Executive summary
“A-Day” First atomic bomb explosion at Bikini in the Marshall Islands 1 July 1946 © Science in HD, Unsplash
There are various estimates of the size of China’s nuclear arsenal. The Federation of American Scientists (FAS) estimated in 2019 that China has a total stockpile of approximately 290 nuclear warheads for delivery by about 180–190 land-based ballistic missiles, 48 sea-based ballistic missiles, and bombers.\(^1\)

Based on Chinese publications and Western governmental and non-governmental estimates, this author estimates that in 2020 China has a total inventory of approximately 360±50 nuclear warheads, including approximately 280±50 nuclear warheads for delivery by approximately 175±24 land-based nuclear ballistic missiles (of which approximately 132±19 can reach the continental United States), approximately 80 warheads for its submarine-launched ballistic missiles (SLBMs), bombers, and retired warheads. This stockpile is likely to grow further over the next decade as additional nuclear capable missiles become operational. In particular, the number of China’s ICBMs have increased significantly since 2015, driven mainly by expansion in US missile defence programmes as many Chinese believe. China’s arsenal may be somewhat larger than France’s but is smaller than the US and Russia.

Modernisation

Since 2015 China has shown it is quickly modernising its nuclear force through adding more and “better” intercontinental ballistic missiles (ICBMs) and multiple independently targetable re-entry vehicles (MIRVs).

China’s ongoing nuclear weapons modernisation aims to increase the survivability, reliability, safety, and permeating ability of its small nuclear arsenal and thereby assure a limited, reliable, and effective counterattack capability in order to “deter” a first nuclear strike. Hu Side, the former president of Chinese Academy of Engineering Physics emphasised, “China’s nuclear modernisation [is conducted] under the guideline of China’s nuclear policy, maintaining the principle of counterattack in self-defense and avoiding [an] arms race.”\(^2\)

Economics

It is difficult to estimate the cost of China’s nuclear weapon force. Chinese experts of nuclear weapons believe China invests at a very low level for its nuclear weapon programmes.\(^3\) China’s officially announced military budget of 1.19 trillion yuan (US $177.5 billion) for 2019 is an increase of 7.5 per cent over the 2018 budget of US $167.4 billion.\(^4\) This accounted for less than two per cent of its gross domestic product (GDP) and about one fourth of the US military budget of 2019.

However, some foreign analysts suspect that the Chinese official data misrepresent the real Chinese military spending. For instance, the Stockholm International Peace Research Institute (SIPRI) estimated that total Chinese military spending in 2018 was about US $250 billion, about 1.5 times that of China’s official figure in 2018.\(^5\)

International law and doctrine

Since its first nuclear explosion in 1964, China has maintained what it calls a “minimum deterrent” and a no-first use (NFU) pledge, both of which it says are aimed at avoiding a costly nuclear arms race.

China signed the Comprehensive Test Ban Treaty (CTBT) in 1996 but has not yet ratified it. It has stated that it supports negotiating “a non-discriminatory, multilateral and internationally effectively verifiable fissile materials cut-off treaty (FMCT) under the framework of the Conference on Disarmament (CD) on the basis of the Shannon Mandate as early as possible. China opposes any attempt, even in disguised form, to start the negotiation of the FMCT out of the framework of the CD.”\(^6\) China’s official policy has long called for “the complete prohibition and thorough destruction of nuclear weapons,” which was reiterated in its 2010 White Paper on Defense.\(^7\) Furthermore, the White Paper stated that to “attain the ultimate goal of complete and thorough nuclear disarmament, the international community should develop, at an appropriate time, a viable, long-term plan with different phases, including the conclusion of a convention on the complete prohibition of nuclear weapons.”

However, China did not participate in the negotiation of the Treaty on the Prohibition of Nuclear Weapons (TPNW) and has said it will not sign or ratify it.
Recently, the US government under President Trump demanded that China agree to join in arms control restraints before it will agree to extend the New Strategic Arms Reduction Treaty (New START). Beijing has rejected such a request.

Public discourse

Beijing has made its nuclear policies clear by issuing defence white papers since 1998, but China has kept information about its stocks of fissile materials and nuclear weapons secret. The Chinese public gets information about its nuclear force posture mainly through Western publications. While some scholars and security analysts in China frequently challenge the government’s official nuclear policies, in particular its unconditional non-first-use pledge, there are few civil society groups that engage in critical analysis of China’s nuclear weapons policies and programmes. The voices against China’s nuclear weapon programme have been very weak in China. However, concerns about the safety of nuclear facilities, in particular in the wake of Japan’s Fukushima nuclear energy disaster in March 2011, are increasing along with the emergence of antinuclear movement in some local communities within China.8

Democratic People's Republic of Korea (DPRK)

Ko YouKyoung

Current status

The Democratic People’s Republic of Korea (DPRK) has been conducting nuclear test explosions since 2006 and is expected to have a current arsenal of around 35 assembled nuclear warheads.9 While the Democratic People’s Republic of Korea (DPRK) has rarely disclosed information about its nuclear programme, there is a growing body of data provided externally by experts and intelligence agencies based on official DPRK statements, information provided during negotiations, and satellite imagery. Occasionally, the DPRK has invited foreign scientists and inspectors to visit its nuclear facilities to demonstrate its capabilities. The DPRK has also announced the results of successfully conducted nuclear and missile tests.

