

Executive summary

"A-Day" First atomic bomb explosion at Bikini in the
Marshall Islands 1 July 1946 © Science in HD, Unsplash

China

Hui Zhang

Current status

There are various estimates of the size of China's nuclear arsenal. The Federation of American Scientists (FAS) estimated in 2021 that China has a total stockpile of approximately 350 nuclear warheads for delivery by approximately 280 operational land-based ballistic missiles, 72 sea-based ballistic missiles, and 20 nuclear gravity bombs.¹

Based on Chinese publications and Western governmental and non-governmental estimates, this author estimates that in 2021 China has a total inventory of approximately 391 ± 56 nuclear warheads, including approximately 299 ± 56 nuclear warheads for delivery by approximately 193 ± 26 land-based nuclear ballistic missiles (of which approximately 141 ± 12 can reach the continental United States), approximately 72 warheads for its submarine-launched ballistic missiles (SLBMs) and approximately 20 nuclear gravity bombs.² 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 the United States' missile defence programmes, as many Chinese believe. China's arsenal is significantly expanding but is smaller than that of 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 reentry vehicles (MIRVs).

Recently, China is reported to be building about 300 new ICBM silos in at least three sites.³ However, Beijing has not publicly acknowledged the construction of the silo fields. Some Chinese media have said those silos are wind farms.

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."⁴

Economics

It is difficult to estimate the cost of China's nuclear weapon force. Chinese nuclear weapons experts believe China invests at a very low level for its nuclear weapon programmes.⁵ China's officially announced military budget of 1.35 trillion yuan (US \$209 billion) for 2021 is an increase of 6.8 per cent over the 2020 budget of 1.27 trillion yuan.⁶ This accounted for less than two per cent of its gross domestic product (GDP).

However, some foreign analysts suspect that official Chinese data misrepresents 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 2018.⁷

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."⁸ 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.⁹ 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."

Beijing has long maintained that “countries possessing the largest nuclear arsenals bear special and primary responsibility for nuclear disarmament” and thus they “should further drastically reduce their nuclear arsenals in a verifiable, irreversible, and legally-binding manner, so as to create the necessary conditions for the complete elimination of nuclear weapons.”¹⁰ However, Beijing does not state when China itself would participate in the process of nuclear reduction.

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 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.¹¹

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 no-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.¹²

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.¹³ 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.”¹⁴

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.

In April 2018, the DPRK announced that it would “discontinue nuclear and inter-continental ballistic missile tests from April 21, Juche 107 (2018)”, and “The northern nuclear test ground of the DPRK will be dismantled to transparently guarantee the discontinuance of the nuclear test.”¹⁵ On 24 May 2018, the DPRK destroyed test tunnels and buildings of the Punggye Ri

nuclear test site, allowing 30 international journalists from the ROK, the United States (US), China, the United Kingdom (UK), and Russia to observe.¹⁶ The US State Department stated that Chairman Kim Jong Un had “invited inspectors to visit the Punggye Ri nuclear test site to confirm that it has been irreversibly dismantled” but such an inspection has not yet occurred, as the second US-DPRK summit ended without agreement.

Since the US-DPRK Hanoi Summit of 28 February 2019, there has been little progress made between the two countries. In response to the United States’ decision to resume US-ROK combined military drills and maintain sanctions against the DPRK, DPRK leader Kim Jong Un declared on 1 January 2020, “The DPRK has found no grounds to be unilaterally bound any longer by the commitment with no other party to honour, and this has put a damper on its efforts for disarmament and the non-proliferation of nuclear weapons across the world.”¹⁷

Economics

There is little data on the cost of the DPRK’s nuclear and missile programmes.

In June 2011, Global Zero estimated the core and full cost of the DPRK nuclear programme to be between 500 and 700 million USD respectively.

