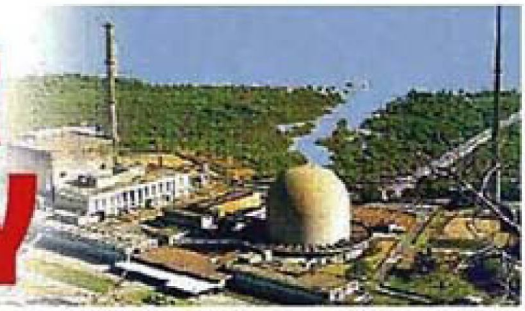
# NUCLEAR SECURITY



A FORTNIGHTLY NEWSLETTER ON NUCLEAR DEFENCE, ENERGY AND PROLIFERATION FROM CENTRE FOR AIR POWER STUDIES

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**OPINION – Hamid Bahrami**

## Will Trump Push Iran Towards Nuclear Deterrence and the East, or Open Door to Diplomacy?

As Iran confronts an evolving global order, marked by increasing Western pressure and shifting power dynamics, it faces some critical decision-making. To safeguard its security and interests, Iran seeks to recalibrate its foreign policy, pursuing its own nuclear deterrent and strategic alliances with China and Russia. These steps are not only logical, but also necessary responses to the realities on the ground.

Indeed, what Iran is doing — a nuclear deterrent and alignment with the East — is not a random choice, but a necessary response to constant hostility from Western powers. This hostility is deeply rooted in Israeli influence over Western foreign policy, where ensuring Israel's strategic dominance in the region has shaped a confrontational approach towards Iran. Such policies have left Tehran with little choice but to strengthen its defences and seek partnerships that counter these adversarial forces.

Iran's history is filled with external threats, from the Arab conquests and Mongol invasions to the Allied occupation during World War Two and the devastating Iran-Iraq War. These experiences underscore the country's strategic vulnerability and the imperative for robust defence capabilities. For decades, Tehran has sought to address these vulnerabilities through creating an "Axis of Resistance" and its missile programme, aiming to deter aggression from adversaries such as the US and Israel.

**Nuclear deterrence serves as a powerful tool in modern geopolitics. It not only bolsters Iran's defensive capabilities but also elevates its status as a regional power, forcing adversaries to think twice before escalating conflicts. The symbolic and strategic weight of nuclear capability cannot be overstated; it provides leverage in negotiations and reinforces Iran's independence in an era of heightened tensions. However, nuclear deterrence must be accompanied by pragmatic diplomacy and a clear-eyed assessment of the regional and global landscape.**

While the "Axis of Resistance" once served as a deterrent, its efficacy has waned due to setbacks in Syria, serious damage to Hezbollah and the West-Israel-Arab bloc's plan to target Iran's allies in Iraq and Yemen. Nuclear deterrence thus emerges as not only a countermeasure against Western threats, but also as a bargaining chip in the global system.

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The unipolar dominance of the US is giving way to a multipolar order, with China and Russia emerging as pivotal actors. For Iran, this transition presents both challenges and opportunities. Aligning with these Eastern powers could provide Tehran with the economic and political support necessary to counter Western pressures.

China, with its burgeoning economic influence, and Russia, with its assertive military and security posture, offer Iran pathways to enhance its regional and international standing. The synergy between Iran's strategic location and its energy resources makes it an indispensable partner in a multipolar world. Leveraging these partnerships could strengthen Iran's hand in navigating the complexities of global politics.

Iran's geopolitical landscape is fraught with challenges, though. From Pan-Turkism and NATO's presence in the South Caucasus, to the rise of the US-backed extremist groups in Central Asia and Afghanistan, Tehran faces a spectrum of security threats.

The Caucasus and Central Asia are also of great importance to Russia due to their strategic location. Given the fragility of the post-USSR Commonwealth of Independent States (CIS) and Caucasus countries, the Western-Israeli bloc is actually pursuing projects to contain Russia, Iran and China in the Caucasus and Central Asia by creating insecurity. Given the fact that Russia is the main player in these regions, cooperation between Tehran, Moscow and Beijing can play an effective role in countering common threats.

**Trilateral efforts in Central Asia could address the threats posed by the growth of extremist groups in Uzbekistan and Tajikistan as well as in Afghanistan, such as the Taliban and ISIS-K, ensuring the security of critical economic projects. Similarly, collaboration with Beijing in the Persian Gulf could counterbalance US and Israeli influence while reinforcing Iran's role as a key energy supplier to China. Such partnerships are not merely tactical; they are strategic investments in Iran's long-term security and prosperity.**

For instance, trilateral efforts in Central Asia could address the threats posed by the growth of extremist groups in Uzbekistan and Tajikistan as well as in Afghanistan, such as the Taliban and ISIS-K, ensuring the security of critical economic projects. Similarly, collaboration with Beijing in the Persian Gulf could counterbalance US and Israeli influence while reinforcing Iran's role as a key energy supplier to China. Such partnerships are not merely tactical; they are strategic investments in Iran's long-term security and prosperity.

This includes efforts to prevent the rise of Middle East regional powers like Iran. Washington's approach, grounded in John Mearsheimer's offensive realism, seeks to activate geopolitical fault lines to destabilise rival nations. From the Ukraine war to tensions in the South China Sea, the US strategy is clear: create insecurity and weaken rivals.

Iran's foreign policy, however, has often faltered in the face of this reality. Attempts to revive

relations with the West, including the now-defunct JCPOA signed in 2015, have yielded limited results. Western powers viewed the JCPOA not as a mutual agreement, but as a disarmament project aimed at curbing Iran's independence. This fundamental clash of visions underscores the futility of relying on Western compromise.

In response, Tehran should logically embrace its strategic alignment with Eastern powers. While not without their limitations, Russia and China are more likely to respect Iran's aspirations for regional leadership. Many Iranians have reached the conclusion that by deepening these alliances, Iran can sidestep the pitfalls of Western negotiations and focus on building a resilient and independent foreign policy.

For Iran, the choices it makes today will shape its role in a rapidly changing world. Yet, this vision requires overcoming internal policy contradictions and the so-called "paradigmatic chaos" that has plagued Tehran's decision-making. A coherent strategy, rooted in realist principles and informed by historical lessons, is essential. By aligning its policies with the realities of a multipolar world, Iran can navigate the complexities of this transitional era with confidence and purpose.

The incoming Trump administration will be faced with two distinct paths: either its policies continue to push Iran toward developing its own nuclear deterrent and forming stronger alliances with China and Russia, or it takes steps to acknowledge and respect Iran's right to exist as a sovereign and influential regional power. Given Iran's current ambivalence in its foreign policy direction, the next Trump administration has a critical opportunity to engage with Tehran constructively. By recognising the complexities and potential flexibility in Iran's global and regional strategies, the US could pursue diplomatic efforts to dissuade Tehran from pursuing a nuclear deterrent or deepening its partnerships with Eastern powers.

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To achieve this, the US would need to reassess the role of Israeli influence in shaping its Iran policy. A more balanced approach would involve addressing Iran's economic challenges and security concerns, as well as its enduring commitment to sovereignty and regional leadership. Such an approach could foster conditions for meaningful dialogue and potentially reshape Iran's strategic trajectory.

*Source: https://www.middleeastmonitor.com/20241219-will-trump-push-iran-towards-nuclear-deterrence-and-the-east-or-open-door-to-diplomacy/, 19 December 2024.*

**OPINION – Tanya Ogilvie-White**

**Toward New High-Level Disarmament Initiative**

On Dec. 10, the Nobel Peace Prize was awarded to Nihon Hidankyo — a group of organizations representing survivors of the August 1945 nuclear bombings on Japan. Known as "hibakusha," these survivors have spent their lives courageously reliving the horror of the atomic bombings of Hiroshima and Nagasaki, telling their stories to anyone brave and wise enough to listen. Their testimonies are heartbreaking and harrowing. They remind us of the full horror of nuclear weapons at a time when reliance on nuclear deterrence is growing — and with it, the prospect that more states will seek to acquire nuclear weapons despite the existential danger they pose.

The timing of Nihon Hidankyo's award is significant. Having been nominated and passed over in 1985, 1994 and 2015, the group's win this year should be a wake-up call to all humanity that nuclear dangers are grave and growing. Hidankyo's

win is a chilling comment on the fact that global disarmament leadership currently relies on the efforts of civil society, including an inspiring but diminishing group of atomic bomb survivors in Japan, who are now older adults. This is extremely disturbing, given that the potential for a conventional conflict to escalate into a nuclear war is widely acknowledged to be growing.

Now more than ever, we need courageous disarmament leadership from the leaders of the nuclear-armed states, who have the power to prevent nuclear war and steer us toward a safer world. That leadership has all but collapsed in recent years, as the international security environment has deteriorated and governments have increasingly looked to nuclear weapons to provide security. The expanding list of missteps is frightening. Nuclear weapons programs are expanding, nuclear arsenals are growing and becoming more potent, the nuclear testing moratorium is wavering, and military technologies, doctrines and postures are changing in ways that make the use of nuclear weapons in conflict more likely. With the world's nuclear-armed states leading the charge, disarmament leadership is being abandoned, and we are racing backward, blindfolded, into a world of extreme, existential risk.

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This crisis in global disarmament leadership goes much deeper than many experts and commentators are willing to admit. Beyond the usual suspects, leaders of states that do not possess nuclear weapons are actively contributing to the problem. Some are openly reneging on their non-nuclear commitments in full knowledge of the damage it will inflict on the nuclear nonproliferation regime. Others are raising the prospect of developing indigenous nuclear weapon capabilities as if they are a cure-all for insecurity without acknowledging the wider proliferation consequences. Still, others are treating nuclear deterrence as if it is a "necessary evil" that cannot or should not be challenged or even questioned. Many of these leaders are complicit in the rapid global backsliding on nonproliferation, arms control and disarmament, helping to feed the permissive environment that is holding us all hostage to nuclear catastrophe.

In contrast, the hibakusha, now old and frail and with limited means, continue to step up, motivated by a shared mission to spare others the terror, suffering and injustice inflicted upon them and their cities in August 1945. They are survivors of the most extreme and excessive violence humanity is capable of inflicting — violence that has grown exponentially in the intervening 80 years. Their experiences could have left them bitter, frozen in fear and feeling hopeless about the future of humanity. Instead, they have recognized the power of the human spirit to bring light into the shadows, even against the greatest odds.

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As the members of Nihon Hidankyo know and advocate, we can create a safer world if we work together, but we cannot continue to rely on nuclear weapons to help us do that. Depending on these weapons for our security is an extremely high-risk strategy, reliant on accurate information and rational decision-making. Yet time and again

(often suddenly and unexpectedly), political leaders engage in rash, self-interested, destabilizing, and even delusional behavior. Also, artificial intelligence is impacting decision-making in ways that are not fully understood and constantly evolving. These sobering realities should lead us to conclude that there are no safe hands for nuclear weapons in today's world — if there ever were.