The DPRK has tested a nuclear explosive device six times between 2006 to 2017. One source assessed that “after the six nuclear tests—including two with moderate yields and one with a high yield—there is no longer any doubt that the DPRK can build powerful nuclear explosive devices designed for different yields.”10 The DPRK has a large and diverse arsenal of land-based ballistic missiles and has tested submarine-launched ballistic missiles. In one assessment, the parts of this arsenal that are confirmed to be operational are close-range ballistic missiles, short-range ballistic missiles, and two of its three medium-range ballistic missiles. One of two intermediate-range ballistic missiles may be close to operational status, and one ICBM may have a limited operational capability, while as many as four are in development.

Economics

There is little data on the cost of the DPRK’s nuclear and missile programmes. In December 2012, an official from the Republic of Korea’s (ROK) Ministry of National Defense told reporters that it estimated the DPRK spent US $1.74 billion on missile development and US $1.1–1.5 billion on nuclear development for a total of US $2.8–3.2 billion.11 Other unconfirmed media reports put South Korean estimates of the DPRK’s nuclear programme at US $1–3 billion, with the higher number combining nuclear and missile development.

Critics have denounced the DPRK government for investing in a nuclear and missile programme at the expense of the national economy and public welfare. They contend that the DPRK should instead divert its resources toward feeding its people and providing clean water and medical supplies. But some also maintain that economic sanctions should remain in place until the complete, verifiable, and irreversible dismantlement of
the DPRK’s nuclear programme. Alternatively, some humanitarian and civil society groups argue that the United States and the DPRK should formally end the Korean War with a peace agreement to help facilitate a shift in the government’s investments.

International law and doctrine

According to the UN Office for Disarmament Affairs (UNODA), the DPRK is categorised as a state party to disarmament treaties of 1925 Geneva Protocol (1988), Antarctic Treaty (1987), Biological Weapons Convention (1987), Convention on Environmental Modification Techniques (1894), Outer Space Treaty (2009), and the NPT (1985)—though the DPRK says it withdrew from the NPT in 2003. The DPRK is not a party to the Comprehensive Nuclear-Test-Ban Treaty (CTBT). It is also not party to the Treaty on the Prohibition of Nuclear Weapons (TPNW), though it voted in favour of the resolution in October 2016 to convene negotiations in 2017 on a "legally binding instrument to prohibit nuclear weapons, leading towards their total elimination".

The DPRK presents itself as a country that is in principle in favour of global denuclearisation, but legally entitled and practically “forced” to develop nuclear weapons for self-defence due to the ongoing state of war with a nuclear-armed state, the United States. It does not consider itself to be party to any binding agreement generally limiting its nuclear programme. It notably considers that it lawfully withdrew from the NPT in 2003, although according to UNODA, “States parties to the Treaty continue to express divergent views regarding the status of the DPRK under the NPT.”

A longer history of the DPRK’s withdrawal from the NPT; the Six Party talks, responses from the international community and current status of dialogue with the United States and the ROK is included in the complete chapter on the DPRK.

Public discourse

To people in the Korean peninsula and the region, public discourse on the DPRK’s nuclear weapons has been focused on how to achieve denuclearisation along with a peace regime on the peninsula. There have been various and diverse public discourses from different perspectives for over 75 years as the armistice regime has been maintained without political settlement to replace it into a peace agreement.

According to the Asan Report in July 2018, 71.8 per cent of South Koreans rated the US-DPRK summit as positive. As perceptions on the prospect for the denuclearisation of the DRPK improved, 62.6 per cent of South Koreans were optimistic about DPRK’s implementation of the agreement.

In the United States, the public discourse on DPRK’s nuclear weapons is dominated by those who advocate resuming large-scale military exercises and maintaining sanctions as leverage to denuclearise the DPRK. Increasingly however, experts and civil society groups are challenging this conventional view.

France

Hans M. Kristensen

Current status

As of early 2020, France possessed a stockpile of an estimated 290 nuclear warheads. Approximately 200 of these warheads are deployed or operationally available for deployment on short notice. This includes about 160 warheads on two of the three deployable submarines and up to 40 cruise missiles on bomber bases. The third submarine might take longer to ready and the cruise missiles for the Charles De Gaulle aircraft carrier are stored on land. France’s nuclear posture is based on two types of delivery vehicles: aircraft and ballistic missiles.

