

Research Briefing

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# Nuclear weapons at a glance: Russia



## Summary

- 1 Nuclear status
- 2 Nuclear doctrine
- 3 Nuclear arms control agreements
- 4 Capabilities
- 5 Ongoing modernisation

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## Summary

In June 2020 the Russian Government published, for the first time, an updated version of its “Foundations of State Policy in the Area of Nuclear Deterrence”. Previously classified, the document sets out the basic principles of Russia’s nuclear doctrine:

- Russia’s nuclear deterrence policy is defensive in nature, to ensure Russia’s sovereignty and territorial integrity, along with that of its allies.
- Russia will maintain its nuclear weapons at a sufficient minimum level to ensure deterrence.
- The use of nuclear weapons will be as a last resort.

The document does not advocate “first use” in a nuclear scenario. Yet it does not rule out first use in response to a conventional attack under certain circumstances either. The debate therefore continues among Western scholars as to whether the concept of “escalate to de-escalate” is a central tenet of Russian nuclear policy.

Russia has the largest nuclear arsenal in the world, with a stockpile estimated at 5,977 warheads, of which 4,477 are operational (strategic, non-strategic and reserve).

Russia’s large arsenal of 1,910 non-strategic/tactical warheads are not currently subject to any arms control limitations.

Forces are organised on the nuclear triad principle. Russia does not operate a policy of continuous at-sea deterrence but patrols periodically.

Russia has been undertaking an extensive programme of capabilities modernisation since 2008. In 2018 President Putin outlined a number of new nuclear weapons capabilities under development that are intended to counter US missile defence systems. These include hypersonic missiles and glide vehicles, a nuclear-powered torpedo and a nuclear-powered cruise missile. In December 2021 the Russian Ministry of Defense said that modern weapons systems comprised 89% of its nuclear inventory.

This short paper is intended as an introduction to Russia’s nuclear weapons policies and programmes. It is part of a series of country profiles which are available on the [House of Commons Library website](#).

# 1

## Nuclear status

The Soviet Union tested its first atomic weapon in 1949.

Under the Nuclear Non-Proliferation Treaty (NPT) a nuclear weapon state is defined as one that manufactured and exploded a nuclear weapon, or other nuclear explosive device, prior to 1 January 1967.

Following the dissolution of the Soviet Union in late 1991, Russia was formally recognised as the sole nuclear weapon state under a Protocol to the US-Soviet Strategic Arms Reduction Treaty, which was signed in May 1992.<sup>1</sup>

Alongside the other permanent members of the UN Security Council (the P5), Russia is, therefore, one of the five officially recognised nuclear weapon states under the NPT.

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<sup>1</sup> The dissolution of the Soviet Union left Soviet nuclear weapons stationed on the territory of four newly independent republics - Russia, Kazakhstan, Ukraine and Belarus. Under the Lisbon protocol all four states became parties to the Strategic Arms Reduction Treaty (START I) and acceded to the NPT as non-nuclear weapon states.

## 2

# Nuclear doctrine

Historically, Russia has been far more secretive about its nuclear policies than the United States.

Much of the detail had been contained in a classified report, *Foundations of State Policy in the Area of Nuclear Deterrence to 2020*. Only references set out in Russia's Military Doctrine and its National Security Strategy gave an indication of Russian nuclear thinking. The 2014 Military Doctrine confirmed:

27. The Russian Federation shall reserve the right to use nuclear weapons in response to the use of nuclear and other types of weapons of mass destruction against it and/or its allies, as well as in the event of aggression against the Russian Federation with the use of conventional weapons when the very existence of the state is in jeopardy.

The decision to use nuclear weapons shall be taken by the President of the Russian Federation.<sup>2</sup>

In December 2015 President Putin approved a new National Security Strategy for Russia. Echoing the 2014 Military Doctrine the strategy stated:

Strategic deterrence and the prevention of armed conflicts are achieved by maintaining the capacity for nuclear deterrence at a sufficient level, and the Russian Federation Armed Forces, other troops, and military formations and bodies at the requisite level of combat readiness.<sup>3</sup>

Although not formally acknowledged in either document, the concept of “escalate to de-escalate” was also considered, by some Western analysts at least, to be a central tenet of Russian nuclear doctrine.<sup>4</sup> Under that concept Russia would contemplate the limited first use of non-strategic nuclear weapons in order to end a low-level conventional conflict in their favour.<sup>5</sup>

However, in a speech to the Valdai Club in October 2018, President Putin appeared to contradict this long-established belief on “escalate to de-escalate”, stating that:

Our strategy of nuclear weapons use doesn't envision a preemptive strike...our concept is a launch under attack.