Like the hibakusha, we need to have our eyes wide open to the full horror of nuclear use. Like them, we should all be demanding genuine, sustained disarmament leadership from those who have the greatest power to reduce and eventually eliminate nuclear dangers. In 2025, the world urgently needs a new, high-level disarmament and security initiative that is led by political leaders and inspired by the spirit of the hibakusha, embracing courage, tenacity and transparency and wholly devoted to creating a world without nuclear weapons. Who will be awarded the Nobel Peace Prize in 2025 and beyond? Political leaders, it is time to step up.

*Source: https://www.koreatimes.co.kr/www/opinion/2024/12/137_389066.html, 25 December 2024.*

**OPINION – Bryan Clark, Dan Patt**

**The Pentagon Must Build Weapons Differently to Mobilize for the Information Age**

The Pentagon's depleted weapons magazines don't look like those of a military preparing to fight China in two years. Facing shortages for training and future contingencies, Washington has constrained weapons shipments to Ukraine. At home, industry is unable to keep up with demand and the changes needed to counter GPS jamming. But the uncomfortable truth is this—today's scarcity is self-imposed.

With their custom components and bespoke integration, the DoD's preferred munitions are more like the artisan products featured on Etsy than the mass-produced weapons that came off assembly lines during World War II. The Arsenal of Democracy turned auto plants into aircraft and bomb factories by designing—or redesigning—military hardware for producibility. To prepare for protracted conflict, the DoD needs to think like a manufacturer and pursue weapons that leverage existing parts and elastic production facilities.

**The Air Force/Defense Innovation Unit Enterprise Test Vehicle (ETV) program shows how modern industrial approaches can enable adaptability at scale. The program designs cruise missiles using modular components and open architectures that decouple software-heavy guidance and sensing systems from physical structures. As a result, ETV can use faster modular production techniques and continuously evolve through software and component updates.**

America has plenty of capacity for the Pentagon to tap. US manufacturing output rose during the last decade, and the $100 billion US electronics contract manufacturing industry already builds complex and competitive products from MRI machines to chip-making equipment. US production of semiconductors—the heart of any new weapon—is growing faster than any other country.

But harnessing US manufacturing capacity demands a different acquisition philosophy. Program officials will need to avoid custom components that create artificial scarcity. Like Dell or General Electric, who maintain quality and control while designing around available commercial parts, the Pentagon needs to build weapons that can evolve with dynamic supply chains. This means moving away from rigidly specified configurations toward continuous testing and qualification processes that enable ongoing evolution.

***Three Programs Illuminate this New Way Forward:*** The Air Force/Defense Innovation Unit Enterprise Test Vehicle (ETV) program shows how modern industrial approaches can enable adaptability at scale. The program designs cruise missiles using modular components and open architectures that decouple software-heavy

guidance and sensing systems from physical structures. As a result, ETV can use faster modular production techniques and continuously evolve through software and component updates.

Two other programs are focused on speed and price by taking advantage of existing components. The Navy's air-launched Multi-mission Affordable Capacity Effector (MACE) is designed to cost under $300,000 per unit at annual production rates of 500-plus while delivering ranges comparable to missiles costing ten times as much. The Navy hopes to achieve these characteristics by taking advantage of existing guidance and control systems, additive manufacturing for rocket motors, and modular designs.

Like MACE, the Air Force's Extended Range Attack Munition (ERAM) program is planning to use available components and modular manufacturing to achieve high production rates. Intended for the tough electromagnetic environment in Ukraine, the Air Force wants ERAM to be adaptable and able to navigate without GPS.

***Acting Like a Manufacturer:*** The normal Pentagon response to munition shortfalls—as urged by many defense analysts—is to try to build more of today's weapons. But this approach is fundamentally flawed. Even adding a whole new production line at best doubles output, while depleting inventories of custom components and creating artificial scarcity. And as we saw in Ukraine, battlefield innovation can make stockpiles of exquisite weapons irrelevant in an instant.

So, instead of continuing to stockpile obsolescence, the DoD should design a complementary family of weapons from the bottom up that could be built at multiple facilities in wartime. Requirements officials will need to prioritize adaptability and production scale over raw performance. Program managers will need to use open architectures that enable continuous evolution as technology and supply chains evolve. Most important, industry will need to create surge-able, mass-producible designs that align with existing manufacturing capacity.

This bottom-up approach takes advantage of America's industrial strengths. The US contract manufacturing base that already produces precision electronics at volumes that dwarf military demands. These companies maintain sophisticated quality control and security protocols and offer elastic capacity that can surge when needed. The foundation they provide for weapons assembly could be complemented by component technologies for software, rocket motors, warhead chemicals, and automated manufacturing and 3D printing for structural elements being pursued by a new generation of US defense startups.

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Critics will argue that tapping into commercial capacity compromises performance or security. But that misses the point. A weapon in hand that can evolve with the fight is infinitely more useful to US troops than an empty missile magazine and an impressive PowerPoint deck.

DoD acquisition officials should take four key actions to implement this new family of weapons. First, they need to remove policy barriers that hinder using commercial components such as outdated or inflexible technical standards. Second, they should accelerate ongoing efforts to digitize and make testing and qualification a streamlined and continuous process instead of a laborious one-time validation. Third, they will need to organize weapons programs to allow building and evolving mission systems from seekers to thrusters independently from physical structures. Finally, they should write contracts to reward a vendor's ability to produce on time and at scale over its ability to meet arbitrary performance targets.

None of these changes need new legislation or

reorganization. They simply require program executives to direct a bottom-up approach driven by available industrial capabilities rather than arbitrary top-down performance specifications. The ERAM, MACE, and ETV programs prove this model can work. What's needed now is the will to fund and scale it.

**Like Freedom's Forge during World War II, US mobilization in the 21st century should rely on fundamental American economic strengths like technological innovation, product adaptability, and market-driven solutions. The Pentagon can field a new generation of weapons that leverage these attributes. The question is whether requirements officials and program managers can start behaving like titans of industry rather than art connoisseurs before it is too late.**

Like Freedom's Forge during World War II, US mobilization in the 21st century should rely on fundamental American economic strengths like technological innovation, product adaptability, and market-driven solutions. The Pentagon can field a new generation of weapons that leverage these attributes. The question is whether requirements officials and program managers can start behaving like titans of industry rather than art connoisseurs before it is too late.

*Source: https://breakingdefense.com/2024/12/the-pentagon-must-build-weapons-differently-to-mobilize-for-the-information-age/, 11 December 2024.*

**OPINION – Shay Khatiri**

**Can NATO Deter Turkish Nuclear Weapons Acquisition?**

Middle Eastern fortunes have changed dramatically over recent months. Iran is down and, especially after the fall of Syrian President Bashar al-Assad, Turkey is up. This may be a net positive for now, but not for long if Turkey's current trajectory continues.

***Michael Rubin Recently Wrote:*** "Too many Western officials and analysts make two basic mistakes when it comes to Turkey. First, they see Turkey as it was, or as they wish it to be, rather than as it is. Two decades of Erdoðanism have transformed the country irreversibly. Second, they believe that because Turkey is not Iran or Russia, it represents a positive force."

**While arms-control attention in the Middle East focuses on Iran, Turkey may operationalize its Akkuyu nuclear plant within months. Turkey has good reasons to pursue nuclear weapons. It fits with Turkey's resurgent imperialism. It is also important for deterrence as Iran nears its own nuclear weaponization.**

While arms-control attention in the Middle East focuses on Iran, Turkey may operationalize its Akkuyu nuclear plant within months. Turkey has good reasons to pursue nuclear weapons. It fits with Turkey's resurgent imperialism. It is also important for deterrence as Iran nears its own nuclear weaponization.

This should worry Israel. Israel has managed its relationship with Turkey over the decades, but a fragile international order, revanchist Turkey, and potential Turkish nuclear armament make the prospects of future such management bleak. Elsewhere, Rubin points out that Israel might have to attack Turkey's nuclear plant. This would complicate Israel's relationship with the United States.

Under Article 5 of the NATO charter, an attack against one member in Europe or North America is an attack against all. Turkey was added as a member later, and so Article 6 added "the territory of Turkey" to NATO's defensive obligations. This means that, because NATO is a U.S.-ratified treaty and its charter is U.S. law, an attack against Turkey is an attack against the United States, and the U.S. government, again, under U.S. law, is required to "assist [Turkey] by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force."

This is further a problem because Israel is not a U.S. treaty ally, and there is no legal obligation to defend it. NATO's collective defense commitment is absolute and does not distinguish between provoked and unprovoked attacks. Rubin suggests a few loopholes. One is cyber sabotage. This would not violate existing NATO practice. Estonia is the victim of the first-ever state-sponsored cyberattack in 2007, and it did not trigger Article 5, nor have many other Russian cyberattacks over the past decade and a half against NATO members. Likewise, covert operations will be outside the bounds of Article 5, as NATO members have tolerated many Russian intelligence operations, including assassinations on European soil. The problem is that, as the Iranian nuclear program case shows, these are good delaying tactics, not permanent fixes.

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Another loophole Rubin mentions is a covert, conventional attack without taking credit for it. This is akin to the attack against the Syrian plant in 2007. Whereas this might legally save Israel from NATO retaliation, at best, it will cause a crisis within NATO. At worst, it will expose its mutual defense clause as optional and hollow.

**On the one hand, Turkey is a disruptive actor inside NATO that nobody likes. On the other hand, Turkey is the key to the Black Sea—which has proven very useful against Russia during the Ukraine War. It is also geographically located between Russia and the Middle East and complicates, if not entirely blocks, Russian access to the region.**

It also could force Turkey out of NATO, which is a double-edged sword. On the one hand, Turkey is a disruptive actor inside NATO that nobody likes. On the other hand, Turkey is the key to the Black Sea—which has proven very useful against Russia during the Ukraine War. It is also geographically located between Russia and the Middle East and complicates, if not entirely blocks, Russian access to the region. This was key in protecting the Middle East from Soviet domination throughout the Cold War.

But as Rubin also points out, Turkey's nuclear ambitions will not be met positively by NATO members, either, especially Greece. All members also have a shared interest in protecting the Nuclear Non-Proliferation Treaty. It is in NATO's best interest to resolve this problem while it can—before Israel must.

It will not be the first time that NATO has gone through an internal crisis over nuclear weapons. During the 1960s and before the Nuclear Non-Proliferation Treaty era, Germany considered developing nuclear weapons. A German nuclear weapon was unacceptable to the United Kingdom and France, but Germany complained that preventing it from acquiring nuclear capability would be a double standard and contrary to NATO's "equals" promise. The crisis brought NATO close to collapse until German Chancellor Konrad Adenauer voluntarily pledged that Germany would never pursue nuclear weapons.

