The structure and composition of Russia’s nuclear forces largely reflect the evolution of the force that was created by the Soviet Union during the cold war. Russia continues to maintain the strategic triad of land-based intercontinental missiles, submarines with sea-launched ballistic missiles, and long-range bombers. In addition, Russia has kept its arsenal of tactical nuclear weapons, which is believed to include weapons that could be deployed on submarines, short- and intermediate-range aircraft, and air-defense missiles. Interceptors of the Moscow missile defence system are also believed to carry nuclear warheads.

Russia also maintains the infrastructure that was built to support operations of nuclear forces—an early-warning system that includes satellites and radars, and a command and control system that could allow the strategic forces to operate in the extreme conditions of a nuclear attack.

Nuclear weapons: stocks, deployed, storage, dismantlement

According to the most recent New START data exchange, in September 2011 Russia had 516 operationally deployed strategic launchers that carried 1,566 nuclear warheads. The actual number of delivery systems and warheads in the strategic arsenal is somewhat higher, mostly because New START does not accurately account for warheads associated with strategic bombers. Overall, as of 2011, Russia was estimated to have about 2,430 warheads in its strategic arsenal.

The number of warheads associated with non-strategic delivery systems is somewhat harder to estimate, for Russia never disclosed information about its tactical nuclear forces. It is believed to have about 2,000 non-strategic warheads that could be considered operational. According to Russia’s official statements, all these warheads are consolidated at centralized storage facilities.

In addition to warheads that are associated with operationally deployed strategic and non-strategic systems, Russia has a substantial number of warheads awaiting dismantlement. This category is estimated to include about 3,000 strategic and up to 3,300 tactical warheads. These estimates suggest that Russia has a total arsenal of about 11,000 nuclear warheads. Non-deployed nuclear warheads and the warheads that are awaiting dismantlement are stored at centralized facilities managed by the 12th Main Directorate of the Ministry of Defence.

Russia does not maintain a large stock of reserve in-active warheads that could be operationally deployed at a relatively short notice. Instead, it has traditionally relied on its capability to remanufacture warheads as necessary. It is estimated that Russia remanufactures about 200 warheads each year.

The number of warheads associated with operationally deployed strategic and non-strategic systems is unlikely to change significantly, since the deployment of new systems in the course of strategic modernization will be balanced by withdrawal of old warheads. The total number of warheads will probably decline in the coming years as Russia will continue its warhead dismantlement programme. The current dismantlement rate is believed to be about 400–500 warheads a year (this number includes warheads that are being remanufactured).

Russia’s warhead manufacturing capacity is sometimes quoted as giving it a capability to quickly increase the number of deployed nuclear warheads. While theoretically some of this capability does exist, in practice the number of warheads that Russia could deploy is determined by the availability of delivery vehicles rather than warheads. This is particularly true for strategic weapons—the number of warheads that Russia declared as operationally deployed (1,566 in September 2011)—its very close to the maximum number of warheads that Russia’s deployed missiles can carry, so any “surge capacity” that Russia may have is quite insignificant.

Delivery systems

Russia maintains the strategic nuclear triad that was built during the Soviet years—land-based intercontinental ballistic missiles (ICBMs), strategic nuclear submarines with submarine-launched ballistic missiles (SLBMs), and long-range bombers.

Land-based intercontinental missiles

The Strategic Rocket Forces that operate the ICBM leg of the strategic triad historically has been the largest component of the Soviet and Russian strategic forces. It currently includes about 330 operationally deployed
ballistic missiles of five different types that carry about 1100 warheads.\(^9\)

The oldest ICBMs in the force are liquid-fuel silo based missiles that carry multiple independently-targeted reentry vehicles (MIRV)—R-36M2 (Western designation SS-18) with ten warheads and UR-100NUTTH (SS-19) with six warheads. As of the end of 2010, the Strategic Rocket Forces had about 55 R-36M2 missiles and about 50 missiles of the UR-100NUTTH type. These missiles carry almost 840 warheads, more than half of all Russia’s operationally deployed strategic nuclear warheads. In addition, Russia has two types of single-warhead missiles—about 140 road-mobile Topol (SS-25) missiles and 70 missiles of the Topol-M (SS-27) type, which are deployed both as road-mobile and as silo-based missiles. In 2010 Russia also began deployment of a MIRVed version of the Topol-M missile. Known as RS-24 Yars, the missile is believed to carry up to four independently targeted warheads.

