Policy Paper

Shielding the Skies
European Ballistic Missile Defence

| Finn-Niklas Brünner |

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List of Abbreviations

BMD	ballistic missile defence
EDTIB	European Defence Technological and Industrial Base
EPAA	European Phased Adaptive Approach
IAMD	integrated air and missile defence
ICBM	intercontinental ballistic missile
INF	Intermediate-Range Nuclear Forces (Treaty)
IRBM	intermediate-range ballistic missile
JEWEL	Joint Early Warning for a European Lookout
NATINAMDS	NATO Integrated Air and Missile Defence System
SLM	surface-launched missile

Introduction

Russian missile barrages have hit Ukraine almost daily since the start of the full-scale invasion, killing civilians and destroying critical infrastructure. Between February 2022 and January 2023, Russia employed an estimated 750 ground- and air-launched ballistic missiles, with similar numbers reported for 2024. In addition, Russia has launched well over 1 500 surface-to-air missiles repurposed as ballistic missiles against Ukraine.[1] The challenge of defending this vast country against ballistic missiles is compounded by its shortage of missile defence systems. Data reveals interception rates well below 5%.[2] Enhanced manoeuvrability of Russian missiles has further impeded Ukrainian efforts to defend against ballistic missile strikes.[3]

Meanwhile, in April and October 2024, Iran launched unprecedented attacks on Israel that included roughly 300 ballistic missiles.[4] Israel, in cooperation with allies, managed to shoot down around three-quarters of these, indicating that a defence against limited missile attacks is feasible.[5] These two conflicts have showcased the centrality of ballistic missiles in contemporary warfare and the importance of ballistic missile defence (BMD) in enhancing the survivability of armed forces, building resilience, and avoiding decapitation strikes by an enemy.

The US has been the main provider of BMD in Europe, especially against high-end, longer-range threats. Today, however, the US is seeking to reduce its role as a security guarantor on the continent at a time when the risk of armed conflict with Russia is greater than it has been in decades. Europe has acknowledged a need to ramp up its own BMD capacity, but the task is a formidable undertaking. This policy paper examines the ballistic threats Europe faces from Russia, the shortcomings of its current missile defences, and how these might be addressed in the years to come.

1. Russia's Ballistic Missile Capabilities

A significant part of the Soviet Union's (and subsequently Russia's) missile capability was eliminated with the ratification of the Intermediate-Range Nuclear Forces (INF) Treaty in 1987. This prohibited the deployment and testing of ground-launched shorter- and intermediate-range cruise and ballistic missiles, defined as systems with ranges between 500 and 5 500 km.[6] The US, the other party to the treaty, announced its withdrawal in 2018 after accusing Moscow of having violated it for many years. Today, Russia once again possesses a considerable arsenal of ballistic missiles of varying range and capability, all of which can deliver both conventional and nuclear payloads.

Russia's best-known and most mature system is probably the Iskander-M (NATO: SS-26), a short-range ballistic missile estimated to have a range of at least 500 km and able to

1 Ian Williams, *Putin's Missile War: Russia's Strike Campaign in Ukraine* (Center for Strategic & International Studies, 5 May 2023), 30-31; Tetyana Oliynyk, "Ukrainian air defence downed over 11,000 drones and 1,300 missiles in 2024," *Ukrainska Pravda*, 31 December 2025.

2 "Ukraine discloses for the first time real missile interception rates against the various kinds of Russian missiles," *bne IntelliNews*, 24 August 2024.

3 Joseph Trevithick, "Ukraine's Patriots Now Struggling To Intercept Enhanced Russian Ballistic Missiles," *The War Zone*, 14 August 2025.

4 Alexandra Braverman et al., "Iran Update, October 1, 2024," *Institute for the Study of War*, 1 October 2024, 1; UK Parliament, *Israel–Iran April 2024: UK and international response* (House of Commons Library, July 2024), 6; UK Parliament, *Israel–Iran October 2024* (House of Commons Library, November 2024), 4.

5 Michael Knights and Elizabeth Dent, "Israel's Missile Defense Performance: Views from the Gulf," *The Washington Institute for Near East Policy*, 11 October 2024.