Adenauer and Turkey's Recep Tayyip Erdoðan are more opposites than alike, but what drove the German statesman to make this pledge could likely convince the Turkish strongman too: That the crisis could break NATO with the Russian threat looming.

Erdoðan is a troublemaker within NATO, but he does not trust Russia enough to forgo NATO's protection; he needs NATO more than NATO needs him. If he truly has nuclear ambitions, the best way to end them is from within NATO. This is in the best interest of the institution and its individual members. This includes Turkey, which has an interest in preserving NATO and staying in it to deter the Russian menace.

*Source: https://www.meforum.org/mef-observer/can-nato-deter-turkish-nuclear-weapons-acquisition, 23 December 2024.*

**OPINION – Robert Peters**

## The U.S. Nuclear Infrastructure is Crumbling. There's a Way to Pay for It

For almost 80 years, America's nuclear arsenal has served as the ultimate guarantor of security for ourselves and our allies. But our missile systems are aging and are well past their programmed lifespan. Unless dramatic action is taken—and soon—it won't be long before our adversaries can discount any threat from the U.S. nuclear arsenal.

Our antiquated nuclear deterrent is a relic of the Cold War, with systems desperately in need of replacement. The newest nuclear weapon in the arsenal is over 30 years old. America's Minuteman ICBMs were supposed to be replaced when Ronald Reagan was still president, and the Navy's ballistic missile submarine fleet will soon be overdue for its own retirement.

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The good news: A modernization effort is underway. All of these Cold War-era systems are being replaced—simultaneously—with next-generation missiles, warheads, bombers and submarines. The bad news: It's moving much too slowly if we expect to keep us safe in the years ahead. The next-generation ballistic missile submarine, for example, is years behind schedule. The Department of Energy says that America's nuclear enterprise won't be producing new plutonium pits or warheads at scale until the mid-2030s.

**But the biggest problems are that America's next-generation ICBM, the Sentinel program, is 87% over budget and behind schedule. This is because much of the infrastructure surrounding the rocket—the underground tunnels, the command-and-control systems, the computer systems, the wiring, the missile silos themselves—all need to be replaced, in addition to the missile itself.**

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In short, the United States has to rebuild the infrastructure we put in place during the Cold War. Some have argued that the U.S. should simply "life-extend" the existing ICBM program, but the Air Force has certified that this is no longer technically feasible. Constantly switching out parts from a 1975 Cadillac and hunting for fewer and fewer specialized mechanics over time to keep it running can only last for so long before it's cheaper and better to just buy a new car.

Tragically, the annual congressional appropriations process means the Cadillac is in a garage, slowly rusting. Limited increases in the defense budget have not resulted in additional investment in our nuclear deterrent. For far too long the congressional appropriations process has grown the Pentagon bureaucracy and funded questionable research and development spending that won't help America deter our adversaries or win a war. There is, however, another way. Congress should use the reconciliation process to establish a Triad Infrastructure Modernization Fund (TIMF) to modernize our nuclear weapons and enable America's strategic deterrent for generations to come.

Reconciliation is a special legislative process that bypasses the Senate filibuster and allows simple majorities in both the Senate and House to enact multi-year spending. It can be used to modernize

our nuclear deterrent without having to grow the rest of the federal government. Using reconciliation allows national security leaders in Congress to avoid the "I'll give you more domestic discretionary spending if you give me more defense spending" trade that is so often found in annual spending bills.

What would the TIMF entail? It would pay for nuclear infrastructure modernization such as the construction of missile silos, submarine berths, tunnels, plutonium pit production lines, warhead design and fabrication capabilities, and the nuclear command-and-control centers built during the Cold War. The legislation would put very specific limits on what projects and programs would be funded by TIMF resources—and any projects not directly related to America's nuclear infrastructure would not receive these funds.

**Unlike the annual appropriations bills with short-term time limits, a reconciliation bill for nuclear modernization could be used for up to 10 years after being signed into law. It would enable smart long-term planning and fund $10 billion of infrastructure improvements a year—meaning that over the next decade, the United States would pump $100 billion dollars into nuclear facilities in Georgia, Washington state, South Carolina, New Mexico, Texas and the missile fields of the High Plains.**

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The TIMF would not be a permanent increase to the defense budget. It would not be about throwing money at a problem. It would meet today's needs to maintain America's strategic deterrent without cutting into the military's combat capabilities of the future. It would be a one-time effort that would cover the buy-in cost to build America's strategic deterrent of the 21st century. Given the threats posed by our adversaries in Beijing, Moscow, Tehran, and Pyongyang, America can't afford to live in a world without a credible nuclear deterrent.

*Source: https://www.heritage.org/missile-defense/commentary/the-us-nuclear-infrastructure-crumbling-theres-way-pay-it, 19 December 2024.*

**OPINION – Rui Duarte**

**Trans-Atlantic Security Issue: Russian Use of Tactical Nuclear Weapons in Ukraine**

***Scenario: The Day After Russia Detonates a Tactical Nuke:*** Russia has detonated a tactical nuclear weapon in Ukraine. Current diplomatic and economic efforts have failed to prevent nuclear use by Vladimir Putin and his government. How does the US military respond and prevent subsequent uses in Ukraine? In such a scenario, the DoD must advocate for aggressive actions to counter additional nuclear events in Ukraine. There are several policy choices to consider under this framework. Course of Action (CAO) 1 includes a conventional military response involving kinetic strikes, offensive cyber and space operations, and stationing US troops in Ukraine in a worst-case/second-use situation. COA 2 involves nuclear posturing on one end and employment of a US tactical nuke on the other end of the spectrum. Even in a nuclear scenario,

**COA 2 involves nuclear posturing on one end and employment of a US tactical nuke on the other end of the spectrum. Even in a nuclear scenario, some critics will argue that the US does not need to intervene militarily in Ukraine and the DoD should pursue COA 3: supply more weapons to Ukraine. The challenge for DoD leaders is determining which option will best prevent Putin from employing more tactical nukes.**

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***The Cost/Benefit Analysis for Russia:*** The appropriate policy choice will make clear that the costs of using nuclear weapons outweigh the benefits of continuing to use such weapons. The US is well aware of the Russian Cold War doctrine of "escalate to de-escalate," whereby Russia will threaten or use a nuclear weapon so they can "de-escalate" the situation on Russian terms. From the US perspective, there is no logical benefit for Russia to use nuclear weapons in Ukraine. There is a plethora of issues working against Putin, from the Russian military's inability to fight on a nuclear battlefield, the lack of suitable military targets, and the questionable effectiveness of tactical nuclear weapons. If a nation crosses the nuclear threshold, US military leaders understand that they are in a difficult environment to account for all the various risks. Secretary of Defense Jim Mattis pondered this nuclear scenario during another war gaming exercise during the Trump presidency. General Joseph Dunford, the Joint Chief of Staff Chairman, summarized it best when he stated that it did not matter whether the US thought they could control nuclear war but whether the Russians thought they could. Therefore, Putin's perspective is vital in viewing the costs of a limited nuclear war.

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According to Putin's worldview, Ukraine is an opportunity to achieve his grandiose vision for Russia. Putin does not hide his goal of re-establishing the Russian sphere of influence in Eastern Europe, similar to that of the Soviet Union era. In a ceremony following the annexation of four Ukrainian provinces, Putin declared that Russia was fighting the West to preserve a tremendous thousand-year-old civilization with a common culture, traditions, and religions. The speech went on to assert that Ukraine as a country is a relatively new concept and does not supersede Russian claims going as far back as the Ancient Rus era. Putin's Russia is the Soviet Union by another name and Ukraine is its subjugated province. This outlook is unsurprising to Ukrainians and why they fought so hard to secure security agreements from the West after the Cold War when Soviet nuclear weapons were on Ukrainian soil. Despite their efforts, the eventual Budapest Memorandum (1994) failed to secure any lasting guarantees. The first Ukraine president, Leonid Kravchuk, commented on the reality, "If tomorrow Russia goes into Crimea, no one will even raise an eyebrow." This eerie prediction was close to the reality for Crimea twenty years later.

**Putin's Russia is the Soviet Union by another name and Ukraine is its subjugated province. This outlook is unsurprising to Ukrainians and why they fought so hard to secure security agreements from the West after the Cold War when Soviet nuclear weapons were on Ukrainian soil. Despite their efforts, the eventual Budapest Memorandum (1994) failed to secure any lasting guarantees.**

Putin would view a cautious US response to Russian tactical nukes as a weakness given the lack of geopolitical costs for the Crimean invasion. When Russia annexed Crimea in March 2014, the US answered with "mild" economic sanctions. When Putin funded an insurgency in Eastern Ukraine several months later, the NATO seemed uninterested in helping Ukraine with either arms or troops. To Putin, such a weak international response to Crimea was a rousing success for Russia with few noticeable costs. As a result, Putin expected this non-confrontational stance by the US and Europe would continue. Ukrainian forces

proved no match militarily for Russia and the ease of the Crimean operation and the early fighting in the Donbas led Putin to believe that Ukraine was a weak state with an inept military. Crimea led to assumptions that Ukraine itself could be taken quickly without much cost. Indeed Putin claimed Russia could conquer Kiev through conventional means within a few weeks as far back as 2014. These assumptions would likely persist in a nuclear scenario in Ukraine. Putin would still believe the US would back down and international support for Ukraine would eventually dissipate. To Putin, Crimea became the rule rather than the exception as far as the West's response. Therefore, to convince Putin otherwise, the US needs aggressive military options to cause Putin to re-evaluate his assumptions regarding tactical nuclear war. One such option is a conventional military approach.

***Course of Action (COA) 1: The Conventional Response:*** The first option to counter Russia is a conventional attack against military targets. In a simulated war game during President Obama's presidency, such a nuclear scenario involving Russia was played out with the National Security Counsel. The Deputies Committee recommended a conventional response mixed with diplomatic efforts to isolate and weaken the Putin regime in response to a hypnotical nuclear attack on the Baltic States. The thinking went that if a nation responded to a nuclear strike with its own nuclear attack, all political advantage gained from Russia breaking the nuclear taboo would be lost. Under the proposed conventional approach, US forces could strike Russian military forces directly involved in the tactical nuclear strike or strategic military targets such as the Black Sea Fleet in Crimea. With such a response, there would be clear and immediate action for using nuclear weapons on the battlefield. The military response would also stretch into other military domains to increase the punishments on Russia.

