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POLICY BRIEF

High North Security Dialogue '25 Strengthening Deterrence and Defense in the High North

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Figure 1. NATO in the Arctic

KEY FINDINGS

- The Arctic includes diverse subregional environments across the North American and European continents. Differences involve a variety of factors, including infrastructure development, economic opportunities, force readiness, and threat perceptions. This complicates regional security and requires tailored defense strategies.
- Chinese and Russian collaboration and influence in the High North is increasing. Russian hostilities present an acute threat, while Chinese ambitions present long-term concerns for all Arctic states.
- Allied capabilities in the High North can be strengthened by focusing on interoperability, interchangeability, total civil defense, and NATO standardization. At the operational level, the development of a scenario-based playbook for the High North can facilitate effective response options.
- Allies must optimize and coordinate the different strengths of their defense industrial bases. Northern Allies have niche capabilities and technologies. Resilience must be encouraged in defense production while equipping readiness across all domains. These efforts can be achieved by reducing bureaucratic barriers, countering supply chain complexities, offering tax incentives, and improving full life-cycle management of equipment.
- NATO Allies must coordinate more closely with the private sector to advance and incorporate new technologies in collective defense. Artificial intelligence and unmanned systems can improve domain awareness and deterrence across the Arctic.
- More investments and research should be devoted to Arctic infrastructure and energy development. These efforts can reduce the logistical costs of sustaining operations. To develop strong relations with local communities and retain and recruit local work forces, quality of life standards and environmental protection should be upheld.

NATO Allies must continue to deliver unified responses. All acts of aggression that threaten NATO Allies must be condemned and addressed appropriately and collectively.

INTRODUCTION

Over the past decade, the Arctic has shifted from a peripheral concern to a central focus of global security. Although remote, the region increasingly experiences the consequences of international conflict. Achieving effective deterrence and defense in the High North requires Arctic states and the broader NATO alliance to coordinate their actions. NATO and its partners must develop tailored capabilities to support regional operations, expand domain awareness, enhance critical infrastructure, improve interoperability and readiness, and align defense industrial bases through public-private collaboration. Nations must strengthen military capacity and capabilities to operate in harsh Arctic conditions in order to maintain credible deterrence.

Russia's invasion of Ukraine has reshaped the security environment in the High North. Russia has militarized its society and economy and extended this effort to the Arctic, where it maintains more established military infrastructure and a larger operational footprint than the other seven Arctic states, many of which are still building their regional capabilities. Growing Russian and NATO activities, particularly in the Barents Sea, increase the risk of escalation and are of growing concern for both sides. At the same time, Russia depends on foreign investment and technology to exploit its northern resources, and China has moved to fill this gap following the withdrawal of Western firms. There is likely room for dialogue with Russia on economic development, should conditions permit.

China's expanding presence in the Arctic intensifies security concerns for all Arctic states. Beijing continues to advance its economic, scientific, and strategic interests in the region. These interests will only grow as emerging sea lanes, fisheries, natural gas and oil reservoirs, rare earth mineral deposits, and other natural resources become more accessible. Chinese naval and air assets increasingly operate alongside Russian forces off the coasts of Alaska and Canada's northern territories. Although the Sino-Russian alignment does not approach the cohesion of NATO's Arctic states, the alignment of interests between Moscow and Beijing remains consequential. Both immediate and long-term challenges in the High North demand greater NATO investment and sustained attention.

In response to these challenges, the George C. Marshall European Center for Security Studies (GCMC) and the Ted Stevens Center for Arctic Security Studies (TSC), cohosted

the 2025 High North Security Dialogue (HNSD). This four-day virtual event brought together more than sixty alumni, security practitioners, senior policymakers, diplomats, industry leaders, and academic experts from fifteen Arctic and Allied nations. The findings and recommendations in this report reflect the consensus views of HNSD speakers and participants, while also acknowledging differences of perspectives on specific issues.

DETERRENCE AND DEFENSE IN THE HIGH NORTH

The Arctic is a dynamic region shaped by both environmental conditions and geopolitical competition. Operational features vary significantly across subregions and seasons: tundra and polar deserts dominate some areas, while forests and mountains define others. Coastal zones experience moderated temperatures and higher precipitation compared to inland areas, though both face extreme weather. Winters bring freezing temperatures, extended darkness, and heavy concentrations of sea ice and snow, while summers present warmer conditions, increased daylight, and reduced sea ice. Transition seasons, or “shoulder seasons,” create challenging operating conditions because waterlogged and unstable terrain hinders mobility.

Geographically, the Arctic functions as a gateway between markets in Europe, North America, and Asia. Its oceanic connections to the Pacific and Atlantic, combined with its role in global weather systems, sustain extensive marine biodiversity. Beneath the surface, the region contains significant hydrocarbon and rare earth deposits, including an estimated 13 percent of the world’s undiscovered conventional crude oil, 30 percent of its undiscovered natural gas resources, and 31 of 34 of the world’s critical raw materials.¹ As environmental change alters the operational environment, global actors will gain access to new sea routes and increased natural resources. However, in the near term, the policies and actions of regional states will shape the Arctic’s trajectory and set the stage for evolving political dynamics.