The main problem that Russia is facing regarding the land-based component of its strategic triad is that most of the currently operational ICBMs have reached the end of their lives and are being withdrawn from service. The SS-19 missiles were deployed in the early 1980s and although their service life was extended to 33 years, the missiles will have to be decommissioned in the next few years. Single-warhead SS-25 Topol missiles also have been removed from service for several years now, even though their service life has been recently extended to 25 years.\(^10\) All these missiles are expected to be withdrawn from service by 2020.\(^1\)

As a result of this process, by 2020 Russia’s ICBM force will consist of about 50 R-36M2/SS-18 MIRVed silo-based missiles and some 180 Topol-M and RS-24 ICBM, deployed in silos and on road-mobile launchers.\(^11\) The R-36M2 modification of the SS-18 missile, which was produced and deployed in the late 1980s/early 1990s, could probably stay in service as long as until 2026, provided its service life is extended to 33 years, which seems likely.\(^12\) Topol-M and its R-24 MIRVed version are relatively new missiles—the first Topol-M was deployed in 1997 and most of these missiles would probably be able to remain on duty until 2025-2030.

This composition of the force will allow Russia to maintain the size of the ICBM leg of the strategic triad at the level of about 1000 warheads through at least the mid-2020s.\(^13\) The Rocket Forces would therefore preserve their status as the key component of the strategic triad. To deal with the inevitable withdrawal from service of R-36M2 missiles, Russia has started development of a new MIRVed liquid-fuel ICBM that is supposed to replace R-36M2. This project is covered in more detail in the section on modernization.

**Strategic submarines**

As of the end of 2011, Russia’s strategic submarine force included six Project 667BDRM (Delta IV) submarines and three submarines of the older Project 667BDR (Delta III) class. Each submarine carries 16 SLBMs—R-29RM with four warheads and R-29R with three warheads respectively. While the total number of nuclear warheads that can be deployed on SLBMs is more than 500, about two submarines are in overhaul at any given time, which means that the number of operationally deployed SLBM warheads is about 400.\(^15\)

Submarines of the Project 667BDR class are currently based at the Pacific fleet base Vilyuchinsk at the Kamchatka peninsula. They will probably be withdrawn from service in the next few years and will be replaced by new Project 955 Borey submarines.

Most of the Project 667BDRM submarines underwent an overhaul in the last decade or so and would probably be able to stay in service for additional 10–15 years and probably longer. As part of the overhaul the submarines are receiving newly manufactured missiles of the R-29RM/SS-N-23 type. These missiles, known as Sineva, are essentially a moderate modification of the original liquid-fuel R-29RM missiles that submarines of this class were carrying before the overhaul. Russia has also tested a modification of the R-29RM Sineva SLBM that can carry up to ten warheads.\(^16\) This version of the missile, known as Liner, could be deployed on submarines alongside with the regular R-29RM Sineva missiles, increasing the number of SLBM warheads if necessary.

In 2012, Russia is expected to accept for service the first Project 955 Borey submarine equipped with the new Bulava SLBM. This will be a significant milestone for the programme that has experience serious delays from the very beginning. Construction of the lead ship of the Project 955 class, Yuri Dolgoruky, began in 1994, but initially it was designed to carry a different type of SLBM. In 1998, the government made the decision to develop the Bulava missile instead, resulting in a significant delay in the program. The submarine was eventually delivered to the navy in 2011 and performed a series of test launches of the Bulava SLBM. Second submarine of this class, Alexander Nevskiy, began sea trials in October 2011.\(^17\) One more submarine, Vladimir Monomakh, is under construction.

Development of the Bulava missile encountered some technical problems—it failed in eight out of 12 flight tests conducted in 2005–2009. After a serious overhaul of the missile production process, the flight test program eventually had a string of successful launches in 2010–2011. This will allow the navy to accept the missile for service in 2012.\(^18\) It is likely that the first two Project 955 submarines with Bulava missiles will begin service in 2012–2013.