France has recently completed fielding a new class of ballistic missile submarines and aircraft. A modified ballistic missile with a new warhead is being back-fitted onto the submarines. A new class of ballistic missile submarines and a new air-launched cruise missile are in development.

France is no longer thought to be producing fissile materials for nuclear weapons. Large quantities produced during the Cold War are more than sufficient for the current warhead level.
France is not increasing its nuclear forces, nor does it show any indication that it intends to reduce them in the near term. Instead, France continues to reaffirm the importance of nuclear weapons and the 2017 Defence and National Security Strategic Review concluded that maintaining the nuclear deterrent “over the long term” is essential.16

Economics

Assessing the total cost and breakdown costs of French nuclear forces is difficult. The French Ministry of Defense says France allocated at least US $4.9 billion (€4.5 billion) to nuclear forces in 2019,17 an increase of more than 10 per cent compared with €4 billion in 2018.18 But the total apparently does not include all costs.19 The increase is part of an “exceptional increase”20 of military spending in response to what is seen as a deteriorating security environment in Europe and elsewhere. In total, the French government says it will spend €25 billion (US $28 billion) on its nuclear forces in the five-year period between 2019 and 2023.21

International law and doctrine

France continues to reaffirm the importance of nuclear weapons and the 2017 Defence and National Security Strategic Review concluded that maintaining the nuclear deterrent “over the long term” is essential. In February 2020, French President Macron delivered a speech outlining his vision for France’s nuclear “deterrence” strategy.22 In it, he stressed the role of nuclear weapons within European security policy that was widely seen as offering a wider role for France’s nuclear weapons in the security of the rest of the continent,23 including the suggestion that other countries could participate in French nuclear deterrence exercises and war games. Macron’s speech dismissed calls for nuclear abolition as an “ethical debate” that lacks “realism in the strategic context”.

France is a state party to the nuclear Non-Proliferation Treaty (NPT) having ratified the Treaty in 1992.24 France signed the Comprehensive Test Ban Treaty (CTBT) in 1996 and ratified it jointly with the United Kingdom in 1998.25 This brought to an end more than three decades of destructive and controversial nuclear weapon testing that involved a total of 210 tests, almost 200 of which took place in the South Pacific.26 It also stressed for many years the importance of negotiating a Fissile Material Cut-off Treaty (FMCT) within the United Nations’ Conference on Disarmament.

France did not participate in the negotiations of the Treaty on the Prohibition of Nuclear Weapons (TPNW) and has indicated it does not intend to accede to it.

Public discourse

Although there is some debate in France over the composition and cost of the nuclear forces, it is not a very prominent debate. Moreover, the French government has strongly opposed ideas for additional reductions in its nuclear forces—neither unilaterally nor as part of a potential NATO decision to reduce its nuclear forces in Europe. Although the French government will insist that its recent reduction of the land-based air-delivered nuclear force is consistent with France’s obligations under article VI of the NPT to pursue nuclear reductions, its rejection of additional reductions and its ongoing modernisation of its nuclear forces might be seen as being out of sync with those obligations.

Recent polling shows strong opposition to nuclear weapons amongst adults aged 20 to 35, referred to as “millennials”. For example, a 2019 poll, commissioned by the International Committee of the Red Cross (ICRC), found that 81 per cent of French millennials think that it is never acceptable to use nuclear weapons in wars or any armed conflict, and 80 per cent agreed that the existence of nuclear weapons is a threat to humanity.
India is estimated to have 130–140 nuclear warheads. It is also developing a range of delivery vehicles, including land- and sea-based missiles, bombers, and nuclear-powered and nuclear-armed submarines. There are no official estimates of the size of India’s stockpile of fissile materials, though it is known that India produces both HEU for its nuclear submarines and plutonium for weapons. India is estimated to have a stockpile of 3.2 ± 1.1 tons of HEU as of the end of 2014. With regard to plutonium, India is estimated to have a stockpile of 0.69±0.14 tons of weapon-grade plutonium as of the end of 2019. There has been speculation that India has used reactor-grade plutonium in its nuclear weapons, in which case, the nuclear arsenal could potentially be much larger: as of the end of 2014, between around 7.7±4.1 tons of reactor grade plutonium, of which about 0.4 tons are under IAEA safeguards.

Modernisation

The primary focus of modernisation has been on increasing the diversity, range, and sophistication of nuclear delivery vehicles. This includes aircraft, land-based missiles and submarine-launched missiles. The longest range missile in the Indian arsenal is the three-stage, 5,000 kilometer range Agni V, which is fired from what is described as a canister rather than a fixed concrete launch pad. The canister design allows for missiles to be launched quickly and for the missile to be transported by trucks on roads, hence making it harder to locate. Agni-V was successfully tested in December 2018 and is supposed to be inducted into the Indian army in 2020. India has also developed a cruise missile, which is described as nuclear capable, with a range of over 1000 km called Nirbhay, which had its first successful test in November 2017 after several failures, and subsequently successfully tested again in April 2019.