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<sup>2</sup> The Military Doctrine of the Russian Federation, December 2014

<sup>3</sup> Russian National Security Strategy (English translation), December 2015

<sup>4</sup> This concept was referred to in the US' [2018 Nuclear Posture Review](#), p.8

<sup>5</sup> In an article for the RUSI Journal in May 2018 Katarzyna Zysk of the Norwegian Institute for Defence Studies, discusses, in detail, where this policy of 'escalate to de-escalate' has been referenced in Russian strategic documents.

Only when we become convinced that there is an incoming attack on the territory of Russia, and that happens within seconds, only after that we would launch a retaliatory strike”.<sup>6</sup>

## 2.1

# Clarifying Russian nuclear doctrine

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The debate over “escalate to deescalate” continues.

In June 2020 the Russia Government published, for the first time, an updated version of its [Foundations of State Policy in the Area of Nuclear Deterrence](#).

Whilst a welcome move in terms of transparency, the document was widely viewed as providing nothing substantially new in terms of Russia’s nuclear doctrine, from what has previously been expressed elsewhere. But it has been recognised as important in going some way toward helping the West’s understanding of Russia’s nuclear policies, and in particular concepts such as “escalate to deescalate”.

The document confirms the following:

- Russia’s nuclear deterrence policy is defensive in nature, to ensure Russia’s sovereignty and territorial integrity, along with that of its allies.<sup>7</sup>
- Russia will maintain its nuclear weapons at a sufficient minimum level to ensure deterrence. However, what Russia considers to be sufficient is down to its own interpretation of the international security environment.
- A proportion of nuclear forces will be maintained at permanent readiness.
- The use of nuclear weapons will be as a last resort.

Escalate to deescalate is not a policy directly set out in this document. Yet, it does state that “this policy provides for the prevention of an escalation of military actions and their termination on conditions that are acceptable for the Russian Federation and/or its allies”. The document also confirms that Russia will use nuclear weapons in response to a conventional attack that threatens the existence of the state, or one that targets the country’s critical state and military infrastructure, thereby threatening its ability to retaliate with nuclear weapons.

Russia’s new [National Security Strategy](#), approved by President Putin in July 2021, provides little further insight. The use of nuclear weapons in the event of an “existential threat” to Russia was, however, restated by Kremlin Spokesman, Dmitry Peskov, on 22 March 2022 when asked about possible Russian nuclear use within the context of the Ukraine conflict.<sup>8</sup>

The debate over “escalate to de-escalate” therefore continues.

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<sup>6</sup> As reported by [Radio Free Europe](#), 19 October 2018

<sup>7</sup> Largely interpreted to mean the other countries of the Collective Security Treaty Organisation (CSTO): Armenia, Belarus, Kazakhstan, Kyrgyzstan and Tajikistan.

<sup>8</sup> [Interview with CNN International](#), 22 March 2022

## Declaratory policy

The Foundations of State Policy in the Area of Nuclear Deterrence does not advocate “first use” in a nuclear scenario. This was confirmed by Kremlin Spokesman, Dmitry Peskov, in June 2000 when he said that Russia “will never initiate the use of nuclear weapons”.<sup>9</sup>

In January 2022 the five recognised nuclear weapon states (the P5) also issued a statement in which they affirmed that “a nuclear war cannot be won and must never be fought” and that nuclear weapons “should serve defensive purposes, deter aggression, and prevent war”.<sup>10</sup>

However, as outlined above, Foundations of State Policy in the Area of Nuclear Deterrence does not rule out first use in response to a conventional attack under certain circumstances. As Maxim Starchak, writing in a RUSI Commentary in June 2020 noted:

Three out of four reasons for the potential use of nuclear weapons as described in the latest document are not de facto nuclear threats, so the implication must be that Russia could, nevertheless, be ready to initiate a nuclear strike.<sup>11</sup>

## Alert status

Russia, like the United States, keeps its ground-launched nuclear forces (ICBM) at a permanent high state of readiness. Russia’s sea-launched ballistic missiles (SLBM) are thought to adopt a similar posture.