6 US Department of State, *Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles (INF Treaty)* (US Department of State, December 1987).

reach speeds exceeding Mach 7. Even though it is a precision weapon, Russia has used it indiscriminately against civilian targets in Ukraine. For example, an Iskander attack on the city of Sumy in April 2024 killed 35 people and injured over 100.[7]

Russia currently has 13 Iskander-M rocket brigades (one more than in 2023) with a total of 162 erector-launchers.[8] Some are based close to NATO territory in Chernyakovsk (Kaliningrad Oblast) and Luga (Leningrad Oblast), putting major European population centres like Berlin, Warsaw, Stockholm, and Helsinki within range.[9] While Russia's non-strategic nuclear warheads are normally kept in central storage sites deeper inside the country, there is, at least in Kaliningrad, a local storage site that could potentially house such warheads.[10] In 2023, Russia's ally Belarus also received the Iskander system for its 465th Missile Brigade in Asipovichy.[11] While presidents Vladimir Putin and Aleksander Lukashenko have asserted publicly that nuclear weapons would be deployed to Belarus, neither previous CIA assessments nor open-source reports have confirmed an actual transfer. Nonetheless, given the refurbishments resembling Russian nuclear storage facilities at a weapons depot near Asipovichy, the Iskander seems the most plausible delivery platform should these weapons arrive in Belarus.[12]

The Russian economy has increasingly been reoriented towards wartime production, and Russia is estimated to produce more than 750 Iskander-M missiles in 2025, roughly corresponding to its annual rate of consumption in the war.[13] In case of a ceasefire, Russia will thus be able to quickly rebuild the stockpiles that were substantially depleted in the early stages of the conflict.[14]

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Russia is also expected to establish an additional missile brigade in the Republic of Karelia on the border with Finland, portrayed by the Kremlin as a retaliatory measure following Finland's accession to NATO.[15] In a crisis, it would likely send additional units to the Kola Peninsula, north of the Arctic Circle, where the headquarters of the Russian Navy's Northern Fleet, as well as a large portion of the country's strategic nuclear weapons, are housed.[16] Russia regards keeping NATO forces away from the area around Murmansk as pivotal. During the Zapad 2017 exercise, it

7 "9K720 Iskander (SS-26)," Center for Strategic & International Studies, 23 April 2024; Jess Daly, "The Most Lethal Missiles Russia Uses Against Ukraine's Civilians," *United24 Media*, 24 April 2025.

8 "Russia and Eurasia," in Robert Wall (ed), *The Military Balance 2024* (London: Routledge for the IISS, 2024), 193–199; "Russia and Eurasia," in James Hackett (ed), *The Military Balance 2025* (London: Routledge for the IISS, 2025), 182.

9 Kaarel Kaas, "Russian Armed Forces in the Baltic Sea Region," *International Centre for Defence and Security,* 20 June 2014; Konrad Muzyka, *Russian Forces in the Western Military District* (Center for Naval Analyses, 28 June 2021), 45; Agnieszka Legucka, "Die Militarisierung der Oblast Kaliningrad und die Bedeutung für die Sicherheit Polens [The militarisation of the Kaliningrad Oblast and its significance for Poland's security]," *Länder-Analysen, Polen-Analysen* Nr. 287 (February): 1, 4.

10 Hans Kristensen, "Russia Upgrades Nuclear Weapons Storage Site In Kaliningrad," *Federation of American Scientists*, 18 June 2018.

11 Hans Kristensen, "Belarus' "Nuclear-Capable" Iskanders Get A New Garage," *Federation of American Scientists*, 27 July 2023.

12 Hans Kristensen and Matt Korda, "Depot In Belarus Shows New Upgrades Possibly For Russian Nuclear Warhead Storage," *Federation of American Scientists*, 14 March 2024; Hans Kristensen et al., "Russian nuclear weapons, 2025," *Bulletin of the Atomic Scientists*, 13 May 2025.

13 Jack Watling and Nick Reynolds, *Tactical Developments During the Third Year of the Russo–Ukrainian War* (Royal United Services Institute, February 2025), 19.

14 Mykhaylo Zabrodskyi et al., *Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February–July 2022* (Royal United Services Institute, November 2022), 55; Pavel Luzin, "Russia's Estimated Storage of Cruise Missiles," *Eurasia Daily Monitor*, 18 May 2023, 20:81.

15 Thomas Nilsen, "Finland relaxed over Moscow's plans to deploy Iskander-M missiles near border," *The Barents Observer*, 24 April 2024.