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.¹⁸

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.¹⁹ 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.²⁰

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, Antarctic Treaty, Biological Weapons Convention, Convention on Environmental Modification Techniques, Outer Space

Treaty, and the Nuclear Non-Proliferation Treaty (NPT), although the DPRK says it withdrew from the NPT in 2003.²¹ 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”.²²

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 the current status of dialogue with the United States and the Republic of Korea, 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 first US-DPRK summit as positive. As perceptions on the prospect for the denuclearisation of the DPRK 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. However, since the 2019 Hanoi summit ended without an agreement, there has been no progress made between the US and the DPRK, and this has impacted the inter-Korean dialogues and cooperation.

France

Hans M. Kristensen

Current status

As of early 2021, 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 up to 240 warheads for three deployable submarines and up to 50 cruise missiles for land – and sea-based aircraft. The third submarine might take longer to ready and the cruise missiles for the *Charles De Gaulle* aircraft carrier are stored on land under normal circumstances.

The current stockpile of approximately 290 warheads, as explained by former president Nicolas Sarkozy, “is half of the maximum number of warheads we had during the Cold War.”²³ The peak occurred in 1991–1992 at end of the Cold War, and the size of today’s stockpile is about the same as in 1984, although the composition and capabilities are significantly different.

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.

The announcement of a new military alliance between Australia, the United Kingdom, and the United States (AUKUS)²⁴ in September 2021 prompted a strong reaction from the French government. France had had a previous agreement with Australia since 2016 to build 12 diesel electric-powered submarines to replace its existing Collins submarine fleet. Australia cancelled this deal in 2021 in favour of working with the UK and US in the Indo-Pacific region and to build a class of nuclear-propelled submarines. Described by one French diplomat as a “stab in the back,”²⁵ the announcement generated a strong diplomatic response and is now leading France to seek out other strategic partners.²⁶

France is not increasing its nuclear forces, nor does it show any indication that it intends to reduce them in the near term. In a speech in early 2020 on French defense and deterrence strategy, President Emmanuel Macron stated: “I cannot...set France on the moral objective of disarming our democracies while other powers, or even dictatorships, would be maintaining or developing their nuclear weapons...And let us not be naïve: even if France...were to give up its nuclear weapons, the other nuclear powers would not follow suit.”²⁷

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 \$5.3 billion (€4.7 billion) on “nuclear deterrence” in 2020,²⁸ up from US \$4.9 billion (€4.5 billion) in 2019,²⁹ an increase of more than 17 per cent compared with €4 billion in 2018.³⁰ But the total apparently does not include all costs.³¹ The increase is part of an “exceptional increase”³² 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 2023.³³

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.³⁴ 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,³⁵ 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 1992.³⁶ France signed the Comprehensive Test Ban Treaty (CTBT) in 1996 and ratified it jointly with the United Kingdom in 1998.³⁷ 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.³⁸

In 2020 and 2021, civil society and academic organisations published reports exposing the extent and legacy of French nuclear weapons testing in Algeria³⁹ and the Pacific region,⁴⁰ as well the French government’s attempt to cover-up the extent of radiation. These have helped to propel media attention and public interest in France’s role as a nuclear-armed state. The French

government has denied covering up the radiation levels left in the Pacific,⁴¹ but the French constitutional court has since declared that the retroactive use of a 1 mSv exposure threshold to adjudicate the compensation of victims from French nuclear tests is unconstitutional.⁴²

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. In February 2020, French President Macron delivered a speech outlining his vision for France's nuclear "deterrence" strategy.⁴³ 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,⁴⁴ 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" and reiterated France's position on the TPNW.

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

M.V. Ramana

Current status

India has a fast growing nuclear arsenal and its size has increased significantly in the over two decades since the 1998 nuclear weapon tests. The latest figure is from the Federation of American Scientists (FAS), which, based on publicly available information about India's delivery vehicles and strategy, estimated in 2020 that the country might have 150 nuclear warheads.⁴⁵ In comparison, FAS estimated 60-80 assembled nuclear warheads in 2010 and 30-35 warheads in 2002.⁴⁶

Alongside the increase in the numbers of warheads, India's nuclear arsenal has also been undergoing other changes.