India has been developing two submarine-launched ballistic missiles (SLBM), the K-15 and the K-4. K-15, which is also termed the B-5 or the Sagarika, is a nuclear-capable SLBM with a range of 750 kilometres and was reportedly tested thrice by users from a submarine that was “positioned nearly 20-meter deep in the sea, about 10-km off the” eastern coast of India in August 2018.

Since then, the missile has reportedly been deployed on India’s nuclear-powered and nuclear-armed submarine, the Arihant, that was described as having gone on a “deterrent patrol” in 2018. The Arihant’s four launch tubes will reportedly be capable of carrying 12 K-15s. In addition to Arihant, a second nuclear-powered submarine, variously called Arighat and Aridhaman, is reportedly under construction and expected to be commissioned in 2020–2021, and this will be followed by two more.

Economics

The expansion of India’s nuclear and missile arsenals are part of a larger military build-up and consistently-increasing military spending. However, there is no reliable public estimate on nuclear weapon spending in India. According to the Stockholm International Peace Research Institute (SIPRI) database on military expenditures, India spent Rs. 4547 billion, or 66.6 billion constant 2017 US dollars (USD) in 2018, up from Rs. 3107 billion (54.2 billion USD) in 2014. Between 2014 and 2018, India was the world’s second-largest importer of major arms and accounted for 9.5 per cent of the global total. Traditionally, the majority of its imports came from Russia but in recent years the share of imports from Israel, the US, and France have been increasing. The current government seeks to increase exports of weapons, promote the privatisation of public sector companies involved in the defence sector, and increase provision of contracts to private companies, either singly or as public-private partnerships, to manufacture defence equipment.

International law and doctrine

India has not signed either the nuclear Non-Proliferation Treaty (NPT) or Comprehensive Test Ban Treaty (CTBT). This is in line with the Indian government’s historical focus in arms control diplomacy, namely to resist signing onto any international treaties that impose any obligations on its nuclear arsenal. This allows the government to maintain that it is a responsible member of the international community because it has not breached any agreement.

According to India’s official nuclear policy, India has a policy of no-first use of nuclear weapons. But there have been signs that this commitment might not be reliable. In 2019 the current defence minister Rajnath Singh reiterated
that the no first use policy might change in the future, a statement that was particularly relevant because it was made during a period of heightened tension in Kashmir.40

Public discourse

The expansion and modernisation of nuclear weapons has been accompanied by claims about India becoming a powerful nuclear state. Many official announcements about the achievement of any new capability will be accompanied by a statement about how India has reached some exclusive set of countries with that particular capability. While Pakistan is the traditional target of the media, there has been an increased focus on being able to attack China, although this is usually phrased as being able to ‘defend against’ China.41

Israel

Sharon Dolev

Israel neither confirms nor denies the existence of its nuclear programme since the late 1960s, yet it has been widely assumed that Israel possesses nuclear weapons.42

Current status

Estimates about the size of the arsenal are based on the informed speculation and unconfirmed revelations dating back to 1986.43 Experts and analysts estimate that Israel’s current nuclear force ranges from 60 to over 400 weapons44 with 80 warheads being the most cited figure. Israel has a nuclear triad made up of its Dolphin submarines, modified aircraft, and nuclear-tipped Jericho missiles. It is assumed that Israel has deployed between 50 to 100 ballistic missiles45 capable of carrying nuclear warheads.46 It is also believed47 that on 6 December 2019, Israel conducted a test launch of what is assumed to be a Jericho-IV missile with a range of “thousands of kilometers”48.

Israel’s 200 F-16 Falcons, with a range of 2500km and F-15 Eagles (Boeing) have long been the backbone of the Israeli Air Force (IAF). The former is recently being replaced by the new Lockheed-Martin F-35I. All three models are used to carry nuclear weapons by NATO or the US Air Force.

As of January 2016, Israel’s fleet includes five Dolphin-class submarines built in Germany.49 One more submarine should become operational by the end of 2020.50 Estimates51 are that these submarines are part of Israel’s “second strike” capability52, probably using Popeye, Harpoon or Gabriel missiles.

There are two main nuclear facilities in Israel: The Shimon Peres Negev Nuclear Research Center (NNRC), located near Dimona, operating since the 1960s. The reactor’s capacity was initially 24 MWt, and now it is believed to be between 40–70 MWt53 or even 150 MWt.54

The Israeli Atomic Energy Commission (IAEC), secretly created in 1952,55 oversees Israel’s nuclear activities.56 Responsibility for the IAEC falls under the prime minister’s office and it reports directly to him.

Economics

The Stockholm International Peace Research Institute (SIPRI) estimates Israel’s total military spending for 2018 at B 15.88 USD57 And the 2011 Global Zero report58 estimated that 11.53 per cent of military spending allocates to nuclear weapons. compiling this information, we arrive at an estimate of B 1.839 USD for 2018.

