine' (the automated mechanism for an ensured nuclear retaliation in *Dr. Strangelove*) performs as intended and triggers a Soviet retaliation against the American attack triggered by a rogue military officer and thereby causes an inadvertent nuclear catastrophe that could have been avoided by the political leadership of both countries.

In the real world, the specter of AI involvement in nuclear decision-making raises similar concerns. While there is a growing international consensus – highlighted by the November 2024 agreement between Chinese President Xi Jinping and U.S. President Joe Biden – that AI must never replace human judgment in the authorization or execution of nuclear weapon launches, the scale of the challenge is underappreciated. AI is increasingly integrated into nuclear command, control and communication (NC3) systems, as well as supporting platforms. This integration risks creating misplaced confidence in AI-generated information, which is increasingly shaping military leaders' situational awareness, and potentially influencing nuclear-related decisions under false premises.

Two Categories of Escalation Risk

Efforts to govern AI in nuclear decision making need to account for two distinctive categories of escalation risks: 'accidental' and 'inadvertent'.[1] Both may lead to nuclear use contrary to political intent, yet differ in the mechanisms, actors, and policy tools that are required to address them.

'Accidental escalation' refers to the use of nuclear weapons without, or against, the explicit decision of the leader of the state who controls the nuclear weapons. This is the narrow definition of keeping a human – usually the head of state and several executive military personnel – in the loop. Publicly reaffirming this guarantee or avoiding doing so needs to be understood in the context of general efforts to manage nuclear risks and the respective available tools.

'Inadvertent escalation', by contrast, involves a conscious

1 Chernavskikh, Vladislav. 2024. 'Nuclear Weapons and Artificial Intelligence: Technological Promises and Practical Realities.' Stockholm International Peace Research Institute. https://doi.org/10.55163/VBQX6088.

decision by a human leader to use nuclear weapons that was not intended at the beginning of a conflict by either conflict party or is based on wrong or misinterpreted information in stressful situations under immense time and psychological pressure. This situation can either arise due to new military capabilities enabled by AI or through accelerated decision processes where leaders are forced to make decisions based on information that is structured and preprocessed by AI systems. This aspect is more difficult to address as it collides with states' incentives for conventional military modernization and military benefits of strategies that aim to induce shock in the initial, often decisive, phase of a potential conflict.

While these two categories are linked, each demands a distinct policy approach. Avoiding accidental escalation requires political reassurance, the implementation of technical safeguards and rigid command integrity. Mitigating inadvertent escalation calls for managing the cognitive and organizational consequences of AI integration into an ever growing range of military applications.

Avoiding Accidental Escalation

Avoiding accidental escalation through technological malfunction should be the minimum denominator that all state leaders can agree on. The logic is straightforward:

- → Political control is key already. Any state leader has spent significant efforts in their respective political system to gain and maintain control over their government and in consequence, their military forces. A decision to employ nuclear weapons signals the shift to a different kind of conflict with existential risks that can only be taken by the highest political authority in any given state. Therefore, leaders are unwilling to give away the decision to begin a nuclear war either exclusively to executive military personnel or to machines.

- → Control also guards against traditional internal threats. Ensuring reliable political control over nuclear weapons is also part of the efforts already undertaken against rogue military action or the capture of nuclear weapons by terrorist actors. Maintaining this control over machine automation should likewise be of fundamental interest to state leaders.

However, the factual basis of existing political control over nuclear weapons does not necessarily need to overlap with the willingness of a state leader to state this principle publicly. That is because statements about the role of AI in a state's nuclear decision making need to be understood as part of the strategic manipulation of nuclear risk. A plausible risk of uncontrolled escalation is not a bug of a nuclear posture, nor is it an objective threat that should be controlled like a natural disaster. It is an intended feature of having nuclear weapons that states seek to use as leverage in conventional military conflict. Without a credible pathway to escalation, the deterrence benefits of nuclear weapons decrease. A higher perceived risk of accidental escalation by an adversary through an opaque role of AI systems in nuclear decision making therefore serves the purpose of deterrence.

Different Incentives for Risk

The incentives for higher or lower nuclear risk are not distributed equally among states. Military forces that have an advantage in conventional capabilities in a certain conflict setting have a higher incentive to reduce nuclear risks and to deemphasize nuclear weapons in their signaling than their adversary. Conversely, states that fear facing a conventional defeat, possibly with the credible chance to lose political control or the military capability to retaliate against a nuclear attack, have a higher incentive to use the threat of nuclear escalation to induce constraint into the other side's decision making and to deter the escalation of the conflict.

The willingness of leaders to support or to refuse statements to guarantee a 'human in the loop' need to be treated similarly to the Reagan-Gorbachev formula of reemphasizing "that a nuclear war cannot be won and therefore must never be fought." It serves as a proxy for a state's willingness to emphasize or deemphasize nuclear weapons in its deterrence posture. This willingness is usually lower for states that perceive themselves to be conventionally vulnerable and decreases further in crisis moments. This is illustrated by the willingness of China, the US, France and the UK to issue such statements and conversely by the lack of such statements from states such as Pakistan, Russia, North Korea or Israel.

Those countries who perceive themselves to be conventionally inferior to their most likely adversary or coalition of adversaries, have different incentives for delegating launch decisions to an AI driven system. Afraid of a possible decapitation strike against political leadership or a successful disarmament strike against nuclear capabilities, threatened state leaders would seek to achieve a similar objective by announcing a role for AI-driven decisions as they would through pre-delegating launch authority to executive military personnel. Both measures increase the general risk of nuclear use and thus safeguard political leadership against successful elimination attempts.

Asymmetric Perceptions of Risk Drivers

Beyond the balance of conventional military power, states also see different sources of nuclear risk. Simplified, Western states see an increase of nuclear risk through their adversaries pronouncing nuclear weapons in deterrence postures. Examples include recent changes to Russia's nuclear doctrine, Russia's large stockpile of sub-strategic nuclear weapons, the forward stationing of Russian nuclear

weapons to Belarus, the Chinese nuclear build-up, and the demonstration of new nuclear delivery systems by Russia and China. China and Russia, on the other hand, see an increase of nuclear risk caused by Western alliance structures granting political and military support to their neighboring countries, Western power projection through conventional forward deployments of missile systems and naval military assets, and investments in technologies that infringe on the reliability of their nuclear second-strike capability, such as missile defense and conventional precision strike systems. These sources of nuclear risk are influenced by progress in AI but would also exist without the current AI boom.

Substantial progress to lower intentionally inflated nuclear risk correspondingly requires the discussion on AI to be integrated into a broader process of political de-escalation, a stabilization of deterrence postures and tradeoffs between conventional and nuclear deployments. Accordingly, traditional instruments of nuclear risk management are helpful ways to address the accidental risks through the integration of AI. Two key instruments are:

- → Maintaining clear **mechanical and observable barriers** that need to be crossed before the use of nuclear weapons. Prominent examples are the transport of warheads from central storage facilities to military units in the field or the dispersal of additional strategic submarines to sea. This is also in the interests of states who want a credible way of signaling the risk of impending nuclear escalation. States should avoid medium and intermediate range nuclear armed ground launched missiles.

- → Including **reassurance communications during crisis** that set limits for the political goals of a war that are below the known threshold for nuclear use, which usually is the overthrow of the government in control of nuclear weapons.

Excursus: No First Use (NFU) doctrines

Several countries have announced a so-called No-First Use-Doctrine (NFU), most notably China, India and previously the Soviet Union. NFU doctrines state that a country's nuclear arsenals exist only to deter adversary nuclear use and to retaliate to it. No first use doctrines enjoy strong support as an effective risk reduction tool by advocates for disarmament and by many non-nuclear states. This manifests most clearly in proclamations by members to the Treaty on the Prohibition of Nuclear Weapons (TPNW).[2]

Germany and other states within the US alliance system have harbored a strong aversion to NFU doctrines. NFU commitments have been perceived as being deceitful and inherently lacking military credibility. These states often point to archival Soviet material that documents Warsaw Pact exercises for nuclear warfare while the leadership maintained NFU commitments.[3] *In this sense, NFU announcements have been perceived as diplomatic maneuvers by China (and previously the Soviet Union) to undermine Western alliance cohesion, American security commitments and increasing the reputational costs for NATO's extended nuclear deterrence arrangements.*

This stance is more reflective of the traditional strategic framework of the Cold War rather than of present-day military realities where Western states enjoy conventional military superiority and Russia pursues an explicit first-use posture trying to offset its disadvantage.[4] *Western nuclear arsenals primarily serve to deter Russian nuclear use and to limit the effectiveness of Russian nuclear coercion, rather than to defeat a conventionally superior force with nuclear warfare. Rethinking Germany's position on NFU doctrines even without changes to current nuclear deployments could offer diplomatic benefits in a) enhancing European reputation among non-nuclear states, b) in mitigating risks of nuclear escalation, c) in integrating China and India in European arms control efforts that seek to curb Russian strategies of nuclear risk manipulation.*

2 United Nations. February 2025. 'Report of the Coordinator for the Consultative Process on Security Concerns of States under the Treaty on the Prohibition of Nuclear Weapons (Austria).' TPNW/MSP/2025/7, p. 9. https://meetings.unoda.org/meeting/73413/documents.

3 Heuser, Beatrice. 1993. 'Warsaw Pact Military Doctrines in the 1970s and 1980s: Findings in the East German Archives.' *Comparative Strategy* 12 (4): 437 – 57. https://doi.org/10.1080/01495939308402943.

4 Bruusgaard, Kristin Ven. 2024. 'Deterrence Asymmetry and Strategic Stability in Europe.' *Journal of Strategic Studies* 47 (3): 334 – 62. https://doi.org/10.1080/01402390.2024.2354322.

Avoiding Inadvertent Escalation: AI in Nuclear-Adjacent Systems

The risk of inadvertent escalation is driven by the growing role of AI in a range of military systems that are primarily designed for conventional warfare but are increasingly related to nuclear missions. As a result, this gives a clear role to states like Germany, Poland or Japan which – while non-nuclear – emerge as major military powers in their regions and acquire the technologies to strike nuclear systems of their adversary. However, the further development and integration of AI in military applications do not exert a clearly discernible, one-directional impact on nuclear strategic stability, since AI-enhanced technologies can strengthen both defensive and offensive capabilities. For example, AI will have applications in improving the reaction time and accuracy of missile defense, as well as in tracking and hiding Submersible Ship Ballistic Nuclear (SSBNs), road-mobile transporter-erector-launchers (TELs), and in both creating and deciphering decoy signatures for warheads and delivery platforms.[5] Old-school countermeasures such as fake trucks imitating dispersing missile launchers are potent strategies against AI driven tracking technologies. In general, the integration of AI systems will impact nuclear stability in three broad trends:

a) Large-scale air and precision strike campaigns become more realistic. This increases the vulnerability of nuclear arsenals and the likelihood of crossing thresholds that an adversary perceives for nuclear use.

b) Nuclear decision-making time becomes further compressed because the stakes of initial mistakes grow. This increases pressure for AI driven automatization in early warning, air and missile defense, and possibly counter-launch preparations.

c) Operators on both sides will be forced to increasingly rely on situational awareness provided by AI systems, which can increase the risks of entanglement between nuclear and conventional infrastructure and the risks of misinterpreting warnings of an incoming attack.

All of this is accompanied and mutually reinforced by a continued emphasis of military strategies to induce shock and disrupt adversary decision-making and situational awareness early in a conflict. This is especially true for Western armed forces that rely on superiority in the air and intelligence domain to enable maneuver warfare and decide wars before they enter a prolonged phase of attrition for which their militaries lack ammunition depth and manpower reserves. This also increases the benefits of cyber and kinetic attacks on an adversary's digital and space-based C^3 infrastructure.

AI in Target Generation and Decision Pressure

In the early phase of a conflict, militaries seek to destroy the underlying infrastructure that enables their adversary's military operations. This primarily includes forward positioned ammunition and fuel storages, military and political decision makers, communication and control nodes, and any high value systems that can be destroyed or suppressed in their bases, such as missile launchers, airplanes and air defense batteries. As a preceding step, this requires destroying, penetrating or overloading integrated air and missile defense systems to operate more freely and with cheaper ammunition in later conflict stages.

The integration of AI (specifically Machine Learning) into existing reconnaissance structures will improve capabilities that track moving targets and quickly identify and target systems after they become active. Missile launchers and air defense installations can be tracked visually and reveal their locations temporarily through the heat signatures of launch plumes or active radar tracking. AI also supports autonomous operations in environments where electronic warfare blocks communication with remote operators and that are deemed too dangerous for human piloted aircraft. In summary, AI improvements may make it more likely that advanced air forces are able to successfully establish and maintain air superiority for the initial phase of the conflict. AI likely also improves states' abilities to defend against limited conventional missile and drone attacks. This increases escalation risks two-fold. On one hand, early evidence suggests that conventional disarming strikes could become more likely to succeed and leaders are more willing to adopt military forces as a tool of counter-proliferation especially against states with nascent nuclear forces and conventional missile programs. On the other side, the increased role of AI in target generation sharpens known issues of entanglement between conventional and nuclear targets in conflicts with nuclear adversaries.[6] Prominent examples are the destruction of dual-capable missile launchers regardless of their nuclear or conventional role or the destruction of satellite infrastructure that is used for conventional missile command and missile defense.