Modernisation

The main focus of modernisation and enhancement of the nuclear arsenal has been on developing new and longer-range delivery vehicles. In particular, the deployment of a nuclear powered and armed submarine over the last five years has allowed India to justifiably claim that it now possesses the "triad of aircraft, mobile land-based missiles and sea-based assets" that was called for in the country's 1999 Draft Nuclear Doctrine.⁴⁷

India's first operational nuclear delivery vehicle was the Mirage 2000 aircraft. Although India had purchased these aircraft from France in the 1980s, it was only in the mid-1990s that its use for delivering nuclear weapons was operationalised; a similar effort involving the Jaguar was unsuccessful "because of the low ground clearance between the aircraft and the nuclear weapon container".⁴⁸ However, after the 1998 nuclear weapon tests and further

refinements in weapon design, the Jaguar might indeed have been capable of use as a nuclear delivery vehicle.

The Mirage 2000H was retired in the summer of 2018, and is undergoing upgrades to extend its service life and enhance its capabilities; the modernised version is called Mirage 2000I. Most of the changes involve upgrades in sensing equipment, such as radars and receivers, navigation and communication systems, and data management systems. While these might not affect the nuclear delivery capability as such, it enhances the ability of the aircraft to carry out such a task without being intercepted.

India is also embarking on developing hypersonic missiles and tested a “hypersonic technology demonstrator vehicle (HSTDV) that will have futuristic applications for next generation missiles and aerial systems” in June 2019.⁴⁹

India also signed a deal with France for purchasing Rafale aircraft.⁵⁰ Newspaper reports suggest that it will be used to deliver nuclear weapons and conventional weapons; the first squadron of aircraft are to be based in the eastern part of the country, suggesting that their primary targets will be in China.⁵¹

The naval variant of the Prithvi is called the Dhanush, with a range of around 350 or 400 km. Like Prithvi-II, it has been deployed and is regularly tested by its “users”, the Strategic Forces Command, and the annual reports of India’s Ministry of Defence record two tests in 2015, two in 2016, and two in 2018.⁵² The focus of development in the last few years, however, has been on two submarine-launched ballistic missiles (SLBM), the K-15 and the K-4. A second SSBN, variously called Arighat and Aridhaman, was reportedly under construction and expected to be commissioned in 2021.⁵³ A news report from November 2021 said that it is “likely to be commissioned within the next few months”.⁵⁴

India is also in the process of constructing nuclear powered attack submarines, with news reports suggesting that six of them will be built.⁵⁵ However, the timeline for this construction will stretch well into the next decade and, as of June 2019, the project had only been given seed money to work on a new special alloy for the hull.⁵⁶

On the basis of the limited amount of publicly available information and reasonable assumptions, and after accounting for material that would have been used in nuclear weapons tests and other purposes, India is estimated to have a net stockpile of weapon-grade plutonium of 0.69 ± 0.14 tons of weapon-grade plutonium as of the end of 2019.⁵⁷ In comparison, in the 2012 edition of *Assuring Destruction Forever*, the estimated stockpile was around 0.43 tons. The 2019 stockpile should suffice for about 140 nuclear weapons

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’s military spending has traditionally been around 2.5 to 3.0 per cent of its GDP. Other sources record lower percentages but it is not clear what expenditures are included. For example, the International Institute for Strategic Studies database puts the figures closer to 2 per cent.⁵⁸

India, however, is one of the world’s largest arms importers. Between 2016 and 2020, it was the world’s second largest importer of major arms and accounted for 9.5 per cent of the global total.⁵⁹ In addition to arms imports, one of Prime Minister Narendra Modi’s stated priorities is to increase exports of weapons. In February 2020, at a large defence he announced that India was looking to achieve defence exports worth Rs 350 billion (or roughly US \$5 billion) in the next five years.⁶⁰ This has implications for weapons development. The short range (200 km) missile called Pranash that is under development has been described as attractive because it “is outside the purview of the Missile Technology Control Regime (MTCR), which places export restrictions on missiles with ranges of more than 300km” and can therefore be exported to other countries.⁶¹

The current government is, as a matter of stated policy, promoting the privatisation of public sector companies involved in the defence sector.⁶²

Both these trends—the privatisation of the defence industry and the focus on exports—are worrying and will likely set the course of ever-increasing build-ups of weapons, including nuclear weapons and allied systems.