The region’s geography, a mix of sovereign territory ashore and the Arctic Ocean, drives its geopolitical dynamics. Russia is the primary Arctic actor with just over half of the Arctic Ocean’s coastline and regards the region as its

strategic backyard. Russia also faces NATO Allies on both its eastern and western flanks. On NATO’s western flank, particularly in the North Pacific, China’s growing presence complicates US and Canadian security interests.

Since the early twenty-first century, Russia has positioned advanced defense systems throughout the Arctic. Remote islands, such as Alexandra Land, host air, sea, and land capabilities that enable Russia to assert control over the region’s maritime and air spaces. These include the S-400 and S-300 long-range air defense systems, P-800 Onyx antiship cruise missiles, Kalibr-NK land-attack cruise missiles, Pantsir-SA and Tor M2-DT systems for short-range defense, and other coastal defense systems.² Collectively, these assets protect Russian land and naval forces in the region. Russia’s Northern Fleet in particular maintains a capable submarine force despite the strain of war expenditures. Russia continues to build fourth-generation ballistic missile and multipurpose submarines at a steady pace. Its new Yasen-class submarines carry Tsirkon hypersonic missiles that fire at velocities capable of challenging Allied air defenses.

Russia also operates the world’s largest icebreaker fleet, with approximately 40-50 vessels in service and more under construction or planned. Many operate on nuclear power, which allows Moscow to maintain year-round access and extend operational reach across the Arctic Ocean. The newly build Arktika-class nuclear icebreakers can penetrate ice up to 2.8 meters thick, enabling year-round operations along the Northern Sea Route. However, many of Russia’s icebreaker projects are facing delays due to costs and sanctions from its war in Ukraine. Russia cancelled two of its next-generation icebreakers due to funding issues, and its only remaining Leader-class vessel, the *Rossiya*, is severely delayed.³ Despite these challenges, Russia’s fleet is a dominant force in the Arctic, and it is planning to expand its capabilities.

In contrast, NATO Arctic nations maintain smaller fleets that typically run on diesel, operate in limited numbers, and lack the ability to sustain operations in the thick, multi-year ice common to the central Arctic Ocean and in ice-ridged conditions. This disparity in scale and endurance explains why NATO Arctic nations are considered to have less capable icebreaker fleets.

China is expanding its Arctic presence as part of its growing Belt and Road Initiative and broader global competition with the West. Beijing aims to establish polar trade routes linking Asia and Europe and currently pursues research, mining, land purchase, infrastructure, energy, and subsea cable projects across the Nordic and North American Arctic. These ventures advance strategic state objectives, with scientific and technological activities directly supporting China's military modernization and intelligence efforts. The absence of clear boundaries between China's state, military, and private sectors enables this integration.

Arctic states have increasingly limited China's regional influence by pausing or cancelling projects. Of the 15 Chinese initiatives proposed in North America between 2007 and 2025, only one, in northwestern Alaska, remains operational. Similarly, Arctic states have cancelled 13 of 25 projects in the High North during the same time period.⁴ Despite these setbacks, China continues to leverage dual-use scientific and commercial activities as tools for intelligence collection and subsea cable interference. Chinese forces also gain operational familiarity with the region through joint exercises with the Russian military.

NATO distributes its defensive posture in the Arctic across its member states. With the rising challenges from Russia in the east and China's growing activity in the west, NATO Arctic nations face competing demands for resources and attention. Even so, the Alliance continues to expand its capabilities in the High North through new defense investments and an increasing tempo of exercises with Allies and partners. Finland and Sweden's accession to the Alliance in 2023 and 2024 respectively, has substantially strengthened NATO's Arctic posture. Both countries contribute highly advanced air and land forces, robust domain awareness and intelligence networks, strong defense industries, and deep regional expertise. Finland, in particular, has invested heavily in cold-weather technology and readiness. It fields advanced drone systems to monitor its long border with Russia, and it conducts regular exercises in the region, such as Arctic Forge 25.⁵ Continued development of emerging technologies, including cold-weather-capable drones, combined with sustained joint exercises will be essential to bolstering NATO's collective security in the Arctic.

Norway, Denmark, and Iceland, the three other Nordic Arctic states and founding members of NATO, also provide critical advantages in the High North. In June 2024, the Norwegian Parliament approved a long-term plan to acquire five new frigates equipped with anti-submarine helicopters, along with several new submarines and standardized vessels.⁶ The Norwegian Army is expanding from one to three brigades, increasing overall force levels with conscripts, volunteers, and reservists.⁷ Denmark has taken parallel steps, announcing in January 2025 a \$2 billion plan to strengthen its Arctic security.⁸ This package includes new naval vessels, long-range drones, and expanded satellite capacity to monitor and manage its vast territory that spans from Copenhagen to Nuuk, Greenland. Iceland, which has no standing military, contributes to NATO's defense posture by controlling access to the North Atlantic maritime corridor. As NATO expands its exercises and deployments in the region, Allied operations will increasingly rely of facilities in Iceland.

The United States and Canada continue to strengthen their strategic partnership in the North American Arctic. Their shared commitments to the North American Aerospace Defense Command (NORAD) remain essential for monitoring and defending North American airspace and maritime approaches. Joint exercises such as Operation NANOOK build interoperability, cohesion, and regional expertise between US and Canadian forces while also providing opportunities for NATO allies to participate.⁹ These engagements strengthen Allied readiness in Arctic conditions and reinforce NATO's role in collective defense across the High North.