**If the initial conventional measures fail and Putin were to violate the nuclear threshold once again, the US should introduce US troops into Ukraine. Experts have surmised that if Putin used a tactical nuclear weapon to freeze the conflict and preserve military gains, it would take several of these tactical weapons to achieve the objective.**

To disrupt Russian communications and supply chains, a conventional military response would stretch across multiple domains, including cyber and space capabilities. Both cyber and space domains have immediate impacts with wide-ranging repercussions, such as degrading key nodes of civilian infrastructure or transportation. The space domain specifically could impact satellite communications and the sensor-to-shooter kill chain (i.e. targeting). All these effects could reasonably distress the Russian supply chain to the Ukrainian front lines and reduce Russian military capabilities. In an ideal situation, space and cyber capabilities could delay Russia's ability to employ another tactical nuke and introduce unexpected costs to the Russian military and economy. However, no plan is fool-proof and the US needs to devise a backup plan in case these conventional measures are not enough.

If the initial conventional measures fail and Putin were to violate the nuclear threshold once again, the US should introduce US troops into Ukraine. Experts have surmised that if Putin used a tactical nuclear weapon to freeze the conflict and preserve military gains, it would take several of these tactical weapons to achieve the objective. If conventional strikes or cyber/space operations were not enough to dissuade Putin, possible confrontations between Russian and US troops might be necessary to prevent a subsequent tactical nuclear attack. Though the risks sound unreasonable, if the US were to chance striking Russian military targets, stationing US troops in Ukraine would not be such a leap in escalation. US troops in Ukraine would increase the risk calculus for Putin and visibly reinforce American long-term commitment to the conflict. As the former Polish Foreign Minister Radoslaw Sikorski once said in 2010, "Everyone agrees that countries that have US soldiers on their territory do not get invaded." Although the conventional option provides a robust DoD response with several

options, it will have its critics.

The primary objection to the conventional plan will be stationing US troops in Ukraine with an unknown timeline. Critics will ask how long US troops will be committed to Ukraine and the exact mission for the DoD? This approach would violate the Weinberger Doctrine, which calls for defined military objectives and an outcome the military can clearly "win." Will this situation be reminiscent of the quagmire in Afghanistan or, worse, Lebanon? Though US public support for Ukraine is currently high, US domestic support cannot be counted on long-term. Opinion polls in late 2022 are beginning to show declining support for the vast financial commitment to the ongoing conflict. As a result, DoD leadership needs to contemplate the impacts of such an open-ended commitment to Ukraine under this conventional response.

From the nuclear deterrence perspective, conventional approaches may, in fact, weaken the overall national security picture. During the Obama war game, the Principals committee advocated a nuclear strike against Belarus, a Russian ally, to signal American resolve and commitment to NATO. The Baltic states are under an extended nuclear umbrella, whereby the US has the right to respond with nuclear weapons. Ukraine is not in NATO, and the US does not need to meet Russian attacks with all available means. Nevertheless, such hesitation could signal that the US nuclear deterrence posture depends on American self-interest vice upholding the international order. Likewise, a non-nuclear response could embolden Putin and strengthen his assumptions regarding the West's resolve. Realistically, a strategic nuclear response against Russia or its allies would be a non-starter for the Biden administration, given that the proponents of the conventional response during the Obama war game are currently serving key roles in Biden administration, including Avril Haines, the Director of National Intelligence. So what is a realistic nuclear option?

**NATO cannot deploy nuclear weapons to new members after the NATO-Russia Founding Act (1997). However, Ukraine is not a part of NATO and does not fall under such restrictions, so the US could position its tactical nukes in Ukraine. This action would visibly reinforce American commitment and meet Russian tactical employment with the threat of a similar US response. Unfortunately, this tactic might be of limited utility given that Russia has a ten-to-one advantage in tactical nuclear weapons according to open-source figures (2,000 vs. 200 tactical nukes for US/NATO). Unlike strategic nuclear weapons, the START does not regulate tactical nukes nor any current arms control agreements, which Russia has exploited to its advantage.**

***COA 2: The Nuclear Option:*** A second option involves US tactical nuclear weapons. On the lower end of the escalation scale, the US could pursue military posturing by forward deploying tactical nukes closer to the Russian border, even stationing them in Ukraine. NATO cannot deploy nuclear weapons to new members after the NATO-Russia Founding Act (1997). However, Ukraine is not a part of NATO and does not fall under such restrictions, so the US could position its tactical nukes in Ukraine. This action would visibly reinforce American commitment and meet Russian tactical employment with the threat of a similar US response.

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On the highest end of the escalation scale, the US could use a tactical nuclear weapon to respond to a second Russian tactical nuke. In early Cold War planning, the US would use tactical nukes to slow down a conventional Russian invasion in Eastern Europe. Today, the roles are reversed, and Russia is looking to use tactical nukes to slow a

conventional US/NATO response. Despite the role reversal, the US views tactical nukes as an outdated weapons system. According to US Air Force General John Hyten, the former STRATCOM commander responsible for the DoD nuclear mission, tactical nuclear weapons is a misnomer, and there is essentially no difference between a tactical nuclear weapon and a strategic one in terms of danger. If an enemy were to employ a nuclear weapon against the US, the US should respond with strategic weapons. Despite Hyten's perspective, it is unlikely the Biden administration would pursue such a heavy-handed approach. Per the 2022 Nuclear Product Review, the US objective is to "seek the lowest damage possible" for the best outcome for the US and its Allies. A tactical weapon with its lower yield might be a compromise for US military leaders looking to balance an overt response to Russian actions with potential escalatory consequences.

Like COA 1, the tactical nuclear option has several risks. For one, any tactical nuclear strike will have long-lasting radioactivity associated with its employment. Even a nuclear yield equal to one percent of the Hiroshima bomb would create radioactive debris leading to "intense and deadly fallout. Given the impact, how would planners pick a suitable military target? Locations inside Ukraine may be off the table in addition to targets near NATO territories since this fallout could spread through the weather. Targets inside Russia could quickly escalate up the nuclear ladder. In contrast, strikes on Russian allies, such as Belarus, could punish countries not associated with the fighting while doing little to dissuade the Putin regime.

In addition, the US risks dividing NATO allies by employing a tactical nuclear weapon on the battlefield. Per NATO's own 2022 Strategic Concept, NATO "does not seek confrontation and poses no threat to the Russian Federation." A tactical nuke would go against this proclamation. Least of all, previous versions of NATO's strategic concept included a vision of a "nuclear weapons-free world," with domestic audiences within Germany, the Netherlands, and Belgium having strong anti-nuclear views. Consequently, employing tactical nukes may divide NATO members and dampen diplomatic pressure on Russia. Critics of an aggressive approach will focus on these diplomatic avenues and recommend a third option for the DoD: a logistical support role.

***COA 3: The Logistical Approach:*** Some critics will argue against any aggressive military actions by the DoD, advocating instead for a logistical role. In 2022 alone, the US provided over $45 billion in military, financial, and humanitarian support, dwarfing all other foreign aid. The US should continue on this path and increase supplies to Ukraine, including previously denied equipment, such as modern battle tanks and longer-range missile systems. Ukraine has successfully prevented Putin from achieving his objectives so far, and the Ukrainians can continue this fight with the right supplies. Ukrainian President Zelensky echoed this sentiment and Winston Churchill by going before the US Congress and saying, "Give us the tools and we will finish the job." Nuclear war will quickly escalate out of control, so the logistical approach may be the pragmatic answer to minimizing nuclear risk. The indirect DoD role allows for greater flexibility in the diplomatic arena, encouraging harsher sanctions and a broader coalition against Russia. China and India have yet to condemn the Russian invasion of Ukraine despite a recent joint statement from a "majority" of the G-20 to condemn Russian rhetoric related to nuclear warfare in November 2022. A logistical approach may open diplomatic inroads to these important world players and affect the strength of additional sanctions.

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Despite these advantages, the logistical approach is overly cautious and may not prevent Putin from employing more nuclear weapons, leading to a greater humanitarian crisis in Ukraine. Putin has a history of endorsing tactical nuclear weapons as far back as his time in the Kremlin Security

Council under President Yeltsin. If Putin were desperate enough to use nuclear weapons once, he would continue to use them to achieve his objectives. Russia, with no restraints, can quickly go from targeting Ukrainian military units to Ukrainian population centers. The US cannot take a hands-off approach in a nuclear scenario since nuclear weapons will eventually pull the US into conflict. As noted in an editorial by former National Security Advisor Condoleezza Rice, and former Secretary of Defense Robert Gates, the lessons of the 20th century and world wars are clear: if one nation is allowed to violate the international order unchecked, the US own security will be in danger and be forced to respond. If Putin uses nukes, the US and its allies would need to respond militarily, given the threat to the post-World War II international order and US national security interests. Better to take immediate, aggressive military action to quell this danger vice allowing it to grow to a larger existential threat impacting all of Europe.

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***Recommendation:*** Given the three previous COAs, COA 1 provides the best response to meet a Russian tactical nuclear strike in Ukraine. This option visibly costs Putin and his military forces while also signaling long-term American commitment to allies in the region. A nuclear nation cannot simply impose its will on a non-nuclear nation. If such a situation were allowed to stand, nothing would prevent other nations from following suit, such as North Korea. If the DoD were to pursue COA 2, the US would risk normalizing tactical nukes and chipping away at the nuclear deterrence strategy. COA 3 delays the eventual US involvement and allows Russia time to commit untold atrocities before US action.

It is worthwhile to remember Senator John McCain's predictions following Russia's invasion of Crimea. During a 2014 BBC interview, McCain predicted that Russia would invade Eastern Ukraine and attempt to form a land bridge to Crimea because the US and Europe were unwilling to stand up to Putin. Putin viewed caution as weakness. Given the Crimea experience, the US needs to stand up to Putin's actions since inaction would be far worse for the US and the international order. A world without an aggressive US response would be one where anyone with a nuclear weapon could blackmail the globe.

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*Source: https://faoajournal.substack.com/p/trans-atlantic-security-issue-russian?utm_ campaign=post&utm_medium=web, 19 December 2024.*

## NUCLEAR STRATEGY

### USA–JAPAN

### Japan, US to Communicate on Possible Use of Nuclear Weapons

Establishing such an operational framework is aimed at strengthening the U.S. nuclear umbrella that protects Japan and enhancing its deterrence capabilities against North Korea and China.

Japan and the United States will communicate regarding Washington's possible use of nuclear weapons in the event of a contingency, the two governments have stipulated in their first-ever guidelines for so-called extended deterrence, The Yomiuri Shimbun has learned.

According to Japanese government sources, Japan will convey its requests to the United States via the Alliance Coordination Mechanism (ACM), through which the Self-Defense Forces and U.S. forces maintain contact with each other. Establishing such an operational framework is aimed at strengthening the U.S. nuclear umbrella that protects Japan and enhancing its deterrence capabilities against North Korea and China.

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***Against North Korea, China:***

The Foreign Ministry announced the formulation of the guidelines Friday but had not disclosed the details, as they contain classified military intelligence. The U.S. president, who is also the commander in chief of U.S. forces, has the sole authority to authorize a nuclear attack. Before the completion of the guidelines, no written statement existed that said Japan was allowed to pass on its views to the United States regarding Washington's possible use of nuclear weapons.