16 Joseph S. Bermudez et al., "The Ice Curtain: Modernization on the Kola Peninsula," *Center for Strategic & International Studies*, 23 March 2020.

deployed Iskander-Ms near the Norwegian border and used them to simulate attacks on NATO military installations.[17]

The Kinzhal air-launched ballistic missile, claimed by Vladimir Putin to be an invincible hypersonic weapon, is a derivative of the Iskander-M. With an estimated range somewhere around 1 500 km and 2 000 km, it is designed to eliminate key military sites, including missile defences, across Europe.[18] Hypersonic weapons combine high speeds with agility, making interception much more difficult, but according to some assessments, the Kinzhal lacks the in-flight manoeuvrability to be classified as a true hypersonic weapon. In practice, US-made Patriot air defence systems have been able to shoot down a substantial portion of Kinzhal missiles above Ukraine.[19]

Even so, the Kinzhal should not be underestimated. After launching from its carrier aircraft, usually the Mikoyan MiG-31K, the missile accelerates to speeds of up to Mach 10, posing a significant challenge to all modern air defence systems and potentially allowing it to penetrate even highly defended airspace. During a Russian strike on Kyiv in 2023, Kinzhals were able to hit and damage a Patriot battery.[20]

The Oreshnik, another Russian ballistic missile, made headlines in November 2024 when one was targeted at a military-industrial site in Dnipro. So far, little is known about the Oreshnik. It seems to be an inter-mediate-range ballistic missile (IRBM – 3 000 to 5 500 km range) which, before 2019, would have been banned by the INF Treaty. It can deploy six warheads, each releasing six submunitions – 36 projectiles in total. This is an unusual concept for an IRBM, as they are mostly assigned to nuclear tasks, whereas the use of submunitions, which can be dispersed over a larger area, points to a conventional role.[21]

Russia's Oreshnik strike on Dnipro appears to have been a direct response to US and UK decisions to supply standoff weapons to Ukraine and authorise their use for strikes deep into Russian territory. It also demonstrated Russian military capabilities to NATO Allies. Putin compared the destructive power of this conventional rocket to that of nuclear weapons. This may be an exaggeration, but it aligns with Russia's broader strategy of nuclear coercion against Ukraine's supporters and against NATO states generally: a conventionally armed Oreshnik could disable strategically important targets, such as airfields or command and control centres (NATO is highly dependent on its air power in joint military operations), which might otherwise have been targeted by tactical nuclear weapons.[22]

Neither Europe's nor NATO's BMD systems are capable of countering large numbers of ICBMs

The Oreshnik presents a new challenge, but at the moment, it remains an experimental system. Even if fielded in substantial numbers, it would not be unstoppable as the Kremlin would like to portray. Interception during the missile's midcourse flight, using longer-range interceptors, such as the Israeli Arrow 3 or the US Navy's SM-3, would eliminate the advantages that the Oreshnik seeks to exploit through the release of submunitions in the terminal phase.[23]

Russia also deploys intercontinental ballistic missiles (ICBMs), such as the R-12 Topol-M,

[17] Dave Johnson, "Russia's Conventional Precision Strike Capabilities, Regional Crises, and Nuclear Thresholds," *Livermore Papers on Global Security* No. 3 (January 2018): 87; Thomas Nilsen, "Russian bombers simulated an attack against this radar on Norway's Barents Sea coast," *The Barents Observer*, 5 March 2018.

[18] Richard Connolly, "Putin's 'super weapons'" in *Advanced military technology in Russia* (London: Chatham House, 2021), 23-27; "Kh-47M2 Kinzhal," Center for Strategic & International Studies, 23 April 2024.

[19] "Ukraine Discloses for the First Time Real Missile Interception Rates against the Various Kinds of Russian Missiles," *bne IntelliNews,* 24 August 2024; Lyle Goldstein and Nathan Waechter, "China Evaluates Russia's Use of Hypersonic 'Daggers' in the Ukraine War," *RAND*, 12 January 2024.

[20] Jake Epstein, "A US-made Patriot system was likely damaged in an 'intense' missile attack in Ukraine involving Russia's Kinzhal, US official says," *Business Insider*, 17 May 2023.

[21] Sidharth Kaushal and Matthew Savill, "The Oreshnik Ballistic Missile: From Russia with Love?," *Royal United Services Institute*, 10 December 2024.