The United States is expanding its defense investments in the region, particularly through efforts to modernize the US Coast Guard's icebreaking fleet. The United States commissioned a third operational polar icebreaker in August 2025, and in early October 2025, signed a \$6 billion deal with Finland to build as many as 11 icebreakers.¹⁰ US assessments identify a requirement for a fleet of icebreakers to ensure year-round access and mission support in Arctic waters in the future.¹¹

The United States is also strengthening homeland defense in Alaska. In 2024, it deployed new missile systems and

additional troops to Eareckson Air Station on Shemya Island, the closest US military installation to Russia.¹² The US Navy is also reconsidering the reopening of Adak Island facilities to counter rising Chinese and Russian presence in the North Pacific.¹³ Despite these initiatives, the current US footprint in the Arctic remains limited relative to emerging threats. NATO will require sustained and coordinated defense investments across the region to achieve effective deterrence and defense.

With this understanding of the strategic landscape, the HNSD examined five key challenges and developed findings and recommendations for each.

FINDINGS AND RECOMMENDATIONS

STRENGTHEN COLLECTIVE DEFENSE AMONG ALLIES: BURDEN-SHARING, CAPABILITIES, DEFENSE INDUSTRIAL BASE

Findings

Rising geostrategic threats posed by China, Russia, and other actors are driving a reassessment of defense spending and contributions by NATO members. Defense budgets have significantly expanded due to the greater power responsibilities assumed in particular by European Allies. In 2023, the 2 percent of GDP target for defense spending, established at the 2014 NATO Wales Summit, remained unmet by many of these states.¹⁴ However, the transition to greater balance is being led by Arctic Allies. As of 2025, the Wales benchmark is being met by all European Arctic nations, except Iceland, and further increases to 3 percent or more by the end of the decade have been announced in line with new commitments from the Hague Summit.¹⁵ Despite this progress, responsibilities must be better aligned, operationally relevant capabilities must be developed, and the defense industrial base must be strengthened if NATO is to maintain sustained credibility and deterrence.

Recommendations

- **Develop a NATO playbook for the northern flank.** NATO should establish pre-agreed response options for threats in the Baltic, North, Norwegian, and Barents Seas –where Allied critical infrastructure remains vulnerable. The Beaufort and Chukchi Seas should have a coordinated defense plan as well, due to growing threats from Russia and China. Similar to strategies in the Mediterranean and Black Seas, a northern flank framework would enable allies to respond swiftly and lawfully by linking legal authorities with available capabilities. This would reduce duplication, enhance transparency, and strengthen operational readiness across the Alliance.
- **Leverage comparative advantages in defense industrial bases.** Coordinated production strategies would allow Allies to capitalize on national strengths in defense manufacturing, ensuring sustainable and efficient supply chains. For example, Allies could optimize icebreaker production and sustainment by leveraging respective strengths in design, production, workforce development, and training.
- **Promote EU-NATO synergy.** The European Union's *Readiness Roadmap 2030*, which allocates 800 billion Euros for rearmament and defense, presents an opportunity for deeper institutional cooperation.¹⁶ Strengthening NATO-EU coordination would align defense investments, improve industrial base resilience, and ensure resources are used effectively.
- **Standardize defense production.** In 2024 at the Washington Summit, Allies agreed to the NATO Industrial Capacity Expansion Pledge including standardization in production of defense materials.¹⁷ This standardization effort can be achieved by reducing bureaucratic barriers and countering supply chain complexities. By doing so, NATO weapon systems, munitions, and equipment can become more interoperable and interchangeable among member states, enhancing collective operational effectiveness.
- **Increase private-public sector engagement.** Sustaining industrial capacity requires stronger partnerships between governments and commercial enterprises.

The production of advanced technologies, including artificial intelligence, autonomous systems, and conventional defense platforms, depends on robust collaboration. Incentives, conferences, and structured engagement mechanisms will strengthen these relationships.

- **Issue unified Allied responses.** NATO must maintain collective messaging and joint action against conventional and hybrid threats from China, Russia, and other adversaries. Unified responses will reinforce deterrence and counterdisinformation campaigns aimed at dividing the Alliance. Improve all-domain awareness. From seabed to space, quantum computing may assist with the processing of massive amounts of data to assist with intelligence and surveillance, improving awareness in all domains.

ADVANCE INTEROPERABILITY AND READINESS

Findings

NATO has made considerable interoperability and readiness advancements in the High North since the accession of Sweden and Finland in 2023 and 2024. Both countries contribute highly capable militaries and mature defense industries. Finland strengthens NATO's defense posture with its roughly 1,300-kilometer border with Russia, while Sweden does so through its control of key Baltic islands. NATO has expanded exercises across the region to strengthen operational familiarity and joint capabilities, enabling Allies and partners to share tactical expertise and regional knowledge. Since 2022, these exercises have increased in both frequency and scale. Despite these developments, significant gaps persist in Arctic readiness, particularly in preparing for sustained operations against Russia's entrenched military presence. To address these concerns, the following recommendations focus on closing those gaps.