International law and doctrine

India has not signed either the nuclear Non-Proliferation Treaty (NPT) or Comprehensive Test Ban Treaty (CTBT).

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.⁶³ 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.⁶⁴

This has been the case ever since the Hindu Nationalist Bharatiya Janta Party (BJP) came back to power under the leadership of Prime Minister Narendra Modi after

the 2019 general elections. The BJP's political outlook has also led to heightened tensions between India and Pakistan. In early 2019, the two countries were embroiled in a major standoff that involved aerial attacks and that prominently featured threats to launch missiles at each other.

India did not participate in the negotiations of the Treaty on the Prohibition of Nuclear Weapons, adopted in July 2017. At the time, it stated that it was "not convinced" that the negotiations would deliver an effective nuclear disarmament treaty, including one with effective verification mechanisms, and that it would prefer to see discussions occur within the UN Conference on Disarmament.⁶⁵ To that end, India has advocated a negotiating process toward a Convention on the Prohibition of Use of Nuclear Weapons including through statements and resolutions tabled at the UN General Assembly's First Committee on International Security and Disarmament.

Public discourse and multilateral engagement

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.⁶⁶

There is also a long-standing desire on the part of the elite to have India be recognised as a great power. 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. Today, India can legitimately lay claim to belonging to another select, if infamous, club: of countries that are at risk of nuclear war. It is not a club worth belonging to, for the lives of millions and millions of people are at stake.

Israel

Sharon Dolev

Current status

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.⁶⁷

Estimates about the size of the arsenal are based on the informed speculation and unconfirmed revelations dating back to 1986.⁶⁸ Experts and analysts estimate that Israel's current nuclear force ranges from 60 to over 400 weapons⁶⁹ 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 missiles⁷⁰ capable of carrying nuclear warheads.⁷¹ It is also believed⁷² 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"⁷³.

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.⁷⁴ One more submarine should become operational by the end of 2020.⁷⁵ Estimates⁷⁶ are that these submarines are part of Israel's "second strike" capability⁷⁷, 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 MWt⁷⁸ or even 150 MWt.⁷⁹

The Israeli Atomic Energy Commission (IAEC), secretly created in 1952,⁸⁰ oversees Israel's nuclear activities.⁸¹ Responsibility for the IAEC falls under the prime minister's office and it reports directly to him.

Economics

When trying to estimate Israel's annual spending on its nuclear capabilities, one has to rely on scarce information. The Stockholm International Peace Research Institute (SIPRI) estimates Israel's total military spending for 2018 at US \$15.88 billion.⁸² If we combine this information with a 2011 report from Global Zero report⁸³ which estimated that 11.53 per cent of Israeli military spending is allocated to nuclear weapons, we arrive at an estimate of US \$1.839 billion for 2018. However, the IAEC budget is under the budget of the Office of the Prime Minister, and Israel military spending remains ambiguous and difficult to understand, organised across a variety of budget lines and items.