According to the current plan, the Russian Navy expects to receive eight new submarines of the Project 955 class. Each submarine will be equipped with 16 missiles that are projected to carry up to six warheads each. If the Project 955 construction program is com-
pleted as planned, these submarines would be able to carry 128 missiles with 768 nuclear warheads. These submarines will replace Project 667BDR ships in the Pacific and eventually some of the Project 667BDRM submarines as well.

The strategic fleet rearmament programme is unlikely to significantly increase the size of the SLBM leg of the strategic triad. Taking into account the submarines in overhaul, the number of operationally deployed SLBM warheads will remain on the level of 400–500 warheads.

**Strategic bombers**

Strategic bombers traditionally played a secondary role in Soviet and then Russian nuclear postures. That role is unlikely to change in the future—there are no plans to do so. The modernization programme that is currently underway is aimed primarily at maintaining the strategic bomber force in its current configuration and giving the bombers the capability to carry out conventional missions.

In 2011, Russia had 72 heavy bombers—13 Tu-160 aircraft and 59 turboprop Tu-95MS. Together, these bombers are capable of carrying more than 800 air-launched cruise missiles, although the actual number of cruise missiles that are available for deployment is probably somewhat smaller. According to the New START accounting rules, each bomber is counted as carrying a single nuclear warhead, reflecting the fact that no bombers are routinely deployed with nuclear armaments and therefore cannot be considered as operationally deployed.

Most of the currently operational bombers were built in the late 1980s, so they are currently undergoing overhaul to extend their service life. As part of this process, which is expected to take up to 15 years, Tu-160 aircraft receive an upgrade of their avionics, which is supposed to equip them for missions with conventional high-precision munitions. Tu-95MS bombers also receive a moderate upgrade, but it appears that they will continue to be assigned nuclear missions.

**Early warning and command and control**

In addition to maintaining the full strategic triad, Russia has preserved key elements of the infrastructure that supports operations of strategic nuclear forces—the early-warning and command and control systems. It also operates a missile defence system deployed around Moscow that is supposed to protect the capital from a limited missile attack.

The early-warning system includes two tiers—a network of radars that could detect incoming missiles and a constellation of satellites that could provide early detection of missile launches.

Most of the early warning radars that were built during the Soviet time were located outside of Russia, so after the breakup of the Soviet Union Russia lost a number of important nodes of the network—Skrunda in Latvia, Mukachevo and Sevastopol in Ukraine. However, Russia preserved the capability to use the radars in Belarus, Azerbaijan, and Kazakhstan. In the 2000s, Russia also began deployment of new radars on its own territory that will eventually allow it to phase out those that are located outside Russia.

At the end of 2011, the Russian network of early warning radars included two old Daryal radars in Pechora and Gabala, Azerbaijan, built in the early 1980s. One Volga radar is operating in Baranovichi, Belarus. This radar is relatively new—it has been fully operational since 2002. Older radars of Dnestr-M/Dnepr type are deployed in Olenegorsk, Mishelevka (near Irkutsk), and Balkhash, Kazakhstan. These radars were built in the 1970s.

There are two types of new early warning radars that Russia has been deploying since the mid-2000s—Voronezh-M and Voronezh-DM. The first Voronezh-M radar was deployed in Lekhtusi (near St.-Petersburg) in 2006. Two Voronezh-DM radars have been built in Armenia at the south of Russia—they will replace the radars in Ukraine and Azerbaijan. A Voronezh-DM radar in the Kaliningrad region began initial operations in 2011. Two Voronezh-M radars are being built in Mishelevka and one Voronezh-DM radar is expected to be built in Barnaul. The radars in Pechora and Olenegorsk will be replaced by new Voronezh-type radars as well.

The space-based component of the early-warning system in 2011 included four satellites placed on highly elliptical orbits. The satellites worked as part of the system, known as US-KS, which first became operational in 1982. The current system is capable of detecting missile launches form the territory of the United States, but does not seem to be able to see launches originated elsewhere. Russia is developing a new space-based system, known as EKS, that will provide more reliable coverage of all areas of possible missile launches. The new system is expected to enter the flight test stage in 2012–2013.