Modern battlefields and military campaigns take place in an environment with a multitude of sensors. Military sensors combine different physical data types such as optical, heat and radar imagery. Sensors operate at different elevations, from personnel and vehicles on the ground to low- and high-altitude drones, to plane-based observations, and satellite intelligence. This is further complemented by intelligence service operations that gather troop positions from mobile phone triangulation, social engineering, civilian reporting and open-source social media evaluation.

5 Acton, James M. 2025. 'The Survivability of Nuclear Command-and-Control Capabilities.' *Journal of Strategic Studies* 48 (2): 407 – 64. https://doi.org/10.1080/01402390.2024.2435957.

6 Acton, James M. 2018. 'Escalation through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War.' *International Security* 43 (1): 56 – 99. https://doi.org/10.1162/isec_a_00320.

With the proliferation of sensors, battlefield data becomes increasingly difficult to process for commanding officers. Future AI systems are envisioned to compress these vast sensor inputs into prioritized tasks and target lists. This reduces the human decision loop from assessing complex direct and circumstantial evidence to a series of fast, binary strike confirmations based on recommendations generated out of often uncertain information. The resulting pressures are twofold. First, algorithmic pre-filtering and interpretation risks discarding or downplaying contextual signals that human analysts would otherwise notice or judge to be not convincing. This can produce deceptively confident outputs when uncertainty is high. Second, the temporal constraints of modern strikes – where success depends on exploiting fleeting sensor windows and overwhelming countermeasures – push operators toward accepting algorithmic recommendations uncritically in order to meet mission timelines. Together, these dynamics increase the probability that commanders will authorize strikes on assets whose nuclear relevance is ambiguous or misclassified. In contrast, incoming attacks can be treated as part of a counterforce or control degradation campaign targeted on nuclear forces. Even defensive reactions way below the threshold of launching retaliatory strikes will be observable, such as the dispersal of mobile launchers, submarines and airplanes, pre-mating of warheads and increased readiness levels. In the lead up to a crisis or ongoing violence, this can be perceived as preparations for nuclear use by adversaries and increase pressure for preemptive attacks.

AI also affects human decision-making in the longer term, potentially deskilling operators and fostering over-reliance on AI analyses. This trend is evident in various fields where AI has already been implemented to a higher degree, from professional medical diagnostics to average population writing skills, to risk assessments regarding civilian casualties during military operations. AI-supported targeting software should be designed to explicitly highlight nuclear entanglement risks that are associated with potential targets and, most importantly, to include other common risk parameters such as ecological consequences and civilian collateral damage. There is evidence that civilian collateral damage concerns have been deemphasized or disregarded in the authorization process of recent military operations to improve the speed of operations.

The military establishments of traditional nuclear powers have a fairly clear understanding of the entanglement risks on their own side as well as of their adversary. With the current proliferation of long-range precision strike ammunitions, this knowledge should be transferred to states that have to incorporate it into their strike planning. Military officials who oversee the implementation of AI into battlefield planning should ensure that these risk parameters –alongside human rights violations and ecological consequences– are included in training data for AI driven target generation and provided to humans who authorize strike missions.

Operationalizing the 'Human In The Loop' – Political and Military Measures

a) Human Decision-Making in Political Practice

The political commitment by all P5 nuclear-weapon states, except Russia, to maintain a 'human in the loop' for nuclear decision-making, and its bilateral reaffirmation by China and the US, is a promising political first step but requires reinforcement and diplomatic follow-up to widen the number of states adhering to the principle. This is best achieved through engagement in diplomatic and strategic forums where principles on nuclear risk management and artificial intelligence integration can be elevated to the highest levels of state leadership. Suitable formats include bilateral meetings and multilateral summits such as the G7, G20 or the UN First committee. Institutions without Western participation such as BRICS and the SCO can be beneficial as well, especially as non-nuclear states and key countries of the Global South can use these platforms to bring their concerns to the agenda.

Engagement within the framework of the Nuclear Non-Proliferation Treaty (NPT) and the P5 can facilitate important preparatory diplomatic exchanges, although the lack of participation of some nuclear-armed states and lack of direct head-of-state involvement constrain the political weight of NPT declarations. One preparatory step could be to develop and agree on a glossary of terms referring to certain aspects of AI governance. On a political level, states could also tie AI-governance language to other stabilizing principles, e.g. avoiding decapitation strikes with the help of AI.

b) Controlling AI in Military Postures

Current leaps in AI development happen in parallel with the proliferation of conventional missile systems for conventional warfare and supporting space-based intelligence assets both in numbers and to new states. These trends mutually reinforce each other and make nuclear forces more vulnerable than they have been in the past 30 years.

The traditional nuclear superpowers have maintained a long-standing body of military-theoretical thought and operational practice focused on escalation management, encompassing both political signaling and graduated mil-

itary measures.[7] In contrast, European states – particularly those without independent nuclear forces – lack comparable frameworks that explicitly account for the interaction between conventional warfighting, cyber operations, and nuclear deterrence dynamics. Understanding these pathways is key for controlling the risks of integrating AI into military systems. Developing such conceptual and practical tools would also allow Europe to contribute more substantively to stability dialogues and to manage an independent conventional deterrence where US policy priorities diverge. While arms reductions remain a goal of a seemingly distant future, these internal deliberations on escalation risks through entanglement can build the basis for initial demands in arms control negotiations moving forward.

Nuclear states seeking to limit the impact of AI on nuclear escalation risks can evolve their postures towards known strategic principles with a positive effect on crisis stability. Doctrinal measures such as no first use policies, damage assessment protocols before retaliation for small attacks, and emphasizing survivability in posture decisions, introduce critical time into crisis decision-making to mitigate escalation risks. On a military operational level, managing warhead readiness and avoiding the pre-mating of warheads to sub-strategic delivery systems contributes to risk reduction. To prevent inadvertent escalation triggered by AI-supported systems, it is essential to maintain dual physical principles of radar and heat signatures for identifying missile attacks and protecting the communication infrastructure from cyber and physical attacks. States can also invest in redundancies, such as space-based constellations instead of single warning and communication satellites. Towards adversaries, states could issue commitments to avoid cyber and physical intrusions into nuclear NC3 systems.

While fora such as the P5 and NPT remain foundational, it is crucial to broaden the participation of these discussions.[8] Debates on the intersection of AI and nuclear weapons need to expand both horizontally to include other nuclear-armed states such as India and Pakistan, and vertically to include military professionals. Since these questions span both diplomatic and military spheres, they should be addressed not only in diplomatic forums but also in military exchanges and defense minister meetings, both inside alliances and with adversaries.

c) Continuous Unilateral Risk Examination

Nuclear-armed states must prioritize thorough risk assessments regarding AI's integration into all facets of nuclear decision-making, including the relevant supporting platforms and networks. This entails rigorous red teaming and stress tests to expose unforeseen vulnerabilities and emergent behaviors beyond standard evaluations. The aim is not to halt AI use but to deepen understanding of potential unintended consequences and ensure adequate human understanding of the parameters that drive AI interpretations and room for intervention. Given the complexity of the entire command and control enterprise, it is prudent to employ the precautionary principle in prescribing the approach to innovations with potential for causing harm – as no model fully captures crisis dynamics.

While states will be unwilling to share code, training data or systems design, as a farther-reaching step, they can unilaterally disclose certain mechanisms they have taken to ensure human control in nuclear launch decisions, and when or if they detected possible dangerous behavior in their own AI command. This can be taken without reciprocity by the conventionally superior side that seeks to limit the instrumentalization of nuclear risk.

Conclusion

Ultimately, human judgment – encompassing moral reasoning, contextual awareness, and ethical responsibility – must remain central to nuclear launch decisions. This requires both maintaining the necessary skills and providing the required information to human operators. To use a metaphor, the integration of AI can be likened to modern navigation techniques in maritime shipping: While technical innovation has made it possible to cross an ocean solely based on directions from a mobile phone – a "human captain" should still be able to grab the steering wheel at any point with access to nautical charts and the ability to understand the currents along the planned route. Historical thought experiments – from imagined autonomous systems like Skynet in the film *The Terminator* to the hypothetical automated 'Doomsday Machine' in *Dr. Strangelove* – play out some of the persistent dangers of over-relying on machines in high-stakes nuclear contexts. Crucially, the principal risk does not stem from the AI itself, but from how humans interact with it – how they trust, interpret, and act upon its outputs – highlighting that even sophisticated systems cannot replace the need for careful, ethically grounded human oversight.

7 Kofman, Michael, Anya Fink, and Jeffrey Edmonds. April 2020. 'Russian Strategy for Escalation Management: Evolution of Key Concepts.' https://www.cna.org/reports/2020/04/DRM-2019-U-022455-1Rev.pdf; Rosa-Hernandez, Gabriela Iveliz, Decker Eveleth, and Paul Schwartz. 2025. 'When Nuclear Weapons Return to Belarus: Evolving Concepts in Russian Escalation Strategy.'.

8 Saltini, Alice. November 2023. 'AI and Nuclear Command, Control and Communications: P5 Perspectives.' https://europeanleadershipnetwork.org/wp-content/uploads/2023/11/AVC-Final-Report_online-version.pdf.

Götz Neuneck

The Weaponization of Space, Missile Defense and the Wider Implications for Space Security

The near-Earth space environment is home to many services for communication, navigation, observation, research etc. Bringing payloads into space becomes easier, cheaper and more common thanks to commercial actors and more countries investing in space launchers and satellite services. Endeavors in space are also associated with national prestige, technical independence, autonomy and the ability to project power. Space technologies can be used for dual military and civilian purposes and are increasingly used for military purposes for non-nuclear missions (warfare on the ground) and nuclear deterrence.

The number of human-made objects orbiting the Earth has multiplied in the last decade. Almost 16.000+ active and defunct satellites that enable or have enabled commercial services including communication (TV, telephone, Internet, etc.), navigation (GPS, Galileo, etc.), or Earth observation (weather, environmental monitoring, etc.). Today, many small satellites can be orbited with a singular launch of a heavy space launch vehicle, reducing launch costs. Private companies such as Space X, One Web or Amazon are planning 'mega constellations' that will provide internet services to previously underserviced regions of the planet. More actors and more countries are becoming active in space. Approximately 20 to 25 percent of all satellites today are used for military purposes, i.e., reconnaissance, early warning, communications, missile navigation and missile defense etc. These are central to the coordination of global military operations and to weapons deployment (drones, cruise missiles).

The challenges for the increasingly congested and contested space domain are rising due to the geopolitical rivalries of space-faring nations, new private companies in space, and the military use of satellites, which makes them an 'attractive target'. Beyond the dominant space powers of the US and Russia, more countries such as China, Europe and India are investing in space services that have a dual-use character. The leading space powers accuse each other of weaponizing space while testing anti-satellite (ASAT) capabilities and preparing counterspace capabilities. The establishment of a Space Force in the US, Russia and China, the inclusion of space warfighting in space doctrines, and the testing of counter-space activities by leading space powers are evidence of the preparation of a next wave of space weaponization that can be used in the event of a war or even trigger a war. While no nations have used kinetic ASAT systems against other countries´ satellites in orbit, non-destructive counterspace capabilities such as jamming and spoofing have been used in conflict zones and in active military conflicts.[1]

Satellites vulnerable to offensive attacks

Satellites are vulnerable objects that can be threatened by many means in the more congested low-Earth orbit (LEO) and should be protected to maintain their important functions for services on earth. Many developments, such as in launch vehicles, Earth observation, and satellite technology, illustrate the dual-use nature of space technologies, as its operations can be used for hostile purposes as well as for commercial or peaceful purposes. It is estimated that as many as 100.000 satellites will be added in the next decade. This growth of orbiting satellites increases the risk of collisions, break-up accidents and electromagnetic interferences. Satellites are fragile structures affected by meteorites, kinetic objects or cyberattacks. Satellite failure or prolonged disruption could lead to serious problems on Earth if critical services are disrupted. As their numbers increase, so does the problem of space debris. Space debris uncontrollably circling the Earth in various orbits is made up of rocket launches (burned out rocket stages) or broken satellites. Because of their breakneck speed and small size, they pose a danger to active satellites, especially since they remain in orbit for a long time, depending on the orbit. The 2025 Global Counterspace Capabilities Report stated that the debris-causing ASAT tests by the United States, China, Russia and India created 6.851 catalogued pieces of trackable space debris, of which 2.920 are still in orbit.[2] The International Space Station (ISS) has had to change its trajectory several times in view of the danger posed by man-made space debris. Major accidents showed the disastrous consequences of collisions in space. In September 2009, two communications satellites, Cosmos 2251 and Iridium 33, collided at an altitude of 800 km, resulting in about 100.000 pieces of debris, of which about 2.200 are now catalogued. As the atmosphere thins due to climate change,

1 See f.e. Laetitia Cesari; Victoria Samson (Editors.). 2025. Global Counterspace Capabilities. An Open Source Assessment. Secure World Foundation or Swope, Clayton; Kari A. Bingen, Makena Young, Kendra Lafave (2025). Space Threat Assessment 2025. *Center for Strategic and International Studies, April 2005.*

2 Ibid. Table 5.1. Laetitia Cesari; Victoria Samson (Editors.). 2025. Global Counterspace Capabilities. An Open Source Assessment. Secure World Foundation or Swope, Clayton; Kari A. Bingen, Makena Young, Kendra Lafave (2025). Space Threat Assessment 2025. *Center for Strategic and International Studies, April 2005.*

less space debris is falling back to Earth. By 2100, the number of space debris could increase by a factor of 50 and pose a serious threat to the space environment.