[22] "Russia has used its hypersonic Oreshnik missile for the first time. What are its capabilities?," *Associated Press*, 9 December 2024; Decker Eveleth, "The Latest Russian Missile Is Bad News for NATO," *Foreign Policy*, 17 March 2025.

[23] Doyle et al., "Inside Russia's new missile, 'Oreshnik'," *Reuters,* 27 November 2024.

the R-24 Yars, and the submarine-launched RSM-56 Bulava, primarily for strategic nuclear delivery. Neither Europe's nor NATO's BMD systems are capable of countering large numbers of ICBMs.

2. Concepts and Scenarios

Since the late 2010s, Russia has pursued a strategy of 'active defence', which acknowledges NATO's overwhelming economic superiority and military potential and thus the need for Russia to avoid a prolonged and costly military confrontation with this more powerful opponent. Active defence, as described by Chief of the General Staff Valery Gerasimov, comprises measures for the pre-emptive neutralisation of threats to Russia's security.[24] These exist along a continuum of escalation, which begins long before the actual outbreak of armed hostilities. Advanced stages on the escalation ladder may require pre-emptive military strikes to paralyse the adversary and constantly maintain escalation dominance.[25]

Russia considers its conventionally armed missiles to be a strategic asset, serving first as instruments of coercion

Active defence prioritises long-range strike and non-contact warfare over ground offensives and direct engagement with enemy forces. Russia thus considers its conventionally armed missiles to be a strategic asset, serving first as instruments of coercion ('Iskander diplomacy'). As all major Russian missile systems are dual-capable, such threats also imply a potential nuclear dimension.[26] If coercion fails, the limited application of force to maintain the strategic initiative might follow. Missile strikes on military installations, command centres, and key economic assets would degrade an adversary's capacity to wage war, while attacks on critical infrastructure would undermine the will of its population.

Russian strategists assume that the calculated use of force can persuade the opponent to back off, eventually leading to de-escalation.[27] If this fails, Russia might resort to the employment of (tactical) nuclear weapons (due to the risks involved in their use in an initial strike, Russia's nuclear weapons seem to be mostly reserved for in-conflict escalation management).[28]

Active defence is highly dangerous in that it provides a pretext for Russian intervention abroad to fend off perceived threats to the homeland. It is particularly destabilising in moments of exceptional tension, as it amplifies fears of a decapitation strike. Analysts have argued that the lower threshold for the use of military force, inherent in this concept, poses the most significant threat to European security.[29]

With the publication of its 2021 National Security Strategy, Russia officially classified many NATO members as hostile and portrayed the west as its main strategic adversary.[30] Under the

[24] Dave Johnson, "General Gerasimov on the Vectors of the Development of Military Strategy," *NATO Defence College*, 20 March 2019; Michael Kofman et al., *Russian Military Strategy: Core Tenets and Operational Concepts* (Center for Naval Analyses, 19 October 2021), i; Amund Osflaten, "Russian Forecasting and Pre-emption: The Prelude to the Invasion of Ukraine," *Scandinavian Journal of Military Studies* 8, no. 1 (February 2025): 57–73.

[25] Dave Johnson, "Russia's Conventional Precision Strike Capabilities, Regional Crises, and Nuclear Thresholds," *Livermore Papers on Global Security* No. 3 (30 January 2018): 20; Amund Osflaten, "Russian Forecasting and Pre-emption," 57–73.

[26] Michael Kofman et al., *Russian Strategy for Escalation Management: Evolution of Key Concepts* (Center for Naval Analyses, 13 April 2020), 12–15; Maren Garberg Bredesen and Karsten Friis, "Missiles, Vessels and Active Defence," *The RUSI Journal* 165, no. 5–6 (November 2020): 73; Kofman et al., *Russian Military Strategy: Core Tenets and Operational Concepts* (Center for Naval Analyses, 19 October 2021), i.

[27] Michael Kofman and Anya Fink, "Escalation Management and Nuclear Employment in Russian Military Strategy," *War on the Rocks*, 19 September 2025.

[28] Dave Johnson, "Russia's Conventional Precision Strike Capabilities, Regional Crises, and Nuclear Thresholds," *Livermore Papers on Global Security* No. 3 (30 January 2018), 51; Kofman et al., *Russian Strategy for Escalation Management*, 2; Kofman et al., *Russian Military Strategy*, 13; Kofman et al., "Escalation Management and Nuclear Employment."