Recommendations

- **Develop and tailor common capabilities, tactics, and doctrine to different conditions and regions.** Arctic operations require distinct approaches depending on

geography and climate. Forces must adapt clothing, vehicles, and equipment to varied terrains, while ensuring logistics such as blood, medical supplies, food, and water remain viable in freezing temperatures. Increased investment in institutions such as the US Cold Regions Research and Engineering Laboratory and Norway's NATO Centre of Excellence for Cold Weather Operations will help identify solutions and refine doctrine.

- **Expand NATO exercises and operations in the Arctic.** Ongoing exercises, such as Operation NANOOK, Joint Viking 25, and Nordic Response 24, should be broadened and integrated into a NATO-led large-scale operation, similar to the Defender Series.¹⁸ Whole-of-government participation, multinational integration, and private-sector engagement would improve readiness, operational knowledge, and exchange of expertise.
- **Conduct additional cold-weather training in sub-Arctic regions.** While training in the Arctic is critical, its scale is limited by geography and logistics. Sub-Arctic environments in the United States such as Minnesota and Maine provide valuable training opportunities for a larger share of US personnel and systems.
- **Train personnel in traditional navigation and war-fighting skills.** Given adversaries' abilities to disrupt GPS, communication, and logistics, NATO forces must be able to operate effectively without modern digital systems. Training should reinforce manual navigation, fieldcraft, and alternative methods of coordination.
- **Strengthen US cold-weather specialization.** The US military has units, such as the 11th Airborne Division, that are home-stationed in Arctic environments to support cold-weather training. However, personnel typically rotate every 18–24 months, which limits individual and organizational proficiency in cold-weather operations. Expanding career incentives, promotions, and assignments within northern commands would help retain specialized skills and strengthen longterm readiness.

- **Differentiate threats and align joint force responses.** Russia presents immediate and conventional challenges, while China poses long-term strategic risks. NATO must align specific multinational and joint capabilities with each type of threat to ensure effective responses in the Arctic.
- **Increase societal resilience and readiness.** Adversaries continue to target NATO Allies with disinformation, coercion, and hybrid threats. Building resilience requires enhanced public education, improved emergency planning, new methods for recruitment and, where applicable, conscription.
- **Consider a NATO Arctic strategy and command structure.** Arctic security is currently pursued through national strategies with Allied collaboration. A cohesive NATO-level plan, directed through an existing headquarters such as Joint Force Command Norfolk or the Joint Warfare Centre in Stavanger, Norway, would unify efforts and provide the command and control needed for credible deterrence and defense.

IMPROVE INFRASTRUCTURE RESILIENCE

Findings

As the operational environment in the High North continues to evolve, infrastructure resilience plays an increasingly critical role. Regional challenges include sea-level changes, permafrost thaw, changing sea ice dynamics, and abnormal weather patterns. Permafrost degradation already undermines existing infrastructure, reduces the endurance of local communities, disrupts commercial trade, and complicates military operations.

Limited energy systems and storage capacity, insufficient road networks to support logistics, and extreme weather conditions throughout much of the year further challenge the development and maintenance of infrastructure in the High North. Norway supplies Europe with the largest share of its natural gas and remains a major petroleum exporter, underscoring the need to safeguard critical energy

infrastructure for European security.

Communications infrastructure in the Arctic remains limited and vulnerable. The region relies heavily on a small number of undersea cables, which are difficult to repair in extreme conditions and remain exposed to accidental damage or sabotage. Satellite systems provide supplementary coverage, but high latitudes, auroral activity, and severe weather frequently disrupt signals, and reduce the reliability of long-range communications.¹⁹ These limitations weaken defense operations by disrupting GPS accuracy, reducing the reliability of precision-guided munitions, and complicating navigation. Russian forces have repeatedly interfered with GPS by jamming airspace across the Arctic, especially in northern Europe.²⁰ NATO must strengthen its posture in the High North through sustained investment in resilient, redundant, and secure infrastructure.

Recommendations

- **Invest in diversified energy sources.** Energy transport and supply are expensive and vulnerable. Expanding energy infrastructure while incorporating alternative sources such as microgrid solar, small modular nuclear reactors, and nuclear powered ships will improve resilience and operational effectiveness. Further research should also focus on extending battery life in cold temperatures.
- **Develop robust energy storage and grids.** Permafrost thaw and extreme weather create grid instability, while resupply remains costly. Investments in Arctic-adapted storage and grid solutions are essential for long-term energy security.
- **Utilize and protect dual-use infrastructure.** Ports, airstrips, and road networks with dual-use capability are important for sustaining Allied presence and operations. These facilities must be hardened against espionage, hybrid warfare, and direct attacks.
- **Expand logistics networks.** Arctic operations require resilient roadways, ports, airstrips, and deepwater facilities capable of supporting sustained economic and military activity. Redundant infrastructure will help

the system withstand extreme weather and adversary interference.

- **Support local communities and workforces.** Developing transport and energy infrastructure depends on a capable workforce. Increasing living standards can attract and retain personnel while ensuring environmental protection and social stability.
- **Develop resilient communication systems.** NATO requires redundant, seasonally reliable communication networks across the High North. This includes hardened satellite, terrestrial, and undersea cable systems resistant to environmental disruption and adversary interference.
- **Enhance Arctic integrated air and missile defense through NORAD–NATO coordination.** Existing US and Canadian systems integrated through NORAD provide the foundation for North American early warning and aerospace defense, while NATO maintains its own air and missile defense architecture in Europe. In the Arctic and North Atlantic where threats span both theaters closer coordination between NORAD and NATO is essential to achieve layered and integrated defense. Developing this architecture will require significant investment and adaptation to Arctic conditions. The emergence of hypersonic weapons compresses decision timelines and strains current defenses, making it critical to extend early warning, tracking, and interception coverage into the High North and synchronize operations with northern European Allies.