Armed conflict in space and the deliberate destruction of satellites would cause havoc in the already cluttered space environment with significant consequences for different satellite constellations and consequentially for services on earth. Some military assets are important for military missions including nuclear deterrence. In the past, space technologies for space-based reconnaissance and early warning had a more stabilizing function to prevent a nuclear exchange. In the past, they lowered the risk of misperceptions and of unwanted escalation in a crisis and have been used for the verification for nuclear arms control agreements (START, N-START) between the superpowers. Nevertheless, since the Cold War, the US and the Soviet Union have repeatedly pursued weapons programs and testing space vehicles with ASAT functions but have not officially permanently deployed space weapons so far due to possible destabilizing effects. Now, major space-faring nations are obviously experimenting with technology targeting satellite services from enemy countries.[3] The United States, Russia, China and India have conducted debris-causing anti-satellite tests by direct-ascent missile defense interceptors, but also others such as Australia, France, Japan, Iran, North and South Korea and the United Kingdom are developing counterspace technologies to disrupt or destroy satellites in orbit.

The wide spectrum of Counter-space Activities

Technically, there is a wide spectrum of options for weapons in space. Space-faring nations are testing anti-satellite capabilities in different orbits against their own satellites for decades. These counter-space capabilities can be used in a war-like situation as well as having the capacity to escalate tensions to erupt in war on Earth. Incapacitating the 'eyes and ears' of other nations in space could trigger dangerous situations in a crisis.

Different technologies exist to hit, disrupt or render objects in space inoperable. The spectrum ranges from nuclear explosions in space to electromagnetic interferences and kinetic weapons (i.e. conventional explosion or collision). A nuclear explosion initiated in orbit can damage or destroy satellites over a large radius due to the radiation released and pose a significant long-term problem. The use of "direct energy weapons" (such as lasers, microwaves or jamming), for example by blinding sensor systems, requires considerable technological experience. Lasers on earth are used to track satellites. If their power is increased, this can be used to damage satellites by blinding them.

Space weapons are objects in space or that can act in space designed to damage, render inoperable, or destroy satellites. This now includes increasing developments of new, more maneuverable missiles beyond the classical intercontinental ballistic missile (ICBM) trajectory (hyper-glide vehicles) that can launch on Earth, traverse space, and engage Earth targets again, i.e., a weapon that operates from space. A prerequisite for the launch and operation of space weapons is both interceptors in outer space and the presence of ground-based infrastructure and associated data transmission and trajectory tracking. Some space missions are seen with much concern. For example, when the US used a small, unmanned space plane X-37B with an intransparent mission, and when China conducted a potential fractional bombardment system (FOBS) test flight with a low-orbit glider.

Space weapons include smaller satellites that have limited maneuverability but can act like a space mine. These are not hampered with the kinds of hurdles facing larger combat satellites, which must be brought to the target through co-orbital maneuvers, requiring fuel and time and requiring extensive testing, globally distributed ground stations for Space Situational Awareness (SSA), and years of technological development.

The US and the USSR had already begun developing and testing kinetic anti-satellite technologies (ASAT) in the late 1950s. Nuclear tests in space, such as Starfish Prime in 1962, showed that the electromagnetic pulse (EMP) triggered by a nuclear explosion would massively and indiscriminately disturb satellites and communication services. Recently, the US accused Russia of developing a co-orbital nuclear ASAT weapon in space to destroy US satellites in space. This would not only be a violation of the Partial Nuclear Test Ban Treaty (PTBT) from 1963, but also from Art. 4 of the Outer Space Treaty.

The Multinational Force Operation Olympic Defender (MNF-OOD) was established in 2024 by the US Space Command to optimize space operations against hostile actors.[4] The MNF-OOD is a seven state alliance enabling the participating states to share SSA information data and "deter aggression to, from and in the space domain".[5] US Space Force officials accuse China and Russia of experimenting with stealth technologies in medium Earth orbit satellites to make it harder to identify and spot them.[6]

3 Götz Neuneck (2022). A New Arms Race in Space? Options for Arms Control in Outer Space. Security and Defence: Ethical and Legal Challenges in the Face of Current Conflicts. J. C. Peña. Heidelberg/New York, Springer: p. 23-36.

4 Participating nations are Australia, Canada, France, Germany, New Zealand, United Kingdom, United States. See f.e. Ryan Schradin DoD's Operation Olympic Defender, December 11, 2024, https://www.kratosspace.com/constellations/articles/dods-operation-olympic-defender

5 See Homepage Spacecom: https://www.spacecom.mil/About/Multinational-Force-Operation-Olympic-Defender/

6 China, Russia experiment with stealthy satellites, Space Force official says, *Breaking Defense*, December 11, 2025.

The UK, France and the US already practice joint satellite maneuvers to show their response and reaction potential. In 2025, the German government published its own Space Safety and Security Strategy,[7] stating that Germany, as an ally and partner, is "committed to responsible behavior in space based on international law."[8] The strategy also states "it will decisively and rapidly expand its defense capabilities in space."[9] Priorities here include advancing the capability to conduct its own space and cyber operations, developing SSA capabilities and defending its own and European space infrastructure.[10]

From Earth, missiles can also kinetically destroy satellites through direct ascent attacks as part of missile defense systems. Satellites can also be put into orbit with the purpose of being close enough to enemy satellites to destroy them, a method that is slower and more predictable, but also achieves higher orbits. Notably, such orbital ASAT tests were conducted by the USSR in the 1970s. US ASAT developments intensified on the premise of an assumed Soviet ASAT threat with Reagan's 1983 Strategic Defense Initiative (SDI) speech, announcing the beginning of the consequent SDI program between 1984-1993, nicknamed the Star Wars Program. Although the program saw some development and testing, these capabilities were not permanently deployed as they proved too expensive to maintain, inefficient and too dangerous in case of crisis. This legacy is at stake today due to the overambitious and unfeasible plan of the Golden Dome system (see below).

Satellite protection is also possible by making satellites capable of changing their orbit, but generally requires extra weight, fuel usage and maneuverability. Concepts of unilateral protection with shields, or the capability of rapidly substituting satellites, or otherwise being able to quickly make satellites redundant are also possible but are expensive and not very effective.

Satellites can also be destroyed with kinetic effects that can easily be achieved in space by collisions due to the high intrinsic velocities of satellites. It is often overlooked that ground-based missile defenses have an implicit ASAT function in lower earth orbits. Anti-satellite interceptor missiles can be launched from Earth or stationed in space for longer periods of time and used in the event of war. Ground-launched missiles can be used to directly target specific satellites as part of the regional or global ballistic missile defense (BMD) systems.

A final possibility to sabotage satellites is to disrupt or cut their data links. Due to the high dual-use potential of space technologies, the leading space nations generally possess such capabilities. These require being able to measure the orbits of targeted satellites, which requires radar or optical orbit tracking systems, i.e., extensive space surveillance. Satellites return cyclically, so they are easy to track. Due to their lightweight structure, they are very vulnerable and especially destructible at low Earth orbit (LEO) also and especially by the ground-based BMD systems of the USA, Russia, China, and India that are currently being developed and tested. Tests show evidence of such developments in ground-based BMD systems. Technically, it is easier to hit a vulnerable satellite when it is orbiting above the same territory as the BMD system than colliding with an incoming warhead elsewhere in space due to its unknown trajectory.

Space threats and nuclear deterrence

When speaking about the space-nuclear-war nexus, it is important to stress that the space domain is also used to support nuclear deterrence postures through space-based intelligence, surveillance and reconnaissance (ISR). Early warning (EW) satellites to detect missile launches cover a wide range of the planet´s surface and can provide the first indication of a potential nuclear attack. These are important for the launch on warning (LOW) posture of the US and Russia but are increasingly decisive for ground-based missile defense purposes against conventional equipped missiles. Communication satellites are a crucial part of the nuclear command, control and communication (NC3) system. Being attacked could also mean the start of a nuclear war as incoming threats would immediately trigger a retaliation strike. In some nuclear scenarios, nuclear explosions in space triggering an EMP to blind electronic infrastructure in space and on earth have been discussed. The P5 should be very clear to exchange a list of EW satellites that are indispensable for the stability of nuclear deterrence. Conventional attacks by the Ukrainian forces against two Russian EW satellite locations show how critical but also executable such incidents are.

The current US government is also planning to erect a new space-based anti-missile defense system called Golden Dome. In a formalized executive order on January 27, 2025 US President Trump initiated "a Golden Dome for America" to defend the US against ballistic, hypersonic and advanced cruise missiles, which he said will be "forever ending" the missile threat to the United States.[11] On May 20, 2025, he announced that $25 billion had been allocated for a multi-layered anti-missile architecture comprising land-, sea-, and space-based interceptors and sensors.[12] An

7 Federal Government of Germany (2025). Space Safety and Security Strategy. Ministry of Defense/Foreign Office. Berlin.

8 Ibid. page 7.

9 Ibid. page 11.

10 Ibid. page 15.

11 Presidential Actions: https://www.whitehouse.gov/presidential-actions/2025/01/the-iron-dome-for-america/

12 Secretary of Defense Pete Hegseth Statement on Golden Dome for America, https://www.war.gov/News/Releases/Release/Article/4193417/secretary-of-defense-pete-hegseth-statement-on-golden-dome-for-america/

on-orbit satellite constellation of space-based anti-ICBM interceptors is planned "capable of intercepting missiles even if they are launched from other sides of the world and even if they are launched from space". First contracts are already planned.[13] First calculations by the Congressional Budget Office (CBO) show that such a system would be also incredible costly. Orbiting space-based interceptors are also capable of attacking and destroying EW and communication satellites in geostationary orbit (GEO) as well as critical GPS satellite blocks and GLONASS, Russia's global navigation system satellites. Such an approach would pose an intolerable threat to all satellites of all space-faring nations.[14] Counterreactions such as the accelerated development of their own counterspace or stealth capabilities by Russia and China are very likely. It is likely that US allies will be asked by the US government to participate in this new endeavor by investing in counter-space programs, arguing that NATO ISR capabilities are at risk.

The Russian invasion of Ukraine has also triggered the build-up of regional missile defenses in Europe. The European Sky Shield Initiative (ESSI) is a multilayered, ground-based integrated European Air Defense system which is and will include exo-atmospheric ABM capabilities in 23 European states. This aims to strengthen the NATO Integrated Air Defense System. NATO´s Aegis Ashore BMD system and its ground-based interceptors SM-3 have the capability to hit satellites in LEO.

It would be a step forward and build confidence if all militaries possessing BMD systems would declare that they are not using their BMD systems against satellites in space. This would mean that space-based objects could not be attacked from the ground.

The United States, Russia and China are conducting rendezvous and proximity operations in LEO but also in GEO to develop co-orbital anti-satellite capabilities. Jamming and spoofing operations in conflict areas such Ukraine, the Baltics and the Middle East have shed light on the future of warfare. Russia´s GPS jamming has also had an increasing impact on civil aviation and Starlink satellites.[15] The US has deployed one offensive counterspace system and is discussing "low-debris-causing" offensive counterspace capabilities.[16] The US think tank CSIS issued a report, Space Threat Assessment 2025, stating: "Warfighting will happen in, through, and from space, meaning that a future peer-on-peer conflict may very well bring disruption and destruction to space on the same scale that it would bring to other places closer to Earth."[17]

Options for deescalation and regulation "....for all mankind"

The 1967 Outer Space Treaty (OST) provides the foundation for space regulations, but needs additional measures for preventing damage through confidence building, risk reduction and a better implementation of long-accepted standards. Multilateral efforts to develop sustainable space norms for responsible behavior by spacefaring nations are long overdue. In the longer-term, new rules, more transparency, and standards are necessary for the space environment.

The OST is the Magna Charta of international space law, extending the UN Charter to outer space. In the preamble, it emphasizes the "common interest of all mankind in the progressive exploration and use of outer space for peaceful purposes" and declares it a "matter for all mankind". Accordingly, outer space is a sovereign common space, the use of which must be "in the interest of all states" and to "mankind as a whole." Accordingly, security in outer space cannot be pursued exclusively in the national interest of one state.