International law and doctrine

Israel is not a party to any of the major arms control related treaties and therefore, argues that it is not bound by them. The policy of ambiguity has shaped Israel’s behaviour in the international arena. Israel is a member state of International Atomic Energy Agency (IAEA) since 195759 and signed several conventions concerning civilian and humanitarian aspects of nuclear research and use.60 Israel abstained from participating in all humanitarian conferences preceding to the negotiations towards the Treaty on the Prohibition of Nuclear Weapons (TPNW),61 voted against the UN General Assembly to commence the negotiations in 2017, and voted against the adoption of the treaty.62
A weapons of mass destruction free zone (WMDFZ) was first proposed in the Middle East by Egypt in 1990 with backing from Iran. In 1995, the NPT Review and Extension Conference with a specific resolution calling for the establishment of a WMDFZ in the Middle East. This resolution linked the indefinite extension of the NPT to commitments to create such a zone. At the 2010 NPT Review Conference, states parties agreed to practical steps to progress toward establishing the WMDFZ. A subsequent conference was convened in November 2012. In 2018, UN General Assembly First Committee adopted a resolution, submitted by the Arab states, to convene a regional conference on the zone by the end of 2019, outside of the NPT process.

The first conference on the zone was convened at the UN Headquarters in New York in November 2019, with the presence of all twenty-two-member states of the Arab League, Iran, four nuclear-armed states (China, France, Russia, and the United Kingdom), relevant international institutions, a handful of civil society organisations and the absence of Israel and the US.

Public discourse

While ambiguity outside Israel mainly covers the question of possession, the ambiguity inside Israel has a different magnitude. There is some limited discussion in academic circles amongst a small group of academics and think tanks, usually comprised of those who used to be part of the security system, and a steadily growing number of discussions in the media, though the focus is usually on Iran’s nuclear programme and not Israel’s.

On 29 August 2018, Prime Minister Binyamin Netanyahu stood outside the Dimona reactor and said to the media that any country that threatens to destroy Israel risks meeting a similar fate. This kind of direct threat, along with reports on missile tests and “slips of the tongue” by Israeli officials, are seen outside of Israel as nuclear threats and as “maintaining deterrence,” but all this seems to be unseen or less understood by the Israeli media and, as a result, by the Israeli public.

Pakistan

Zia Mian

Current status

As of the start of 2020, Pakistan was believed to have around 150–160 nuclear weapons, an almost ten-fold increase from the year 2000. This arsenal is projected to grow to perhaps 250 weapons by 2025. Pakistan has a number of short-range, medium, and longer-range road-mobile ballistic missiles as well as ground-launched, air-launched, and sea-launched cruise missiles in various stages of development that are capable of delivering a nuclear warhead. It is estimated that Pakistan could have a stockpile of 3.6 tonnes of weapon-grade highly enriched uranium (HEU) and almost 350 kilograms of plutonium as of 2020. It continues to block talks on a fissile material cut-off treaty at the United Nations Conference on Disarmament (CD).

Modernisation

Pakistan is moving from an arsenal based wholly on HEU to greater reliance on lighter and more compact plutonium-based weapons, which is made possible by a rapid expansion in plutonium production capacity. As of 2020, it has four plutonium-production reactors in operation. Pakistan’s arsenal has moved from aircraft-delivered nuclear bombs to include nuclear-armed ballistic and ground and air launched cruise missiles and from liquid-fueled to solid-fueled medium-range missiles. It has been testing a sea-launched cruise missile to be deployed on submarines.

Economics

There is almost no reliable information about the funding and environmental consequences of Pakistan’s nuclear weapons programme. It is clear that a significant fraction of Pakistan’s financial resources go to its nuclear weapons, but that this cost is not a large share of its overall military spending. Despite extensive foreign military assistance, Pakistan’s effort to sustain its conventional and nuclear military programmes has come at increasingly great cost to the effort to meet...
basic human needs and improve living standards and the country continues to rely on extensive bilateral and international economic aid.

Environment

Local communities have raised concerns about health and environmental effects from uranium mining, radioactive waste disposal, and nuclear weapons testing but there is a lack of detailed technical information due to secrecy on the part of the government and independent confirmation of the claims.

International law and doctrine

Pakistan is not a signatory to the nuclear Non-Proliferation Treaty (NPT) nor has it signed the Comprehensive Test Ban Treaty (CTBT) and it appears to recognise no legal obligation to restrain or end its nuclear weapons and missile programme. Pakistan has blocked negotiations of a fissile material cut-off treaty at the CD. While the government has said it supports negotiation of a nuclear weapons convention, Pakistan did not join the talks in 2017 on the Treaty for the Prohibition of Nuclear Weapons.

