



NATO PARLIAMENTARY ASSEMBLY

DEFENCE AND SECURITY COMMITTEE (DSC)

A NEW ERA FOR NUCLEAR DETERRENCE?

MODERNISATION, ARMS CONTROL, AND ALLIED NUCLEAR FORCES

Draft General Report

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Until this document has been adopted by the Defence and Security Committee, it only represents the views of the General Rapporteur.

TABLE OF CONTENTS

I.	INTRODUCTION.....	2
II.	NATO'S NUCLEAR POSTURE	2
III.	GLOBAL NUCLEAR MODERNISATION	4
IV.	NATO ALLIES, RUSSIA AND CHINA: NUCLEAR FORCE MODERNISATION EXAMINED MORE CLOSELY	5
V.	WHAT FUTURE FOR ARMS CONTROL?	7
VI.	INTERIM CONCLUSIONS AND RECOMMENDATIONS FOR NATO PARLIAMENTARIANS	8
	ANNEX: INDIA, PAKISTAN, AND ISRAEL'S NUCLEAR MODERNISATION PROGRAMMES EXAMINED MORE CLOSELY	10
	SELECT BIBLIOGRAPHY	11

I. INTRODUCTION

1. NATO declaratory policy consistently states that a credible defence and deterrence posture includes a combination of nuclear, conventional, and missile-defence capabilities. As a result, nuclear weapons remain central to NATO policy. Still, while a critical element of NATO deterrence, the Alliance's nuclear weapons posture and management have long been issues largely left on the margins of discussion and debate about NATO's defence and deterrence adaptation.
2. However, technological developments and concerns about a deteriorating global arms control regime have recently brought debates about Allied nuclear weapons and the Alliance's nuclear posture to the forefront of policy discussions in Brussels and across Allied capitals.
3. In the context of this renewed focus on nuclear capabilities both in the Alliance and across the globe, this draft general report will review NATO's current nuclear posture and highlight the debate surrounding its future. To this end, the draft report will underscore the challenges of maintaining an effective global nonproliferation regime in an era where all nuclear powers across the globe are investing in the modernisation, and in some cases the expansion, of their nuclear capabilities.

II. NATO'S NUCLEAR POSTURE

4. NATO's nuclear pillar is strongly reliant on the strategic forces of the United States, as well as the strategic forces of both France and the United Kingdom. Both the United States and the United Kingdom make nuclear weapons available to the Alliance as part of their national nuclear policies¹. The United States remains committed to an extended deterrence posture, which provides allies protection under its nuclear 'umbrella'. To achieve this extended posture, the United States maintains its nuclear triad² of delivery systems, forward-deployed non-strategic weapons, and readily deployable US-based nuclear weapons (US DoD, 2018). The United Kingdom's sea-based nuclear deterrent is committed to UK and NATO security³.
5. Within the NATO context, according to open sources⁴, the United States forward-deploys approximately 150 nuclear weapons⁵, specifically B61 gravity bombs, to Europe for use on both US and Allied dual-capable aircraft. The European Allies often cited as operating such aircraft are Belgium, Germany, Italy, The Netherlands, and Turkey⁶. Such capabilities ensure broad Allied involvement in NATO's nuclear mission and as a concrete reminder of US nuclear commitment to the security of NATO's European Allies (Lunn, 2019)⁷. The decision to maintain the non-strategic

¹ Both the United States and the United Kingdom retain ownership and command and control over their nuclear forces. France's sea and air-based strategic forces remain independent, but French national security policy allows the Alliance to consider that France's strategic forces 'contribute' to the Alliance's deterrence posture (NATO, 2010).

² Meaning air, land, and sea-capable delivery systems for nuclear warheads.

³ While committed to NATO security, any use of UK nuclear weapons for Alliance purposes would have to have authority from the UK prime minister.

⁴ During the DSC meeting in May 2019, the Rapporteur noted that information drawn from the Nuclear Threat Initiative's report cited below was not properly attributed. The NTI report itself cites articles from the Bulletin of the Atomic the Scientist. The Rapporteur is pleased to clarify this before presenting an amended and updated draft of this report to the Committee in October.