ENHANCE DOMAIN AWARENESS

Findings

The Arctic's vast size and remoteness make monitoring and surveillance challenging. Extreme weather, persistent sea ice, and limited GPS coverage compound these challenges. Limited airfields and fuel supplies constrain airborne intelligence, surveillance, and reconnaissance (ISR). Platforms such as P-8 aircraft and unmanned aerial vehicles provide local ISR but lack endurance for long-range missions. Maritime ISR faces similar limitations. NATO also has limited access to deepwater ports in the Arctic. The northernmost

facility, the US installation at Pituffik Space Base in Greenland, supports year-round airfield operations but remains icebound for much of the year, which limits port access and navigation despite recent increases in maritime traffic. Larger initiatives, such as Canada's NORAD modernization, are underway, but NATO still needs systematic and large-scale investment in Arctic domain awareness.²¹

Ongoing hybrid warfare in the Baltic Sea underscores NATO's limitations in protecting critical infrastructure. Adversaries, or proxies acting on their behalf, weaken deterrence when they avoid detection, detainment, and prosecution. China and Russia exploit this ambiguity by using commercial vessels, both domestic and international, to conduct hybrid operations. Strengthening domain awareness in the High North will be critical to countering these threats and likely requires solutions that integrate military, civilian, and scientific contributions.

Recommendations

- **Conduct systemic analysis on gaps in domain awareness.** NATO, with its Arctic Allies, partners, and stakeholders, should conduct comprehensive assessments using conferences or wargaming and tabletop exercises to pinpoint gaps in awareness. Given the dual-use nature of much of the supporting infrastructure, public-private sector engagement must be prioritized to expand and harden domain awareness systems.
- **Establish whole-of-government information sharing agreements and architectures.** While bilateral and multilateral agreements (e.g., Arctic Council, Nordic Defence Cooperation) provide for some data exchange, the information is fragmented. A whole-of-government system that integrates contributions from local law enforcement, intelligence agencies, science and research institutions, and Allied militaries will deliver a more coherent domain awareness architecture.
- **Increase investment in polar research institutions.** Robust scientific data collection is indispensable to operational awareness. Investments in buoy networks, radiosondes, satellite monitoring, and other instruments that can track environmental factors such as sea ice shifts and extreme weather will improve Arctic operations.

- **Expand existing domain awareness systems.** The United States Department of Transportation operates SeaVision, a maritime domain awareness application that monitors global maritime traffic through automatic identifications systems, satellite synthetic aperture radar, coastal radar, radio frequencies, and other tools that already provide wide maritime visibility.²² Expanding these systems to focus on the Arctic will improve real-time situational awareness.
- **Continue investment in polar icebreakers.** Icebreakers enable both operational access and awareness in ice-covered waters. Initiatives such as trilateral Icebreaker Collaboration Effort (ICE) Pact among the United States, Canada, and Finland, and the US Coast Guard's Polar Security Cutter program are critical to building capacity.²³
- **Coordinate critical infrastructure resilience among Allies, partners, and stakeholders.** NATO should convene Allies, partners, and stakeholders to identify vulnerabilities in energy, communication, and transportation networks. Infrastructure ownership varies from large corporations with established defenses to small firms with limited cybersecurity. These complex networks require tailored approaches to resilience across the Alliance.

INVEST AND INTEGRATE ADVANCED TECHNOLOGIES

Findings

The rapid development of advanced technologies is reshaping Arctic defense. Unmanned aerial, surface, and subsurface vehicles, coupled with improvements in satellite systems, SONAR, and artificial intelligence, expand operational options in the High North. Russia has invested heavily in polar-capable systems, including drones adapted for extreme cold. Its operational lessons from Ukraine have accelerated the integration of unmanned platforms, and companies such as ZALA Aero now develop long-range combat drones such as the S-70 Okhotnik, designed to operate in temperatures below -12°C.²⁴ NATO countries are also advancing drone capabilities. In 2023, the United States announced plans to acquire “tens of thousands of cheap drones” with “kamikaze” capabilities, incorporating

swarming tactics into its force design.²⁵ Losing a small reconnaissance drone may cost as little as \$3,000, while losing a long-range unmanned drone can exceed \$200 million. Finland has deployed French-manufactured drones capable of operating at temperatures below -36°C to monitor its 1,343-kilometer border with Russia, demonstrating the importance of platforms hardened for Arctic conditions.²⁶

Emerging concepts in missile defense, such as the United States' proposed Golden Dome project, also stand to reshape Arctic security.²⁷ The United States has only begun developing this project, and experts argue it must incorporate space-based sensors and interceptors, artificial intelligence, and directed-energy systems. The Golden Dome architecture would cover US territory, including Alaska, and requires coordination with Canada and European Allies.²⁸ Integrating these technologies in the High North will demand substantial investment, rigorous testing in Arctic conditions, and close Allied cooperation. NATO will need exercises, shared defense systems, expanded science, technology, engineering, and math education, and robust and effective industry partnerships to achieve these goals.