On 27 February 2022 President Putin ordered Russian nuclear forces to move to a heightened status of alert. Putin said he was issuing this order in response to escalating economic sanctions and “aggressive statements” being issued by the West following Russia’s invasion of Ukraine.<sup>12</sup>

In practice, analysts concur that the change in status is likely to relate to the command and control system of Russia’s nuclear forces, as opposed to visible moves toward deploying them.<sup>13</sup> As Dr Heather Williams noted in a recent commentary for RUSI:

The change in nuclear status should be seen more as a symbol of Putin’s willingness to take risks with nuclear threats, rather than necessarily his willingness to use nuclear weapons.<sup>14</sup>

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<sup>9</sup> [TASS Russian News Agency](#), 3 June 2020

<sup>10</sup> [Joint Statement of the Leaders of the Five Nuclear Weapon States](#), 3 January 2022

<sup>11</sup> “Russia’s new nuclear strategy: unanswered questions”, RUSI Commentary 26 June 2020

<sup>12</sup> TASS, [“Putin orders special service regime in Russia’s deterrence force”](#), 27 February 2022

<sup>13</sup> RUSI Commentary, [“Putin is a nuclear bully”](#), 1 March 2022 and Congressional Research Service, [Russia’s nuclear weapons: doctrine, forces and modernization](#) (PDF), 21 March 2022

<sup>14</sup> RUSI Commentary, [“Putin is a nuclear bully”](#), 1 March 2022

## 3 Nuclear arms control agreements

### 3.1 Bilateral arms control

After the Cuban Missile Crisis, and throughout the 1960s, there was mounting concern about the rapid expansion in the number of nuclear warheads and delivery systems. By the time the NPT was concluded in 1968 both the Soviet Union and the United States had a nuclear stockpile of tens of thousands of warheads apiece.

In response, bilateral talks aimed at restricting the nuclear arsenals of the Soviet Union and the US began. Over the decades that followed, a series of arms control regimes emerged.

A history of these bilateral arms control agreements is available in:

[Nuclear weapons: disarmament and non-proliferation regimes](#), House of Commons Library, June 2016

Of those agreements only the New START treaty, concluded in 2010, remains in force after President Biden and President Putin agreed to extend it in February 2021, for a period of five years.

The US officially withdrew from the Intermediate-Range Nuclear Forces (INF) treaty on 2 August 2019 after accusing Russia of violating the treaty.<sup>15</sup>

### Box 1: Provisions of New START

Under the terms of New START the US and Russia committed to:

1. A limit of 1,550 strategic operationally deployable warheads
2. A combined limit of 800 deployed and non-deployed intercontinental ballistic missile (ICBM) launchers, submarine launched ballistic missile (SLBM) launchers and heavy bombers equipped for nuclear armaments.

The treaty also established a verification regime that combines various elements of the original START verification regime and measures that are tailored to the current treaty.

Both sides are in compliance with the treaty,<sup>16</sup> which will remain in force until February 2026.

Discussions on a successor treaty to New START are currently on hold.

### A successor to New START?

In June 2021 the US and Russia [agreed to re-establish the bilateral Strategic Stability Dialogue](#) (SSD), which has, in the past, been the main forum through which nuclear arms control and risk reduction talks have taken place.

Talks took place in July and September 2021. A third round of strategic stability talks took place January 2022, amidst diplomatic efforts to avert a crisis in Ukraine. That meeting focused, however, on Russia's wider security concerns in Europe, as opposed to future arms control.<sup>17</sup>

While the US had indicated a willingness to continue dialogue on this issue,<sup>18</sup> the US administration suspended bilateral talks with Russia following its invasion of Ukraine at the end of February 2022. US Deputy Secretary of State, Wendy Sherman confirmed on 26 February that the US would not go ahead with Strategic Stability talks with Russia "under the current circumstances".<sup>19</sup>

As analysts at the Arms Control Association have noted, however:

<sup>15</sup> The INF Treaty is examined in greater detail in [Demise of the Intermediate Nuclear Forces Treaty](#), House of Commons Library, September 2019

<sup>16</sup> US State Department, [New START treaty aggregate numbers of strategic offensive arms](#)

<sup>17</sup> Russia's security concerns are discussed in greater detail in House of Commons Library, [European security: The outcome of talks with Russia](#), January 2022

<sup>18</sup> US State Department, [Press Briefing](#), 10 January 2022

<sup>19</sup> Interview with [Kommersant](#), 26 February 2022

The 2010 New Strategic Arms Reduction Treaty, which is the only remaining treaty limiting U.S. and Russian nuclear arsenals, expires in four years, which is a short period of time for negotiating and securing the necessary domestic support for a replacement arrangement.

Although Putin's regime must suffer international isolation now, US and Russian leaders must eventually seek to resume talks through their stalled strategic security dialogue to defuse broader NATO-Russia tensions and maintain common sense arms control measures to prevent an all-out arms race.<sup>20</sup>

## 3.2

## Other nuclear-related agreements

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### Article VI, NPT

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

### Nuclear Non-Proliferation Treaty

As a State Party to the NPT, Russia has a legal obligation to pursue disarmament under Article VI of that treaty.