The currently deployed command and control system that provides communication between the central command authority and individual launchers has been described as a “third-generation” system. According to the Russian military, this system provides the Strategic Rocket Forces not only with the capability to control individual launchers, but also with the flexible targeting capability. In 2012 the Strategic Rocket Forces are planning to begin deployment of a “fourth-generation” command and control system.

The missile defence system deployed around Moscow, known as A-135, includes the Don-2N battle-management radar in Pushkino and 68 short-range interceptors of the 53T6 (Gazelle) type, deployed in silos at five sites near Moscow. In the past, the system also included 32 long-range interceptors, but they have been withdrawn from the system. The interceptors are
believed to be equipped with nuclear warheads. The system has only a limited capability against a ballistic missile attack. According to Soviet estimates made at the time the system was being built, A-135 is able to intercept one or two “modern ICBMs”.

**Fissile materials**

Russia's stock of weapon-grade materials is far larger than it would be necessary to support the current nuclear force. At the end of 2011 Russia was estimated to have about 128±8 tonnes of weapon-grade plutonium, of which 88 tonnes is either in weapons or available for military purposes, and about 737±120 tonnes of highly enriched uranium (HEU). Of this amount, about 666 tonnes are available for weapons and for fueling naval, research, and civilian reactors.²⁵

The total amount of weapon-grade plutonium produced in Russia is estimated to be 145±8 tonnes. About 17 tonnes have been used in nuclear tests or lost in waste or lost nuclear warheads.²⁶ Russia shut down most of its plutonium production reactors in the early 1990s. Three reactors, however, continued to operate until 2008–2010, since they provided heat for nearby cities.²⁷ About 15 tonnes of plutonium that have been produced by these reactors after September 1994 are covered by Russia's pledge not to use it for military purposes. Also, Russia declared 25 tonnes of plutonium from its pre-1994 stock as excess to national security needs. This material is not available for military purposes as well, leaving the potential military stock of 88 tonnes.

The 25 tonnes of excess military plutonium and 9 tonnes of the plutonium produced after 1994 will be eliminated as part of Russia's obligations under the US-Russian Plutonium Management and Disposition Agreement that was finalized in April 2010.²⁸ In September 2010 the United States and Russia invited the International Atomic Energy Agency (IAEA) to establish verification measures with respect to the plutonium disposition program.²⁹

The plutonium disposition program in Russia will include elimination of the weapon-grade plutonium in fast reactors. Only one of these reactors, BN-600, is currently operational. The second one, BN-800, is currently under construction and is expected to begin operations in 2014. In order to begin the plutonium elimination activities, Russia will have to develop the technology to produce plutonium-containing fuel assemblies for the BN reactors and to build a facility that will manufacture the fuel. The United States and Russia pledged to commit about $3 billion toward this goal ($300 million provided by the United States), but they do not expect the disposition activities to begin before 2018.³⁰

In addition to the weapon-grade plutonium, as of the end of 2010 Russia had 48.4 tonnes of unirradiated separated civilian plutonium.³¹ Virtually all this material is stored at a dedicated storage facility at the RT-1 reprocessing plant at the Mayak Combine.

The Soviet Union stopped production of highly enriched uranium (HEU) in 1988. Before that it had produced about 1470±120 tonnes of 90% HEU equivalent. About 287 tonnes of HEU have been used in various applications, military as well as civilian.³² In addition to the weapons complex, among the largest users of HEU in Russia are the submarine fleet, civilian nuclear-powered ships, and the two tritium production reactors. Also, Russia operates more than 80 research reactors, critical and subcritical assemblies that use highly-enriched uranium.³³