Extended deterrence is a security policy aimed at preventing a third country from attacking an ally by demonstrating a commitment to retaliate not only in the event of an armed attack on one's own country, but also in the event of an attack on an ally.

...Under the ACM, discussions are designed to take place both by the Alliance Coordination Group, comprising director general-level officials of the diplomatic and defense authorities, and by the Bilateral Operations Coordination Center, involving senior officials of the SDF and U.S. forces. If necessary, high-level discussions involving Cabinet members are also expected to be held. This system will enable Japan to convey its views to the United States on Washington's potential use of nuclear weapons at all stages, from normal times to contingencies.

**The environment surrounding nuclear weapons is deteriorating. Russia has hinted at the possibility of using nuclear weapons in its ongoing aggression against Ukraine. In East Asia, North Korea conducted its sixth nuclear test in 2017 and has greatly improved its ballistic missile capabilities. China is expected to possess more than 1,000 operational nuclear warheads by 2030. Prime Minister Shigeru Ishiba said at a plenary session of the House of Councillors on Dec. 3 that he had instructed relevant secretariats to strengthen even further the credibility of the extended U.S. deterrence.**

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that the guidelines "have great significance as a message of strengthening deterrence."

*Source: https://asianews.network/japan-us-to-communicate-on-possible-use-of-nuclear-weapons/, 30 December 2024.*

## BALLISTIC MISSILE DEFENCE

### PAKISTAN

### Pakistan Advancing Missile Program Capable of Reaching US

A senior White House official claimed on Thursday that Pakistan, a nuclear-armed nation, is advancing its long-range ballistic missile program, which could potentially enable it to reach targets beyond South Asia, including the United States.

**Deputy National Security Adviser Jon Finer said Islamabad's conduct raised "real questions" about its intentions. "Candidly, it's hard for us to see Pakistan's actions as anything other than an emerging threat to the United States," Finer said in a speech to the Carnegie Endowment for International Peace.**

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Pakistan's foreign ministry warned in a statement that the sanctions "have dangerous implications for strategic stability of our region and beyond." It also cast doubt on U.S. allegations that targeted businesses were involved in weapons proliferation because previous sanctions "were based on mere doubts and suspicion without any evidence whatsoever." It also accused the U.S. of "double standards" for waiving licensing requirements for advanced military technology to other countries.

The sanctions freeze any U.S. property belonging to the targeted businesses and bar Americans from doing business with them. The U.S. State Department said one such sanctioned entity, the Islamabad-based National Development Complex, worked to acquire items for developing Pakistan's long-range ballistic missile program including the SHAHEEN series of ballistic missiles. The other sanctioned entities are Akhtar and Sons Private Limited, Affiliates International and Rockside Enterprise.

... The latest U.S. sanctions came months after similar measures were slapped on other foreign entities, including a Chinese research institute after the U.S. State Department accused them of working for the National Development Complex, which it says was involved in the development and production of Pakistan's long-range ballistic missiles. ...

*Source: https://www.dailysabah.com/world/asia-pacific/pakistan-advancing-missile-program-capable-of-reaching-us, 19 December 2024.*

### RUSSIA

### Russia Expands Strategic Nuclear Arsenal with Avangard Hypersonic Missile Deployment

On December 18, 2024, the Russian Strategic Missile Forces (SMF) completed the re-equipment of a division with the Avangard hypersonic glide vehicles, further enhancing Russia's nuclear deterrent and reinforcing the growing importance of hypersonic technologies in its defense strategy. This deployment, taking place in the Orenburg region near the Russian-Kazakh border, marks another milestone in the operational expansion of one of Russia's most advanced weapons systems.

The Avangard hypersonic missile was first introduced to the Russian military in December 2019 with the 13th Red Banner Rocket Division, and by 2021, this unit had achieved full operational capability. A second unit went on

combat alert by mid-2022, and now, the Orenburg division has joined the ranks, solidifying the Avangard's role in Russia's nuclear strike capabilities.

**The Avangard is a cutting-edge hypersonic glide vehicle (HGV) designed to be launched atop a ballistic missile. It represents a major leap forward in Russia's ability to penetrate missile defense systems and strike high-value targets with immense speed and precision. One of the most remarkable aspects of the Avangard is its ability to travel at speeds exceeding Mach 20 — roughly 6.28 km per second — after being boosted into suborbital flight.**

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**As a boost-glide weapon, the Avangard is carried to its suborbital apogee by a ballistic missile. Currently, this is the SS-19 "Stiletto" (UR-100NUTTH), though plans are in place to transition to the more powerful RS-28 "Sarmat" ICBM in the future. The RS-28 "Sarmat" will replace the SS-19 as the Avangard's primary delivery system, providing increased range, payload capacity, and overall capability.**

In terms of technical specifications, the Avangard boasts a range of over 6,000 km, with a weight of approximately 2,000 kg. The vehicle can carry both nuclear and conventional payloads, with the nuclear warhead reportedly capable of yielding more than 2 megatons of TNT equivalent — a staggering amount of destructive power. This versatility allows the Avangard to be employed in a variety of strategic contexts, from high-yield nuclear strikes to more conventional targets requiring precision.

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Once boosted to its apogee at around 100 km in altitude, the Avangard separates from its rocket carrier and begins its glide towards its target. This separation occurs in the vacuum of space, allowing the glide vehicle to re-enter the atmosphere and continue its descent with atmospheric speeds exceeding Mach 20. During this phase, the Avangard remains highly maneuverable, using its aerodynamic features to shift its trajectory and evade interception. As Russia's President Vladimir Putin revealed in a 2018 speech, the Avangard's ability to maneuver at hypersonic speeds gives it an unpredictable flight path, making it especially difficult for missile defense systems to track and engage during its descent.

Though no publicly available images of the Avangard exist, reports suggest that it likely features a short, wedge-shaped design or possibly a shuttle-like configuration with small stabilizer wings. The HGV itself likely does not

rely on any propulsion system after separation from its carrier missile, instead using gravity and aerodynamic forces to maintain its speed and altitude. This design minimizes the complexity of the system and ensures that the vehicle remains as fast and efficient as possible while still retaining the ability to maneuver in flight.

The operational capabilities of the Avangard present significant challenges for missile defense systems, particularly those developed by NATO and the United States. The vehicle's combination of high speed, maneuverability, and range makes it an effective counter to current missile defense technologies, which are designed to intercept traditional ballistic missiles that follow predictable, high-arc trajectories. Hypersonic glide vehicles like the Avangard, with their unpredictable flight paths and speeds, complicate attempts to intercept or destroy them before they reach their targets.

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The threat posed by the Avangard is serious for the United States and Europe. The glide vehicle's ability to carry up to a 2-megaton nuclear warhead provides Russia with a highly effective means of delivering devastating strikes to multiple targets simultaneously, potentially overwhelming missile defense systems. Each large Russian intercontinental ballistic missile (ICBM) can carry up to 12 Avangard warheads, allowing for a strike on 12 separate locations, all with the potential for thermonuclear destruction. This significantly enhances Russia's strategic capabilities and raises the stakes in the nuclear arms race.

Furthermore, the deployment of such advanced weapons systems by Russia increases the pressure on NATO and the U.S. to develop countermeasures that can neutralize hypersonic threats. While current missile defense systems can intercept traditional ICBMs, they are less equipped to deal with the unpredictability and extreme speed of hypersonic glide vehicles. This technological gap presents a potential vulnerability, particularly if Russia continues to expand its arsenal of hypersonic weapons, forcing the West to accelerate its own research into counter-hypersonic technologies.

The Avangard's deployment, alongside other Russian strategic systems like the Sarmat ICBM and Poseidon underwater drone, indicates a deliberate move by Moscow to ensure the survivability of its nuclear deterrent in the face of emerging missile defense technologies. For Russia, the Avangard is a tool of both defense and power projection, designed not only to counter U.S. missile defense systems but also to reinforce its nuclear deterrent in an increasingly multipolar global security environment.

**The Avangard hypersonic glide vehicle represents a significant advancement in Russia's military capabilities. With its long range, high speed, and ability to carry massive nuclear payloads, the Avangard poses a formidable challenge to missile defense systems in both the U.S. and Europe. As Russia continues to modernize its nuclear arsenal, the Avangard's role as a primary component of its strategic deterrence posture is set to grow, while the implications for global arms control and missile defense systems will likely shape future military and diplomatic strategies worldwide.**

In conclusion, the Avangard hypersonic glide vehicle represents a significant advancement in Russia's military capabilities. With its long range, high speed, and ability to carry massive nuclear payloads, the Avangard poses a formidable challenge to missile defense systems in both the U.S. and Europe. As Russia continues to modernize its nuclear arsenal, the Avangard's role as a primary component of its strategic

deterrence posture is set to grow, while the implications for global arms control and missile defense systems will likely shape future military and diplomatic strategies worldwide.

*Source: https://armyrecognition.com/news/army-news/army-news-2024/russia-expands-strategic-nuclear-arsenal-with-avangard-hypersonic-missile-deployment, 24 December 2024.*

## EMERGING TECHNOLOGIES AND DETERRENCE

### INDIA–INDONESIA

### Indonesia Explores BrahMos Technology Collaboration with India

Indonesia is exploring cooperation with India on defense technology, including on the BrahMos cruise missile. Additional areas of cooperation include joint exercises, ship development, and joint maritime security operations, Indonesian Defense Minister Sjafrie Sjamsoeddin said after a meeting with visiting Indian Navy Chief Admiral Dinesh K Tripathi. "India is ready to participate in the Multilateral Naval Exercise Komodo 2025 in Bali and supports the plan for joint patrols in the Straits of Malacca," Sjamsoeddin said on X. "Collaboration on advanced technologies such as BrahMos is also in the spotlight, as well as an opportunity for Indonesia to learn and develop."

**Jakarta has been considering acquiring the supersonic missile for the last few years but consideration of a collaboration on its technology is a first. It comes as the defense minister acknowledged India's strides in the development of domestic defense technology in recent years.**

***Defense Collaboration with India***: Jakarta has been considering acquiring the supersonic missile for the last few years but consideration of a collaboration on its technology is a first. It comes as the defense minister acknowledged India's strides in the development of domestic defense technology in recent years. In addition to BrahMos, the South Asian country has developed and produced indigenous platforms for both domestic needs and exports such as artillery, multi-barrel rocket launchers, and air defense systems. With that, it is attempting to position itself as a more cost-effective alternative to Western platforms. ...

*Source: https://thedefensepost.com/2024/12/23/indonesia-brahmos-technology-india/, 23 December 2024*

### USA

### US Armed Forces Test Dark Eagle Hypersonic Missile at Mach 5 Speeds

The U.S. military has successfully tested its Long-Range Hypersonic Weapon (LRHW), moving closer to fielding advanced hypersonic technology. The test, conducted at Cape Canaveral Space Force Station in Florida, demonstrated the missile's ability to exceed speeds of 3,800 miles per hour, more than five times the speed of sound, and strike distant targets.