Recommendations

- **Integrate artificial intelligence into defense networks.** Artificial intelligence can be applied in numerous ways to address Arctic security. Artificial intelligence can organize data across multiple domains—buoys, ships, satellites, coastal radar, radio frequencies, human intelligence networks—to improve domain awareness, missile defense, and strategic planning.
- **Research cold-weather thermal camouflage.** Personnel are easily detected in Arctic conditions due to heat signature contrast. Advanced apparel, coatings, and equipment that mask thermal emissions are required to reduce vulnerability.
- **Expand unmanned systems in the Arctic.** Deploying, testing, and refining unmanned surface and subsurface vehicles, as well as fleets of small aerial drones, will increase the visible security footprint, improve maritime awareness, and strengthen deterrence.
- **Develop all-season Arctic vehicles.** The Arctic is a dynamic environment, and regions in the North American Arctic are vastly different than the

European Arctic. Vehicles that can traverse in the Arctic during the winter season struggle to move during the so-called “shoulder seasons,” or time between peak extremes of winter and summer temperatures. NATO Allies and partners must field mobility platforms designed for these diverse conditions and establish supporting logistics networks.

- **Incorporate environmental safeguards into technology development.** Defense projects must be designed to minimize ecological impacts and protect local communities and ecosystems. Approaches that balance operational requirements with environmental stability promote long-term sustainability.
- **Modernize and harden space-based assets.** Robust and resilient space platforms are crucial for Arctic security. Allied and partner satellite systems are critical for domain awareness, environmental monitoring, and Arctic communications. Ensuring these systems are resilient to threats from adversaries, and improving satellite coverage at high latitudes are critical for sustaining Arctic deterrence and defense.

CONCLUSION

Today’s geopolitical realities diverge sharply from Mikhail Gorbachev’s 1987 vision of the Arctic as a “zone of peace.”

²⁹As relations continue to sour between Russia and its Arctic neighbors, there is mounting regional insecurity, while China’s expanding presence adds further complexity. Economic competition, coupled with hybrid warfare, will continue to intensify. Diplomatic resolutions with China and Russia should be explored where possible, but both China and Russia respond foremost to strength. NATO Allies and partners must therefore prioritize defense and deterrence to secure the Alliance’s northern flank.

The four-day High North Security Dialogue underscored that security in the Arctic will not be achieved through isolated national efforts. It requires coordinated investments in collective defense, improved burden-sharing, interoperable capabilities, resilient infrastructure, expanded domain awareness, and the integration of advanced technologies. Each of these elements reinforces the others—ensuring forces can operate in extreme environments, sustain presence, and defend critical infrastructure against

conventional and hybrid threats.

Equally important is the continued convening of Allies, partners, industry leaders, and research institutions through dialogues such as HNSD. These forums provide essential opportunities to test assumptions, share expertise, and refine joint approaches to complex Arctic challenges. Sustained engagement and visible unity among Allies are critical not only for building readiness, but also for signaling resolve to adversaries.

As geopolitical pressures in the region grow, NATO and its partners must maintain collective focus, accelerate investment, and preserve unity of effort. Only through persistent coordination and continued dialogue can a safe, stable, and secure Arctic be ensured.

A NOTE ON COURSE METHODOLOGY AND STRUCTURE

The HNSD 2025 structure was multifold, incorporating numerous background readings, briefs from subject-matter experts, plenary discussions, and seminars to inform and facilitate the exchange of insights from participants. The goals of the dialogue were to:

- Examine High North security challenges and resultant impacts on achieving successful deterrence and defense. The Arctic’s strategic landscape, threat environment both in the region and beyond, modern warfare, critical infrastructure, security of waterways, the impact of new technologies, and other shaping factors were considered in the analysis.
- Enhance warfighting readiness in the High North and identify innovative defense measures, including potential Golden Dome architecture, enhanced domain awareness, and integration of new technologies.
- Enable dialogue and strengthen cooperative networks to advance mutual understandings, capacities for addressing regional security challenges, and conditions to achieve regional prosperity and stability.
- Develop policy recommendations to inform forthcoming Allied Arctic and national security strategies on how to best achieve collective deterrence and

defense, while strengthening burden-shifting, regional interoperability, and the defense industrial base and capability alignment.

The opening addresses for this year's event came from senior US and German officials. These remarks were highly informative and set the context and overarching perspectives for the four-day event. The HNSD was organized into plenary and seminar sessions around four different themes, to achieve the event's objectives.

Day 1: Understanding the Evolving Strategic Landscape

As the intersection of extreme weather, economic security, technological innovation, and Euro-Atlantic defense cooperation, the High North is playing an ever-growing role in global strategic competition. Indeed, global geopolitical changes demand new strategic approaches to the Arctic. Most notably, Russia's ongoing war with Ukraine and aggression toward other Arctic states, Allies, and partners highlight the immediate necessity to strengthen deterrence and defense in the region. With Western investment and cooperation virtually frozen, Russia has increasingly relied on China for the funding and technology necessary to continue its economic development of the Russian Arctic Zone. This "no limits friendship" continues to manifest itself with joint military exercises and a growing Russian security presence in the region. Day 1 explored the Arctic's changing strategic landscape and implications for Arctic states and the NATO alliance and reflected on Allied defense cooperation and the evolving Russian defense posture.