Article IV explicitly prohibits the deployment of weapons of mass destruction in space, but not the stationing or use of 'conventional weapons' or the electronic interference with satellites. An additional protocol that also prohibits the use of satellites as destructive weapons would certainly have a preventive prohibition function for many states. Bringing a nuclear weapon in orbit permanently would be a clear violation of the OST. Nevertheless, given the diversity of ASAT weapons, a definition of a ban on space weapons has not yet been achieved. Other important international treaties were negotiated during the 'Golden Age' of space law between 1967 and 1984. For example, the 1976 UN Registration Agreement requires states parties to report information about the launch date, location, and purpose of the mission to a UN agency in Vienna. Unfortunately, the reported data from the world's space powers today is inadequate and reflects the intentional lack of transparency of military relevant space missions. This behavior must be significantly improved.

Other arms control agreements, such as those concerning the prohibition of nuclear tests in space or the use of satellites for verification purposes, include measures relevant to space but these are visibly eroding. The termination of the ABM Treaty in 2001 by the USA, means that strategic missile defense can be used for anti-satellite actions in low orbits in case of war or emerging armed conflict. Earth-based interceptors, functioning space surveillance by radar,

13 Satnews, USSF Awards Initial 'Golden Dome' Prototype Contracts, Signaling Strategic Shift to Space-Based Defense, December 1, 2025 https://news.satnews.com/2025/12/01/ussf-awards-initial-golden-dome-prototype-contracts-signaling-strategic-shift-to-space-based-defense/

14 Fetter, S. and D. Wright (2025). 'Can Iron Dome be transmuted into a Golden Dome?' The Washington Quarterly 48(2): 95-114.

15 Swope, Clayton; Kari A. Bingen, Makena Young, Kendra Lafave (2025). Space Threat Assessment 2025. *Center for Strategic and International Studies, April 2005*, p. 17-21.

16 Laetitia Cesari; Victoria Samson (Editors.). 2025. Global Counterspace Capabilities. An Open Source Assessment. Secure World Foundation, p.1-46.

17 Ibid, page 2.

and optical methods are all crucial in this case, but these are only in the possession of a few space powers. Space is a transparent medium so it is relatively uncomplicated to monitor and to verify orbiting satellites from earth and space. Most of these capabilities are only in the hands of the leading space powers.

Proposals for a comprehensive prohibition regime for space weapons were developed in the 1980s to keep outer space weapon-free on a multilateral basis. These range from unilateral commitments by states, informal agreements, confidence- and security-building measures (CSBMs), and mandatory codes of conduct, up to comprehensive prohibition regimes. In several international fora, such as the Geneva Conference on Disarmament (CD), the issue of Prevention of Arms Race in Outer Space (PAROS) has been on the agenda since 1982 without producing a concrete result. In 2008 and updated in 2014, Russia and China proposed a treaty called Prevention of the Placement of Weapons in Outer Space (PPWT), which commits states parties to "not place weapons in outer space." Criticisms focused on the inadequate definition of a space weapons, the difficulties of verification, and the exclusion of earth-based ASAT weapons or non-disruptive techniques such as cyber attacks. Even if the arguments are justified, the Western side has presented hardly any serious proposals to overcome these hurdles to find confidence solutions.

In the United Nations, resolutions on the prevention of the space arms race have been adopted annually since 1981, emphasizing the need and desire of the international community to prevent the weaponization and a dangerous arms race in space.

At the UN level, in 2013 and 2017, several UN Group of Governmental Experts (GGE) developed voluntary transparency and confidence-building measures for space activities. These reports are rich in content, but often no consensus for the adoption of their recommendations has been reached. While the negotiating states agree that there is a significant need for rules, there is currently no comprehensive regulation in sight.[18] A non-legally binding International Code of Conduct (ICOC) of the European Union was not successful. This focused on the avoidance of space debris and collisions in space and wanted to promote the "responsible behavior of states in space", but at the end, while it started as a confidence building measure, this approach was not bold enough.

More successful was the civilian-oriented UN Committee on the Peaceful Uses of Outer Space (UN-COPUOS), in which some 90 member states voluntarily developed 21 "guidelines for the long-term sustainability of space activities" from 2010 to 2018.[19] Such 'best practices' can help avoid collisions with space debris, increase awareness of hazards in hazardous situations, or just share official data. Involving the booming private industry is essential here, not the least because protecting their expensive space assets is of great economic importance to operators. However, military aspects are kept out of UNCOPUOS, meaning it is blocked to implement solutions to the problem posed by ASAT.

Under the leadership of Great Britain and some like-minded countries, UN resolution 75/36 titled Reducing Space Threats Through Norms, Rules and Principles of Responsible behaviors in Outer space was introduced in the UN General Assembly (GA) in December 2020. Here, states submit national reports on the subject that the UN Secretary-General then summarizes in a report.

The international trend is to move away from object-based to behavior-based prohibitions. There are good reasons for this, but in the end, binding commitments that verifiably prohibit space actors from attacking specific objects will also be necessary.

While arms control in space must be based on the principles of international space law, additional bilateral arms control arrangements among the world's leading space powers can help prevent acts of war in space and reduce the threat to space objects. All space powers proclaim that an arms race in space must be avoided, but serious steps to establish sustainable and lasting rules in space are hardly visible so far.

Unfortunately, the bilateral talks between the US and Russia that started in July 2020 on "regulating the militarization of space" are now blocked. These were intended to lay the groundwork for future arms control and risk reduction measures between the two superpowers and were meant to include further nuclear disarmament of high warhead ceilings and space and missile defense issues. Space-based early warning components for missile attacks or earth observation and radar satellites for verification are key space assets that must not be attacked even in the event of a crisis. The creation of 'keep out' zones or a non-attack obligation for strategically important satellites would be another stabilizing step. A legally binding agreement to ban ASAT tests would be a major step forward.[20] In their statement, Biden and Putin underscored the Gorbachev-Reagan formulation that "a nuclear war must not be won and never fought." Similarly, a war in space would significantly undermine international space security and create considerable amounts of new space debris. The leading nations in space, led by the US, Russia, and China,

18 UN General Assembly. 2019. Group of Governmental Experts on further Practical Measures for the Prevention of an Arms Race in Outer Space. A/74/77, 9. April. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N19/105/32/PDF/N1910532.pdf?OpenElement.

19 Adopted by UN COPUOS. Factsheet November. https://swfound.org/news/all-news/2019/06/guidelines-on-long-term-sustainability-of-outer-space-adopted-by-un-copuos/.

20 Raju, Nivedita. 2021. A Proposal for a Ban on Destructive Anti-Satellite Testing: A Role for the European Union? *EU Non-Proliferation and Disarmament Consortium*. EU Non-Proliferation and Disarmament Papers. Nr. 74.

must move forward here with binding, risk-reducing measures and strengthen security for all objects in space for the future of mankind.

Some Recommendations

1. Given the overlap of counter-space capabilities and emerging missiles defense efforts, more studies and science-based analysis are necessary to raise awareness for the public and governments about the dangers of a further weaponization of space. A public debate is urgently needed to discuss the implications of the build-up of counterspace capabilities thus triggering an arms race, both on the ground, and in space. The deployment of space-based interceptors should be prohibited and a no-first use of space-based interceptor (SBI) testing in space should be negotiated.

2. The P5 should start a dialogue for non-interference and confidence building measures about central strategic space assets for nuclear deterrence and exclusion zones for any offensive attack by the other side. Additionally, crisis management and risk reduction procedures should be worked out. Joint and shared verification measures and crisis communications for space debris are a first step. A European Chinese dialogue can help to identify workable measures and solutions by conducting joint seminars and visits of space facilities.

3. The provisions of the Outer Space Treaty from 1967 should be revised. Additional protocols, confidence building measures and code of conduct/best practices that have been elaborated by the United Nations and its committees can be included starting with a first Global Space Forum organized by the United Nations. Strengthening the provisions to prevent the development of nuclear-capable satellites for orbital ASAT purposes to conduct nuclear explosions in outer space should be a must for all states. China´s and Europe´s commitment to a peaceful development and policies for outer space security should be underlined by common actions, confidence and transparency building measures.

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Oliver Meier

The growing importance of protecting nuclear facilities in armed conflict: What China and Germany can do to address the problem

China and Germany share an interest in preventing military attacks on nuclear facilities.

First, both countries could directly bear the consequences of such attacks. The whole of Europe could be impacted by any release of radioactivity resulting from an attack on a nuclear facility in Ukraine and Russia. The severe and widespread consequences of the 1986 meltdown at the Chernobyl nuclear power plant are still vivid in the collective minds of people in many European countries and particularly in Germany. Russia's temporary occupation of the Chernobyl plant and attacks on the Zaporizhzhya nuclear power plant (ZNPP) and its critical infrastructure during the ongoing and protracted Russian invasion of Ukraine have raised concerns of radioactive contamination of wider Europe, as a result of attacks against civil nuclear facilities.

Possible attacks on North Korean nuclear facilities pose a risk to China. Many of these facilities are situated closer than 30 miles from the DPRK's border with China. Some of these sites pose likely targets in a military conflict with potentially wide-ranging and long-lasting environmental consequences for China.[1]

Second, China has the world's fastest growing civil nuclear sector and aspires to also export nuclear power plants to other countries.[2] Stronger norms and regulations to ensure that such facilities would not be targeted in any future possible military conflict would reduce risks associated with such transfers. While Germany has phased out nuclear energy for the production of electricity, Berlin continues to participate in other segments of the nuclear market, including through its share in the trilateral Urenco partnership (with the Netherlands and the United Kingdom), which is one of the world's largest producers of nuclear fuel.

Third, China and Germany prefer diplomacy over military force to prevent nuclear proliferation. In the past, Beijing and Berlin have spoken out against counterproliferation, understood as military action to destroy nuclear infrastructure.

Recent Events Highlight the Need to Protect Civil Nuclear Facilities

Better protection of nuclear facilities from military attacks is urgently needed. Pre-existing norms against military attacks are eroding as a result of four convergent developments.

First, some major powers, including Russia and the United States, now appear to consider nuclear facilities legitimate military targets. Attacks on nuclear facilities in the 1980s and 1990s were mostly carried out by smaller states, including Israel, Iran and Iraq. Recent attacks against Europe's largest nuclear power plant ZNPP, as well as Iranian nuclear facilities have been carried out by Russia (in Ukraine) and the United States (in June 2025 and March/April 2026 in Iran).

Second, operational and operating nuclear facilities are increasingly targeted. Until recently, that was not the case. Israel's 1981 attack on the Iraqi Osirak reactor, the Iraqi attacks on the unfinished Iranian Bushehr reactor in the 1980s, the US attacks on Îraqi nuclear sites in the early 1990s, or the 2007 Israeli attack on the al-Kibar nuclear reactor under construction in Syria were all aimed at destroying facilities that were not (yet) operational.[3] By contrast, facilities under attack by Russia in Ukraine and the nuclear sites attacked by Israel and the United States in Iran were or are already operational. This includes several strikes near the Iranian power reactor at Bushehr during the March-April 2026 war against Iran.[4] Iran also struck targets close to the Israeli nuclear reactor at Dimona, which is allegedly capable of producing weapons-grade fissile material for Israel's nuclear weapons programme.[5] The willingness to attack such operating facili-

1 See for example Luo, Shuxian. 'China's North Korea Problem'. *Foreign Affairs*, 21 August 2025. https://www.foreignaffairs.com/guest-pass/redeem/r22k1YfTTyI.

2 Plumer, Brad, and Harry Stevens. 'How China Raced Ahead of the U.S. on Nuclear Power'. *The New York Times*, 23 October 2025. https://www.nytimes.com/interactive/2025/10/22/climate/china-us-nuclear-energy-race.html.

3 See Malin, Martin B. 'The Effectiveness and Legitimacy of the Use of Force to Prevent Proliferation'. In *Arms Control in the 21st Century: Between Coercion and Cooperation*, edited by Oliver Meier and Christopher Daase. Routledge, 2012; *BBC News*. 'Israel Admits Striking Suspected Syrian Nuclear Reactor in 2007'. 21 March 2018. https://www.bbc.com/news/world-middle-east-43481803.

4 Tweet by the International Atomic Energy Agency, 6 April 2026, https://x.com/iaeaorg/status/2041109442553352609?s=20.

5 Freiberg, Nava. 'Fallout from Iranian Strike on Dimona Plant Would Be Symbolic, Not Radioactive'. *The Times of Israel*, 24 March 2026. https://www.timesofisrael.com/fallout-from-iranian-strike-on-dimona-plant-would-be-symbolic-not-radioactive/.

ties greatly increases risks of long-term damage to people and the environment in the countries affected and around them because of the large amounts of fissile material present.[6]

Third, the number of nuclear facilities worldwide, including in regions and areas of conflict, is projected to grow because of the renewed interest of some countries in using nuclear energy to produce electricity.[7] Of particular concern is the interest in small modular reactors (SMRs). Some predict that over the coming years, hundreds or possibly even thousands of SMRs could go into operation all over the world. Many SMRs will likely be placed in locations where protection from armed attacks will be difficult to establish and maintain.[8]

Finally, the number of armed conflicts involving state or non-state actors has been on the rise for the last 25 years.[9] There are few reasons to believe that this trend will change anytime soon.