### Comprehensive Test Ban Treaty

Russia signed the Comprehensive Test Ban Treaty in 1996 and ratified it in 2000.

In May 2019 the [Head of the US' Defence Intelligence Agency](#) claimed that Russia had "probably" violated the CTBT by carrying out low yield tests at a remote facility in the Arctic. The comments were met with criticism for repeating earlier claims that proved to be unsubstantiated. The Comprehensive Test Ban Treaty Organisation (CTBTO) said at the time that there was no evidence to back up the US' claims.<sup>21</sup>

In April 2020 the US State Department once again accused Russia of conducting nuclear tests "inconsistent with the zero-yield standard".<sup>22</sup> Russia has denied the allegations.

### Fissile Material Cut-off Treaty

Russia supports a verifiable ban on the production of fissile material for weapons purposes.

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<sup>20</sup> Arms Control Association, [Issue brief: Russia's war on Ukraine and the risk of nuclear escalation](#), 28 February 2022

<sup>21</sup> ["Russia probably violating nuclear test ban treaty"](#), The Guardian, 29 May 2019, and ["Nuclear watchdog chief: no evidence Russia is violating test ban"](#), The Guardian, 30 May 2019

<sup>22</sup> US State Department, [2020 Adherence to and Compliance with Arms Control, Nonproliferation and Disarmament Agreements and Commitments \(Compliance Report\)](#)

## Treaty on the Prohibition of Nuclear Weapons

Russia has not signed the [Treaty on the Prohibition of Nuclear Weapons](#) which entered into force in January 2021.

However, Kazakhstan, which has been involved in several Russian ICBM tests in the last few years, ratified the treaty in August 2019. Under the treaty States Parties have an obligation to ensure the elimination or irreversible conversion of all nuclear related facilities. This would include the test site at Sary-Shagan. It is unclear what the implications of Kazakhstan's ratification of the TPNW will mean for Russia's ICBM programme in the longer term.<sup>23</sup>

## Open Skies Treaty

In December 2021 Russia withdrew from the [Open Skies Treaty](#). The United States had already withdrawn from the treaty in November 2020. Although not specifically about nuclear weapons development or stockpile cuts, the treaty was considered an important arms control and confidence building measure as it allowed for unarmed reconnaissance flights to be conducted over the territory of any State Party to collect data on military forces and activities.

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<sup>23</sup> See "[Kazakhstan – once more a testing ground?](#)", Carnegie Endowment for International Peace, July 2019

## 4

## Capabilities

Since the end of the Cold War, Russia has relied on its nuclear arsenal, and its intercontinental ballistic missile (ICBM) capabilities specifically, as a means of power projection. Russia's nuclear arsenal has arguably also been used to offset the increasing obsolescence and inferiority of its conventional capabilities. Russia's sea and air-launched nuclear capabilities have, historically, been considered less technically advanced than its ICBM force.

For over a decade, however, Russia has been undertaking an extensive programme of military modernisation. Established in 2008, the intention of Russia's wholesale modernisation plan was to rebuild a cohesive military out of the old Soviet structures. As part of that programme, the modernisation of the strategic nuclear deterrent has been a priority.

While the broader plan has been beset with financial pressures and industrial challenges, upgrades to Russia's nuclear capabilities have remained largely unscathed.<sup>24</sup> In March 2018 President Putin announced details of several new nuclear weapons systems under development, intended to defeat US missile defence systems. Those new capabilities include hypersonic delivery systems,<sup>25</sup> a nuclear-powered torpedo and a nuclear-powered cruise missile. All form part of the State Armament Plan 2018-2027 and either have been, or are expected to, deploy over the next five years (see below).

In its 2021 annual update, the Russian Defence Ministry Board stated that Russia's nuclear forces were now equipped with 89% modern armaments across the whole of the nuclear triad.<sup>26</sup>

Russian nuclear weapons spending is largely classified. In 2019 the International Campaign to Abolish Nuclear Weapons (ICAN) estimated that Russia spent \$8.5 billion in that year alone on its nuclear weapons.<sup>27</sup> A previous SIPRI estimate in 2018 suggested that Russia spent 606 billion

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<sup>24</sup> Russia's rearmament programme and the challenges it has faced in its first decade is examined in greater detail in Library briefing paper CBP7877, [Russia's rearmament programme](#), January 2017

<sup>25</sup> Hypersonic weapons can travel five times faster than the speed of sound. There are generally two categories: cruise missiles powered by engines and glide vehicles which are launched nearly into space before diving back down to a target. Hypersonic cruise missiles are manoeuvrable and fly at lower altitudes making them more difficult to detect than a ballistic missile which flies on a more predictable trajectory. Such characteristics arguably make hypersonic missiles more destabilising as they reduce response time and it is difficult to distinguish between a nuclear and conventionally armed weapon.