There are two major HEU elimination programmes in Russia—the US-Russian HEU-LEU deal, also known as the Megatons to Megawatts programme, and the Material Conversion and Consolidation project. The HEU-LEU program blends down military-origin HEU to produce low-enriched uranium that is then used to fuel US nuclear reactors. The programme, which began in 1996, will eliminate 500 tonnes of HEU by 2013, when it is scheduled to end. As of the end of 2011, it has successfully eliminated 442.5 tonnes of HEU.³⁴ The Material Conversion and Consolidation project is also a joint US-Russian effort. It provides Russian research facilities with US financial assistance in order to eliminate their stocks of HEU by blending it down. The amount of HEU eliminated by the program was expected to reach 13.5 tonnes by October 2011 and 17 tonnes by October 2015, when the programme will end.³⁵

To sum this up, the two programmes eliminated 456 tonnes of HEU as of the end of 2011. They are expected to eliminate additional 61 tonnes in the coming years. This leaves about 666 tonnes of HEU that is available for military or civilian use.

Most of the military nuclear material that is not in use is stored at one of the large storage facilities managed by the Rosatom State Corporation. These facilities are located in so-called closed cities—Ozersk, Seversk, Zheleznogorsk, Sarov, and Snezhinsk.³⁶ The weapon-origin plutonium that Russia declared excess to its national security needs has been moved to the Fissile Material Storage Facility at Mayak, which Russia built with US assistance.³⁷ The facility is expected to store 25 tonnes of weapon-origin plutonium.³⁸ The weapon-grade plutonium produced after 1994, which Russia pledged not to use for weapons purposes, will be stored in Zheleznogorsk.³⁹

**DEVELOPMENT AND PRODUCTION INFRASTRUCTURE**

**Nuclear weapons**

The work on nuclear weapons development is the responsibility of nuclear weapon laboratories that are subordinated to the State Corporation Rosatom—the All-Russian Scientific Research Institute of Experimental Physics (VNIIEF) in Sarov (formerly Arzamas-16) and the All-Russian Institute of Technical Physics (VNI-
ITF) in Snezhinsk (Chelyabinsk-70). The third laboratory, the All-Russian Institute of Automatics (VNIIA) in Moscow, is involved in weapon research that does not deal with fissile material components. The laboratories also take part in civilian research programs.

The weapon laboratories conduct research that allows them to maintain the current nuclear arsenal and develop new nuclear warheads. In particular, they developed warheads for new ballistic missiles that are introduced to active service—Sineva, Bulava, RS-24, and Liner. The new warheads are reportedly based on the designs that were tested before the end of nuclear testing in Russia. To support the weapon development process Russia conducts subcritical experiments at the nuclear test site at Novaya Zemlya and relies on computer models.

In addition to weapon development, Rosatom is responsible for all aspects of fissile material production and for storage of military-related nuclear material that is not used in weapons or in other military applications (e.g. fuel of naval reactors).

In the past, Rosatom operated plutonium production reactors at the Mayak Plant in Ozersk (Chelyabinsk-65), Siberian Chemical Combine in Seversk (Tomsk-7), and the Mining and Chemical Combine in Zheleznogorsk (Krasnoyarsk-26). All these reactors have been shut down. In 2012 Rosatom is expected to close the chemical reprocessing plant in Zheleznogorsk that has been extracting weapon-grade plutonium from spent fuel of production reactors.

The military reprocessing plants in Seversk and Ozersk have been shut down earlier.

The Mayak Plant continues to operate two production reactors, Ruslan and Lyudmila, that were built to provide tritium for the weapon program. Since Russia has plenty of tritium from dismantled weapons, these reactors have been converted to the production of isotopes for civilian purposes. However, they maintain the capability to produce tritium if necessary.

Russia’s uranium enrichment complex includes the Urals Electrochemical Plant in Novouralsk (Sverdlovsk-44), Siberian Chemical Combine in Seversk (Tomsk-7), Electrochemical Plant in Zelenogorsk (Krasnoyarsk-45), and Electrolyzing Chemical Combine in Angarsk. All these facilities operate gaseous centrifuges to enrich uranium. With the exception of Angarsk, all of them were involved in production of HEU for the military programme, which was discontinued in 1988. Today, all enrichment plants produce low-enriched uranium for civilian purposes.