⁵ See, for instance, Andreasen, Steve, Isabelle Williams, Brian Rose, Hans M. Kristensen, and Simon Lunn, "Building a Safe, Secure and Credible NATO Nuclear Posture", Nuclear Threat Initiative, January 2018. https://media.nti.org/documents/NTI_NATO_RPT_Web.pdf

⁶ Andreasen *et al.* op cit

⁷ B61 bombs assigned to US and European aircraft are under US control and are only useable with presidential authority. Those weapons assigned to Allied aircraft may only be used after the US president has released them to NATO (Andreasen et al. 2018).

gravity nuclear bombs in Europe is principally due to Russia's maintenance of a large number of tactical nuclear weapons in its arsenal⁸ (IISS, 2019; Andreasen et al., 2018).

6. NATO has both formal and informal structures to oversee nuclear infrastructure, handling, and policy. The most significant formal groups involved in the planning and execution of NATO's nuclear mission are the Nuclear Planning Group (NPG) and the High-Level Group (HLG)⁹. Nuclear issues are also, at times, raised in the North Atlantic Council (NAC) forum (Andreasen et al., 2018). In addition to the formal consultative bodies and formal decision-making processes, the Alliance also carries out exercises to guarantee readiness to execute a nuclear mission, if necessary (Andreasen et al., 2018).

Key Changes in the International Nuclear Arena

7. The international security environment is evolving quickly, marked by new great-power strategic competition and powerful non-state armed groups. NATO's reconfigured defence and deterrence posture seeks to provide 360-degree security to face down a complex spectrum of threats, from near-peer aggressive competitors to terrorism. NATO's nuclear policy is reacting to a significantly changed environment as well.

8. A key means for the Alliance to articulate its nuclear policy is via the summit declarations after the meetings of all Alliance heads of state and government. These statements are a key mechanism for NATO to signal the credibility of its nuclear posture to three principal audiences: existing and potential future adversaries, Allied governments, and all Allied populations. NATO's Strategic Concepts and the Deterrence and Defence Posture Review (DDPR) have also relied on to signal the Alliance's nuclear priorities, but these have not been updated since 2010 and 2012.

9. Russia's continued aggression along the Alliance's eastern flank, irresponsible use of nuclear rhetoric toward NATO Allies¹⁰, and use of illegal chemical agents on Allied territory¹¹ has driven a subtle, but important shift in NATO's declaratory language on its nuclear weapons policy.

10. The change came via the 2016 and 2018 summit declarations, which reasserted a strong Alliance nuclear position. The 2018 Brussels declaration clearly states: "Following changes in the security environment, NATO has taken steps to ensure its nuclear deterrent capabilities remain safe, secure, and effective." (NATO, 2018 Brussels Summit Declaration). The declaration goes on to state: "Given the deteriorating security environment in Europe, a credible and united nuclear Alliance is essential." Such strong language is a clear and unified signal from the Alliance that its nuclear deterrent capabilities are central to NATO's defence and deterrence posture in the face of an increasingly aggressive and revisionist Russia.

11. The declarations stress that the Alliance's strategic forces, particularly those of the United States, are the ultimate guarantee of Allied security. The declarations also underscore the necessity of US forward-deployed nuclear weapons and the Allied-supported infrastructure to support these weapons, as well as the dual-capable aircraft to deploy and deliver them to target if necessary (NATO, 2018). Such language was noticeably absent from the 2012 DDPR and the 2014 Wales Summit Declarations. The past spirit to attempt to find room for positive strategic cooperation with Russia had been replaced with a strong reminder of the Alliance's ultimate guarantee.

⁸ Estimates are that Russia maintains approximately 2,000 non-strategic (tactical) nuclear weapons in its arsenal (IISS, 2019).

⁹ France does not participate in either the NPG or the HLG.

¹⁰ For example, Russia warned Denmark it would aim nuclear missiles at its ships should the nation decide to participate in NATO's missile defence system (Reuters, 2015). Russia has made similar threats to several other Allies since 2014.

¹¹ Russian agents used a military-grade nerve agent in an assassination attempt in Salisbury, United Kingdom on 4 March 2018 (UK Government, 2018).

A Renewed Focus on NATO's Nuclear Posture

12. Renewed debate about NATO's nuclear posture is likely just over the horizon for Allies. There are two key factors driving the shift in attention toward the Alliance's nuclear forces. First, all Allied nuclear powers are engaged in significant efforts to modernise their nuclear forces. This is happening in parallel to the modernisation of nuclear forces across the globe. Second, the long-standing cooperative bilateral efforts by the United States and Russia to work toward stable nuclear forces management and gradual reduction of arsenals are being challenged. These two issues are examined in the sections that follow.