**Hypersonic weapons are considered critical for modern battlefields, combining speed, range and maneuverability to target well-defended or time-sensitive objectives. However, critics question their high production costs and potential to escalate tensions with adversaries such as China and Russia, which are also advancing their hypersonic programs. The U.S. military emphasized the importance of continued testing and evaluation to ensure the system's safety and effectiveness.**

Officials described the event as a significant milestone in making the weapon combat-ready. The hypersonic system, also known as "Dark Eagle," is part of a joint effort by the Army and Navy. Designed to counter emerging threats, the system can outpace and outmaneuver traditional defenses. The Navy plans to deploy the LRHW on Zumwalt-class destroyers and submarines, while the Army prepares for its operational debut by 2025.

The test included the missile's ground-based launcher and operations center, marking the first live-fire trial of its complete system. Previous tests have focused on individual components or simulated scenarios. This latest success builds on earlier trials, including a June 2024 test in Hawaii. Hypersonic weapons are considered critical for modern battlefields, combining speed, range and maneuverability to target well-defended or time-sensitive objectives. However, critics question their high production costs and potential to escalate tensions with adversaries such as China and Russia, which are also advancing their hypersonic programs. The U.S. military emphasized the importance of continued testing and evaluation to ensure the system's safety and effectiveness. With this technology, commanders aim to enhance deterrence and precision targeting in an evolving global threat environment.

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*Source: https://san.com/cc/us-armed-forces-test-dark-eagle-hypersonic-missile-at-mach-5-speeds/ , 13 December 2024.*

## NUCLEAR ENERGY

### ARGENTINA

### Argentina Aims to be Nuclear Pioneer, President Milei Says

The president, standing between his chief adviser Demian Reidel, who will oversee a new nuclear programme, and IAEA Director General Grossi, said "we are contemporaries of a true technological revolution ... the development of artificial intelligence opens a new frontier for this manifest destiny that we share as a species" but "many of the free nations that have always been at the forefront of technological development are now afraid of innovation and punish the technological sector with taxes and regulations". Argentina by contrast was "removing the regulations that have tied the hands of our people for decades and inviting the world's big capitals to cooperate with Argentina".

He added: "The potential for development in artificial intelligence is so immense that conventional energy will not be enough to supply this new demand, which is why we are convinced that a resurgence of nuclear energy will occur throughout the world, because despite the countless campaigns of discredit that some international foundations have mounted, nuclear energy is the only source that is sufficiently efficient, abundant and rapidly scalable to cope with the development of our civilisation.

**So, after decades of decline, nuclear energy will make its triumphant return and we will not only not be left behind, but we intend to be pioneers." The outline of the plan announced, according to various reports, is initially for the construction of a small modular reactor on the Atucha site.**

"So, after decades of decline, nuclear energy will make its triumphant return and we will not only not be left behind, but we intend to be pioneers." The outline of the plan announced, according to various reports, is initially for the construction of a small modular reactor on the Atucha site. According to the *Financial Times*, Reidel said the plan was to use Argentine technology, developed by its nuclear engineers, but with funding from a US investor joining a joint venture with Invap, with the goal of having a first plant online by 2030. No mention was made during the announcement

about the existing Argentine SMR project, the CAREM-25.

The second stage of the government's nuclear plan is reported to be to develop uranium reserves to cover domestic demand and position the country as an exporter of high-value-added fuel elements. Grossi said that the IAEA had signed a memorandum of understanding agreement with Argentina following the announcement, which aimed to expand their collaboration on small modular reactors "to meet the energy demands of data centres and AI applications".

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***The Background:*** Argentina currently has three operable nuclear power units – Atucha 1, connected in 1974, Atucha 2, which was connected in 2014 and Embalse which was connected to the grid in 1983. Between them they generate about 5% of the country's electricity. There have been plans for a fourth unit, as Atucha III, with an EPC contract signed with China's CNNC in February 2022. It is unclear what the current status is of this project and whether it will be part of the nuclear programme.

**The CAREM SMR - the name comes from Central Argentina de Elementos Modulares - is a 32 MWe prototype and is Argentina's first domestically designed and developed nuclear power unit. First concrete was poured in 2014, but construction has since been suspended a number of times. It is currently estimated to be about two thirds complete, and a Critical Design Review was ordered for it in May this year with reported uncertainty over funding.**

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*Source: https://www.world-nuclear-news.org/articles/argentina-aims-to-pioneer-new-nuclear-president-milei-says, 23 December 2024.*

**INDIA**

**Land Allocation Key to Kerala Securing its First Nuclear Power Station**

Kerala may be in line to host a nuclear power station if land for the project is made available, as discussed in a high-level meeting between Union Power Minister Manohar Lal Khattar and Kerala's Power Minister K Krishnankutty. The discussions, held in Thiruvananthapuram, focused on Kerala's energy needs, including renewable energy, power distribution, and capacity addition. Union Minister Khattar urged the state to identify and allocate a suitable site for a nuclear project, emphasising its potential to enhance Kerala's energy infrastructure. The meeting also included Union Minister of State for Petroleum and Natural Gas and Tourism Suresh Gopi, along with senior officials from the state and central governments.

... Currently, India operates 22 nuclear reactors across seven plants, with a total installed capacity of 6,780 MW. The central government aims to expand nuclear power capacity to 63,000 MW by 2032, aligning with its push for sustainable energy solutions. This potential project could mark Kerala's entry into nuclear energy, offering a significant boost to its power capabilities and aligning with India's broader energy goals. Whether the state will move forward depends on its ability to meet the prerequisites for hosting such a transformative initiative.

*Source: https://www. manufacturingtodayindia.com/land-allocation-key-to-kerala-securing-nuclear-power-station, 25 December 2024.*

## SMALL MODULAR REACTORS

### SOUTH KOREA

### HD Hyundai Teams Up with TerraPower to Develop Core Equipment for SMRs

HD Hyundai has officially partnered with TerraPower, a US-based company, to develop key components for SMR. The HD Hyundai announced that it recently secured a project from TerraPower to manufacture cylindrical reactor vessels. The reactor vessel in this project will be integrated into TerraPower's Natrium, a 345 MW 4th-generation Sodium Fast Reactor (SFR), which is planned for installation in Kemmerer, Wyoming, USA. The SFR, being jointly developed by HD Hyundai and TerraPower, is a type of SMR. The reactor vessel is a critical component of the SFR, containing the reactor core where nuclear fission occurs and ensuring the safe operation of the high-temperature, low-pressure coolant.

**The SFR generates electricity by using high-speed neutrons for nuclear fission and cooling the resulting heat with liquid sodium instead of water. Among SMRs, it is noted for its high safety and advanced technology, with nuclear waste volumes only one-twentieth of conventional reactors, making it the most promising next-generation SMR. The Natrium project aims for completion by 2030 after obtaining construction and operational permits from the U.S. Nuclear Regulatory Commission (NRC).**

To successfully execute this project, HD Hyundai Heavy Industries, a shipbuilding affiliate of HD Hyundai, plans to actively leverage its accumulated expertise. This expertise comes from its participation in the development and production of key equipment, including vacuum vessels, for the ITER and Korean Superconducting Tokamak Advanced Research (KSTAR).

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Globally, interest and demand for nuclear power, a carbon-free energy source, are growing to achieve carbon neutrality and enhance energy security. As the limitations of large-scale nuclear plants, such as safety concerns and public acceptance, become more evident, the global nuclear market is expected to shift toward SMR-centric.

According to SMR market report by global research firm MarketsandMarkets, the global SMR market is projected to grow from $5.7 billion in 2022 to $6.8 billion by 2030, with an average annual growth rate of 2.3%. "SMR has significant growth potential in the global decarbonization trend," said an official of HD Hyundai. "Leveraging the expertise and capabilities built through projects such as ITER and KSTAR, we aim to lead the SMR sector, emerging as a next-generation power source."

**Meanwhile, in March, HD Hyundai has played a leading role in co-founding the world's first international private organization in the field of offshore nuclear power, the Nuclear Energy Marine Organization (NEMO). Since February, the company has also been conducting joint research on SMRs with leading global nuclear power companies.**

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*Source: https://www.prnewswire.com/news-releases/hd-hyundai-teams-up-with-terrapower-*

*to-develop-core-equipment-for-smrs-302337043.html, 20 December 2024.*

## NUCLEAR COOPERATION

### USA–BELGIUM

### Westinghouse Signs Agreement to Diversify Fuel Supply for Bulgarian Plant

The company has signed a contract with Kozloduy Nuclear Power Plant to conduct safety analysis for licensing a new nuclear fuel assembly design for Kozloduy unit 6. The agreement, which was signed in the presence of Bulgarian Energy Minister Vladimir Malinov, follows the delivery of the first reload of Westinghouse-supplied VVER-1000 fuel assemblies to unit 5 at the plant earlier this year.

"The signing of the contract with Westinghouse marks a new key step in our consistent efforts to diversify nuclear fuel supplies for the Kozloduy NPP," Malinov said, describing the partnership between Kozloduy NPP and Westinghouse as a guarantee of Bulgarian energy security: "Thanks to the fruitful cooperation with our American partners, we have achieved tremendous progress in our common goal - to make Bulgaria's energy sector independent."

**Kozloduy 5 and 6 are Russian-designed and supplied VVER-1000 units that were connected to the grid in 1987 and 1991, respectively. Both units have been through refurbishment and life-extension programmes and together generate about one-third of Bulgaria's electricity. Two Westinghouse AP1000 units are also planned for the site, aiming to come into operation in the latter half of the 2030s.**

In November 2022 Bulgaria's National Assembly voted to accelerate the process of securing an alternative to Russia as supplier of nuclear fuel for the VVER-1000 units. The following month, Kozloduy NPP signed a 10-year contract with Westinghouse to fabricate and deliver VVER-1000 nuclear fuel for Kozloduy unit 5 from Westinghouse's fabrication site in Västerås, Sweden. The first fuel supplied under that contract was loaded into the reactor earlier this year. Westinghouse said the nuclear fuel licensing for unit 6 will meet the rigorous requirements of the Bulgarian Nuclear Regulator, executing a Lead Test Assemblies Licensing Programme. ...