Russia operates two major warhead assembly and dismantlement facilities—the Electrochemical Instrument Combine in Lesnoy (Sverdlovsk-45) and the Instrument Building Plant in Trekhgorny (Zlatoust-36). The plant in Lesnoy has the capability to produce and handle HEU components for nuclear weapons. Plutonium components of nuclear charges are handled at the metallurgical facilities of the Mayak Plant, which can also produce HEU components. The weapon laboratories, VNIIEF and VNIITF, also have small-scale material handling and warhead assembly and disassembly facilities. All these facilities provide Russia with the capability to maintain its current active nuclear arsenal by providing the necessary remanufacturing capability.

Delivery systems

Development of land-based and sea-based ballistic missiles is mostly concentrated in two design bureaus that act as primary contractors for a strategic system. The Moscow Institute of Thermal Technology (MIT) is the lead design organization for solid-propellant ballistic missiles. It has developed Topol (SS-25), Topol-M (SS-27), and RS-24 ICBMs and the Bulava SLBM. It is also working on a range of other projects. The second design bureau, the Makeyev State Missile Center in Miass, is the lead developer of submarine-launched ballistic missiles. The Center designed the R-29R and R-29RM SLBMs that are currently deployed on Project 667BDR and Project 667BDRM submarines. It also designed the new modifications of the R-29RM missile—Sineva and Liner. In 2011, the Makeyev design bureau was awarded a contract to develop a new liquid-fuel silo-based ICBM.

All solid-propellant ballistic missiles are produced at the Votkinsk Plant. There are three types of strategic missiles that are currently in production—Topol-M and its RS-24 Yars modification, and Bulava. Liquid-fuel missiles are produced at the Krasnoyarsk Machine-Building Plant. Today, the plant is manufacturing Sineva and Liner modifications of the R-29RM missile.

The lead design organization responsible for development of strategic submarines is the Central Design Bureau for Marine Engineering “Rubin” in St.-Petersburg. This design bureau developed all ballistic missile submarines of the Russian Navy—Project 667BD, Project 667BDRM, and Project 955. The only class of submarines that is currently in production is Project 955 Borey (and its modifications). These submarines are built at the Sevmash ship-building plant in Severodvinsk.

Strategic bombers that are currently in service—Tu-95MS and Tu-160—were developed by the Tupolev design bureau that remains the leading developer of long-range bomber aircraft. As of 2011, no new aircraft are being produced. However, some planes are undergoing modernization at the Kazan Aviation Plant (Tu-160) or at the Taganrog Aviation Plant (Tu-95MS).

ECONOMICS AND MODERNIZATION PLANS

Modernization of the strategic forces is part of the broader rearmament programme that is expected to spend 19 trillion rubles (about $600 billion at the current exchange rate) on various military systems in 2011–2020. About 10% of the total funds allocated for
rearmament, or 1.9 trillion rubles, will be spent on the modernization of the strategic forces.\textsuperscript{47} It should be noted, however, that the state rearmament program for 2006–2015, which was as ambitious as the new one, fell far short of its goals, so it is far from certain that the 2011–2020 programme will be completed as planned.\textsuperscript{48}

Military spending is one of the largest spending categories in Russia's federal budget. In 2012 the government expenditure is expected to reach 12.7 trillion rubles, which means that the rearmament programme will account for about 15 percent of the government spending. Indeed, the three-year budget plan assumes that the share of military spending in the budget will increase from 14.6 percent in 2012 to 18.8 percent in 2014. At the same time, the budget plan calls for reduction of a number of social programmes—for example, spending on education will decrease from 5.1\% in 2011 to 3.4\% in 2014; on health, from 4.6\% to 3.2\%.\textsuperscript{49}

The Russian government has not published a full account of specific strategic weapons modernization programmes or their cost. Nevertheless, the publicly available information allows one to outline the key elements of the strategic modernization effort.

Rearmament of the ICBM leg of the strategic triad concentrates on deployment of multiple-warhead RS-24 Yars missiles. These ICBMs will replace the currently deployed Topol (SS-25) and, to some extent, UR-100NUTTTH (SS-19) missiles. Being a multiple-warhead missile, RS-24 allows Russia to keep the number of deployed warheads at the relatively high level without the need to produce a large number of missiles. At the same time, if future arms control agreements would require it, Russia could quickly reduce the number of deployed warheads without decommissioning its ICBMs.