Public discourse

The government has sought to create a positive public image of the nuclear weapons programme, often by linking it to national pride and identity. Pakistan’s major political parties support the nuclear weapons programme. The central thrust of most public debate about Pakistan’s nuclear weapons is the struggle with India, especially over the disputed territory and status of the people of Kashmir, which continues to be the focus of concern and a driver of possible conflict that could escalate into conventional war and into nuclear war.

Russia

Pavel Podvig

Current status

According to the most recent New Strategic Arms Reduction Treaty (New START) data exchange, in September 2019 Russia had 513 operationally deployed strategic launchers that carried 1,426 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 2019, Russia was estimated to have about 1,600 deployed warheads in its strategic arsenal. The total number of warheads associated with strategic launchers is estimated to be about 2,700. 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 1,800 non-strategic warheads that could be considered operational and another 2,000 awaiting dismantlement.

The Strategic Rocket Forces of the strategic triad has historically been the largest component of the Soviet and Russian strategic forces. As of early 2020, it includes about 320 operationally deployed ballistic missiles of five different types that carry up to 1,180 warheads.

As of the beginning of 2020, Russia’s strategic submarine force included six Project 667BDRM (Delta IV) submarines; one submarine of the older Project 667BDR (Delta III) class; and three new Project 955 Borey submarines. A new submarine of the Project 955A Borey-A class, a moderate upgrade of the Project 955, will enter service in 2020. It is estimated to have 66 heavy bombers.

At the end of 2019 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.

Modernisation

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 maintains and modernises the strategic triad of land-based intercontinental
missiles, submarines with sea-launched ballistic missiles, and long-range bombers. The modernisation programme also includes a number of non-traditional delivery systems, such as a hypersonic glider vehicle, a nuclear-powered cruise missile, and an underwater nuclear-powered vehicle. 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-defence missiles.

Economics

Modernisation of the strategic forces is part of the broader rearmament programme. The 2011–2020 State Armament Program allocated 20 trillion rubles (about US $600 billion at the exchange rate at the time) for various military systems. About 10 per cent of the total funds allocated for rearmament, or 1.9 trillion rubles, was spent on the modernisation of the strategic forces. The current State Armament Program, signed into law in 2017, covers the period from 2018 to 2027. The difficult process to approve the new programme illustrates that financial constraints could affect the scale of strategic modernisation. The Russian economy is heavily dependent on export of natural resources, so a fall in oil and gas prices has already forced the government to reconsider its spending priorities.

International law and doctrine

The issues relating to the legitimacy of nuclear weapons under international law are rarely discussed in Russia. Although official documents and statements do not question Russia’s right to possess nuclear weapons, they also recognise its responsibilities as a nuclear-armed state party to the nuclear Non-Proliferation Treaty (NPT). The National Security Strategy approved in 2015 recognises the goal of building a world free of nuclear weapons as part of overall progress toward “strategic stability” with equal security for all.72

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. 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 centralised storage facilities on its national territory.73 However, Russia has been reluctant to discuss legally binding measures related to its non-strategic 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. More than half of the population consider nuclear weapons to be the main guarantee of the security of the country and about 30 per cent of respondents believe that nuclear weapons play an important, although not a decisive, role.74

Public discussion of issues relating to nuclear weapons rarely questions the role of these weapons in Russia’s national security. The strategic modernisation programme described above is also rarely criticised, despite its potentially very substantial cost. In general, public opinion in Russia tends to view favourably the efforts to support the military industry and introduce modern equipment to the armed forces. Government policy and public attitudes combine to ensure that the strategic modernisation efforts undertaken by the Russian government will continue as a high priority programme that is unlikely to be affected by budgetary pressures.
United Kingdom
Janet Fenton

Current status

The United Kingdom has 120 operationally available nuclear warheads as part of a larger stockpile of around 180. There are four Vanguard class submarines which carry eight ICBM missiles and 40 warheads, each with a yield of 100 kilotons. The warheads are manufactured and serviced in England and transported by road to and from the atomic weapon storage facility at Coulport and the submarines are based close by at Faslane on the Gare Loch in Scotland.75

Modernisation

The new Dreadnought class submarines will be built by BAE at Barrow-in-Furness in Cumbria. As with the Trident system, the UK will have access to United States’ D5 missiles from a common pool, which are currently being upgraded along with other key parts of the system. In a context of close collaboration between British and American nuclear weapon labs, the warheads will be manufactured in the UK with improved accuracy in delivery, meaning that the same number of destinations can probably be targeted with a reduced number of missiles.76

The modernisation programme is critically affected by cost over-runs, delays to the building of infrastructure, difficulties in recruiting submariners and scientific staff, bottlenecks in dock space, faulty engineering, and inadequate project oversight. The new submarine class is unlikely to be ready to replace the current fleet when the Vanguard boats reach their already extended projected lifetime.77

Economics

Non-governmental estimates for the lifetime costs of the replacement programme range from £172 billion to £205 billion. Actual costs are obscured by complex budgeting arrangements and there persists an overall lack of transparency on the part of the government.78 The economic challenge to the replacement programme is intensified by the reality of the era of austerity and the COVID-19 emergency, which has highlighted human needs as a priority but shows that government spending plans can change dramatically when required.