III. GLOBAL NUCLEAR MODERNISATION

13. With the exception of North Korea, which is still developing its first generation of nuclear weapons, all nuclear powers are currently engaged in some form of modernisation of their respective nuclear arsenal.

State of Play: Current Global Stockpiles

14. In early 2018, the nine nuclear-armed states¹² owned approximately 14,465 nuclear weapons¹³, a net decrease of 500 compared to 2017¹⁴ (SIPRI, 2018). This decline mainly reflects Russian and US efforts to reduce their deployed nuclear forces, as agreed with the 2010 Treaty of Measure for the Further Reduction and Limitation of Strategic Offensive Arms (New START). Russia and the United States possess just over 90% of the world's nuclear warheads, with 6,850 and 6,450 respectively (Zala, 2019).

15. The nuclear arsenals of the other nuclear-weapons states are comparatively much smaller. With 300 and 215 warheads respectively, France and the United Kingdom have also undertaken significant reductions to their arsenals. Each nation's nuclear policies, however, indicate their willingness to maintain credible nuclear deterrence capabilities. China maintains roughly 280 warheads but is in the process of both modernising and expanding its stockpile. India (approximately 130-140 warheads) and Pakistan (approximately 140-150) have also been increasing their nuclear capabilities in recent years. Finally, Israel¹⁵ is estimated to possess approximately 80 warheads.

16. North Korea, a first-generation nuclear power, stands out from the other nuclear states. Although the existence or deployment of operational nuclear warheads by Pyongyang remains to be confirmed, it is estimated that North Korea has produced between 10 and 20 nuclear weapons (SIPRI, 2018). In September 2017, it conducted its sixth nuclear test explosion. North Korea possesses ten types of short-, medium- and intermediate-range ballistic missiles. It is also modernising its force by seeking to develop a road-mobile intercontinental ballistic missile (ICBM) capable of reaching the United States and a submarine-launched ballistic missile (SIPRI, 2018). It however remains unclear whether North Korea has produced a nuclear warhead compact enough to be delivered by a long-range ballistic missile. More specifically, observers doubt Pyongyang has developed an operational re-entry vehicle. North Korea is however achieving rapid progress and is expected to be able to produce such missiles in the short-term (SIPRI, 2018).

¹² The nine nuclear weapons states are: the United States, Russia, France, the United Kingdom, China, India, Pakistan, Israel, and North Korea.

¹³ Since there is no authoritative open-source evidence of development or deployment of nuclear warheads by Pyongyang, figures for North Korea are not included in the total estimates.

¹⁴ The figures used in this section reflect the situation as of January 2018.

¹⁵ To this day, Israel has neither confirmed nor denied that it has a nuclear arsenal.

17. Thus, despite significant disarmament efforts in the last decades, regional and international geostrategic evolutions, in conjunction with notable technological progress, have renewed the emphasis on nuclear capabilities.

IV. NATO ALLIES, RUSSIA AND CHINA: NUCLEAR FORCE MODERNISATION EXAMINED MORE CLOSELY

18. **United States:** The United States is engaged in an extensive modernisation of its entire nuclear force – from storage to delivery systems and warheads. The programme is slated to take until 2046 to complete and will cost an estimated USD1.2 trillion - USD494 billion of which to be allocated between 2017 and 2026¹⁶ (Congressional Budget Office, 2019). Its renovation programme aims to upgrade its triad of nuclear delivery systems (ground-, air-, and sea-based), warheads, supporting infrastructures, as well as command and control systems (SIPRI, 2018). The United States is reducing its number of nuclear warhead types from ten to five and, via its Life Extension Programs (LEP), and is refurbishing the remaining warheads (the W76, W80, W87, W88 and the B61) (Arms Control Association, 2018). Likewise, delivery systems, such as the Minuteman III ICBM, the Trident II submarine-launched ballistic missile (SLBM), as well as the B-2 and B-52 bombers, are undergoing modernisation (SIPRI, 2018). The US Navy is also upgrading its SLBMs to the new Columbia-class, replacing the older Virginia-class.

