



# ASSURING DESTRUCTION FOREVER: 2019 EDITION

WOMEN'S INTERNATIONAL LEAGUE FOR  
**PEACE & FREEDOM**





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# Introduction

Ray Acheson

It's 2019 and there are about 14,485 nuclear weapons in the world.<sup>1</sup> The detonation of even a fraction of these weapons would destroy the planet and end human civilisation as we know it.<sup>2</sup> Yet even now, nearly twenty years into the twenty-first century, with all of our understanding of the catastrophic consequences of nuclear weapons and the global economic and climactic strains on our existence, some states are investing in a nuclear arms race.

China, the Democratic People's Republic of Korea (DPRK), France, India, Israel, Pakistan, Russia, the United Kingdom, and the United States all possess the capacity to detonate nuclear explosive devices. The DPRK's programme is relatively recent,<sup>3</sup> but the rest of these states have had nuclear weapons for decades. They are now all "modernising" their arsenals of warheads and delivery systems. Some are also expanding the size of their arsenals.

These modernisation programmes are not, as this study has shown since in its first edition in 2012, just about "increasing the safety and security" of nuclear arsenals, which is what the governments of these countries claim. The "upgrades" in many cases provide new capabilities to the weapon systems. They also extend the lives of these weapon systems beyond the middle of this century, ensuring that the arms race will continue indefinitely.

Modernisation of nuclear weapons is driven largely by the quest for military advantage.

Nuclear "deterrence" requires the threat of the use of nuclear weapons to be credible, and preparations for such use, legitimate.

Modernisation, especially if new capacities are created, refreshes the perceived utility and credibility of nuclear use, both technically and politically.

States are legally obligated to achieve nuclear disarmament. Article VI of the Non-Proliferation Treaty (NPT) obligates all states parties to "undertake to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament." Nuclear weapon modernisation is the qualitative aspect of the "nuclear arms race". Forty-seven years ago the NPT required this practice to end "at an early date," an outcome the Treaty paired with "good faith" progress toward nuclear disarmament. The NPT, especially as unanimously and authoritatively interpreted by the International Court of Justice, requires nuclear disarmament.<sup>4</sup> The illegitimacy of nuclear weapons is a foundation of the NPT.

It is also a foundation of the Treaty on the Prohibition of Nuclear Weapons, adopted by the United Nations in July 2017.<sup>5</sup> This treaty prohibits *inter alia* the development, testing, possession, use, or threat of use of nuclear weapons, and establishes parameters for the elimination of nuclear weapon programmes. The motivation for the development of this treaty was to put nuclear weapons on the same legal footing as the other weapons of mass destruction, biological and

chemical weapons, on the basis that nuclear weapons violate international humanitarian law and human rights law through their catastrophic humanitarian and environmental impacts.

Thus nuclear weapon modernisation goes against the letter and spirit of international law. Such modernisation also absurd and immoral, in light of the known consequences of their use and in light of the economic, social, and environmental crises we collectively face. The nine states possessing nuclear weapons, and the countries that support the modernisation and perpetuation of their arsenals by including nuclear weapons in their security doctrines, are all complicit in this horrific threat to the planet.

These states' failure to meet their legal obligation to end the nuclear arms race and eliminate their arsenals must be met with resolve for concrete action by non-nuclear-armed states so as to avoid further entrenchment of the indefinite possession of nuclear weapons. All governments have the responsibility to prevent a humanitarian and environmental tragedy.

This publication is an update of a study Reaching Critical Will initiated in 2012 on the nuclear weapon modernisation programmes of the nuclear-armed states. Each chapter is authored by country experts. The original report, and updates from 2013 to 2018, can be found at [www.reachingcriticalwill.org](http://www.reachingcriticalwill.org). This 2019 edition is a summary update, with research undertaken by the authors and editor.

## Notes

1. Hans M. Kristensen and Robert S. Norris, "Status of World Nuclear Forces," Federation of American Scientists, updated November 2018, <https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces>.
2. For details on the environmental and humanitarian consequences of nuclear weapons, please see *Unspeakable suffering: the humanitarian impact of nuclear weapons*, Reaching Critical Will of the Women's International League for Peace and Freedom, 2012, <http://www.reachingcriticalwill.org/images/documents/Publications/Unspeakable/Unspeakable.pdf>.
3. The Democratic People's Republic of Korea is not included in this study.
4. *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion of 8 July 1996, International Court of Justice, 105(2)F.
5. See <http://www.reachingcriticalwill.org/disarmament-fora/nuclear-weapon-ban> for details.