International law and doctrine

The UK argues for the lawfulness of its nuclear weapon system on the basis that it is a recognised nuclear weapon state within the NPT and has ceased the production of new fissile material, although it has in fact a huge stockpile of separated plutonium. It also relies on the 1996 International Court of Justice (ICJ) Advisory Opinion as rejecting the argument that nuclear weapons use would necessarily be unlawful in all circumstances.79 Despite a separate legal system in Scotland and opposition to UK nuclear weapons policy, it has not so far been possible to test the legality of the nuclear weapons under UK jurisdiction and based in Scotland on the fundamental international humanitarian law principles of controllability, discrimination, and civilian immunity.

Public discourse

The ruling Conservative Party, and the opposition Labour party, are both supportive of the Trident replacement programme. Within the Scottish parliament the ruling Scottish National Party (SNP) and the Greens are strongly opposed to nuclear weapons, while the Scottish Labour Party is opposed to the replacement programme. This reflects the widespread and longstanding public rejection of weapons of mass destruction and their deployment from Scotland itself. Significant movement in the UK position could be brought about by the following: international developments, especially the impacts of the Treaty on the Prohibition of Nuclear Weapons (TPNW); the election of a UK government open to disarmament; by a major nuclear accident in the UK; through an independent Scottish government effectively disarming the whole UK by having nuclear weapons removed from Scotland; or by major economic shocks that cripple the modernisation programme. The COVID-19 pandemic is forcing the UK to be more open to thinking the “unthinkable” and they may have to consider an alternative to their current patriarchal and imperialistic position of power.
**United States**

Greg Mello and Trish Williams-Mello

**Current status**

The US nuclear weapons programme is relatively transparent. As outlined by the Federation of American Scientists, the US Department of Defense maintained an estimated stockpile of 3,800 nuclear warheads for delivery by 800 ballistic missiles and aircraft. Most of the warheads in the stockpile are stored for potential upload onto missiles and aircraft as necessary. Many are destined for retirement. The FAS estimated that approximately 1,750 warheads are currently deployed, of which roughly 1,300 strategic warheads are deployed on ballistic missiles and another 300 at strategic bomber bases in the United States. An additional 150 tactical bombs are deployed at air bases in Europe.

**Modernisation**

There have been a number of changes in the US nuclear modernisation programme since the April 2019 edition of Assuring Destruction Forever. These are not so much changes in scope but in speed.

First, accelerated, massive hiring is occurring across the nuclear weapons enterprise.

Second, parallel investments in warhead core (“pit”) factories have begun, to front-load production in the 2020s to support new-warhead (W87-1) production.

Third, accelerated and early-to-need development of a new submarine warhead (W93) is beginning, budgeted at US $53 million for FY2021 with first production in 2034 (see Table 1), a two-year advancement at both ends of the development period.

Fourth, an unusually early—years-ahead—sole-source contract has been awarded for the Long Range Stand Off (LRSO) cruise missile.

Fifth, unprecedented near-term spending increases for FY21 have been requested to enable these accelerations as discussed below, despite the US $8 billion already available in unspent prior appropriations.

Two programmes were completed since the April 2018 edition of this report. The W76-1 submarine warhead upgrade was completed in late 2018, extending this warhead’s life by a planned 30 years while dramatically increasing its accuracy. Some W76 warheads were easily and cheaply converted to low-yield W76-2s in early 2019. These low-yield warheads began deployment in December 2019.

**Economics**

For FY2019, the most recent year for which an independent estimate is available, the Congressional Budget Office (CBO) assessed annual then-current spending on US nuclear weapons at US $33.6 billion—US $21.8 billion in DoD and US $11.8 billion in Department of Energy (DOE). This figure does not include the development of naval reactors for nuclear weapons platforms (US $1.8 billion, in DOE) or warhead-associated DOE environmental expenses of US $6 billion in that year. If included, these would raise the total to US $41.4 billion. By way of comparison, this is larger than the total military spending in all but nine other countries.

Costs are increasing rapidly. That same CBO ten-year estimate showed US $42 billion in unanticipated cost growth over the front decade in comparison to its 2017 ten-year estimate—5.3 per cent/year above inflation. Most of the unanticipated growth came from “new modernisation programmes” added since 2017 and “more concrete plans for nuclear command-and-control systems.”