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. Despite resisting calls to join the nuclear non-Proliferation Treaty (NPT) Israel has been a member state of the International Atomic Energy Agency (IAEA) since 1957⁸⁴ and signed several conventions concerning civilian and humanitarian aspects of nuclear research and use.⁸⁵ Israel abstained from participating in all humanitarian conferences preceding to the negotiations towards the Treaty on the Prohibition of Nuclear Weapons (TPNW),⁸⁶ voted against the UN General Assembly to commence the negotiations in 2017, and voted against the adoption of the treaty.⁸⁷

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.⁸⁸ 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 United States.⁸⁹ The second conference, which took place in 2021, ended on a hopeful note. The final report was adopted by consensus and includes agreement on the Rules of Procedure, thematic areas, and to continue the discussion through intersessional meetings. The decision of states to establish a Working Committee to continue deliberations during the Intersessional Period of the Conference is an encouragement for civil society to continue their work, despite not being able to physically access the meetings in New York due to the COVID-19 pandemic.⁹⁰

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. The vast majority of Israelis, including the media, parliament,⁹¹ and civil society organisations, are sure that the main reason for ambiguity is security confidentiality.

On 29 August 2018, Prime Minister Binyamin Netanyahu stood outside the Dimona reactor⁹² and said to the media that any country that threatens to destroy Israel risks meeting a similar fate.⁹³ This kind of direct threat, along with reports on missile tests⁹⁴ and "slips of the tongue" by Israeli officials,⁹⁵ 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.

The change in the discourse in Israel since the 2021 election is a minor one. While there are voices now claiming that Israel shouldn't have pushed for the US to withdraw from the last agreements, there are hardly any voices supporting any new deal with Iran, for instance.

Pakistan

Zia Mian

Current status

As of mid-2021 Pakistan was believed to have around 165 nuclear weapons.⁹⁶ About 154 warheads are estimated to be assigned to operational forces.⁹⁷ This is a more than ten-fold increase from the 14 weapons it was estimated to hold in 2000.⁹⁸ The growth of the arsenal appears to have been steady for most of the past decade. The arsenal is projected to reach perhaps 200 weapons within five years.

Pakistan has various road-mobile ballistic missile systems and ground-launched, air-launched, and sea-based cruise missiles to carry its nuclear weapons. These missiles are at various stages in their development, with several short-range and long-range ballistic and cruise missile tests in 2020 and 2021, and it is unclear which systems will eventually be deployed.

Pakistan has developed an extensive nuclear infrastructure that allows it to produce both HEU and plutonium for weapons. This includes capacity for uranium mining, uranium enrichment, nuclear reactor fuel fabrication, nuclear reactor construction, and spent fuel reprocessing for plutonium recovery. Some of these facilities, and the organisations responsible for managing them, also are part of Pakistan's nuclear energy programme.

Accurate estimates about Pakistan's production of HEU for its nuclear weapon programme are limited by uncertainty about Pakistan's enrichment capacity and the operating history of its centrifuge plants at Kahuta and Gadwal.⁹⁹ It is estimated that, as of the start of 2021, Pakistan could have a stockpile of about 4 tonnes of weapon-grade (90 per cent-enriched) HEU.¹⁰⁰

The nuclear weapons programme has had environmental impacts. These include concerns about health effects from uranium mining and radioactive waste disposal in a former uranium mining site.¹⁰¹ 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.

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

The cost of Pakistan's nuclear weapons programme cannot be estimated with any reliability. Secrecy prevents access to details about the history and scale of the nuclear weapon and missile programmes, the extent of external technical and material support, and the effect of indirect support through military and economic aid and the environmental consequences of nuclear weapon-related activities.

Pakistan is not reliant only on its own resources to support its military spending, including on nuclear weapons, or to meet its development needs. Since 2001, Pakistan has received an estimated US \$34 billion in military and economic assistance from the United States, of which about US \$11 billion was economic aid of various kinds, but the annual level of military and economic aid has declined over ten-fold in recent years.¹⁰²

Pakistan has also received extensive economic aid and military assistance from China. China's conventional military assistance to Pakistan now exceeds the scale of support previously provided by the United States. Pakistan in 2015 agreed to buy eight new submarines from China.¹⁰³

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 is the subject, along with India, of a unanimous UN Security Council resolution calling for restraint of its nuclear weapon and ballistic missile programmes.