19. In addition, Washington has launched the development of new systems to replace some of its bombers and ICBMs: the B-21 is scheduled to enter service in the mid-2020s to replace the B-1 and B-52 bombers, whereas the Ground Based Strategic Deterrent (GBSD) should replace the Minuteman III in 2028 (Kristensen and Norris, 2018a). The United States also plans to modernise its non-strategic nuclear weapons through its NATO membership. While the US nuclear modernisation programme has so far consisted in upgrading or replacing existing capabilities, recent declarations by President Donald Trump have suggested the United States may also increase the size of its arsenal (Zala, 2019).

20. **France:** In an address to France's armed forces in January 2018, President Emmanuel Macron committed to renew both components of the country's nuclear arsenal – sea and air – by 2035. The French government is allocating EUR 37 billion from 2019 to 2025 for the purposes of maintaining and modernising its nuclear arsenal – the amount budgeted represents almost 10% of the increase in the defence budget (Le Point, 2018). Paris plans to modernise its four ballistic missile-carrying submarines SSBNs, which will be equipped with a new version of the M51 ICBM by 2025 and has announced its intention to launch a new generation nuclear-powered SSBNs by the 2030s. A new air-to-surface system, the ASN4G, will replace France's air-launched supersonic cruise missile by 2035 (Granholm and Rydqvist, 2018; Le Point, 2018). In parallel, the *Rafale B* will replace the *Mirage 2000N* aircraft as the principal delivery system for the delivery of its air-launched cruise-missile arsenal (SIPRI, 2018).

21. **United Kingdom:** The United Kingdom is the only nuclear power that has reduced its nuclear arsenal to a sea-based component (Zala, 2019). The Trident submarine successor programme will replace the four ageing SSBNs in the United Kingdom's arsenal today. The new Dreadnought-class submarines are slated to enter into service in the early 2030s (SIPRI, 2018). The United Kingdom is also working on the extension of life of its Trident II missiles (Zala, 2019). The cost of these modernisation efforts, originally budgeted at GDP31 billion with an extra GDP10 bn to cover possible increases, is likely to increase as a result of significant cost overruns related to the nuclear reactor propulsion plant (SIPRI, 2018). In May 2018, the National Audit Office has warned that an extra GDP 2.9 bn would be necessary over the next decade to maintain the nuclear renewal plans (Polianskaya, 2018).

¹⁶ The 2017-2026 estimate projects an additional USD94 bn will be needed to meet the demands of the project.

NATO Nuclear Modernisation

22. US nuclear modernisation efforts will include the upgrade of the country's forward-deployed nuclear bombs on European bases. This will therefore require a modernisation of the facilities at which these weapons are stored, as well as the dual-capable aircraft used as the means of delivering the weapons in the event of a contingency. The United States and Allies are already taking the necessary steps to do this.

23. As part of its broader nuclear weapons systems modernisation programme, the United States is upgrading the B61 gravity bombs currently forward-deployed in Europe. The new version, the B61-12 guided nuclear bomb, is the result of the consolidation of five B61 variants. The guided, low-yield nuclear bomb will be delivered in the next decade, and the total production costs for the new B61-12 is estimated to be between USD7.5 and USD10 bn (GAO, 2018).

24. Lockheed Martin was awarded the USD350 million contract to adapt the F-35 joint strike fighter to be capable of carrying and firing the new B61-12. To date, Belgium, the Netherlands, Italy, and Turkey¹⁷ have chosen the F-35A as the replacement for their dual-capable aircraft (IISS, 2019). Germany has decided to replace its current PA-200 Tornados with the Eurofighter, but it has not announced whether or not it will purchase additional F-35As for its dual-capable mission responsibilities (Andreasen et al., 2018).

25. **Russia:** Like the United States, Russia is modernising across its nuclear triad. Over the past 15 years, Russia has worked to modernise its ICBM capabilities, focusing on the deployment of the multiple independently targetable re-entry vehicles (MIRV) version of the RS-12 (Podvig, 2018). It is also developing the RS-28 Sarmat, a new liquid-fuelled, MIRV-equipped heavy ICBM (IISS, 2019). Although the substitution programme has been slower than scheduled, the replacement of the remaining Soviet-era ICBMs should be completed by 2024. Russia is also modernising its nuclear infrastructures, such as silos, centres or garrisons (SIPRI, 2018).