<sup>26</sup> Although that figure varies between each leg of the triad. [Russian Defence Ministry Board Session](#), December 2021

<sup>27</sup> ICAN, [Enough is enough](#), 2019

roubles (\$10.8 billion) on nuclear weapons that year, around 13% of its total defence budget.<sup>28</sup>

## 4.1

### Stockpile

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Russia continues to have the largest nuclear arsenal in the world

Russia has the largest nuclear inventory of all the nuclear weapon states, capable of being delivered from land, sea and air (the nuclear triad). At present it is estimated to have a total inventory of 5,977 warheads, of which:

- 4,477 are active/operational warheads, including non-strategic warheads
- 1,500 are retired and awaiting dismantlement.<sup>29</sup>

The latest New START data exchanged between the US and Russia on 1 September 2021 showed that, of those 4,477 operational warheads, 1,458 were deployed strategic nuclear warheads (below the ceiling agreed in new START).<sup>30</sup>

### Tactical nuclear weapons

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Russia possesses a large inventory of non-strategic nuclear weapons.

Russia possesses a significant nonstrategic arsenal that is thought to total approximately 1,910 warheads.<sup>31</sup> Nonstrategic nuclear weapons are often referred to as tactical, or battlefield, nuclear weapons as they are intended for use within a limited battlefield context.

According to the Russian Ministry of Defence, non-strategic warheads are kept in central storage and are not deployed with their delivery systems.<sup>32</sup>

Russia retains a nonstrategic capability for two primary reasons: the existence of potential nuclear powers within Russia's sphere of influence and the deployment of US nuclear weapons in Europe. Such capabilities could also potentially be deployed against elements of the proposed US ballistic missile defence architecture in Eastern Europe.

Within the context of the current Ukraine crisis, fears have been expressed that Russia could resort to the use of tactical nuclear weapons to achieve its objectives.<sup>33</sup>

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<sup>28</sup> SIPRI Backgrounder, "[How much does Russia spend on nuclear weapons](#)", 1 October 2018

<sup>29</sup> Hans Kristensen and Matt Korda, Nuclear Notebook, [Russian nuclear forces 2022](#), 25 February 2022

<sup>30</sup> US Department of State, [New START Aggregate Numbers of Strategic Offensive Arms](#), 1 September 2021

<sup>31</sup> SIPRI, [World Yearbook 2021: World Nuclear Forces](#). This figure is thought to have increased slightly on previous years due to the recent fielding of dual-capable non-strategic weapons.

<sup>32</sup> Most analysts concur that storage facilities are often located near to operational bases.

<sup>33</sup> Dr Patricia Lewis, Chatham House, "[How likely is the use of nuclear weapons by Russia?](#)", 1 March 2022

## 4.2

### Fissile material

The extent of Russia's holdings of fissile material is uncertain. Although the country no longer produces fissile material for weapons purposes,<sup>34</sup> according to the latest figures from the [International Panel on Fissile Materials](#), Russia has approximately 678 tons of HEU and 128 tons of plutonium available for weapons production.

In October 2016 Russia suspended its cooperation in a bilateral agreement signed with the US in 2000 to dispose of 68 tonnes of excess weapons-grade plutonium (34 tonnes each).<sup>35</sup> The Russian Government justified its decision on the basis of “unfriendly actions” by the US and the inability of Washington to fulfil its own obligations under the agreement. The Russian Duma subsequently passed legislation setting out a number of conditions that would have to be met before Russia would resume cooperation under the agreement. Namely:

- The lifting of all US sanctions enacted in response to Moscow's actions in Ukraine in 2014.
- Compensating Russia for the damage caused by the sanctions
- Reducing the US military presence in Eastern European NATO countries.

The likelihood of the agreement being resurrected, given the current relationship between the US and Russia, is regarded as negligible.

## 4.3

### Ground based capabilities

The ground-based arm of the nuclear deterrent is operated and maintained by three Rocket Armies of the Strategic Missile Force, organised into 12 divisions operating both silo and mobile missile launchers.