In addition to the RS-24 deployment, Russia is working on a number of other ICBM projects. In 2011 the government made a decision to begin development of a new multiple-warhead liquid-fuel ICBM.\textsuperscript{50} The new missile is supposed to be ready for deployment in 2016, although the development will almost certainly take longer. Another new ICBM is developed by the Moscow Institute of Thermal Technology. There is almost no information about this project beyond the fact that the missile failed in a test conducted in September 2011. It appears that it has not received a full approval yet.\textsuperscript{51}

At this point, there are no plans to extend modernization of the strategic fleet beyond the planned construction of eight Project 955 submarines. Starting with the fourth or fifth hull, the submarines will receive an upgrade—the new submarine is known as Project 955A class—but the number of new submarines and the type of missiles they will carry will remain unchanged. Depending on the progress with construction of new submarines the six older ships of the Project 667BDRM class might stay in service longer than previously planned, probably until 2020. If so, they are likely to receive the Liner modification of the R-29RM SLBM, which could carry up to ten warheads, allowing the navy to maintain the number of warheads in the sea-based leg of the strategic triad at the level of 400–500 warheads in the event of delay with the construction of Project 955 submarines.

As far as the strategic aviation is concerned, in the next few years Russia will continue an overhaul of its current strategic bomber fleet. At the same time, it started preliminary work on a new-generation strategic bomber, known as a PAK DA (Advanced Aviation System for the Long-Range Aviation). It is expected that the Tupolev Design Bureau will present a preliminary draft design of the new aircraft in 2012 and produce a prototype in 2020. The new bomber is not expected to enter service until about 2025.\textsuperscript{52}

Russia's strategic modernization plans demonstrate that it is determined to maintain its strategic nuclear forces and to preserve the parity with the United States in the number of warheads and delivery systems. Arms control and disarmament efforts could change these plans and result in a smaller force, but it is likely that most of the reductions would be done by reducing the number of deployed warheads rather than by eliminating strategic launchers.

Financial constraints could also affect the scale of strategic modernization. Although Russia has managed to minimize the effects of the recent economic recession, its economy is heavily dependent on export of natural resources, so a fall in oil and gas prices could force the government to reconsider its spending priorities. However, the rearmament effort appears to have strong support of the political leadership and the public, so significant cuts of the modernization programme are unlikely. This situation may change if the political environment in Russia would allow an open discussion of government spending priorities and the role of nuclear weapons in the national security policy, but so far this discussion has been very limited.

\textbf{INTERNATIONAL LAW}

Issues related to the legitimacy of nuclear weapons under the international law are rarely discussed in Russia. The official National Security Doctrine, approved in 2009, calls for maintaining “strategic stability” and lists strengthening Russia’s strategic nuclear forces as one of the priorities of the national defense policy.\textsuperscript{53} The military doctrine adopted in 2010 also emphasizes the role of Russia's nuclear forces in maintaining strategic stability in the world.\textsuperscript{54}

Although the official documents do not question Russia’s right to possess nuclear weapons, they also recognize its responsibilities as a nuclear weapon state member of the nuclear Non-Proliferation Treaty (NPT). The national security doctrine recognizes the goal of building a world free of nuclear weapons as part of the overall progress toward strategic stability with equal
security for all.55 High priority is also given to nuclear disarmament and to nuclear non-proliferation.

In its military doctrine, Russia reserves the right to use nuclear weapons “in response to a use of nuclear or other weapons of mass destruction against her and (or) her allies, and in a case of an aggression against her with conventional weapons that would put in danger the very existence of the state.”56 While this policy assumes the right to a first use of nuclear weapons, the range of scenarios in which Russia would consider using nuclear weapons is somewhat limited. It should be noted that early versions of the military doctrine apparently included an option of preventive use of nuclear weapons, which was later removed from the document.57

As part of the bilateral US-Russian nuclear arms reduction process, Russia has substantially reduced its strategic nuclear arsenal. Both countries consider these reductions to be their contribution toward the goals of Article VI of the NPT.58 In addition, Russia periodically reiterates its commitment to the US-Russian Presidential Initiatives of 1992, in which the two countries declared their intent to substantially reduce their arsenals of non-strategic nuclear weapons. Russia concentrated all its non-strategic nuclear weapons at centralized storage facilities on its national territory.59 However, Russia has been reluctant to discuss legally-binding measures related to its tactical nuclear weapons before the United States removes its nuclear weapons from Europe.