Pakistan's long-running search for strategic parity with India informs almost all its nuclear diplomacy, including on a possible international treaty banning the production of fissile materials for nuclear weapons (known as a fissile material cut-off treaty or FMCT).¹⁰⁴ 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

Nuclear weapons have played a major role in Pakistan's domestic political discourse for over 40 years. The central thrust of most public debate about Pakistan's nuclear weapons is the struggle with India that has

shaped Pakistan's history and politics since the two countries were formed by the partition of British India into independent states.

All of Pakistan's major political parties support the nuclear weapons programme. Pakistan's current Prime Minister Imran Khan, who came to power in 2018, supported the 1998 nuclear tests, declaring "My party was clear that we had to tell India that we had a deterrent."

The government has sought to create a positive public image of the nuclear weapons programme, often by linking it to national pride and identity. It has been commonplace for prime ministers to inaugurate nuclear facilities and they are often photographed at nuclear missile tests and send public messages of commendation and congratulations after such tests.

The underlying dynamics of the Pakistan-India relationship may be shifting, however. A longer-term concern now driving Pakistan's nuclear programme is the United States' policy of cultivating a much stronger US' strategic relationship with India to counter the rise of China as a potential great power competitor.¹⁰⁵

Russia

Pavel Podvig

Current status

According to the most recent New Strategic Arms Reduction Treaty (New START) data exchange, in September 2021 Russia had 527 operationally deployed strategic launchers that carried 1,458 nuclear warheads.¹⁰⁶ 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 2021, 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 2,600.¹⁰⁷

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 1,900 non-strategic warheads that could be considered operational.¹⁰⁸

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.¹⁰⁹

At of 2020 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.¹¹⁰

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.

Modernisation

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

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.

In the last decade Russia has initiated an extensive programme to build a network of new early-warning radars. By 2020, Russia discontinued the use of all but two early-warning radars that are not located in Russia. While the modernisation of the radar network has been a largely successful programme, replacement of old early-warning satellites has encountered significant delay. The deployment of a new space-based early-warning system, known as EKS, began in November 2015.¹¹¹ In November 2021 Russia launched the fifth satellite of this type.

Russia's strategic modernisation 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.

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. Originally, the military requested a significant increase in funding, up to 35

trillion rubles, but in the end the programme was scaled down to 19 trillion rubles, similar to the funds allocated to the previous programme.¹¹²

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. However, the rearmament effort appears to have strong support of the political leadership, so significant cuts of the modernisation programme are unlikely.

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.¹¹³

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 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.

Russia has stated¹¹⁴ that it does not intend to sign the Treaty on the Prohibition of Nuclear Weapons and has further explained that it views the TPNW as failing to promote nuclear disarmament and undermining the NPT.¹¹⁵

Public discourse

Public opinion in Russia tends to support the nuclear status of the country. In 2017, at the height of tensions around North Korea, over 40 per cent of respondents to a poll suggested that states should be allowed to build their own nuclear weapons if they choose to do so. The share of those who believe that the international community should be sanction and isolate such states

was comparable, but somewhat smaller.¹¹⁶ A public opinion poll conducted in 2019 explored attitudes toward the dangers associated with nuclear weapons found that only about half of the respondents, 52 per cent, are to various degrees afraid of a new nuclear war. About 60 per cent of respondents named the United States as the main nuclear threat to Russia, with China a distant second with 13 percent. About 11 per cent of participants do not believe that any state poses a nuclear threat to Russia.¹¹⁷

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 (UK) previously claimed 120 operationally available nuclear warheads as part of a larger stockpile of between 180 and 225 warheads. The Ministry of Defence (MoD) had indicated that it would reduce the overall stockpile to 180 warheads by the mid-2020s. There are four Vanguard class submarines, three of which are normally armed. Each armed submarine carries eight US-built Trident D5 missiles and a total of 40 nuclear warheads.¹¹⁸

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 at Faslane on the Gare Loch in Scotland.¹¹⁹