According to SIPRI, the Strategic Missile Force has 310 ICBM at its disposal, collectively capable of carrying 1,189 warheads, although the ICBM force is thought to deploy around 800 warheads to meet arms control obligations.<sup>36</sup>

After more than a decade of modernisation, less than a quarter (73) are now Soviet-era ICBM: the RS-20 with MIRV capability (up to 10 warheads apiece), and the RS-12M mobile single warhead ICBM.<sup>37</sup> The RS-18 ICBM is thought to have been largely retired, although some have been used as a booster for the Avangard hypersonic boost glide vehicle (HGV), which was first deployed in

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<sup>34</sup> Russia announced a halt to highly enriched uranium production in 1989 and the cessation of plutonium production for weapons in 1994.

<sup>35</sup> [Plutonium Management and Disposition Agreement](#), 2000.

<sup>36</sup> SIPRI Yearbook 2021, p.351

<sup>37</sup> In contrast to 2017 when more than half of the ICBM inventory were Soviet-era missiles (Military Balance 2017).

2019. Russia is estimated to be installing Avangard equipped missiles at a rate of two per year, and the first Avangard regiment achieved its full complement of missiles in December 2021.<sup>38</sup> A second regiment is expected to be installed by 2027. The Russian Ministry of Defence has stated that the Avangard HGV falls within the scope of the New START treaty.

The remaining ICBM are Topol-M single warhead ICBM (both silo-based and road mobile) and the RS-24 Yars ICBM (road mobile and silo based) which has MIRV capability.<sup>39</sup> The older Soviet-era missiles are gradually being phased out to be replaced by these two ICBM variants. Previous estimates have put delivery of new Topol-M and RS-24 Yars ICBM systems at 40 per year.<sup>40</sup> The last of the Soviet-era missiles are expected to be phased out by 2024, although the slow pace of modernisation has left this timetable in question.

Russian ground forces also possess an undisclosed number of non-strategic (tactical) nuclear weapons. Estimates vary but SIPRI's 2021 assessment suggests that 90 warheads are assigned to 164 ground-launched, short-range ballistic missiles.<sup>41</sup> The majority are deployed on the dual-capable Iskander-M tactical short-range ballistic missile system, which over the last few years has reportedly been stationed close to NATO territory, for example around St Petersburg and in the Russian enclave of Kaliningrad, between Poland and Lithuania. More recently, Russia has also been deploying the nuclear-capable Novator 9M729 ground-launched cruise missile. With a range of between 500km and 5,500km, it was the fielding of this missile which led to the collapse of the Intermediate Nuclear Forces Treaty in August 2019.<sup>42</sup>

## 4.4 Naval capabilities

The Russian Navy currently has 10 operational SSBN (plus one in reserve for training), each equipped with 16 SLBM, at its disposal. The majority of those SSBN are Soviet-era platforms, dominated by the Delta IV class.

Russia does not operate a policy of continuous at-sea deterrence but patrols periodically. The adoption of this posture has been largely attributed to the possession of capabilities across the nuclear triad, and Russia's primary focus on its extensive ground-launched ICBM capability.

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<sup>38</sup> President of Russia, [Russian Defence Ministry Board Session](#), December 2021

<sup>39</sup> Deployment of the RS-24 began in 2010. The RS-24 is reportedly a modified Topol-M but was given a new designation in order to avoid potentially violating the obligations of the START treaty, or its successor, which prohibited increasing the number of warheads on existing missiles but did not preclude building new missiles.

<sup>40</sup> In 2016 strategic ground forces received 41 new ballistic missiles ([Statement to Extended Board Session of the Russian Defence Ministry](#), 22 December 2016)

<sup>41</sup> SIPRI Yearbook 2021, p.349. This excludes those assigned to anti-ballistic missile defence.

<sup>42</sup> This is examined in greater detail in Library briefing, CBP08634, [Demise of the Intermediate Nuclear Forces \(INF\) Treaty](#)

Modernisation of Russia's SSBN fleet has been a priority since 2008. The Delta IV SSBN have been upgraded to deploy with a modified SLBM, codenamed Sineva, which carries up to four warheads. Since 2008 five new vessels of the new Borei class have also entered service with the Pacific and Northern fleets. Two of those vessels are the improved Borei-A design. The first entered service in June 2020 and the second in December 2021.<sup>43</sup>

The first SSBN to be constructed since the end of the Cold War, the Borei class is equipped with 16 new Bulava SLBM, each with an operational range of 8-9,000 km and capable of carrying 6 warheads apiece. A total class of ten boats is anticipated by 2027, divided equally between the Pacific and Northern fleets, to replace the ageing Delta III SSBN which has largely been retired from service.

However, a series of testing failures of the Bulava missile in 2008 and 2009 delayed the programme which is now years behind schedule. Delays in the introduction of the Borei class has subsequently forced Moscow to retain the Delta IV-class SSBN in service until well into the 2020s. As such, the delay to the Borei class is not considered detrimental to Russia's sea-based nuclear posture, although it has raised questions as to the technical capabilities and overall condition of Russia's military-industrial complex.