26. In parallel, the sea-based component is undergoing similar modernisation efforts. A new version of SSBNs, the Borei class, is gradually replacing the remaining Soviet-era Deltas. Three of the Borei-class are already operational, while five more of an improved design could be deployed in the next three years (SIPRI, 2018). Finally, after modernising most of its Tu-95MS bombers, Russia has announced it was developing two next-generation bombers: the Tu-160M2, which should be produced after 2023, and the PAK-DA, which should be tested in 2021 and delivered in the mid-2020s. Some analysts, however, have questioned Russia's ability to carry out the simultaneous development and production of two strategic bombers (Zala, 2019).

27. In March 2018, President Putin revealed plans for six new nuclear weapon systems including two nuclear-powered weapons (an underwater drone and a cruise missile), an air-launched hypersonic missile and a hypersonic boost-glide vehicle. Moscow should therefore be expected to pursue sustained nuclear modernisation efforts (Zala, 2019).

28. **China:** As noted earlier, China maintains a relatively small, although slowly increasing, nuclear arsenal¹⁸. According to the country's official military strategy, Beijing's nuclear policy aims to "strengthen [China's] capabilities for strategic deterrence and nuclear counterattack" by improving the "strategic early warning, command and control, rapid reaction, and survivability and protection" capabilities (Chinese State Council, 2015). China's nuclear strategy therefore remains focused on securing its second-strike capability, without seeking to move beyond that point (Rose, 2018).

¹⁷ Due to Turkey's decision to purchase the S-400 air-defence system, the United States announced in early April it would suspend the delivery of essential parts for Turkey's F-35As (Baldor and Lee, 2019). This story was evolving at the time of drafting.

¹⁸ In 2010, China's estimated stockpile was of about 240 nuclear warheads. It increased to reach 250 in 2014 and 280 in 2018 (SIPRI, 2018).

29. China's nuclear modernisation, which has to a large extent improved the quality rather than the quantity of its nuclear arsenal, illustrates its desire to enhance the robustness of its nuclear forces. It has focused on improving its ability to respond to systems deployed by the United States and other countries, notably ballistic missile defences and precision-guided conventional strike systems (SIPRI, 2018; Kulacki, 2018). Moreover, China is particularly concerned with US progress in intelligence, surveillance, and reconnaissance capabilities. It is therefore currently replacing its ageing silo-based missiles with the mobile, solid-fuelled DF-41, with an estimated range of 12,000 km. To respond to the development of the US global missile-defence system, and to a lesser extent to Indian and Russian missile-defence systems, China has also developed several MIRVs (SIPRI, 2018). In parallel, China is developing its sea-based nuclear component: it has commissioned four, potentially five nuclear-powered SSBNs which can be equipped with JL-2 SLBMs. The JL-2, with a range of up to 7,200 km, 'will provide Beijing with its first sea-based nuclear deterrent' (Stewart, 2017).

V. WHAT FUTURE FOR ARMS CONTROL?

30. In the late 1970s and early 1980s, the United States and its NATO Allies were forced to respond to Russia's deployment of the SS-20 intermediate-range missiles, which caused Allies to worry Russia would be able to 'decouple' NATO North America from Europe by undermining the United States' willingness to defend its Allies in Europe in the event of a conflict with the Soviet Union. This led to the 'dual-track' approach consisting of US deployment of equivalent missile systems in Europe to offset any Russian advantage as well as engagement in negotiations to pursue arms control. US deployments of cruise missiles and Pershing II engendered significant public protests in Europe about the forward-deployment of new US missile systems (Lunn & Williams, 2019). A key finding of post-SS-20-crisis analysis of Alliance decision making underscores the vital role the earnest pursuit of arms control negotiations played in allowing for a period of nuclear calm to return to Europe (Lunn & Williams, 2019).