[29] Maren Garberg Bredesen and Karsten Friis, "Missiles, Vessels and Active Defence," *The RUSI Journal* 165, no. 5–6 (November 2020): 69.

[30] Dmitri Trenin, "Russia's National Security Strategy: A Manifesto for a New Era," *Carnegie Endowment for International Peace*, 6 July 2021; Amund Osflaten, "Russian Forecasting and Pre-emption."

circumstances of active defence in combination with a Russian revisionist political agenda, NATO needs to prepare for at least two scenarios. One scenario is a limited incursion into Allied territory, probably accompanied by threats of nuclear use if the Alliance attempts to retaliate.[31] Among Russian strategic analysts, there is a prevailing view that the highly developed societies of western Europe are vulnerable to coercion or the actual use of force, for example, against critical infrastructure.[32] This could encourage decision-makers in the Kremlin to test NATO's willingness to respond collectively to (small) territorial incursions.

One scenario is a limited incursion into Allied territory, probably accompanied by threats of nuclear use if the Alliance attempts to retaliate

A second scenario is a large-scale NATO-Russia conflict that would include strikes on NATO infrastructure to force the Alliance to back down and to degrade its ability to conduct military operations

A second is a large-scale NATO-Russia conflict that would include strikes on NATO infrastructure to force the Alliance to back down and to degrade its ability to conduct military operations. Disabling airfields would be especially critical to prevent NATO from exploiting its overwhelming air superiority vis-à-vis Russia. The difficulty of intercepting ballistic missiles would make them indispensable assets for this task.[33]

BMD is required in either scenario to deny Russia the advantages its ballistic missile arsenal offers and to strengthen NATO's deterrence posture. NATO has acknowledged this priority. For example, Secretary General Mark Rutte has called for a 400% increase in the Alliance's air and missile defence capabilities.[34]

3. NATO's US-Heavy BMD

NATO has been engaged in ballistic missile defence efforts for about two decades. At their Lisbon Summit in 2010, Allies adopted a new strategic concept that included their intent to establish an integrated missile defence system. The project primarily targeted the growing Iranian ballistic missile threat to Allied territory.

Today, the main pillar of NATO BMD is the European Phased Adaptive Approach (EPAA), a network of sensors and effectors provided by the US. EPAA is built around the US Navy's Aegis Combat System, which uses the SPY-1 or the newer SPY-6 radar, in combination with the SM-3 interceptor, which can engage targets outside the atmosphere. Two Aegis Ashore sites in Deveselu (Romania) and Redzikowo (Poland) form the backbone of this architecture, each housing up to 24 interceptors. The Romanian site became operational in 2016, and the Polish site in 2024.[35] The US Navy also permanently deployed four Arleigh Burke-class destroyers to Rota (Spain), each fitted with the Aegis Combat System, and in 2023, agreed to deploy two additional ships.[36] EPAA also includes a forward-deployed AN/TPY-2 radar in Türkiye, directed towards the Middle East and the NATO BMD command centre at Ramstein Air Base. US space-based surveillance satellites

[31] David Shlapak and Michael Johnson, "Reinforcing Deterrence on NATO's Eastern Flank," *RAND*, 29 January 2016; Fabian Hoffmann, "A Russia-NATO War Would Look Nothing Like Ukraine," *Foreign Policy*, 19 May 2025.

[32] Kofman et al., *Russian Strategy for Escalation Management*, 53–54.

[33] Camille Grand, "Nuclear deterrence and the Alliance in the 21st century," *NATO Review*, 4 July 2016; Dave Johnson, "Russia's Conventional Precision Strike Capabilities," 55; "Air Force Doctrine Note 1-21: Agile Combat Employment," US Air Force, 23 August 2024, 2.

[34] Elizabeth Piper and Sarah Young, "NATO needs 400% increase in air and missile defence, Rutte will say in London," *Reuters*, 9 June 2025.

[35] Oliver Thränert, "NATO and Missile Defence: Opportunities and Open Questions," *CSS Analysis in Security Policy* No. 86, (October 2010): 1; "The opening of the Redzikowo base is a milestone in missile defence," Ministry of National Defence Republic of Poland, 13 November 2024; Daryl Kimball, "The European Phased Adaptive Approach at a Glance," Arms Control Association, 17 March 2022.