Approximately 935 warheads are also thought to be assigned to Russia's naval forces for delivery via cruise missiles, anti-submarine weapons, torpedoes and depth bombs, including the Kalibr land attack sea-launched cruise missile, which entered service in 2017.<sup>44</sup>

## 4.5

### Air-launched capabilities

Russia's air-delivered nuclear capability is operated by Long Range Aviation Command from two strategic bomber bases at Engels in Saratov Oblast in Western Russia, and Ukrainka in Amur Oblast in the Russian Far East.

It consists of four squadrons operating 68 bomber aircraft: the Tu-160 'Blackjack' and the Tu-95MS 'Bear H'. Both aircraft are in the process of being incrementally upgraded with significant improvements to the aircrafts' weaponry, navigation and avionics. Those upgrades will allow both aircraft to remain in service until the late 2020s-early 2030s, and to deploy with the new KH-102 stealthy air-launched cruise missile (ALCM). While modernisation is progressing, the pace of delivery has, however, been slower than anticipated.<sup>45</sup>

One squadron deploys 13 Tu-160 and the upgraded Tu-160M1 aircraft. Both are equipped with up to 12 AS-15B nuclear air-launched cruise missiles

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<sup>43</sup> Hans Kristensen and Matt Korda, Nuclear Notebook, [Russian nuclear forces 2022](#), 25 February 2022

<sup>44</sup> SIPRI Yearbook 2021, p.357

<sup>45</sup> SIPRI Yearbook 2020, p.337

(ALCM). The Tu-160M1 is also equipped with the new KH-102 ALCM, which has a range of approximately 5,000km, twice that of the AS-15.

Three squadrons operate the Tu-95MS 'Bear H' (55 aircraft in total), each with between six and 16 AS-15A ALCM. 39 modernised aircraft (the Tu-95MSM) have been delivered thus far, including four in 2021, which are also equipped with the Kh-102. Both platforms can also be equipped with nuclear-armed free-fall bombs.

Approximately 495 non-strategic warheads are also estimated to be deployed on AS-4 air-to-surface missiles and free fall bombs assigned to tactical air forces.<sup>46</sup> The air force operates a medium-range bomber, the Tu-22M, which is capable of deploying with nuclear-armed cruise missiles. The Su-24, the Su-34 and the newest Su-57 combat aircraft can also be deployed in a tactical nuclear role.

In November 2019 Russia also conducted the first tests of the new Kinzhal hypersonic air-launched ballistic missile, deployed aboard a MiG-31K. That missile entered service in 2021.<sup>47</sup>

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<sup>46</sup> SIPRI Yearbook 2020, p.338

<sup>47</sup> President of Russia, [Russian Defence Ministry Board Session](#), December 2021

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## 5 Ongoing modernisation

Despite having already been in place for over a decade, modernisation programmes across all three legs of the triad are ongoing. As outlined above, in March 2018 President Putin revealed details of several new nuclear delivery systems that are expected to enter service over the next decade. Not all of these programmes are new, however. Some, including the new Sarmat ICBM programme, have been under development for many years.

### 5.1 Ground-launched nuclear capabilities

Work has been ongoing to develop a new silo-based ICBM, the RS-28 Sarmat, for some years. A replacement for the RS-20, it is expected to be capable of carrying up to 10 warheads. It has recently been suggested that a few may be equipped with the Avangard hypersonic glide vehicle.<sup>48</sup>

The first Sarmat prototype was due to be completed in March 2016, with entry into service expected in 2019/2020. However, flight testing of the missile has been delayed until 2022.<sup>49</sup> Given the delays in the testing programme, it is unclear when the missile may enter service. In November 2019 the Russian Ministry of Defence confirmed that the Sarmat ICBM would fall within the scope of the New START treaty.

As outlined above, Russia also plans to deploy two Avangard HGV regiments, each with six missiles, at Dombarovsky in southern Russia by 2027.

Russia is also developing the Burevestnik ground-launched nuclear cruise missile. Nuclear-powered, it has an estimated range of over 25,000km. While achieving intercontinental range, it would also be low flying and potentially radar evading, therefore posing a major challenge for any missile defence system. However, a fatal explosion in northern Russia in August 2019 is thought to have been caused by a test of the missile that went wrong, raising concerns over the viability of the programme. In October 2020 Russia was preparing to resume testing of the Burevestnik,<sup>50</sup> although experts still remain sceptical of the programme's future.