The convergence of these trends makes it imperative to review steps to better protect nuclear facilities from military attacks.[10]

The Legal Frameworks that Govern the Protection of Civil Nuclear Facilities in Crisis or War

There is no single, global, legally-binding agreement or treaty that comprehensively prohibits attacks on nuclear facilities during crises or war. A range of agreements touch upon relevant aspects and govern certain parts of the problem:

- Article 15 and Article 56 of the 1977 Additional Protocol I of Geneva Conventions protect "works and installations containing dangerous forces" but they are not comprehensive.

- Article 17 of the Draft Rules for the Limitation of the Dangers incurred by the Civilian Population in Time of War protects the civilian population "from the dangers that might result from the destruction of engineering works or installations, such as hydro-electric dams, nuclear power stations or dikes, through the releasing of natural or artificial forces" but does not universally prohibit all such attacks.

- The International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT) is aimed at protecting nuclear material during international transport and The Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 Amendment tackles threats from non-state actors.

- The Treaty of Pelindaba on a nuclear-weapons free Africa is the only Nuclear-Weapons Free Zone treaty that includes a specific provision prohibiting attacks on nuclear facilities.

- The 1988 Agreement between India and Pakistan on the Prohibition of Attack Against Nuclear Installations and Facilities is the only bilateral agreement protecting nuclear facilities against armed attack.

The International Atomic Energy Agency (IAEA) Director General's March 2022 "Seven Indispensable Pillars for Nuclear Safety and Security" during armed conflict have established another important point of reference in the debate around better protection of nuclear facilities, not least because Rafael Grossi addressed the need to also protect the infrastructure of nuclear facilities. This has become imperative as Russia in its war against Ukraine has repeatedly targeted ZNPP's supporting infrastructure, essential for the safe operation of the reactor.[11]

States have also tackled the problem in a variety of international fora and have adopted a range of resolutions or joint statements on the issue of protecting nuclear facilities from attack. The IAEA General Conference addressed the issue in five resolutions. The 1981 Israeli attack on Iraq's Osirak reactor and the 1984-87 Iraqi attacks on Iran's Bushehr facility triggered the adoption of the first four resolutions, between 1981 and 1990. In 2009, the IAEA General Conference adopted a fifth resolution against the background of the destruction of Syria's al-Kibar reactor by Israel in 2007.[12]

One year later, NPT parties at the 2010 NPT Review Conference called "upon all States to abide by the decision adopted by consensus at the IAEA General Conference on

6 See Fedchenko, Vitaly. *Nuclear Security During Armed Conflict: Lessons From Ukraine*. Stockholm International Peace Research Institute, 2023. https://doi.org/10.55163/ZZSP5617.

7 See "Emerging Nuclear Energy Countries", World Nuclear Association, 19 September 2025, https://world-nuclear.org/information-library/country-profiles/others/emerging-nuclear-energy-countries.

8 Comparatively little research has been done on nuclear security implications of SMRs. For a good introduction to the nuclear safety and security aspects see Zhukov, Dan, and Lindsay Rand. 'Proceed with Caution: The Price of Neglecting Safety for SMRs'. The National Interest, 18 March 2025. https://nationalinterest.org/blog/energy-world/proceed-with-caution-the-price-of-neglecting-safety-for-smrs/.

9 See "Uppsala Conflict Data Program", https://ucdp.uu.se/#/encyclopedia.

10 See also Alkiş, Muhammed Ali. *Armed Conflict and Nuclear Security: Implications for Europe*. No. 82. Non-Proliferation and Disarmament Papers. EU Non-Proliferation and Disarmament Consortium, 2023, p. 10.

11 Liou, Joanne. 'IAEA Director General Calls for Restraint, Reiterates Need to Ensure Safety of Ukraine's Nuclear Facilities and Their Staff'. International Atomic Energy Agency, IAEA, 2 March 2022. http://www.iaea.org/newscenter/news/iaea-director-general-calls-for-restraint-reiterates-need-to-ensure-safety-of-ukraines-nuclear-facilities-and-their-staff.

12 See Castelli, Ludovica. 'How Can We Protect Nuclear Facilities?' *The Loop*, 17 June 2025. https://theloop.ecpr.eu/how-can-we-protect-nuclear-facilities/

18 September 2009 on prohibition of armed attack or threat of attack against nuclear installations, during operation or under construction."[13]

Yet, none of these agreements comprehensively prohibits attacks on nuclear facilities, is global in reach and legally-binding. Analysts and policymakers differ as to whether this patchwork is sufficient to guide political action towards better protection of nuclear facilities and to ensure compliance with existing legal frameworks that govern the protection of civil nuclear facilities.

Some, like Michal Onderco and Clara Egger, argue that "[l]egally, international humanitarian law norms already establish a detailed and unambiguous system of protection to avoid nuclear facilities becoming battlefields or being targeted by military attacks". Onderco and Egger maintain that a "gap – if any – does not lie in the (lack of) frameworks but in compliance to these frameworks" and argue that "[m]ultiplying treaties to solve issues in an ad hoc manner risks further politicizing international law in a context of increased polarization of relations between countries, especially great powers."[14]

Others, like Ludovica Castelli and Olamide Samuel, argue that none of the existing "legal provisions effectively governs attacks on nuclear facilities, nor do they exhaustively impinge on states' ability to justify such attacks."[15] In the same vein, Luis Rodriguez and Lauren Sukin point out that the unprecedented "Russian military attacks on Ukraine's nuclear power plants show the need for expanded guidelines for the physical protection of nuclear facilities."[16] In particular, they argue that the illegal occupation of nuclear power plants in Zaphorizia and (temporarily) Chernobyl highlight the need for better legal protection.[17]

In the same vein, Muhammed Ali Alkiş has argued that "[i]ntroducing new rules and norms for protecting nuclear facilities may not necessarily result in direct enforcement but it would prevent the legitimization of acts of aggression against such facilities and the exploitation of current policy gaps by states."[18]

While there are different views on the desirability of new regulations or a new regime to protect nuclear facilities in conflict, there is much agreement that a new governance mechanism, such as a convention or a treaty, is not currently politically feasible. The main reason for skepticism around the viability of attempts to create new, comprehensive legal norms is the global competition between major powers. Two of the five permanent members UN Security Council, namely Russia and the United States, have recently attacked nuclear facilities and Russia continues to illegally occupy ZNPP. Russia and the United States have opposed efforts to solidify existing norms and develop new regulations, including in the IAEA General Conference and the NPT. It must thus be assumed that they want to escape criticism of their own actions and keep a free hand to attack such nuclear facilities.

Partly because the road to new agreements seems to be blocked, governments in Europe have focused political efforts on how to strengthen existing agreements and to support practical efforts to improve the safety and security of nuclear facilities in and near war zones.

For example, since the Russian invasion of Ukraine, the focus of the German government has been on protecting nuclear facilities in Ukraine through bilateral programs in the context of the G7 and through the IAEA. In 2024, Germany contributed €1.5 million to IAEA extrabudgetary funds to keep IAEA experts present at Ukrainian nuclear sites and more than €1.7 million to bilateral programs to improve nuclear security in Ukraine.[19]

In 2024, Slovenia sponsored an international expert event with the support of other European countries, "on the protection of nuclear facilities in armed conflicts to examine whether existing international legal norms and political commitments sufficiently address the issue of security and protection."[20] The issue of protecting nuclear facilities in war has also come up in the UN Security Council (UNSC) and other relevant international fora.[21]

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13 Final Document of the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons: NPT/CONF.2010/50 (Vol. I) (2010). Conclusions and recommendations for follow-on actions, Action 64. http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/npt/revcon2010/FinalDocument.pdf.

14 Ondarco, Michal, and Clara Egger. 'Why a New Convention to Protect Nuclear Installations in War Is a Bad Idea'. *Bulletin of the Atomic Scientists*, 5 December 2022. https://thebulletin.org/2022/12/why-a-new-convention-to-protect-nuclear-installations-in-war-is-a-bad-idea/.

15 Castelli, Ludovica, and Olamide Samuel. 'Justifying Attacks on Nuclear Facilities'. *The Nonproliferation Review*, 7 February 2024, 1–23. https://doi.org/10.1080/10736700.2024.2301883.

16 Rodriguez, Luis, and Lauren Sukin. 'Russian Actions at Zaporizhzhia Show Need for Better Legal Protections of Nuclear Installations'. *Bulletin of the Atomic Scientists*, 28 October 2022. https://thebulletin.org/2022/10/russian-actions-at-zaporizhzhia-show-need-for-better-legal-protections-of-nuclear-installations/.

17 Similar also Kecskés, Gábor. 'The Protection of Nuclear Installations in Time of Armed Conflict – Old Rules, New Challenges'. *Hungarian Journal of Legal Studies* 64, no. 4 (2024): 508–19. https://doi.org/10.1556/2052.2024.00511; Zeith, Abby, and Eirini Giorgou. 'Dangerous Forces: The Protection of Nuclear Power Plants in Armed Conflict'. *Humanitarian Law & Policy Blog*, 18 October 2022. https://blogs.icrc.org/law-and-policy/2022/10/18/protection-nuclear-power-plants-armed-conflict/.

18 Alkiş, Muhammed Ali. *Armed Conflict and Nuclear Security*, op. cit., p. 13.

19 Auswärtiges Amt. *Bericht der Bundesregierung zum Stand der Bemühungen um Rüstungskontrolle, Abrüstung und Nichtverbreitung sowie über die Entwicklung der Streitkräftepotenziale für das Jahr 2024 (Jahresabrüstungsbericht 2024)*. Berlin, 2025. https://www.auswaertiges-amt.de/resource/blob/2728538/44f35608348f9b5108a696eaef98ceb6/abrbericht2024-data.pdf, p. 29.

20 *Discussion on the Protection of Nuclear Facilities in Armed Conflicts Held in Ljubljana. 15 November 2024.* https://www.gov.si/en/news/2024-11-15-discussion-on-the-protection-of-nuclear-facilities-in-armed-conflicts-held-in-ljubljana/.

21 See for example 'Ukraine: Briefing on the Zaporizhzhia Nuclear Power Plant'. *Security Council Report*, 12 April 2024. https://www.securitycouncilreport.org/whatsinblue/2024/04/ukraine-briefing-on-the-zaporizhzhia-nuclear-power-plant-3.php.

Better implementation of existing rules and guidelines around the protection of civil nuclear facilities can be supported through a number of steps, including:

- → Universalization of existing regulations. Thus, all countries but particularly states with nuclear facilities (India, Iran, Israel, Pakistan, and the United States) should ratify Additional Protocol I of the Geneva Conventions;
- → Support for efforts to strengthen international law generally, such as the Global Initiative to Galvanize Political Commitment to International Humanitarian Law coordinated by the International Committee of the Red Cross. One of the workstreams under this initiative focuses on the distinction between "civilian objects" and "military objectives" under international humanitarian law rules. This is relevant for improving the protection of civil nuclear facilities under the Geneva Conventions;[22]
- → Expressing political support for existing norms and procedures, such as the IAEA's 'Seven Indispensable Pillars' on nuclear safety and security situation in Ukraine;
- → Financial and technical support for the IAEA in its efforts to better protect nuclear facilities against armed attacks;
- → Stringent national implementation of nuclear safety and security guidelines and regulations and 'best practice' sharing of such implementation experiences.[23]

The Importance of Chinese and German Initiatives to Better Protect Nuclear Facilities in Armed Conflict

China and Germany are well-placed to work towards better protection of civil nuclear facilities. They may pursue such policies unilaterally, where coordination or cooperation is politically difficult. They can work jointly, in bilateral or multilateral settings, where such hurdles appear lower.

Joint German-Chinese statements on nuclear issues carry particular weight. Both countries come to nuclear issues from different angles and are often perceived as sitting in different political 'camps'. Any agreed initiatives that overcome those differences are therefore likely to receive particular international attention and create impact.

Such joint endeavors on protecting nuclear facilities would also likely get noticed because Beijing and Berlin both have security partners have been involved in illegal attacks on nuclear facilities. They can – and probably would – be read also as messages aimed at those partners in Moscow and Washington.

Russia has attacked and is still illegally occupying ZNPP. This crisis is ongoing and the situation around ZNPP remains unsustainable. IAEA Director General Rafael Grossi has called the situation around Europe's largest nuclear power plant "highly precarious".[24]

The United States, in conjunction with Israeli military action, has attacked nuclear facilities in Iran and has not ruled out further attacks against Iranian nuclear facilities. Again, the IAEA has warned of the potentially grave implications of such attacks.