PUBLIC DISCOURSE

Public opinion in Russia tends to support the nuclear status of the country—according to a poll conducted in 2006, 76 percent of all the respondents believed that Russia “needs nuclear weapons.” More than half of the population consider nuclear weapons to be the main guarantee of the security of the country and about 30 percent of respondents believe that nuclear weapons play an important, although not a decisive, role.60

The public discussion of issues related to nuclear weapons reflects these attitudes—their role in providing for the security of the country is almost never questioned. To a large extent, the lack of critical assessment of the role of nuclear weapons is a result of the lack of an open and informed discussion of national security priorities and policies that would involve independent voices. While there are non-governmental research organizations that are involved in the discussion of defence policies, there are no independent public organizations that would have nuclear weapons related issues on the agenda. Accordingly, the public discussion is focused largely on technical issues of US-Russian arms control negotiations and nuclear non-proliferation.

The strategic modernization programme described above is also rarely criticized, despite its very substantial cost. The government has presented the programme as an essential element of the strategy that would allow Russia to maintain its nuclear arsenal and to preserve approximate parity with the United States. This strategy, in turn, has been described as the only way to preserve the sovereignty of the country and its status in international affairs.61 In general, public opinion in Russia tends to view favourably the efforts to support the defence industry and introduce modern equipment to the armed forces.62 Government policy and public attitudes combine to ensure that the strategic modernization efforts undertaken by the Russian government will continue as one of the high-priority programmes that are unlikely to be affected by budgetary pressures.

NOTES

3. Ibid.
4. “[A]ll Russian non-strategic nuclear weapons have been withdrawn from the territory of the former USSR to Russia and concentrated in the central storage facilities.” Statement by the Delegation of the Russian Federation on Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons at the second Session of the Preparatory Committee for the 2011 Non-Proliferation Treaty Review Conference, Geneva, 28 April–9 May 2008.
5. Kristensen and Norris, op. cit.
8. Ibid.
9. Russia has not made public its part of the New START data exchange, so these numbers are an estimate based on the aggregate numbers that were released in October 2010. “The New START Treaty,” op. cit. This estimate assumes that the composition of the Strategic Rocket Forces is as follows: R-36M—55 missiles, UR-100NUTTH—48, Topol—146, Topol-M (silo and road-mobile)—70, RS-24—9. Because of the uncertainty in this estimate, the numbers in the text are rounded.
14. This assumes that 50 R-36M2 missiles will carry 500 warheads, 78 Topol-Ms—78 warheads, and about 100 RS-24—400 warheads.
15. This estimate assumes that four Project 667/BRM submarines and three Project 667/BDRM submarines were operational at the time of the last New START data exchange in October 2011. Since then, one more Project 667/BDRM submarine, K-84 Ekaterinburg, entered overhaul, temporarily reducing the number of operationally deployed SLBM warheads to 326.
30. “United States and Russia sign protocol to plutonium disposition agreement,” op. cit.
42. Pavel Podvig, Consolidating Fissile Materials in Russia’s Nuclear Complex, op. cit., p. 10.
44. Two other major warhead assembly facilities—the Avangard Plant in Sarov/Arzamas-16 and the Start Production Association in Zarechny/Penza-19—have been shut down. Pavel Podvig, Consolidating Fissile Materials in Russia’s Nuclear Complex, IPFM Research Report #7, May 2009.
51. “What was the ICBM that crashed in Plesetsk?” RussianForces.org, 28 September 2011, http://russianforces.org/blog/2011/09/what_was_the_icbm_that_crashed.shtml.

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