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<sup>48</sup> SIPRI Yearbook 2020, p.342

<sup>49</sup> TASS, [“First test launch of Sarmat ICBM postponed to 2022”](#), 20 December 2021

<sup>50</sup> “Satellite images indicate Russia is preparing to resume testing its nuclear-powered cruise missile”, CNN, 20 October 2020

## 5.2 Naval nuclear capabilities

Within the Russian Navy, further vessels of the Borei class SSBN, and its complement of Bulava SLBM are expected up to 2030. A total class of ten boats is anticipated, with the boats currently under construction expected to be the modified Borei-A.

Work is also expected to begin on a fifth generation SSBN, and equivalent SLBM, which will enter the production phase from 2031 onwards.

Russia's nonstrategic naval capabilities have also been the focus of modernisation, with the expected introduction into service of a new class of attack submarine, the Yasen, equipped with a new type of long-range sea-launched cruise missile which is nuclear capable. The Yasen class will also be able to deliver nuclear armed anti-submarine missiles as well as nuclear torpedoes.

As President Putin outlined in March 2018, the Navy has a ship-launched dual-capable hypersonic cruise missile (the Tsirkon) and a new long-range, nuclear-armed, nuclear-powered torpedo (Poseidon), under development.

The Tsirkon had initially been earmarked for deployment in the 2025-2030 timeframe. In April 2021, however, President Putin suggested that the Tsirkon would be placed on alert "in the near future".<sup>51</sup> Defence Minister, Sergei Shoigu, confirmed in December 2021 that acceptance trials for the missile were nearing completion and that deliveries would begin in 2022.<sup>52</sup> There have been reports that the Tsirkon could also be deployed aboard the Borei-class SSBN.<sup>53</sup>

Poseidon is expected to deploy after 2027. It will be deployed on two special-purpose submarines: the Belgorod and Khabarovsk, each capable of carrying up to 6 Poseidon torpedoes.

## 5.3 Air-launched nuclear capabilities

Modernisation of the Tu-160 and Tu-95 strategic bomber fleets remains ongoing, which will allow them to remain in service until the late 2020s-early 2030s.

Going forward the Russian Ministry of Defence is procuring a next generation strategic bomber (PAK-DA), to replace the fleet of Tu-160 and Tu-95 aircraft, and the Tu-22 in a tactical role. Flight testing of a prototype had been

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<sup>51</sup> Jane's Defence weekly, "Putin outlines development of nuclear triad", 22 April 2021

<sup>52</sup> Jane's Defence Weekly. "Shoigu outlines military priorities for 2022", 27 December 2021

<sup>53</sup> Jane's Defence Weekly, "Russian nuclear submarines conduct joint extreme depth exercises", 20 July 2021

expected in 2019, although the project has suffered delays. Construction of the first prototype PAK-DA is reported to have begun in May 2020, with flight testing expected in 2025 or 2026. Serial production is earmarked for 2028 or 2029. It is unclear when the PAK-DA will enter service.

In 2019 the Russian Government confirmed that it would restart the Tu-160 production line to manufacture up to 50 Tu-160M2 variants, starting in the early 2020s. Production is underway, with the first aircraft undertaking flight testing in January 2022. That aircraft is expected to enter service later this year, with serial production beginning in 2023, with a production rate of at least three aircraft per year.<sup>54</sup> The project is intended to fill a gap until the PAK-DA enters service. In February 2020 Russian media reported that the Tu-160 was also being modified to carry the hypersonic Kinzhal dual-capable ballistic missile.

Concerns have been expressed over the capacity of Russian aviation industry to manufacture two strategic bombers at the same time.<sup>55</sup>

Russia is also developing the nuclear-capable Kh-32 air-to-surface missile, which will upgrade the existing AS-4.

## Box 2: Suggested reading

- US Congressional Research Service, [“Russia’s nuclear weapons: doctrine, forces and modernization”](#), 21 March 2022
- Dr Patricia Lewis, Chatham House, [“How likely is the use of nuclear weapons by Russia?”](#), 1 March 2022
- Heather Williams, RUSI Commentary, [“Putin is a nuclear bully”](#), 1 March 2022
- Hans Kristensen and Matt Korda, [Nuclear Notebook: Russian nuclear forces, 2022](#)
- SIPRI Yearbook 2021, [World Nuclear Forces](#) (PDF)
- House of Commons Library, [Russia’s Rearmament Programme](#), January 2017

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<sup>54</sup> Jane’s Defence Weekly, “Russia flies newbuild Tu-160M bomber”, 13 January 2022

<sup>55</sup> Kristensen and Korda, Nuclear Notebook: Russian nuclear forces, 2020

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