While a decision to increase the cap was announced on 16 March 2021, Nukewatch observations suggest that additional warheads had already been delivered to Coulport by this date.¹²⁰

Modernisation

The UK continues to drive forward its Defence Nuclear Enterprise (DNE) programme to replace its Vanguard class submarines with new Dreadnought class vessels.¹²¹ It is also proposed that from 2020, all of the UK's submarine fleet will be based at the upgraded Faslane naval base, located in Scotland.¹²²

UK parliamentarians and experts learned through a Pentagon announcement in early February 2020 that billions of UK pounds will be spent on a new generation of warheads based on United States' (US) technology. The Pentagon announcement stated that the W93 or Mk 7 warhead "will support a parallel replacement warhead programme in the UK." This expenditure had not been reported to them in the House of Commons or by the MoD.¹²³

UK-US collaboration has now been extended to supporting Australia in the acquisition of nuclear-powered military submarines in what is described as an effort to "sustain peace and stability in the Indo-Pacific region"—a controversial policy and statement, both in the region and for the UK's other nuclear ally, France. It comes at a time when the UK still needs to finish building its final Astute model attack submarines in order to minimise delays in building the Dreadnought fleet, suggesting that the US rather than the UK may provide the practical support for the Australian submarines planned for the 2040s. The Australian submarines are almost certain to run on highly enriched uranium (HEU), which would constitute a serious erosion of nuclear non-proliferation norms.¹²⁴

The problems in the UK's nuclear weapons programme are considerable. Burgeoning costs, delays of several years, and the impact of these factors on each other has escalated to the point where it is unlikely that the new submarines will be available by the end of the already over-extended lifetime of the outgoing vessels. Efforts to reign in escalating costs, included moving the Dreadnought delivery back from 2024 to 20, may reduce

expenditure during that budget period but does not reduce the overall cost of the Dreadnought programme. In fact, delays of this sort increase the costs in the longer term.¹²⁵

Economics

The Nuclear Information Service in the UK uses a wide range of elements as well as extrapolating from the Ministry of Defence's own figures and historical spending to estimate costs over time. This method estimates the total cost of the UK's nuclear weapons programme between 2019 and 2070 to be £172 billion. This is a low estimate based on 2019 prices, yet is far higher (four times) than the most commonly cited government figures. The UK government does not release total cost figures, but the estimate for the Dreadnought programme figure is £31 billion, plus the additional £10 billion contingency for building four new Dreadnought submarines.¹²⁶

The inscrutable and escalating cost of the UK's nuclear ambitions are set against a background of crippling austerity, with social security payments at their lowest level since the establishment of the welfare state in the UK.

From March 2020, in responding to the COVID-19 pandemic, action and investment from the government created a *volte face* on public spending policy with the introduction of furlough, paying people who had to stay at home.¹²⁷

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 nuclear Non-Proliferation Treaty (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.¹²⁸

The UK government's stated position in its Strategic Defence Review from March 2021, particularly the previously mentioned increase in the cap on the number of warheads, was the impetus for seeking a legal opinion from two scholars in April 2021 on the legality of the Strategic Review's proposals.¹²⁹ It found that the government's decisions were at odds with its legal obligations under the NPT on three points.¹³⁰

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.

However, the Scottish parliament and government are strongly opposed to nuclear weapons and seek their abolition.¹³¹ In May 2021, Scotland voted in a new parliament with an increased percentage of women members and an increased majority of Members of the Scottish Parliament (MSPs) that are in favour of Scottish independence. In the two main parties, the Scottish National Party and Scottish Greens, all candidates have joined the Parliamentary Pledge of the International Campaign to Abolish Nuclear Weapons (ICAN) for the Treaty on the Prohibition of Nuclear Weapons (TPNW), as did several other candidates—as such, the majority supporting the TPNW is even greater than the majority for independence.¹³²

Public discourse

Despite the UK government's efforts to return to the politics of austerity, the questions that were raised a year ago about the real nature of what constitutes security are not going away, but are informing a very public debate about the climate, misogyny, and colonisation wherever it occurs.