*Source: https://www.world-nuclear-news.org/articles/westinghouse-signs-agreement-to-diversify-fuel-supply-for-bulgarian-plant, 23 December 2024.*

### USA–SINGAPORE

### U.S.-Singapore Nuclear Pact Now in Effect

**This agreement enables deeper nuclear cooperation, consistent with the highest international standards of safety, security, and nonproliferation, and builds on our existing strong bilateral partnership. Cooperation opens new opportunities for exploring advanced clean energy options, ensuring regional security and safety, and complements existing collaborations on clean energy, climate change, and energy security.**

The Agreement for Cooperation Concerning Peaceful Uses of Nuclear Energy ("123 Agreement") between the United States and Singapore entered into force. This agreement enables deeper nuclear cooperation, consistent with the highest international standards of safety, security, and nonproliferation, and builds on our existing strong bilateral partnership. Cooperation opens new opportunities for exploring advanced clean energy options, ensuring regional security and safety, and complements existing collaborations on clean energy, climate change, and energy security. It will

also strengthen the robust and longstanding U.S.-Singapore relationship beyond our traditional pillars of defense and security, economic, and people-to-people ties.

Through this 123 Agreement and other capacity building initiatives, such as the Foundational Infrastructure for the Responsible Use of Small Modular Reactor Technology (FIRST) program, the United States and Singapore intend to further strengthen civil nuclear cooperation to better understand how advanced nuclear energy technologies, including small modular reactors meeting the highest nuclear security, safety, and nonproliferation standards, can potentially support climate goals, while balancing critical energy needs. This will support Singapore's efforts to understand and evaluate advanced nuclear energy technologies, should viable options emerge.

*Source: https://www.miragenews.com/us-singapore-nuclear-pact-now-in-effect-1377622/, 13 December 2024.*

## NUCLEAR PROLIFERATION

### IRAN

### Iran Could Move Toward Building Nuclear Weapons

Reuters reported on Sunday, December 22, that the Biden administration is concerned about this possibility. According to the report, the White House plans to discuss these concerns with Donald Trump, the incoming president of the United States. The report highlights that Iran has suffered significant setbacks in its regional influence following extensive Israeli attacks on Iranian proxy groups and the fall of Bashar al-Assad's regime.

Sullivan told CNN that Israeli strikes on Iranian facilities, including missile production plants and air defense systems, have weakened Iran's conventional military capabilities. He emphasized, "It's not surprising that there are voices in Iran interested in obtaining nuclear weapons." Sullivan pointed out that while Iran claims its nuclear program is peaceful, it has expanded its uranium enrichment despite sanctions. The National Security Advisor stressed that there is a real risk that Iran could abandon its pledge not to build nuclear weapons. He acknowledged that he has discussed this issue with the incoming U.S. administration and shared these concerns with Tel Aviv.

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The world's attention is now focused on January 20, the day Trump is set to take office. It is widely believed that Trump, compared to the Biden administration, will adopt a tougher stance towards Tehran. The growing tension over Iran's nuclear ambitions has once again become a central issue in global diplomacy. As the incoming Trump administration prepares to take office, the future of U.S.-Iran relations and regional security remains uncertain. With the international community watching closely, it will be crucial for both the U.S. and Israel to coordinate closely on countering any potential nuclear threats from Iran while navigating the complexities of a rapidly changing Middle East.

*Source: https://www.khaama.com/sullivan-iran-could-move-toward-building-nuclear-weapons/, 23 December 2024.*

## URANIUM PRODUCTION

### RUSSIA–KAZAKHSTAN

### Russia Sells Stakes in Some Kazakh Uranium Deposits to China

Kazakhstan's nuclear resources company Kazatomprom said on Tuesday that Russia's Rosatom was selling its stakes in some uranium deposits which the two groups had been

developing together to Chinese-owned companies. Kazatomprom, listed in London and Kazakhstan, is the world's largest producer of uranium and has the largest reserve base. It accounted for 20% of global primary uranium production in 2023, but lacks its own uranium processing capacity. Rosatom used to have stakes in 6 of 14 Kazatomprom's deposits, receiving a share of the output in a deal that complicated the Kazakh firm's sales to the West.

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Kazatomprom, which has flagged sanctions risks associated with Rosatom to its investors, said that Rosatom unit, Uranium One Group, had sold its 49.979% stake in the Zarechnoye mine to SNURDC Astana Mining Company Limited, whose ultimate beneficiary is China's State Nuclear Uranium Resources Development Company. Uranium One Group is also expected to give up 30% in the Khorasan-U joint venture to China Uranium Development Company Limited, the ultimate beneficiary of which is China General Nuclear Power Corporation (CGN, China), Kazatomprom said. Kazatomprom's said its stakes will remain unchanged, while Rosatom had no immediate comment.

**Kazatomprom's chief executive Meirzhan Yussupov told the FT in September that sanctions imposed on Russia because of the Ukraine conflict made it difficult to sell uranium to Western buyers. Kazatomprom sells 29% of its output to Europe, according to the company's documents. The company outlined the risks in its latest annual report, stressing that although Rosatom was not directly targeted, some of its companies as well as senior Russian nuclear power industry executives were under Western sanctions.**

China is the biggest buyer of Kazakhstan's uranium. After the Khorasan-U stake sale Rosatom will still have stakes in Kazatomprom deposits, with combined reserves of 255,000 tons. This includes the Budennovskoye deposit, one of the world's largest, that Rosatom acquired under a deal disclosed in 2023. Zarechnoye's uranium reserves amounted to approximately 3,500 tons at the beginning of 2024, Kazatomprom said.

***Sanctions Risks:*** Khorasan-U operates at the Kharasan-1 block of Severny Kharasan deposit in the Zhanakorgan district of the Kyzylorda region. Uranium reserves of the deposit amounted to about 33,000 tons at the beginning of 2024, with an expected maturity in 2038, Kazatomprom said. Uranium One produced 4,831 tonnes of uranium in Kazakhstan in 2023. Russia is the world's sixth largest uranium producer and controls about 44% of global uranium enrichment capacity. Rosatom says that when its production in Kazakhstan is included the company ranked third in the world by production volume in 2023.

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*Source: https://www.mining.com/web/russia-sells-stakes-in-some-kazakh-uranium-deposits-to-china/, 17 December 2024.*

## NUCLEAR SAFETY

### UKRAINE

### Regulator Warns Against Delays in Work on Chernobyl's Shelter

The head of the State Nuclear Regulatory Inspectorate of Ukraine, Oleg Korikov, has urged against any further delays in the project to dismantle the unstable shelter facility, which was built at speed in 1986 to cover Chernobyl's damaged unit 4. He was speaking during a meeting of backers of the International Cooperation Account for Chernobyl, which was established in November 2020 by the European Bank for Reconstruction and Development (EBRD) at the Ukrainian government's request to support a comprehensive plan for Chernobyl. The EBRD had already led the project to fund and construct the New Safe Confinement building which is now in place covering the whole of the reactor involved in the accident, including the initial shelter built around it in a matter of months.

**Korikov said that equipping the New Safe Confinement with the necessary equipment and the dismantling of the unstable structures of the original shelter had already been postponed because of funding issues. This work was an integral part of the three-stage international Shelter Implementation Plan.**

Korikov said that equipping the New Safe Confinement with the necessary equipment and the dismantling of the unstable structures of the original shelter had already been postponed because of funding issues. This work was an integral part of the three-stage international Shelter Implementation Plan, which was firstly to stabilise it - the 2008 work gave it a design life to 2023 - and secondly to build a larger secure construction to enclose it - the New Safe Confinement (NSC) which was completed in 2017 - which would then pave the way for the dismantling and decommissioning stage. "Further delays in the implementation of the project to dismantle the unstable structures of the Shelter under the NSC shell increase the risk of their collapse, which could lead to extremely negative consequences. This state of affairs causes serious concern for the State Nuclear Regulatory Inspectorate of Ukraine," he said.

**The Shelter Object - also known as the 'sarcophagus' - still contains the molten core of the reactor and an estimated 200 tonnes of highly radioactive material. The stability of the structure has developed into one of the major risk factors at the site. The licence for the storage of radioactive waste within the shelter was extended last year from 2023 to 2029, with a 2025 deadline for the development of a new design for the dismantling of "unstable structures with an unacceptably high probability of collapse", and a 31 October 2029 deadline for completion of the dismantling.**

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In October it was announced that a new study was being funded by the International Chernobyl Cooperation Account which aims to determine the scope of deconstruction work for unstable Shelter structures and provide an initial cost estimate and enable the beginning of design work for the dismantling of the unstable Shelter structures. The consultants are also tasked with "revising the criteria and requirements for the NSC infrastructure to support the dismantling of unstable structures in the Shelter. This also involves developing all necessary technical specifications, including for lifting equipment, systems for processing contaminated dismantled structures, their further transportation, engineering and control systems for" the second stage of the project and "additional radiation

monitoring equipment, radiation-protected personnel transfer boxes, and other related documentation".

In June this year members of Ukraine's parliament approved a law approving the framework agreement between Ukraine and the EBRD which allows for the creation of a mechanism for managing the activities of the International Chernobyl Cooperation Account. The State Agency of Ukraine for [the Chernobyl] Exclusion Zone Management also took part in the meeting and said the meeting had seen contributing countries announcing EUR7 million (USD7.3 million) of support for development of the Chernobyl exclusion zone.

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It also quoted the head of the Ukrainian delegation, Minister of Environmental Protection and Natural Resources, Svitlana Hrynchuk, as saying that the meeting "approved important decisions, namely the creation of a Project Management Group for more effective implementation of grant agreements, and agreed on the direction of work on dismantling unstable structures of the Shelter Facility. Today, we have a wide range of opportunities for partnership and achievements in the direction of nuclear and radiation safety".

She said there had been previous contributions amounting to EUR26 million with funds being "directed to the restoration of equipment destroyed and damaged during the Russian occupation, system projects of nuclear and radiation safety at the Chernobyl NPP ... I am grateful to all partner countries for their unwavering position towards Ukraine and your investments in our common future".

According to World Nuclear Association, the hermetically-sealed New Safe Confinement allows "engineers to remotely dismantle the 1986 structure that has shielded the remains of the reactor from the weather since the weeks after the accident. It will enable the eventual removal of the fuel-containing materials in the bottom of the reactor building and accommodate their characterisation, compaction, and packing for disposal. This task represents the most important step in eliminating nuclear hazard at the site - and the real start of dismantling".

**The New Safe Confinement is the largest moveable land-based structure built - with a span of 257 metres, a length of 162 metres, a height of 108 metres and a total weight of 36,000 tonnes equipped - and with a lifetime of 100 years, it has been designed to allow for the eventual dismantling of the ageing makeshift shelter from 1986 and the management of radioactive waste. It has also been designed to withstand temperatures ranging from -43°C to +45°C, a class-three tornado, and an earthquake with a magnitude of 6 on the Richter scale.**

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*Source: https://www.world-nuclear-news.org/articles/warning-against-delays-in-work-on-chernobyls-old-shelter, 20 December 2024.*

## NUCLEAR SECURITY

### GENERAL

### Grossi Restates Key Role for IAEA, After Agency Vehicle Hit by Drone

An IAEA vehicle was hit and damaged by a drone on the day of the latest rotation of the agency's team of experts at the Zaporizhzhia nuclear power plant. The IAEA driver and a security officer, who were in the vehicle at the time of the drone attack, were unharmed. The incident happened at 14:05 local time on 10 December 2024 (Tuesday) about 8 kilometres from the front-line, within Ukrainian-controlled territory. Director General Grossi said: "I condemn in the most firm terms this attack on IAEA staff. Fortunately, there were no victims, and our teams are safe. The rotation has been completed. I have said in the past that attacking a nuclear power plant is a no-go. Attacking those who care for the nuclear safety and security of these plants is also absolutely unacceptable."