Day 2: Infrastructure, Technology, and the Maritime Dimension

Large-scale geopolitical, economic, and shifting weather trends are significantly affecting the Arctic. As these developments continue to unfold, the region is becoming increasingly important for energy security, with significant potential for further development of oil, gas, and renewable energy resources. Indigenous and local communities will be affected by the pursuit of these natural resources, with potential significant negative impacts to these populations arising from regional warming trends that are causing unprecedented permafrost thaw, coastal erosion, and changes to the Arctic's fragile ecosystem. Day 2 considered

the challenges of protecting and building infrastructure to support resource development and security priorities. Participants examined the opportunities presented by technological innovations to improve warfighting readiness in this demanding environment that is known for extreme weather, polar anomalies, limited infrastructure, and vast, remote territories.

Day 3: Peace through Strength

During the peace dividend years, the High North enjoyed decades of unprecedented cooperation and general adherence to international norms and customs. But the war in Ukraine firmly marked the end of "High North, Low Tension," freezing many forms of regional cooperation. The Arctic Council has limited functionality given the cessation of senior-level dialogue. Russia has increasingly turned to China to replace Western investment and technology necessary to the development of its Arctic Zone. Meanwhile, NATO is seeking to strengthen its regional deterrence in response to Russia's aggression. The geopolitical competition among Arctic actors has considerably deepened the region's security dilemma. Day 3 examined and proposed further measures to strengthen deterrence, defense, and readiness in the region and explored opportunities to de-escalate this spiraling security dilemma.

Day 4: Securing the Northern Flank

The final day of HNSD focused on the future of the Arctic, with unique insights from senior leaders on securing NATO's northern flank. Panelists also provided an overview of the Arctic's challenges and opportunities, specifically, the implications of NATO's focus shifting northward and the growing strategic importance for deterrence and defense. Discussions also focused on securing infrastructure and waterways in the High North. This is particularly important given the prevalence of subsea data and power cables, as well as significant oil, gas, and renewable energy infrastructure. Additionally, the readiness and warfighting posture of NATO forces in the Arctic heavily depend on domain awareness and technology innovation. Day 4 investigated these aspects and allowed participants to present recommendations for building warfighting readiness in the Arctic, advancing transatlantic cooperation, strengthening deterrence, defending the northern flank, and enabling conditions for prosperity.

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Endnotes

- 1 U.S. Energy Information Administration (USEIA), "Arctic Oil and Natural Gas Resources," USEIA (website), January 20, 2012, <https://www.eia.gov/todayinenergy/detail.php?id=4650>; and *Arctic Mining Report 2024* (Tromsø, Norway: Arctic Economic Council, September 2024), <https://arcticeconomiccouncil.com/wp-content/uploads/2024/10/aec-arctic-mining-report-2024-sample.pdf>.
- 2 "Russian Military Developments in the Arctic: An Update – June 2023," EuroDefense, June 2023, <https://euro-defense.eu/wp-content/uploads/2023/06/Arctic-observatory-report-June-2023.pdf>.
- 3 Malte Humpert, "Sinking of Russian Ship in the Mediterranean Could Delay Leader-Class Nuclear Icebreaker 'Rossiya,'" *High North News*, January 2, 2025, <https://www.highnorthnews.com/en/sinking-russian-ship-mediterranean-could-delay-leader-class-nuclear-icebreaker-rossiya>.
- 4 Anders Christoffer Edström, Guðbjörg Ríkey Th. Hauksdóttir, and P. Whitney Lackenbauer, *Cutting Through Narratives on Chinese Arctic Investments* (Cambridge, MA: Belfer Center for Science and International Affairs, June 23, 2025), <https://www.belfercenter.org/research-analysis/china-arctic-investments>.
- 5 Finnish Defence Forces, "New Technologies and Practices Shape Defence Research - How Will Finland Prepare for Future Threats and Take Advantage of New Opportunities?," Finnish Defence Forces Press Release, April 3, 2025, [https://puolustusvoimat.fi/en/-/new-technologies-and-practices-shape-defence-research-how-will-finland-prepare-for-future-threats-and-take-advantage-of-new-opportunities-;](https://puolustusvoimat.fi/en/-/new-technologies-and-practices-shape-defence-research-how-will-finland-prepare-for-future-threats-and-take-advantage-of-new-opportunities-) and U.S. Army Europe and Africa (USAREUR-AF), "Arctic Forge," USAREUR-AF (website), n.d., accessed December 3, 2025, <https://www.europeafrica.army.mil/What-We-Do/Exercises/Arctic-Forge/>.
- 6 Naval News Staff, "Norway Makes Downselection for New Frigates," Naval News, November 19, 2024, <https://www.navalnews.com/naval-news/2024/11/norway-makes-downselection-for-new-frigates/>.
- 7 Thomas Nilsen, "Norway Steps Up High North Defense with Fully Equipped Brigade in Finnmark," *Barents Observer*, April 5, 2024, <https://www.thebarentsobserver.com/security/norway-steps-up-high-north-defense-with-fully-equipped-brigade-in-finnmark/166478>.
- 8 DeutscheWelle (DW) Staff, "Denmark Announces \$2 Billion Plan to Boost Arctic Security," DW, January 28, 2025, <https://www.dw.com/en/denmark-announces-2-billion-plan-to-boost-arctic-security/a-71430346>.
- 9 Canadian Armed Forces (CAF), "Operation NANOOK," CAF (website), date modified-August 22, 2025, <https://www.canada.ca/en/departement-national-defence/services/operations/military-operations/current-operations/operation-nanook.html>.
- 10 Gary Warner, "Coast Guard Commissions Its First New Icebreaker in More Than 25 Years," *Stars and Stripes*, August 12, 2025, https://www.stripes.com/branches/coast_guard/2025-08-12/coast-guard-icebreaker-arctic-18733836.html; and "U.S. and Finland Reach \$6 Billion Deal to Build Up to 11 Icebreakers," *The Maritime Executive*, October 9, 2025, <https://maritime-executive.com/article/u-s-and-finland-reach-6-billion-deal-to-build-11-icebreakers>.
- 11 "Coast Guard Polar Security Cutter (Polar Icebreaker) Program: Background and Issues for Congress. Congressional Research Service. January 17, 2024. https://www.congress.gov/crs_external_products/RL/PDF/RL34391/RL34391.252.pdf.