At the same time, both China and Germany may feel constrained by their partnerships with states attacking nuclear facilities. China does want to maintain a neutral stance on Russia's war against Ukraine and therefore has been reluctant to address Russian attacks on nuclear facilities in Ukraine. Some US allies are concerned about equating US (and Israeli) attacks on nuclear facilities in Iran with the Russian attacks on Ukrainian nuclear facilities. They point out that Iranian facilities were not under IAEA safeguards when Israel and the United States attacked them.[25]

Both countries should put those political concerns aside and focus on the humanitarian and environmental dangers associated with attacks on nuclear facilities, no matter by whom and under what circumstances.

A good example of the political weight Chinese-German initiatives carry is the 4 November 2022 statement by Chinese President Xi Jinping and German Chancellor Olaf Scholz who together opposed the use or threat of use of nuclear weapons.[26] At the time, decision-makers were very concerned that Russia could use nuclear weapons against Ukraine.

The statement and associated diplomatic activities did help to signal to Moscow that the political consequences of nuclear weapons use would be grave. US officials have been quoted as saying that outreach and public statements from Chinese leader Xi Jinping and Indian Prime Minister

22 See ICRC: "Global Initiative to Galvanize Political Commitment to International Humanitarian Law. Calling for humanity to be upheld in war", https://www.icrc.org/en/global-initiative-international-humanitarian-law.

23 See for example Nickolas, Roth, Ross Matzkin-Bridger, and Jessica Bufford. *Nuclear Facilities in Times of Crisis*. Nuclear Threat Initiative, 2024. https://www.nti.org/wp-content/uploads/2024/06/NTI_Paper_FITOC_FINAL_060724.pdf.

24 'Update 323 – IAEA Director General Statement on Situation in Ukraine', IAEA, Vienna, 23 October 2025, https://www.iaea.org/newscenter/pressreleases/update-323-iaea-director-general-statement-on-situation-in-ukraine.

25 Iran had restricted IAEA access for some time but ended cooperation with the Agency after the June 2025 Israeli and US attacks on its nuclear facilities. Rauf, Tariq. 'Is There a Way to Rebuild IAEA Safeguards in Iran?' Arms Control Today, November 2025. https://www.armscontrol.org/act/2025-11/features/there-way-rebuild-iaea-safeguards-iran.

26 Rinke, Andreas, and Eduardo Baptista. 'Xi, Scholz Warn against "irresponsible" Nuclear Threats over Ukraine'. China. *Reuters*, 4 November 2022. https://www.reuters.com/world/china/german-chancellor-scholz-lands-beijing-2022-11-04/.

Narendra Modi contributed to averting a crisis and were a "helpful, persuasive factor and showed [Russia] what the cost of all this could be."[27]

The Chinese-German initiative also helped to pave the way for a statement by the G20 later that November, stating that "the use or threat of use of nuclear weapons is inadmissible."[28]

Berlin and Beijing come to the issue of peaceful uses from different directions. While Germany has phased out the use of nuclear power to produce electricity, China is investing in an expansion of nuclear power. Possible initiatives on protecting nuclear facilities from armed attack would also be significant if they were to demonstrate unity on the issue despite different outlooks on the role of nuclear energy and respective roles in the global nuclear market.

What China and Germany Can Do to Ensure Better Protection of Civil Nuclear Facilities

Against this background, what might both countries do unilaterally, bilaterally, and in multilateral contexts to tackle the growing threat of further attacks against civil nuclear facilities in crisis and war?

First, it is important that China and Germany speak out consistently and publicly against attacks on nuclear facilities. The Russian occupation of Ukrainian ZNPP, their attacks on nuclear facilities, the Israeli/US military attacks against Iranian nuclear facilities and Iranian attempts to strike an Israel reactor are blatant violations of international law. Naming and shaming all perpetrators, regardless of context of such attacks is important. This is because the robustness of norms is determined not only by the degree of compliance with them but also by the reactions of the international community to violations. Thus, third parties like China and Germany weaken international norms if they address noncompliance selectively.[29] It is widely accepted that there exists an obligation on the international community to not accept grave violations of international law.[30] However, because there is no single, comprehensive and legally binding prohibition of attacks on nuclear facilities, it is unclear whether such an obligation exists only with regard to the illegal attacks on Ukraine and Iran themselves, or also with regard to the attacks on nuclear facilities more specifically.

More importantly from a political point of view, speaking out against attacks on nuclear facilities also provides Beijing and Berlin with opportunities to raise the importance of stronger regulations and clearer prohibitions against attacks on nuclear facilities. This matters because Russia and the United States have at various times opposed efforts to solidify existing norms and develop new regulations, including in the IAEA General Conference and the NPT.

Impressing on Moscow and Washington the importance of dropping such objections and agreeing to broader norms against attacks on nuclear facilities would also increase the credibility of China and Germany as advocates of stronger norms and regulations to protect nuclear facilities against armed attack more generally.

A positive example in this regard is China's role at the 2022 NPT Review Conference. In the final hours of the four-week conference, Russia single-handedly vetoed adoption of the draft final document because it could not go along with draft language on the situation around ZNPP. Many observers noted positively that during the end game of the Review Conference, China (unsuccessfully) tried to convince Russia to go along with the compromise language in the draft final document.[31] This effect would have been enhanced even further if China would have criticized Russia openly for its illegal occupation of ZNPP.

A negative example is the German chancellor's declaration of "respect" for the Israeli attack on Iranian nuclear facilities, arguing that Israel has done "the dirty work for all of us". Such double standards open the door for criticisms of Western double standards and could be perceived as an indication that Western governments are ready to endorse a 'might makes right' attitude.[32]

Second, China and Germany are members in good standing of all major international instruments that are aimed at preventing attacks on nuclear facilities. Individually or jointly, both governments could reach out to countries that have not yet joined those international accords. Such outreach would carry more weight if it were conducted in a coordinated, or even in a joint effort.

Third, China and Germany could coordinate or maybe even cooperate on efforts to strengthen existing norms and regulations to protect nuclear facilities against armed attacks.

27 Quoted in Sciutto, Jim. 'Exclusive: US Prepared "Rigorously" for Potential Russian Nuclear Strike in Ukraine in Late 2022, Officials Say'. CNN, 9 March 2024. https://www.cnn.com/2024/03/09/politics/us-prepared-rigorously-potential-russian-nuclear-strike-ukraine/index.html.

28 'G20 Bali Leaders Declaration Bali Indonesia 15 16 November 2022 | Portal Kementerian Luar Negeri Republik Indonesia'. 16 November 2022. https://kemlu.go.id/portal/en/read/4171/siaran_pers/g20-bali-leaders-declaration-bali-indonesia-15-16-november-2022.

29 Deitelhoff, Nicole, and Lisbeth Zimmermann. 'Norms under Challenge: Unpacking the Dynamics of Norm Robustness'. *Journal of Global Security Studies* 4, no. 1 (2019): 2–17. https://doi.org/10.1093/jogss/ogy041.

30 *Statement of International Law Scholars on the United States Military Aggression against Venezuela*. Völkerrechtsblog, 2026. https://voelkerrechtsblog.org/statemenot-of-international-law-scholar-on-the-united-states-military-aggression-against-venezuela/.

31 See Baldus, Jana, and Oliver Meier. 'Scheitern Mit Ansage'. *Vereinte Nationen* 70, no. 6 (2022): 266–71. https://doi.org/10.35998/VN-2022-0030.

32 Meier, Oliver. 'Containing the Non-Proliferation Damage from Israel's Attacks on Iran's Nuclear Programme'. European Leadership Network, 18 June 2025. https://europeanleadershipnetwork.org/commentary/containing-the-non-proliferation-damage-from-israels-attacks-on-irans-nuclear-programme/.

Within the NPT, the Israeli and US attacks on Iranian nuclear facilities have put the issue of protecting nuclear facilities from armed attack into the spotlight.[33] China and Germany could help to build support for stronger language to address the issue. They could further develop the language contained in the draft final document of the 2022 NPT Review Conference, wherein NPT states parties expressed:

> *"[...] grave concern at attacks or threats of attack on nuclear facilities devoted to peaceful purposes, which jeopardize nuclear safety and nuclear security. The Conference also considers that attacks or threats of attack on nuclear facilities devoted to peaceful purposes have dangerous political, economic, human health, and environmental, implications and raise serious concerns regarding the application of international law, which could warrant appropriate action in accordance with the provisions of the Charter of the United Nations."*[34]

Such language would be in line with China's statement at the 2025 NPT Preparatory Committee when Beijing stated that it "opposes armed attacks against peaceful nuclear facilities, supports the IAEA in playing a constructive role in promoting the safety and security of peaceful nuclear facilities."[35] It would give credence to and operationalize the statement in China's White Paper on "China's Arms Control, Disarmament, and Nonproliferation in the New Era" that "China opposes any kind of attack on peaceful nuclear facilities, including nuclear power plants."[36]

Strengthening the protection of peaceful nuclear facilities in areas of conflict offers an opportunity for Berlin to contribute to NPT discussions on strengthening cooperation on peaceful uses under Pillar 3 of the treaty, in which it can otherwise only participate in a limited way because it has phased out nuclear energy use for electricity production.[37]

To be sure, the politics of such an attempt will be difficult to navigate in the high stakes environment of an NPT Review Conference. Less costly opportunities to address the issue may offer themselves in the context of more technical meetings, such as the next ICSANT Review Conference. Noah Mayhew, for example, has proposed that ICSANT member states could "pledge not to target nuclear facilities devoted to peaceful purposes or locations where nuclear material is otherwise in domestic peaceful use, storage, or transport; or pledge not to attack critical infrastructure of other States and include specific definitions of facilities to which this pledge would apply."[38] Given their similar positions on protecting nuclear facilities against armed attacks, Germany and China should be able to support such an approach.

Fourth, both countries could attempt to jointly address the security risks associated with the future use of Small Modular Reactors. While there has been some attention on addressing implications of SMRs for nuclear safeguards, little attention has to date been paid to the problems resulting from operating such reactors in remote locations and in regions, where the risks of armed conflict may be high.

Such a push for stronger regulation and precautionary measures would be in line with China's call at the 2025 NPT PrepCom on states parties to develop "advanced reactors and small modular reactors including portable reactors [...] to enhance cooperation with the IAEA to support the safe and secure deployment of such reactors."[39]

Thus, Germany and China could work together to "empower the IAEA to send a mission to nuclear facilities under a new nuclear security and safety protocol concluded between the IAEA and member states" whenever there is a threat to the facility's integrity.[40]

China and Germany could also propose that any technical cooperation agreement involving the supply of SMR must address possible future risks to such installations in armed conflict. Where feasible, suppliers should be expected to identify ways to protect SMRs, including through possible relocation in case of an imminent conflict that might involve a recipient state. Technical cooperation agreements should also address liability issues and clarify that suppliers may be accountable for damages to the environment resulting from attacks on such reactors.

33 "Prohibition of Attacks on Peaceful Nuclear Facilities and Scientists." *Working Paper Submitted by the Islamic Republic of Iran*, NPT/CONF.2026/WP.22. 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 2026. https://docs-library.unoda.org/Treaty_on_the_Non-Proliferation_of_Nuclear_Weapons_-EleventhReview_Conference_(2026)/NPT_CONF.2026_WP.22_-_22._ADVANCE_Iran_-_Prohibition_Attacks_nuclear_Facilities.pdf.

34 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. *Draft Final Document*. NPT/CONF.2020/CRP.1/Rev.2. 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 2022. https://reachingcriticalwill.org/images/documents/Disarmament-fora/npt/revcon2022/documents/CRP1_Rev2.pdf, Paragraph 100.

35 China. *Statement by Sun Xiaobo, Director-General of the Department of Arms Control of the Foreign Ministry of China at the General Debate of the Third Session of the Preparatory Committee for the 2026 NPT Review Conference*. Preparatory Committee for the 2026 NPT Review Conference, 2025.

36 The State Council Information Office of the People's Republic of China. 'China's Arms Control, Disarmament, and Nonproliferation in the New Era'. November 2025. https://www.fmprc.gov.cn/mfa_eng/xw/wjbxw/202511/t20251127_11761653.html.

37 Meier, Oliver, and Michael Staack. *Focused Multilateralism: How China and Germany Can Better Engage on Arms Control, Disarmament and Non-Proliferation*. Friedrich-Ebert-Stiftung/European Leadership Network, 2025. https://europeanleadershipnetwork.org/policy-brief/focused-multilateralism-how-china-and-germany-can-better-engage-on-arms-control-disarmament-and-non-proliferation/.

38 Mayhew, Noah. *Mitigating the Threat of Attacks on Nuclear Facilities*. Vienna Center for Disarmament and Non-Proliferation, 2025. https://vcdnp.org/wp-content/uploads/2025/04/Mitigating-the-Threat-of-Attacks-on-Nuclear-Facilities_VCDNP_web.pdf, p. 13.