**The agency did not attribute blame for the drone attack - which came as a convoy was moving towards the front to pick up the IAEA team which were finishing their month-long rotation at Zaporizhzhia - and Ukraine and Russia have each blamed the other side. The Zaporizhzhia nuclear power plant is Europe's largest, and has been under the control of Russian military forces since early March 2022. It is situated close to the front-line of Russian and Ukrainian military forces.**

The agency did not attribute blame for the drone attack - which came as a convoy was moving towards the front to pick up the IAEA team which were finishing their month-long rotation at Zaporizhzhia - and Ukraine and Russia have each blamed the other side. The Zaporizhzhia nuclear power plant is Europe's largest, and has been under the control of Russian military forces since early March 2022. It is situated close to the front-line of Russian and Ukrainian military forces.
The IAEA has had experts stationed at the plant since September 2022 as part of efforts to promote nuclear safety and security at the site.

***Grossi Nobel Speech:*** On 11 December 2024 (Wednesday), Grossi delivered a speech during the Nobel Peace Prize Forum 2024, a prize which this year went to Nihon Hidankyô and the hibakusha, survivors of the 1945 Hiroshima and Nagasaki atomic bombs, recognising their efforts to rid the world of nuclear weapons.

He warned that the "world has come to a crucial crossroads - our deep psychological connection caused by collectively seeing the horror of the consequences of nuclear war seems to be evaporating, taking with it our joint resolve to do everything possible to prevent a repetition". "War has returned to Europe, and it directly involves a nuclear weapon state. The conflict in Ukraine is also an indirect confrontation between the world's biggest nuclear weapon states, the first since the end of the Cold War. But nuclear exercises and open references to the use of nuclear weapons in the theatre of this war are increasing the risks and cannot be ignored," he said.

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He also referred to tensions between Israel and Iran - "on one side, the assumed presence of nuclear weapons looms in the background. On the other, the very real potential of nuclear proliferation is raising the stakes. We find ourselves in a harmful loop: the erosion of the restraints around nuclear weapons is making these conflicts more dangerous. Meanwhile, these conflicts are contributing to the erosion of the restraints. The vicious circle dynamic is in motion. Doctrines regarding the use of nuclear weapons are being revised or reinterpreted. The quantity and quality of nuclear weapon stockpiles are being increased. And in some non-nuclear weapon states - states that are important in their region - leaders are asking "why not us?"

He said that a return to diplomacy and dialogue was needed, citing the examples of US Presidents Kennedy, Reagan and Trump as well as Soviet Union leaders Khrushchev and Gorbachev as having reached out to a nuclear-armed adversary. Following the start of the Russian-Ukraine war, and the situation of having a nuclear power plant in the middle of a combat zone, "observing this from the outside was never, in my mind, an option".

**We need to walk through perilous times by recognising limitations and keeping our eyes on our common objectives. Nuclear disarmament cannot be imposed on the nuclear armed. Realism is not defeatism. Diplomacy is not weakness. Difficult times call for enlightened leadership, at the national level, and at the international level as well. Putting the international system back on track is within our reach," Grossi added.**

"Staying on the sidelines and later reflecting on 'lessons learned' may have been the more traditional - or expected - path for an international organisation. But to me this would have been a dereliction of duty. So, we leaned into our core mission, crossed the front lines of war, and established a permanent presence of IAEA experts at all Ukraine's nuclear power plants. That makes us the only international organisation operating independently in occupied territory. We are informing the world of what's going on and reducing the chance that a radiological incident enflames the conflict and causes even more devastation," he said, adding that he was in constant communication with both sides.

Together with various other 'hotspots' and tensions, he said the world has "to make a new path", with leaders recognising "the need for responsible management of their nuclear arsenals" and an "iron-clad resolve to observe and strengthen the global non-proliferation regime" was needed. "We need to walk through perilous times by recognising limitations and keeping our eyes on our common objectives. Nuclear disarmament cannot be imposed on the nuclear armed. Realism is not defeatism. Diplomacy is not weakness. Difficult times call for enlightened leadership, at the national level, and at the international level as well. Putting the international system back on track is within our reach," Grossi added.

*Source: https://world-nuclear-news.org/articles/grossi-restates-key-role-for-iaea-after-vehicle-hit-by-drone, 11 December 2024.*

## NUCLEAR WASTE MANAGEMENT

### CANADA

### Ontario First Nation Challenging Selection of Underground Nuclear Waste Site in Court

**A First Nation in northern Ontario is challenging the selection of a nearby region as the site of an underground repository that will hold Canada's nuclear waste, arguing in a court filing that it should have had a say in the matter as the site falls "squarely" within its territory. Eagle Lake First Nation has filed an application in Federal Court seeking a judicial review of the Nuclear Waste Management Organization's decision to build the deep geological repository in the Township of Ignace and Wabigoon Lake Ojibway Nation area.**

A First Nation in northern Ontario is challenging the selection of a nearby region as the site of an underground repository that will hold Canada's nuclear waste, arguing in a court filing that it should have had a say in the matter as the site falls "squarely" within its territory. Eagle Lake First Nation has filed an application in Federal Court seeking a judicial review of the Nuclear Waste Management Organization's decision to build the deep geological repository in the Township of Ignace and Wabigoon Lake Ojibway Nation area.

The decision was announced in November after Ignace's town council and Wabigoon Lake Ojibway Nation both agreed to move forward, but Eagle Lake First Nation says it was "unjustifiably" rejected as a host community and denied its own right to consent to the project. "NWMO rejected ELFN as a host community and not for any fair, justifiable or defensible reasons," but because members of the First Nation had raised concerns about the nuclear waste site, court documents

filed last Friday allege. The court filing, which also names the federal minister of natural resources among the respondents, accuses the NWMO of acting in "bad faith" and seeks to have its decisions quashed.

The NWMO, a non-profit body funded by the corporations that generate nuclear power and waste, said it is reviewing the legal challenge. A spokesperson noted the nuclear waste site was chosen after "extensive" study and community engagement, which "established that the site is safe" and that the host communities understand the project. "We have always been open to engaging with any First Nation interested in this project and welcome the opportunity to continue to build on past discussions with Eagle Lake First Nation," Carolyn Fell wrote in a statement.

The $26-billion project to bury millions of used nuclear fuel bundles underground will include a lengthy regulatory and construction process, with operations not set to begin until the 2040s. The site selection process began in 2010 with 22 potential locations and was narrowed down totwo finalists in Ontario before the Ignace-Wabigoon Lake Ojibway Nation area was ultimately chosen. In its court application, Eagle Lake First Nation said it and Wabigoon Lake Ojibway Nation were one nation until at least 1932 and their territories still overlap. The chosen nuclear waste site "falls squarely in ELFN Territory—an area that ELFN and its members have been occupying since time immemorial," it argued.

The First Nation said it met with the NWMO at "least 10 times" between October 2017 and October 2024 but the organization refused its request to be designated a host community for the site. It argued the risks of burying nuclear waste approximately 80 kilometres from the reserve "have the potential to cause significant impacts on ELFN's rights, including through developing such fear of the area that it drives land users away and dislocates them from their harvesting areas." Grassy Narrows First Nation in northwestern Ontario also expressed concerns about the underground repository when it was announced, saying the transport and disposal of nuclear waste could cause "irreparable destruction to our lands, rivers and our way of life."

At the time, Chief Clayton Wetelainen of Wabigoon Lake Ojibway Nation said his community's role in hosting the nuclear waste site was one of the most important responsibilities of our time. Wetelainen and the council said the project could only continue if it could be proven to be built safely, with respect to the environment and in a way that protects Anishinaabe values. A spokesperson for Wabigoon Lake Ojibway Nation said that the community "does not have a statement to make at this time" about Eagle Lake First Nation's legal challenge.

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*Source: https://www.chroniclejournal.com/news/national/ontario-first-nation-challenging-selection-of-underground-nuclear-waste-site-in-court/article_73102bbf-fd45-5c60-920f-927cb082dd4e.html, 24 December 2024.*

**RUSSIA**

**Russia Denounces Nuclear Waste Management Agreement with Western Donors**

The Russian government has recently submitted a draft law to the State Duma to unilaterally denounce the Framework Agreement on the Multilateral Nuclear Environmental Program (MNEPR), which was signed in 2003 in Stockholm to help Russia cope with the expensive nuclear and radioactive cleanup operations in the Arctic region. This agreement has facilitated international cooperation and provided significant funding and equipment from countries like Norway, the E.U., and the U.S., with resources being used to address critical environmental concerns, such as the disposal of spent nuclear

fuel, the decommissioning of nuclear submarines, and the remediation of contaminated sites like Andreyeva Bay in the Murmansk region.

Moscow cited "the de facto halt of cooperation within MNEPR since 2015-17" as the reason to tear off a major money-line and technical assistance obligation from the West; once denounced, it cannot be reinstated. The decision marks a turning point with potentially far-reaching consequences, increasing the radiation risks across the Arctic. Unfinished projects, such as the cleanup of Andreyeva Bay and the retrieval of submerged nuclear submarines from Arctic waters, could exacerbate environmental and safety threats – especially concerning fisheries, maritime navigation along the Northern Sea route, and future resource extraction in the region.

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...The long-term consequences of this decision are stark. By severing ties with international partners, Russia risks losing access to expertise, funding, and technological support essential for addressing its nuclear legacy. Should Russia fail to independently complete the projects initiated under the MNEPR, the Arctic could face escalating radiation risks, endangering ecosystems, livelihoods, and regional stability. Moreover, this move isolates Russia further on the global stage, making the prospect of future collaboration increasingly unlikely, even in a post-conflict geopolitical landscape.

The program had been financed by Belgium, Denmark, Finland, France, Germany, the Netherlands, Norway, Sweden, the United Kingdom, the United States, and the European Atomic Energy Community. While exact figures are not publicly detailed, reports indicate that the West's assistance amounted to $20 billion over the years. The Russian government had contributed around $10 million. The Russian Federation has not disclosed the volume of stored and lost radioactive and nuclear materials in the Arctic.

*Source: https://energycentral.com/c/rm/russia-denounces-nuclear-waste-management-agreement-western-donors, 23 December 2024.*

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