-
- 12 Dylan Malyasov, "US Troops Land on Remote Shemya Island," Defence Blog, September 15, 2024, <https://defence-blog.com/us-troops-land-on-remote-shemya-island/>.
- 13 "INDOPACOM Commander Recommends Reopening Adak Naval Base in Alaska," Dan Sullivan US Senator for Alaska (website), April 11, 2025, <https://www.sullivan.senate.gov/newsroom/press-releases/indopacom-commander-recommends-reopening-adak-naval-base-in-alaska>.
- 14 *Wales Summit Declaration* (Brussels: North Atlantic Treaty Organization (NATO), September 5, 2024), <https://www.nato.int/en/about-us/official-texts-and-resources/official-texts/2014/09/05/wales-summit-declaration>.
- 15 *NATO Summit 2025* (The Hague: NATO, June 2025), <https://www.government.nl/ministries/ministry-of-foreign-affairs/activiteiten/nato-summit-2025>.
- 16 *Readiness Roadmap 2030* (Brussels: European Commission, October 16, 2025), https://defence-industry-space.ec.europa.eu/eu-defence-industry/readiness-roadmap-2030_en.
- 17 *Washington Summit Declaration* (Washington, DC: NATO, July 10, 2024), <https://www.nato.int/en/about-us/official-texts-and-resources/official-texts/2024/07/10/washington-summit-declaration>.
- 18 USAREUR-AF, "Defender Europe," USAREUR-AF (website), n.d., accessed December 3, 2025, <https://www.europeafrica.army.mil/Defender/>.
- 19 European Space Agency (ESA), "Arctic Poses Communications Challenges," ESA (website), n.d., accessed December 3, 2025, https://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_Earth/Arctic/Arctic_poses_communications_challenges?.
- 20 Thomas Nilsen, "Russian Jamming Is Now Messing Up GPS Signals for Norwegian Aviation Practically Every Day," *Barents Observer*, February 26, 2024, <https://www.thebarentsobserver.com/security/russian-jamming-is-now-messing-up-gps-signals-for-norwegian-aviation-practically-every-day/163663>.
- 21 Jonas Vidhammer Berge and Max Bergmann, "Addressing Arctic Vulnerabilities: Lessons from Ukraine," Center for Strategic and International Studies (website), December 17, 2024, <https://www.csis.org/analysis/addressing-arctic-vulnerabilities>.
- 22 "Seavision: A Web-Based Maritime Situational Tool," US Department of Transportation (website), n. d., <https://info.seavision.volpe.dot.gov/>.
- 23 US Naval Institute (USNI) Staff, "U.S., Canada and Finland Statement of Intent on the Icebreaker Collaboration Effort Pact," USNI, November 19, 2025, <https://news.usni.org/2025/11/19/u-s-canada-and-finland-statement-of-intent-on-the-icebreaker-collaboration-effort-ice-pact>.
- 24 Jacob Gronholt-Pedersen and Gwladys Fouche, "'We're All Having to Catch Up': NATO Scrambles for Drones That Can Survive the Arctic," Reuters, January 30, 2025, <https://www.reuters.com/world/nato-scrambles-drones-that-can-survive-arctic-2025-01-30/>.
- 25 Gronholt-Pedersen and Fouche.
- 26 Gronholt-Pedersen and Fouche.

27 “The United States Golden Dome Self-Defense Program,” *New Space Economy*, n. d., accessed December 2, 2025, <https://newspaceeconomy.ca/2025/12/01/the-united-states-golden-dome-self-defense-program/>.

28 Troy Bouffard, Whitney Lackenbauer, and Andrea Charron, “The ‘Iron Dome’ and Implications for the North,” *Wilson Center* (website), February 28, 2025, <https://www.wilsoncenter.org/article/iron-dome-and-implications-north>.

29 Mikhail Gorbachev, “Mikhail Gorbachev: An excerpt from the speech in Murmansk,” in *The North: A Zone of Peace* (Ottawa: USSR Embassy, Canada, 1988), <https://www.marxists.org/archive/gorbachev/1987/00001.htm>.