[36] "Deepening the Defense Agreement between the US and Spain," United States European Command, 11 May 2023.

could also augment missile defence with supplementary tracking data.[37]

The latest SM-3 Block II variants can defend nearly all of NATO's European territory against Iranian ballistic missiles and offer partial protection against ICBMs.[38] But Europe's ability to defend against longer-range missiles is limited. While Allies, including the Netherlands and Germany, can contribute to the BMD mission with frigate-mounted SMART-L radars, no European country possesses the means to intercept missiles exoatmospherically.[39] The EPAA itself has only 48 land-based interceptors and a limited number of SM-3s onboard US Navy destroyers. Furthermore, Arleigh Burke-class destroyers are in high demand across multiple theatres and may be redeployed to the Indo-Pacific to support the US pivot to Asia in the future.

NATO also addresses short- or medium-range ballistic missiles, such as the Iskander-M, through the NATO Integrated Air and Missile Defence System (NATINAMDS). The main ground-based systems for this task are the MIM-104 Patriot with its PAC-3 interceptor (operated by the US, Germany, Greece, Poland, Romania, Sweden, Spain, and the Netherlands, and under consideration by Estonia and Norway) and the French-Italian SAMP/T.[40] Both can protect strategically important locations but cannot cover larger territories. For instance, Patriot batteries can engage incoming ballistic missiles at distances of only up to 20 kilometres.[41] Here too, Europe depends greatly on the US, which might be expected to deploy two theatre air defence brigades to Europe in a crisis – equivalent to 20–24 Patriot batteries.[42] Germany, the largest operator of the Patriot system in Europe, currently only has nine batteries.[43]

Europe also trails behind the US when it comes to sea-based missile defence.[44] Naval platforms offer more flexibility than land-based defences, which they can usefully complement or even replace. In some cases, such as the SvalSat station on the Svalbard archipelago, sea-based missile defences might even be the only viable option to protect key assets (the provisions of the 1920 Svalbard Treaty prohibit the deployment of military forces to the territory).[45] The recent use of US Navy destroyers in the Mediterranean to assist Israel in defending against Iranian ballistic missiles illustrates how Allied navies could, for example, provide extended coverage over the Baltic region.[46] Finally, Europe also depends on US satellites to provide early warning of

> *The recent use of US Navy destroyers in the Mediterranean to assist Israel illustrates how Allied navies could provide extended coverage over the Baltic region*

> *Europe also depends on US satellites to provide early warning of ballistic missile attacks despite the existence of the necessary technology in Europe*

37 "The future of Missile Defence: A NATO perspective," NATO, 15 January 2014; Kimball, "The European Phased Adaptive Approach."

38 "Aegis Ashore vs THAAD," Mostlymissiledefence, 27 July 2015.

39 "Dutch Treat," Missile Defense Advocacy Alliance, 23 May 2017; "US Navy destroyer uses Thales' radar for SM-3 Launch on Remote test," Naval Technology, 1 June 2021.

40 Forsvarsdepartementet, *Future Acquisitions for the Norwegian Defence Sector 2023–2030* (Forsvarsdepartementet, May 2023), 26–27; "Patriot," Center for Strategic & International Studies, 23 August 2023; "Patriots for Norway?," Norsk Luftvern, 7 December 2024; "Planned Estonian anti-ballistic missile defense may cost over €1 billion," ERR, 3 April 2025.

41 "PATRIOT Deployment," NATO, May 2015, 2.

42 Ben Berry et al., "Defending Europe Without the United States: Costs and Consequences," *International Institute for Strategic Studies (IISS)*, 15 May 2025, 14–17.

43 "50 Jahre FlaRak," *Bundeswehr-Journal*, 27 August 2012, 55; "Raytheon and MBDA to Jointly Build PATRIOT Missiles in Germany," *European Security & Defence*, 1 December 2022.

44 Ben Berry et al., "Defending Europe Without the United States: Costs and Consequences," *International Institute for Strategic Studies (IISS)*, 15 May 2025, 14.

45 Andreas Østhagen, Otto Svendsen, and Max Bergmann, "Arctic Geopolitics: The Svalbard Archipelago," *Center for Strategic & International Studies*, 3.