31. On 20 October 2018, President Trump announced his intention to withdraw the United States from the landmark 1987 Intermediate Nuclear Range Forces Treaty (INF), which eliminated all ground-launched nuclear and conventional missiles with ranges of 500-5500km. Current challenges associated with the INF Treaty go back as far as 2004 when Russia asked the United States if there could be a mutual withdrawal from the treaty. Since that time, there have been disagreements over the treaty. The United States believes Russia has not been compliant with the treaty since 2014 officially, but sources indicate bilateral disagreements over compliance pre-date this period (IISS, 2019). Specifically, the United States is concerned about Russia's RS-26 and 9M729 missile programmes – while the RS-26 predates the 9M729, the 9M729 is the missile system that 'broke the back' of the INF (IISS, 2019; SIPRI, 2018). The New York Times reported the 9M729 had been deployed by February 2017 (Gordon, 2017).

32. Since the Obama administration, the United States has made exhaustive diplomatic efforts to compel Russia back into compliance with the INF Treaty. However, despite such efforts, economic sanctions, and military messaging, Russia refused to comply and has relied on spurious arguments about non-compliance by the United States over the same period (IISS, 2019). Following the US declaration of Russian non-compliance with the INF Treaty, NATO Secretary General Jens Stoltenberg called on Russia to comply fully with the treaty. Summarising the Alliance's position about concerns of Russian non-compliance, Stoltenberg stated: "NATO has urged Russia repeatedly to address these concerns in a substantial and transparent way, and to actively engage in a constructive dialogue with the United States" (NATO, 2018). Russia responded to the mounting crisis by announcing its own withdrawal from the treaty in February 2019.

33. The INF Treaty falling into desuetude risks upsetting the global arms control architecture that has existed since the end of the Cold War. Washington's planned exit from the treaty calls into question the possibility of a renewal of New START, which is set to expire in 2021. New START is essential to limiting the number of new warheads in US and Russian arsenals, and the treaty has strong verification mechanisms, which further mutual trust of compliance in an era that badly needs such mechanisms.

34. The move to suspend the 1987 INF Treaty illustrates the heavy strain currently placed upon the classic model of nuclear arms control. Based largely on bilateral agreements between the United States and Russia, these accords have been increasingly jeopardised by the return of multipolar great-power competition and by rapid technological advancements. This deteriorating context, by endangering the stability of the management and manufacture of nuclear weapons, is paving the way for a potential new era of rearmament and, therefore, a destabilising arms race.

VI. INTERIM CONCLUSIONS AND RECOMMENDATIONS FOR NATO PARLIAMENTARIANS

35. Reversing a nearly three-decade collective effort to reduce nuclear weapons stocks, a worrying trend has emerged in recent years toward nuclear modernisation and, in some cases, expansion. While the global nuclear arms race was certainly destabilising during the Cold War, more actors with complex linkages abetted by new technologies are making a new nuclear arms race both more likely and dangerous.

36. New nuclear systems will be costly, as well as more vulnerable than legacy systems: advances in cyber, artificial intelligence, ballistic-missile defence systems, anti-satellite and submarine weapons, and precision-strike capabilities all render the defence of strategic forces more difficult. Modern systems will rely on potentially hackable electronic command and control communications systems. Further, technological advances, particularly with the near-term advent of a new generation of hypersonic missiles, are compressing the decision space for effective command and control of nuclear arsenals.

37. Given the above realities about the modern nuclear environment, will political leaders have time to react in a crisis? Would leaders move more quickly toward a nuclear strike if they viewed their strategic forces as too vulnerable at the outset of a conflict?

38. It is clear that an increase in the number of nuclear weapons across the globe creates a greater potential for accidents and theft. Challenges related to the safety and security of nuclear materials and know-how may also arise with many terrorist groups openly admitting to seeking the ability to acquire any form of nuclear capability.

39. NATO parliamentarians have a duty to remain informed of the evolution in the Alliance's nuclear policy in the face of the dual-challenge of new force modernisation and a deteriorating framework for nuclear non-proliferation. The advent of new modernised forward-deployed nuclear weapons systems is already drawing critical views among lawmakers and civilians alike across Europe and elsewhere. The ability to give informed responses to these dissenting voices in parliamentary constituencies is important.

40. It is clear that a new discussion about how to respond to Russia's development (and likely deployment) of the 9M729 is emerging in the Alliance. There will be a debate about the sufficiency of the current posture and its reliance on the strategic forces of the United States, the United Kingdom, and France. Certainly, there will be calls for an Allied deployment of a similar missile system in Europe to offset any Russian advantage. To understand how to negotiate such a discussion, Alliance political leaders should revisit the model of the last crisis of destabilising nuclear weapons systems in Europe, – a key lesson from this era being that no new military steps should be taken without a parallel effort to renew negotiated arms control agreements.