The Trump Administration is now requesting US $44.5 billion for nuclear weapons in FY2021, not including US $1.7 billion for naval reactors and US $5.0 billion for environmental cleanup, or US $51.2 billion in all. The request includes US $15.6 billion for warheads—a 25 per cent increase over FY2020 and a 40 per cent increase over FY2019—as well as US $28.9 billion for nuclear weapons in DoD, a 32 per cent increase over two years. Some US $14.8 billion in DoD research and development costs are requested. In 2017, CBO had estimated FY2021 nuclear weapon costs would be about US $40 billion, so the FY2021 request represents about US $5 billion (11 per cent) in unanticipated cost growth in FY2021 since then.
International law and doctrine

The US is a party to the nuclear Non-Proliferation Treaty (NPT). Since 2018, the US government has been promoting an initiative it calls Creating the Conditions for Nuclear Disarmament (CEND). This approach, which focuses on the measures other countries need to take in order for the US to feel “secure” enough to engage in nuclear disarmament, undermines past NPT commitments and other nuclear weapon governance agreements.

The US has not signed or ratified the Treaty on the Prohibition of Nuclear Weapons. It has repeatedly said that will “never” support the Treaty and that it does not consider itself bound by it through customary international law. The US has actively lobbied its allies and other countries to not support the negotiation of the Treaty or to ratify it after its adoption in 2017.

The US has signed but not ratified the Comprehensive Nuclear Test Ban Treaty (CTBT). Comments from the current US administration have given rise to concerns that the US may resume testing, though officials have said the US intends to abide by its explosive nuclear testing moratorium (it has continued to engage in ever-more-sophisticated subcritical testing since the CTBT’s adoption in 1996).


The New Strategic Reduction Arms Reduction Treaty (New START) is the only remaining treaty that places limits on US and Russian nuclear weapon deployments. It is set to expire in February 2021. The US government has said it is interested in pursuing “tripartite” nuclear arms control with Russia and China rather than a bilateral agreement, which China does not see as reasonable given its much smaller arsenal size.

On 8 May 2018, the US government announced its withdrawal from the Joint Comprehensive Plan of Action (JCPOA) with Iran and other states.

Public discourse

At present there is no significant public or congressional opposition to any major US nuclear weapons modernisation programme.

Acceptable narratives in US public discourse on nuclear issues largely flow directly and indirectly from government sources—“newsmakers”—which news outlets favour. Narratives from other sources, if present at all, come primarily from certain academics, think tanks, and government – or party-aligned NGOs and are typically reactive, and secondary or pro forma.

In other words, most “public” discourse about nuclear weapons comes directly or indirectly from government. Government is in turn largely captive of the “unwarranted influence” of the “military-industrial complex.”

Recent polls reveal that Americans overall don’t know or care much about nuclear weapons, and harbor contradictory ideas about them. They do clearly support further mutual stockpile reductions with Russia, and if asked do express a wish to rid the world of nuclear weapons. Recent polling once again affirms support for arms control objectives.
References

3. Ibid.
6. Ibid.
30. Ibid.

83 Personal communication, administration official, 13 February 2020.


90 SIPRI Military Expenditure Database, op. cit. These nine countries are China, Saudi Arabia, India, France, Russia, UK, Germany, Japan, and South Korea.

91 Projected Costs of U.S. Nuclear Forces, 2019 to 2028, op. cit. CBO found explanations for a further $52 B in estimated 10-year cost growth, p. 1.


A survey by YouGov and the Bulletin of the Atomic Scientists, published Monday, finds that a third of Americans would be in favor of a nuclear strike even if it killed a million people…. the public knows almost nothing about the strategic implications of nuclear weapons.

A NuclearBan.US poll, conducted on its behalf this week by YouGov, reveals that 49% of Americans think that the US should work with the other nuclear armed countries to eliminate all nuclear weapons from all countries, in line with the 2017 UN Treaty on the Prohibition of Nuclear Weapons (“Nuclear Ban Treaty”). Only 32% think that the US should continue to ignore the new treaty and hold on to its nuclear weapons regardless of what other countries think or do, while a further 19% say they “don’t know”.

104 Jeffrey M. Jones, “In U.S., 56% Favor U.S.-Russian Nuclear Arms Reductions,” Gallup, 11 March 2013, https://news.gallup.com/poll/161198/favor-russian-nuclear-arms-reductions.aspx: “Americans, by 56% to 38%, support a reduction in U.S. and Russian nuclear arsenals. Democrats are most inclined to support it – saying they would vote for such a law if they could – while Republicans are about evenly divided in their views.”

105 See NuclearBan.US, op. cit., and “AP Poll Shows Americans Prefer Nuclear Disarmament to Alternatives by Large Margins,” Los Alamos Study Group, 31 March 2005, https://www.lasg.org/press/2005/PressAdvisory3-31-05.htm: “A key finding of this week’s results is that Americans prefer a policy of universal and complete nuclear disarmament to other alternatives by a ratio of more than 4 to 1. In contrast to the 66% who chose the statement ‘No countries should be allowed to have nuclear weapons,’ only 13% chose ‘Only the United States and its allies should be allowed to have nuclear weapons.’ Only 11% chose ‘Only countries that already have nuclear weapons should be allowed to have them.’