46 Mallory Shelbourne and Sam LaGrone, "US Destroyers Successfully Down Iranian Missiles with SM-3s, Carrier USS Harry. S. Truman Now in US 6th Fleet," *US Naval Institute News*, October 2, 2024.

ballistic missile attacks despite the existence of the necessary technology in Europe and a strong history of multinational European operations in the space domain.[47]

4. Russia's Response

Historically, NATO has devoted considerable time and effort to persuade Russia that its development of BMD is not a threat.[48] The Alliance has stressed that BMD is purely defensive and intended to protect from threats arising outside the Euro-Atlantic area.[49] It has also offered to explore opportunities for missile defence co-operation with Russia.[50] And in practice, while NATO's current BMD architecture might be able to intercept a limited number of Russian ballistic missiles, including ICBMs, it does not jeopardise the overall strategic balance with Moscow.[51] Russia's missile stockpiles far exceed the available interceptor inventory, particularly when accounting for multiple independently targetable re-entry vehicle warheads, thereby sustaining the enduring credibility of mutual nuclear deterrence.

Russia's missile stockpiles far exceed the available interceptor inventory

Nonetheless, Russia has long criticised NATO's ballistic missile defence efforts and has described the Aegis Ashore site in Poland as a priority target for neutralisation if a conflict were to arise.[52] As the European security environment has degraded and the threat posed by Russia's ballistic missiles has grown, NATO's claims about the focus of its BMD posture have become less credible. Even so, it was not until the Washington Summit in 2024 that NATO (subtly) acknowledged that its BMD might be directed at Russia, too, when it replaced long-standing communiqué language about countering ballistic missile threats emanating from outside the Euro-Atlantic area with a reference to "IAMD [integrated air and missile defence], based on a 360-degree approach."[53]

5. Building European BMD

The need for European states to significantly rebuild their air and missile defences has been highlighted by Russia's full-scale invasion of Ukraine and reflected, for example, in the European Commission's White Paper for European Defence.[54] One key project, the European Sky Shield Initiative (ESSI), first outlined by former German Chancellor Olaf Scholz in 2022, aims to boost European air and missile defence through the joint procurement of off-the-shelf technologies to build layered defence. The selected systems include the Patriot for short- to medium-range ballistic missiles (and air-breathing threats) and the Israeli Arrow 3 and future Arrow 4 for midcourse interception of longer-range ballistic missiles outside the Earth's atmosphere.[55]

However, the scope of the ESSI – whether it is a platform for joint procurement or for the standardisation of air and missile defence systems across Europe – is unclear. Certainly, as the number of participating countries has grown to 23, so too has the range of the technologies involved.[56] Finland and Slovakia, for example, have opted for Israeli missile defence systems – David's Sling and Barak MX,

47 "Germany to invest in French military satellite program," *Reuters,* 30 March 2015; "Athena-Fidus," CNES, 20 January 2025.

48 Richard Weitz, "Illusive Visions and Practical Realities: Russia, NATO and Missile Defence," *Survival* vol. 52 no. 4 (Hudson, August-September 2010): 99–120.

49 "Setting the record straight: De-bunking Russian disinformation on NATO," NATO, 6 November 2025.

50 "Lisbon Summit Declaration," NATO, 20 November 2010.

51 Jaganath Sankaran, *The United States' European Phased Adaptive Approach Missile Defense System* (RAND, 13 February 2015), 47.

52 Scout Hudson, "US military base in Poland is 'priority' target, Russia warns," *Politico*, 21 November 2024.

53 NATO, *Washington Summit Declaration issued by the NATO Heads of State and Government participating in the meeting of the North Atlantic Council in Washington, D.C.* (NATO, 10 July 2024), para 8.

54 European Commission, *White Paper for European Defence – Readiness 2030* (European Commission, 6 March 2025), 7.

55 Lydia Wachs, *Russian Missiles and the European Sky Shield Initiative* (SWP, 3 August 2023), 5; Howard Altman, "Emergency THAAD Deployment To Israel Heightens Concerns On Strain To US Air Defenses," *The War Zone*, 14 October 2024; "THAAD vs. Arrow: Advanced Missile Defense Showdown," Norsk Luftvern, 17 June 2025.

56 "European Sky Shield – die Initiative im Überblick [European Sky Shield – an overview of the initiative]," Bundesministerium der Verteidigung, 29 March 2024 .

respectively – rather than the Patriot.[57] Furthermore, major European powers, such as France, Italy and Spain, have not joined the project and expressed reservations based upon industrial interests (the exclusion of the French-Italian SAMP/T) and different strategic considerations (the incompatibility of procuring from the US with European strategic autonomy).