39 China. *Give Full Play to the Role of the Non-Proliferation Treaty in Promoting Peace and Development in the New Era.* Working Paper Submitted by China NPT/CONF.2026/PC.III/WP.39. Preparatory Committee for the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. New York, 2025.

40 Alkiş, Muhammed Ali. *Armed Conflict and Nuclear Security*, op. cit., p. 13.

Steps by China and Germany to protect nuclear facilities in war are needed because such attacks in armed conflict have become more dangerous and more common. While Beijing and Berlin can and should act independently, joint action to reduce threats to nuclear facilities will carry particular weight because China and Germany have influence in their respective political camps. In particular, China and Germany should speak out consistently and clearly because Russia and the United States have been attacking nuclear facilities. Joint actions should range from political statements by both sides to initiatives in multilateral contexts, such as the NPT. By advocating preventive measures to protect SMRs from armed attacks specifically, both countries could work together to tackle an emergent aspect of the threats to the safe operation of nuclear facilities.

Michael Staack

No first use pledge: What contribution can a renunciation of the first use of nuclear weapons make to global security, and is an agreement on this goal achievable?

Nuclear Weapons and Global Insecurity

The existing international order based on US hegemony has been in a profound crisis for about a decade. While this 'liberal world order' is losing its power and ability to shape events, a new order is not yet discernible. It is likely that any new or modified order will also be characterized by numerous existing norms and treaties. These include both the Charter of the United Nations and the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

The crisis of the nuclear order follows the crisis of the international order—and not the other way around. Joint efforts are needed, especially from the five legal nuclear-weapon states, who are also the only permanent members (P5) of the United Nations Security Council and enjoy the exclusive power to veto any resolution, to maintain and further develop global nuclear order. Through violations of the rules and the prioritization of national interests, these very states bear responsibility for damaging global systems of nuclear order. Some serious symptoms of the crisis are:

- → The inability and unwillingness of the US and the Russian Federation to agree on an extension of the New START Treaty. This means that there is currently, for the first time since 1972, no controlled limitation of strategic nuclear weapons between these two powers, which still possess over 90% of the world's nuclear arsenals.

- → The unwillingness of all P5 nuclear-weapon states, to fulfill their disarmament obligations under the NPT. Instead, current or planned measures of rearmament and modernization are taking precedence.

- → The lowering of the nuclear threshold through changes in nuclear doctrines, particularly by Russia, but also by the US. Russia has also repeatedly threatened to use nuclear weapons since the beginning of its war against Ukraine.

- → Furthermore, Russia withdrew its ratification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in 2024. The US and China have not ratified it to date. In late October 2025, US President Trump announced his intention to resume US nuclear testing, suspended since 1992, basing his decision on evidentially false claims of secret tests by China and Russia.

- → A practice of double standards is common, even to the point of violating the prohibition of the use of force in dealing with non-compliant states such as Iran, North Korea, and Israel.

Despite these major shortcomings, the vast majority of states continue to advocate for a functioning nuclear order based on the principles of the NPT.

- → The majority of nations adhere to the goal of nuclear disarmament and have called for concrete steps from nuclear-weapon states to achieve this goal.

- → Large parts of the world (Latin America, Africa, Southeast Asia) are nuclear-weapon-free zones. Unlike Europe, which has never replaced the logic of nuclear deterrence with another security doctrine – even in the decades following the end of the Cold War, these nuclear-weapon-free regions view their status as essential for security policy and defend it.

- → The Treaty on the Prohibition of Nuclear Weapons (TPNW), concluded in 2017, now has 99 signatories which represents the majority of UN member states. 70 of these states have already ratified this treaty, making it legally binding under international law. This has established a competing norm to the NPT.[1]

1 Cf. Kmentt, Alexander (2021): The Treaty Prohibiting Nuclear Weapons. How it was achieved and why it matters, Abingdon/New York: Routledge; Schmidt-Radefeldt, Roman (2021): Das „Unvereinbarkeitsnarrativ" auf dem rechtlichen Prüfstand. Zum Verhältnis zwischen dem Atomwafenverbotsvertrag und der NATO, dem Nichtverbreitungsvertrag und dem Völkergewohnheitsrecht. In: Die Friedens-Warte, vol. 94, 3-4, pp. 390-417.

The new debate on 'No first use'

States without nuclear weapons, large segments of civil society, non-governmental organizations, and academics are calling for a consistent return to nuclear disarmament and arms control, non-proliferation, and risk reduction, particularly in light of the severe crisis facing the international order.

One instrument for promoting these objectives could be the P5s' commitment to a no-first-use pledge. This commitment would mean that the state in question would never – under any circumstances – use its nuclear weapons first, but only in retaliation against nuclear attacks. Preemptive strikes or nuclear blackmail through the threat of nuclear war would thus be ruled out.

The no-first-use pledge primarily has a declaratory effect. It can contribute to building trust and enhance the stability of the nuclear order. Additionally, a certain amount of verification is both necessary and achievable. Such a renunciation is not as precisely verifiable as with most 'traditional' arms control agreements. However, a breach of this commitment would likely have immense political repercussions.

The renunciation of first use has been a long-standing topic of discussion, dating back to the era of the East-West conflict and the Cold War. Of the P5, only the People's Republic of China has adhered to such a renunciation since acquiring nuclear weapons in 1964. Of the four states that possess such weapons outside the NPT (India, Israel, North Korea, and Pakistan), only India has adopted a No First Use doctrine.[2] Both states demonstrate the credibility of their statements through their operational doctrines and the way they deploy their nuclear weapons. The renunciation of first use can be seen as a step towards the complete elimination of nuclear weapons and/or fulfilling the obligation under Article 6 of the NPT to engage in disarmament negotiations.

On July 12, 2024, China submitted a Working paper to the Preparatory Committee for the 2026 NPT Review Conference.[3] This document contains proposals for concluding a Political Declaration or even a No First Use Treaty within the P5 framework:

"The Chinese policy of no first use of nuclear weapons is based on our country's recognition of the nature of nuclear weapons and nuclear war. There will be no final victory in a nuclear war; it will only bring enormous disaster to humankind."[4]

This initiative has given the debate significant new impetus. China justifies its proposal with the following objectives:

- → Reduce the role of nuclear weapons in national security policies
- → Promote the goal of nuclear disarmament
- → Enhance mutual strategic trust, avoid a dangerous nuclear arms race, effectively reduce strategic risks, and promote global strategic balance and stability.[5]

How such a treaty could strengthen global security and contribute to risk reduction

Whether the (first) use of nuclear weapons would already be contrary to international law is disputed. An explicit prohibition does not exist, but there are various regulations that amount to a ban on their use. At the latest, with the entry into force of the Treaty on the Prohibition of Nuclear Weapons (TPNW) in January 2021, the possession of nuclear weapons can be considered illegal.[6]

Most recently, in a joint statement in January 2022, the P5 nuclear-weapon states reaffirmed their position that a nuclear war is unwinnable and must never be waged.[7] In doing so, they reiterated a key statement agreed upon by the then US and Soviet presidents Reagan and Gorbachev in 1986, and which has been reaffirmed several times since. In fact, current studies on the effects of a nuclear war suggest that they would be far more devastating than anticipated in the 1980s, the last and particularly dangerous decade of the Cold War, based on the scientific methods available at the time. This also applies to regionally fought nuclear wars, the consequences of which cannot be contained regionally.[8] It must also be questioned whether a nuclear conflict is "controllable" or whether it is far more likely that such a conflict would very quickly spiral out of control.

2 Cf. Sundaram, Kumar/Ramana, M.V. (2018): India and the Policy of No First Use of Nuclear Weapons, in: Journal for Peace and Nuclear Disarmament, vol. 1, 1, pp. 152-168.

3 United Nations Office for Disarmament Affairs (UNODA) (2024): 'No-first-use of Nuclear Weapons Initiative: Working paper submitted by China', 12 July 2024; https://docs.library.unoda.org/Treaty_on_the_Non-Proliferation_of_Nuclear-Weapons-Preparatory_Committee_for_the_Eleventh_ConferenceSecond_session_(2024)/NPT_CONF.2026_PC.II_WP.33_-_Corr.1_ADVANCE_UNEDITED_VERSION_China_-_No-first-use_of_Nuclear_Weapons_Initiative_ENG.pdf (16.11.2025).

4 Ibid.

5 Ibid.

6 Cf. Skiljan Amela (2021): Are Nuclear Weapons Illegal?, in: Die Friedens-Warte, vol. 94, 3-4, pp. 418-444.

7 Joint Statement (2022): Joint Statement of the Leaders of the Five Nuclear-Weapon States on Preventing Nuclear War and Avoiding Arms Races | The White House (16.11.2025)

8 Cf. Hess, G.D. (2021): The Impact of a Regional Nuclear Conflict between India and Pakistan: Two Views. In: Journal for Peace and Nuclear Disarmament, vol. 4, pp. 163-175: https://doi.org/10.1080/25751654.2021.1882772 (15.11.2025).

If a nuclear war is neither winnable nor manageable, this logically precludes the first use of nuclear weapons – unless one is willing to accept the most catastrophic destruction, even the self-annihilation of humanity. While such nihilistic ways of thinking must be resolutely countered, nuclear deterrence, supplemented by communication, transparency, and general risk reduction, can provide temporary (fragile) security. A failure of this deterrent, however, would mean a catastrophe with unforeseeable and unsustainable consequences. Given this situation, the renunciation of the first use of nuclear weapons is a rational, difficult-to-achieve, but attainable goal under certain conditions. Even the dialogue among the P5 on pathways to this goal can contribute to stabilizing the international order. For this reason, UN Secretary-General António Guterres recently also advocated for the renunciation of first use.[9] This statement comes, after all, from the former Prime Minister of a NATO member state.

A strategy of no first use, pursued cooperatively among all nuclear weapon states, is a strategy promoting arms control. It should allow (especially in the case of the US, Russia and China) significantly smaller nuclear forces. There would be no requirement for counterforce capabilities. Weapons designed for tactical or battlefield operations ought also largely to be eliminated, in the wider context of no first use a part of a disarmament process. The risk of accidental or unauthorized use of nuclear weapons, or of hasty and foolish authorized resort to nuclear weapons in a crisis, would also be reduced as a consequence of associated changes to force posture.

The no first use policy is rejected primarily by NATO member states and other US allies such as Japan and South Korea on the grounds that it would undermine the credibility of the United States' extended deterrence. This term refers to the US commitment to protect 32 allies in Europe and Asia, if necessary, even through the use of nuclear weapons.[10] While this oft-repeated argument signals loyalty, the use of nuclear weapons in this scenario has little basis in reality. No realistic scenarios are conceivable in which the United States would be the first to use nuclear weapons if one of their allies were to be attacked by another country (that also possesses nuclear weapons), not least because of the associated threat to its own territory.

In a realistic scenario, the credible second-strike capability would likely be crucial. The corresponding capabilities of the US are available with varying ranges.[11] Whether and to what extent a second strike would then lead to the near-total annihilation of the ally need not be discussed further here.

Another conceivable scenario is the threat of a first strike against a non-nuclear power. Such a threat would entail immensely high political costs, rendering it unbelievable. A state that issues such threats would risk its marginalization as a pariah state. The almost unanimous global reaction to Russia's similar threats against Ukraine has fortunately made this clear.

Framework Conditions: Interests and Confidence Building

For a process aimed at renouncing the first use of nuclear weapons, various framework conditions are essential, while others are favorable. The shared conviction that nuclear wars are neither feasible nor winnable is a starting baseline. A robust working relationship between the powers is no less essential, particularly between the US, China, and Russia. Within the framework of such working relationships, common interests and areas of cooperation should be identified, as well as the points of contention that are non-negotiable for each party (antagonistic cooperation). The resumption of US-Russian negotiations on arms control of strategic nuclear weapons, with the aim of concluding a successor agreement to the New START Treaty, is similarly essential. Furthermore, it is crucial to refrain from threats of nuclear war or similar war rhetoric.

Broad public support for agenda-setting in favor of the no first use pledge would be beneficial, both within the United Nations and in societies worldwide. Effective crisis communication between the nuclear powers would also be beneficial. This practiced communication could, over time, lead to trust-building between military and political actors. The same applies to greater transparency and reciprocal communication regarding strategic missile defense. Furthermore, the institutionalization of high-level meetings at shorter intervals would be beneficial, with the aim of fostering a better understanding of the other side and increasing mutual predictability.

At first glance, these conditions seem difficult to achieve at present. However, there are also positive developments: No nuclear power wants to take the risk of a nuclear war with a significant loss of control. Nuclear war threats like those made by Russia meet with almost universal opposition. Unlike during his first presidency, President Trump currently no longer appears to be striving for nuclear superiority. In principle, all powers are interested in nuclear arms control. Presidential leadership may play a special role. The three presidents, Putin, Trump, and Xi, are leaders who are

9 Cf. United Nations (2024): 'Secretary-General's remarks to the Security Council – on Nuclear Disarmament and Nonproliferation,' 18 March 2024; https://www.un.org/sg/en/content/sg/statements/2024-03-18/secretary-generals-remarks-the-security-council-nuclear-disarmament-and-non-proliferation-bilingual-delivered-scroll-down-for-all-english-and-all-french (16.11.2025).