Following the entry into force of the TPNW in January 2021 which was celebrated by citizens across the UK, the current government's Strategic Defence Review in March 2021 came as a shock and surprise to disarmament campaigners and to moderate and progressive civil society organisations in the UK, which was reflected in a wide range of condemnatory responses.¹³³

The legal opinion sought on the validity of the Strategic Review is also the basis for a public petition to the UN member states to challenge the UK's decisions at the upcoming NPT Review Conference.¹³⁴

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

Editor's note: This is the same Executive Summary as appeared in *Assuring destruction forever: 2020 edition*, and the full-length chapter on the United States is also the same as in 2020. For more recent updates, please see the Annex to the full chapter which authors have provided for the 2022 edition of this publication.

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.¹³⁵ 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.¹³⁶

Second, parallel investments in warhead core ("pit") factories have begun, to front-load production in the 2020s to support new-warhead (W87-1) production.¹³⁷

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.¹³⁸

Fourth, an unusually early—years-ahead—sole-source contract has been awarded for the Long Range Stand Off (LRSO) cruise missile.¹³⁹

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.¹⁴⁰

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.¹⁴¹ Some W76 warheads were easily and cheaply converted to low-yield W76-2s in early 2019. These low-yield warheads began deployment in December 2019.¹⁴²

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 \$33.6 billion—US \$21.8 billion in DoD and US \$11.8 billion in Department of Energy (DOE).¹⁴³ 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.¹⁴⁴ By way of comparison, this is larger than the *total* military spending in all but nine other countries.¹⁴⁵ 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."¹⁴⁶

The Trump Administration is now requesting US \$44.5 billion for nuclear weapons in FY2021,¹⁴⁷ 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.¹⁴⁸ 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.¹⁴⁹

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).¹⁵⁰ 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.¹⁵¹ 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 2017.¹⁵²

The US has signed but not ratified the Comprehensive Nuclear Test Ban Treaty (CTBT); ratification was rejected by the US Senate in 1999 even after a bargain was made to modernise its nuclear weapons infrastructure in exchange for ratification.¹⁵³ There has been no technical need, or any publicly expressed desire, for nuclear testing in or from the US warhead complex for 20 years. The negative consequences of nuclear testing for US security are very well-established throughout the foreign policy establishment. 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).¹⁵⁴

The US announced its withdrawal from the Anti-Ballistic Missile Treaty in 2001. On 2 August 2019, the US completed its withdrawal from the Intermediate-Range Nuclear Forces (INF) Treaty. It blamed its withdrawal on Russia.¹⁵⁵

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,¹⁵⁶ 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, despite the fact that the International Atomic Energy Agency (IAEA) consistently found Iran to be in compliance with the agreement.

Public discourse

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

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.”¹⁵⁷

Recent polls reveal that Americans overall don’t know or care much¹⁵⁸ about nuclear weapons, and harbor contradictory ideas about them.¹⁵⁹ They do clearly support further mutual stockpile reductions with Russia,¹⁶⁰ and if asked do express a wish to rid the world of nuclear weapons.¹⁶¹ Recent polling once again affirms support for arms control objectives.¹⁶²

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- 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."
- Nuclearban.us, "New US poll shows strong support for elimination of all nuclear weapons, 23 September 2019, <http://www.nuclearban.us/new-us-poll-shows-strong-support-for-elimination-of-all-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".
- 160 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."
- 161 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.'"
- 162 An in-depth 2004 Program on International Policy Attitudes (PIPA) poll, "Americans on WMD Proliferation," 15 April 2004, is highly relevant and is archived at https://www.lasg.org/WMDreport_04_15_04.pdf.
- Stephen Kull et al, "Americans on Nuclear Weapons," Program for Public Consultation, May 2019, http://www.publicconsultation.org/wp-content/uploads/2019/05/Nuclear_Weapons_Report_0519.pdf.