41. Finally, as members of the Defence and Security Committee learned on their recent visit to US Indo-Pacific Command in March, the context for the debate extends far beyond the Alliance. Part of the rush to develop and field new types of dual-capable missile systems is a response to China's growing arsenal, which has never been bound by the INF. In many senses, the INF crisis of today foreshadows the ways in which China will have an impact on the Alliance tomorrow.

ANNEX: INDIA, PAKISTAN, AND ISRAEL'S NUCLEAR MODERNISATION PROGRAMMES EXAMINED MORE CLOSELY

India: India is believed to be operating seven nuclear-capable systems: two aircraft, four land-based ballistic missiles, and one sea-based ballistic missile (Kristensen and Korda, 2018). In order to modernise its nuclear triad, it is developing at least five new systems. On land, India is seeking to expand the range of its Agni missile: the production of the intermediate-range Agni-IV missile should be launched shortly, whereas the near-ICBM¹⁹ Agni-V is entering the last test phases. There is speculation India is also developing an actual ICBM, the Agni-VI (Kristensen and Korda, 2018). In the air, Dehli is upgrading its current fleet of *Mirage 2000* and Jaguar IS/IB Shamsher aircraft in an effort to extend their service life and improve their capabilities. It could also potentially convert its recently-ordered 36 *Rafale* fighter jets to be nuclear capable (Kristensen and Korda, 2018). As the most recent addition to its nuclear forces, India is looking to expand its sea-based component via the acquisition of two to four additional SSBNs (Gady, 2017). Finally, it should also be noted India, which is estimated to possess enough military plutonium for 150 to 200 nuclear warheads, is building new plutonium-production reactors. This underscores Delhi's desire to increase its plutonium resources for missiles currently under development (Kristensen and Korda, 2018). This expansive nuclear strategy suggests the country is broadening its threat perspective to include China alongside its long-standing efforts to deter Pakistan (Kristensen and Korda, 2018).

Pakistan: Pakistan is believed to have the fastest-growing nuclear weapons programme, although projections of the size and scope of the programme's increase very significantly (Zala, 2019). Like India, it is expanding its production of fissile material. Furthermore, Islamabad has focused its modernisation efforts on land-based missiles: it is seeking to extend the range of the Shaheen-I short-range ballistic missile and of the Shaheen-II medium-range ballistic missile (MRBM). In addition, Islamabad is developing a new MRBM with MIRVs, the Ababeel (SIPRI, 2018). Pakistan has prioritised the development of missiles of relatively limited range, signalling its desire to strengthen the tactical level of its nuclear arsenal (SIPRI, 2018). The country's nuclear policy has sought to achieve a "full-spectrum deterrence posture" i.e. covering all three (strategic, operational and tactical) levels of nuclear weapons. This directly responds to India's "Cold Start" doctrine – a limited-war strategy that entails launching rapid and limited conventional offensive operations through units stationed at the border. Because of the offensive's limited scale, Pakistan would be unable to justify responding to India's attack with nuclear weapons (Sankaran, 2014). To a smaller extent, Islamabad is also modernising its squadron of nuclear-capable fighter jets through the replacement of its ageing *Mirage* with JF-17 Thunder aircraft, jointly developed with China (SIPRI, 2018). Finally, in line with its ambition to pursue parity with India, Pakistan has sought to develop a sea-based nuclear force. To this end, it is working on the development of a submarine-launched cruise missile (SLCM), the Babur-3 (SIPRI, 2018). Therefore, Pakistan's nuclear policy remains considerably linked to India's position on the matter (Zala, 2019).

Israel: Israel is expanding the range of its ballistic missiles. It is suspected to have deployed an intermediate-range missile, the Jericho III, in 2011 and to have tested its ICBM version in 2013 (SIPRI, 2018). Some have also indicated Israel may be developing nuclear-armed sea-launched cruise missiles, though this has not been confirmed (SIPRI, 2018).

¹⁹ India's Agni-V, with an approximate range of 5,000km, technically does not fall into the category of the ICBMs (usually 5,500+km). This, however, has been discussed, since this missile gives India the capability to strike China (Keck, 2018).

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