The high costs of BMD are significant obstacles to progress

Meanwhile, the high costs of BMD are significant obstacles to progress. A single Patriot battery with ammunition can cost over 1 bn euros.[58] Common procurement offers a partial solution and has been used to good effect, for example, in the bilateral agreement between Estonia and Latvia for the purchase of IRIS-T surface-launched missiles. Smaller states can also take advantage of framework agreements with larger Allies to minimise costs.[59]

Large joint contracts with industry may also increase the incentive for foreign defence suppliers – especially US companies – to establish local production lines in the EU, thereby strengthening the European Defence Technological and Industrial Base (EDTIB). For example, on the basis of a substantial order from European Allies, Raytheon and MBDA have agreed to cooperate to produce GEM-T surface-to-air missiles in Germany.[60] Lockheed Martin has also agreed on a partnership on missile production with Rheinmetall, making a PAC-3 production project (like the one in Japan) feasible in Europe, too.[61]

On the operational front, long-range precision strike – of increasing interest to states across Europe – can also make the BMD challenge more manageable by targeting launchers, logistics, production, and command and control, rather than waiting for individual missiles.[62] Nonetheless, the costs of a fully comprehensive active European BMD system – or indeed anything approaching it – will likely remain beyond the reach of European states and necessitate greater investment in passive air and missile defence measures such as hardening, dispersion, mobility, concealment, and redundancy.

The costs of a fully comprehensive active European BMD system will necessitate greater investment in passive air and missile defence measures

Conclusion and Recommendations

As the threat from Russia grows and the United States pursues a strategic realignment toward the Indo-Pacific, Europe must strengthen its capacity to withstand Russian ballistic-missile coercion. Robust air and missile defences can alter the Kremlin's calculus by undermining its ability to degrade NATO's air power, economic might, and societal resolve.

Besides creating this deterrent effect, European BMD can ensure the survivability of the military means that can ultimately neutralise any threat. Europeans should accept the need to devote significant resources to quickly scale up a strengthened missile defence architecture compatible with NATO's IAMD and BMD frameworks.

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The high costs of BMD can best be mitigated by cooperation among European states, for example, in programmes such as ESSI. EU member states can also take advantage of initiatives to support joint procurement and develop the EDTIB. They should:

Besides creating this deterrent effect, European BMD can ensure the survivability of the military means that can ultimately neutralise any threat

- Collaboratively acquire air and missile defence systems to reduce procurement and operational costs. Economies of scale can foster new production lines to enhance the security of supply and strengthen the EDTIB.

- Focus on interoperability to rapidly build a multi-layered defence. Foreign acquisitions are unavoidable given Europe's lack of indigenous upper-tier BMD systems like Aegis or Arrow. But Europe should seek to reduce dependencies on foreign systems, including, in the longer term, upper-tier systems.

- Jointly design and build a comprehensive network of ground-based and space-based sensors to improve Europe's situational awareness and early warning abilities (as envisioned under the recent Franco-German Joint Early Warning for a European Lookout initiative).

- Augment the EPAA with European sea-based effectors and sensors to reinforce European defence and demonstrate a stronger commitment to transatlantic security.

- Strengthen cooperation with Ukraine on BMD by establishing a Joint Analysis, Training, and Education Centre, potentially drawing on the Polish-Ukrainian drone-defence partnership.

- Enhance passive defences of potential ballistic missile targets.

- Continue to deploy missile defences to the eastern flank under NATO's Rotational Air Defence Model. This could include deployments of systems, such as Patriot or SAMP/T, to demonstrate resolve and enhance deterrence towards Russia.

Finally, it is important to keep in mind that ballistic missile defence is not a silver bullet. BMD is costly and can be saturated. European Allies must strike a balance between deterrence by denial – delivered through air and missile defence – and deterrence by punishment through strike capabilities. BMD's core function is to preserve the forces that can eventually neutralise the threat. The shield enables the sword and prevents decapitation. In a prolonged conflict, targeting the archer – i.e., missile launchers – is more effective than trying to intercept every arrow. If Russia cannot rely on disabling its opponent and must expect a coordinated response, it is less likely to initiate further aggression.

Targeting the archer is more effective than trying to intercept every arrow

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