10 Given the outwardly hostile approach of the second Trump administration towards Europe, it becomes questionable whether this 'protection guarantee' can still be relied upon. In the light of this uncertainty, members of the European Union and the European NATO countries are now either already undertaking efforts or planning to quickly build a credible (conventional) defense without the US.

11 Cf. Thakur, Ramesh (2021): Weniger ist mehr. In: Internationale Politik und Gesellschaft, „No first use": Debatte um Verzicht auf Ersteinsatz von Kernwaffen nimmt Fahrt auf – Außen- und Sicherheitspolitik | IPG Journal (15.11.2025).

willing and able to implement objectives they deem correct, even against resistance from bureaucratic politics and vested interests. Regarding the non-first use of nuclear weapons, this will depend on a fundamentally altered calculation of interests by Russia and the USA. Although this is not currently in sight, it should not be ruled out entirely.

Dialogue on Doctrines and Capabilities

A crucial prerequisite for reaching a no first use agreement is the exchange of information on the respective operational doctrines and greater transparency regarding existing capabilities and their development. The design of the doctrines and the manner in which nuclear weapons are deployed are important indicators of the credibility of a no first use commitment. The separate storage of delivery systems and warheads is one such important measure, as it precludes immediate use.[12]

These dialogues should take place at a high level and on a regular basis, for example, at the level of the Chiefs of Staff. Various formats are conceivable for this purpose; for example, in the bilateral relationship between the US and Russia or between the US and China, and within the P5. The smaller nuclear powers, France and the UK, should be involved from the outset.

In this way, a level of transparency can be established that makes military rationales comprehensible and helps to avoid misunderstandings. This also makes an important contribution to crisis communication and crisis resilience. Experiences during and after the Cold War demonstrate how crucial realistic perceptions are for security. A lack of information and communication fosters worst-case scenario thinking and increases the likelihood of misperceptions. Establishing a permanent consultation mechanism among nuclear-weapon states would be the appropriate forum for exchanging information and clarifying potential misperceptions.

Verification

A no first use pledge must be verifiable if it is to contribute to building trust and promote global security. A political declaration of intent can be a first step, but it is not sufficient. Further measures are required. A combination of declaratory policy, legal undertakings, changes to weapon deployments, and a general denuclearization of war planning, military exercises, and training programs could serve to reduce, to a large extent, a nation's capacity and preparedness to use nuclear weapons first. As one of the first steps, nuclear-weapon states should seek agreement on legally binding and unconditional negative security guarantees.

The scope of verification is unlikely to be as precise and far-reaching as that already achieved in traditional arms control treaties, for example, regarding the number of launch facilities, delivery systems, or warheads. A gradual increase in the level of ambition is also conceivable. Verification for a no first use pledge must primarily aim to at least limit the practice of launch on warning (LOW) or launch under attack (LUA) and to implement a de-alerting process. One measure to this end, as already mentioned, is the storage of warheads away from the delivery systems. It should also be considered that certain measures, such as 'strategic early warning,' contribute to, or could be interpreted as contributing to, both strategic stability and potential first use.

States may take unilateral steps

Individual nuclear-weapon states can advance the process by unilaterally renouncing first use. Given the extreme improbability of first use, the security risk associated with such a step is low. Unilateral renouncing not only advances the diplomatic process but also enhances the international reputation of the respective state within the international community, the overwhelming majority of which supports nuclear disarmament and risk reduction.

Sole Purpose as an Intermediate Step

The declaration that nuclear weapons will only be used in response to a nuclear attack that has already occurred (sole purpose) can also be an important intermediate step on the path to no first use. The credibility of such a declaration is all the greater if a strong and deterrent conventional arsenal exists in the respective potential area of operation (e.g., Europe, the Korean Peninsula). Logically, a sole purpose doctrine also includes refraining from the use of nuclear weapons against nations that do not possess nuclear weapons.

A sole purpose doctrine is repeatedly discussed, especially in Western countries. Former US President Joe Biden advocated for such a doctrine before his election (2020). However, his administration did not implement a corresponding change in strategy because the political resistance was too great.

The potential roles of Germany and China

Germany and China reaffirmed their positions that a nuclear war must never be waged and is unwinnable, and condemned the threat of nuclear attacks in a joint declaration by President Xi Jinping and then-Chancellor Olaf Scholz in

12 China has long practiced this separate storage.

Beijing in November 2022.[13] This declaration was made in response to Russia's threats of using nuclear weapons against Ukraine. This declaration received broad international support, for example from the G20.

Germany traditionally understands nuclear weapons as political weapons that serve as a deterrent but must never be used. This understanding of nuclear weapons has always been at odds with the strategy and operational planning of the US and NATO. A nuclear war in the East-West conflict would very likely have led to the complete annihilation of both German states. Helmut Schmidt and other German chancellors therefore declared after the end of their terms that they would have refused to consent to the use of US nuclear weapons from German soil.

After the end of the Cold War, a unified Germany committed itself to the goal of abolishing all nuclear weapons. Initiatives to withdraw US nuclear weapons from Germany and to implement a no first use policy remained half-hearted and found little support within NATO.

For many decades, China has pursued a clearly defensive nuclear strategy.[14] The development of nuclear weapons (1964) was undertaken to deter the Soviet Union, which was perceived as aggressive. Later, they also served to deter the US and China's regional rival, India. China's nuclear doctrine is based on the principle of non-first use. Until a few years ago, it also undeniably followed the principle of minimal deterrence – in Chinese parlance, a "lean and effective arsenal." Only recently has China's arsenal grown from approximately 300 to around 600 warheads for intercontinental systems, which can still be interpreted as a minimal deterrent.[15] Western forecasts predict continued rearmament, which would place China in a "third category" between the major nuclear powers Russia and the US, and the relatively small arsenals of France and the UK.[16] Traditionally, China has advocated for the complete elimination of nuclear weapons.

China should be more transparent about the goals and scope of its nuclear rearmament and modernization. The argument that this would maintain a second-strike capability against the US in times of great power competition seems plausible – but, like the rearmament of other powers, it conflicts with the disarmament obligations of the NPT.[17] Greater transparency could help China solidify its credibility as a 'responsible nuclear power' and as a proponent of the 'no first use' principle and further contribute to international coalition building toward this goal. China's recently published comprehensive white paper on arms control reaffirms its existing nuclear strategy but unfortunately provides no profound arguments regarding the reasons and objectives for expanding its nuclear forces.[18]

Since the first Trump administration (2017-2021), Washington has pursued a comprehensive global policy of containment toward the People's Republic that changed little under President Biden. The aim is to prevent China's further rise through trade wars, high-tech embargoes, and rearmament, including the expansion of missile defense systems. It was foreseeable that China would react to this – also with regard to its nuclear arsenal.[19] Failure to take this into account reflects poorly on the strategic foresight of the US administrations. Regrettably, China's minimal deterrence and its commitment to a no first use policy have received little positive recognition from the US and NATO, even though both have a stabilizing effect. Calling on China to now demonstrate greater transparency does not absolve other nuclear-weapon states of their obligation to contribute to building trust through their own transparency.

Unlike Russia, China adheres to the NPT and other multilateral arms control regimes.[20] This offers areas of cooperation for German and Chinese policy. China should use its good relations with Moscow to persuade the Russian Federation to adopt a policy commensurate with its responsibility as a major nuclear power. This includes renouncing threats of nuclear war and refraining from the dangerous lowering of the nuclear threshold.

13 Cf. Xinhua (2022): Xi meets German chancellor Olaf Scholz. In: Xinhua, 4 November 2022; https://en.people.cn/n3/2022/1104/c90000-10167321.html (16.11.2025).

14 Cf. Li, Bin/Zhao, Tong, Zhao (eds.) (2016): Understanding Chinese Nuclear Thinking. Washington, D.C.: Carnegie Endowment for International Peace; https://carnegieendowment.org/research/2016/10/understanding-chinese-nuclear-thinking?lang=en (15.11.2025).

15 Cf. Cunningham, Fiona S. (2025): China's test of the nuclear revolution: Technology, great power competition and the nuclear balance, in: Journal of Strategic Studies, vol. 48, 2, pp. 510-557; Fravel, M. Taylor/Himm, Henrik Stalhane/Trean, Magnus Langset (2023): China's Misunderstood Nuclear Expansion, in: Foreign Affairs; https://www.foreignaffairs.com/china/chinas-misunderstood-nuclear-expansion (15.11.2025); Kristensen, Hans M./Korda, Matt/Johns, Eliana/Knight, Mackenzie (2025): Chinese nuclear weapons, in: Bulletin oft he Atomic Scientists, vol. 81, 2, pp. 135-160.

16 Cf. Rudischhauser, Wolfgang (2025): Zwischen Erstschlagsverzicht und einem rapiden Ausbau des Nuklearsenals: Chinas Aufrüstung und wie der Westen darauf reagieren sollte. In: Sirius, October 2025, pp. 1-14; https://doi.org/10.1515/sirius-2025-2006 (15.11.2025).

17 Arms Control Association (2025): China Signals Continuity in Nuclear Policy Paper. December 11, 2025; https://www.armscontrol.org/blog/2025-12-11/china-signals-continuity-nuclear-policy-paper?emci=82f3b7b4-a6d6-f011-8195-000d3a1d58aa&emdi=ad642fe7-c2d6-f011-8195-000d3a1d58aa&ceid=27567869 (12.12. 2025).

18 The State Council Information Office oft he People's Republic of China (2025): China's Arms Control, Disarmament, and Nonproliferation in the New Era. November 27, 2025; http://english.scio.gov.cn/whitepapers/2025-11/27/content_118198082_7.html (12.12.2025).

19 Some experts argue that China's military buildup serves not only to maintain its second-strike capability but also to document Beijing's status as a world power with significant military strength and its prestige. Such a policy shift would also entail considerable political costs, for example, in relations with the countries of the Global South. Cf. from different perspectives: Balzer, Kyle/Blumenthal, Dan (2024): The True Aims of China's Nuclear Buildup, in: Foreign Affairs; https://www.foreignaffairs.com/china/true-aims-chinas-nuclear-buildup (15.11.2025); Zhao, Tong (2024): Political Drivers of China's Changing Nuclear Policy: Implications for U.S.-China Nuclear Relations and International Security, Washington, D.C.: Carnegie Endowment for International Peace; https://carnegieendowment.org/research/2024/07/china-nuclear-buildup-political-drivers-united-states-relationship-international-security (15.11.2025)..

20 Cf. Meier, Oliver/Staack, Michael (2022): China's Role in Multilateral Arms Control. Berlin: Friedrich-Ebert-Stiftung; https://library.fes.de/pdf-files/iez/19484.pdf (15.11.2025); The State Council Information Office oft he People's Republic of China (2025): China's Arms Control, Disarmament, and Nonproliferation in the New Era. November 27, 2025; http://english.scio.gov.cn/whitepapers/2025-11/27/content_118198082_7.html (12.12.2025).

After joining the NPT (1975), Germany actively advocated for arms control regarding nuclear weapons and for compliance with the NPT. The achievement of a viable solution to the conflict over the Iranian nuclear program through the JCPoA (2015) can be at least partially attributed to the success of German policy.[21] The Russian invasion of Ukraine has fundamentally altered German security policy since 2022. Nuclear deterrence, presented as the only reasonable security strategy, has experienced a renaissance. The German armed forces are to be transformed into the largest military power in Europe. This entails subordination to the foreign and security policy of the second Trump administration and a widespread neglect of non-European perspectives and politics, including many areas of international order. It is overlooked that rearmament and mere deterrence do not constitute a coherent security policy. While public debates are mostly limited to worst-case scenarios, discourse on the matter also commonly lacks knowledge, perspective, and empathy. German initiatives on arms control and the no first use principle are not to be expected. As a middle power, Germany harms itself by failing to actively participate in relevant international debates.

Given their differing security policy interests, alliance ties, and priorities, there is currently little common ground between China and Germany regarding the no first use pledge. Nevertheless, they are united by their commitment to multilateral arms control, an understanding of nuclear weapons as political weapons, and the rejection of nuclear threats. Based on these commonalities, political and expert dialogues are also useful on controversial topics.[22]

21 The Joint Comprehensive Plan of Action was agreed upon between the P 5 States, Germany, EU and Iran. Iran sticked to the provisions regulating its civilian nuclear program. President Trump in accordance with Republican opposition to this „Obama deal" abandoned the agreement in 2018.

22 Cf. Meier, Oliver/Staack, Michael (2025): Focussed Multilateralism. How China and Germany can better engage on arms control, disarmament and non-proliferation. Berlin: Friedrich-Ebert-Stiftung; https://library.fes.de/pdf-files/international/21919.pdf (16.11.2025).

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