# China

Hui Zhang, with updates by Allison Pytlak

There are various estimates on the size of China's nuclear arsenal. The Federation of American Scientists (FAS) estimates that China has a total stockpile of approximately 280 nuclear warheads for delivery by about 120-130 land-based ballistic missiles, 48 sea-based ballistic missiles, and bombers.<sup>1</sup> This stockpile is likely to grow further over the next decade as additional nuclear-capable missiles become operational.

As of its 2015 defence white paper, China has maintained a no-first-use doctrine for nuclear weapons. However, its modernisation programme "is adding significant new capabilities" to its nuclear forces.<sup>2</sup> Since 2016, the country has continued fielding a new version of an existing nuclear medium-range mobile ballistic missile, a new dual-capable intermediate-range mobile ballistic missile, and an improved road-mobile launcher for an existing intercontinental ballistic missile (ICBM). It has also continued development of a road-mobile ICBM, and might be developing an air-launched dual-capable ballistic missile.<sup>3</sup>

The 2015 white paper explains that China is continuing to "optimise its nuclear force structure, improve strategic early warning, command and control, missile penetration, rapid reaction, and survivability, and protection." Its modernisation programme began in the 1990s and includes transitioning from liquid-fueled slow-launching missiles to solid-fuel, quicker-launching road-mobile missiles, to make the force more "useable".

For the past decade, the focus of China's ICBM modernisation has been the DF-31 (CSS-10 Mod 1) and a longer-range version known as the DF-31A (CSS-10 Mod 2). A significant recent development has been the fielding of the new DF-26 intermediate-range road-mobile missile. First displayed during a parade in 2016 and again in 2017, one or two brigades now appear to have been equipped with the DF-26.<sup>4</sup> China is still working on completing development of its DF-41 ICBM, which some sources say would be capable of carrying MIRVs and up to ten warheads, although this is not confirmed.<sup>5</sup>

China has also recently sped up the modernisation of its sea-based strategic force, replacing its first-generation ballistic nuclear missile-carrying submarines (SSBNs).<sup>6</sup> Some analysts have also argued that China is currently modernising its sea-based strategic force in order to secure a second-strike force. FAS reports that it is not known how many SSBNs China is planning to build, but that the Jin-class submarines are designed to carry a new JL-2 ballistic missile, which has not yet been tested to its full range (7000km).<sup>7</sup> It was announced in 2016 that China is developing a new long-range bomber that the US expects to have a nuclear mission and might become operational by the mid- or late-2020s. If this occurs, then China will have developed a "triad" of nuclear delivery systems.<sup>8</sup>

It is difficult to estimate the cost of China's nuclear weapon force; however, assuming that China consistently maintains 5 percent of its

overall military expenditure for its nuclear weapons programme,<sup>9</sup> China would have spent approximately US \$8.7 billion on its nuclear programme in 2016 (assuming an overall budget of US \$173 billion).<sup>10</sup> According to a new report in *Jane's*, China's military spending is on course to nearly double between 2010-2020, to US \$233.<sup>11</sup>

China is one of the least transparent of the nuclear-armed states and there is scant public debate on the issue. China contends the opacity of its force posture can serve to enhance the “deterrence effect” of its smaller nuclear force. The United States’ (US) “missile defence” plans

have reportedly been a driving force for China's nuclear weapon modernisation, as some Chinese officials are concerned that even a limited “missile defence” system could neutralise China's nuclear force. For example, China equipped some (or all) of its silo-based ICBMs with the capability to carry multiple warheads.<sup>12</sup> The United States’ expansion of ballistic missile defence and prompt global strike capabilities is said to raise particular concerns about vulnerability; Chinese strategists insist that these developments hinder smaller nuclear powers from pursuing nuclear disarmament and instead force them to enhance their own retaliatory-strike capabilities.<sup>13</sup>

## Notes

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# France

Hans Kristensen, with updates by Allison Pytlak

France spends about one third of its defence budget on maintaining and modernising nuclear forces. Like all of the other nuclear-armed states, France is in the middle of a broad modernisation of its nuclear forces involving submarines, aircraft, missiles, warheads, and production facilities. Studies of next-generation weapon systems have begun. Having reduced its air-delivered nuclear forces by one-third in 2008, France does not appear to have plans to reduce its nuclear forces for the foreseeable future. The Macron government has continued the nuclear policy of the Hollande government, which rejected further cuts, and reaffirmed the existing nuclear posture.

France possesses approximately 300 nuclear warheads, approximately 280 of that are deployed, or operationally available for deployment on short notice. Its delivery vehicles consist of approximately 50 aircraft that are assigned a total of 54 cruise missiles; and 48 ballistic missiles for four nuclear-powered ballistic missile submarines (at least two of which are always fully operational) equipped with nuclear-armed long-range ballistic missiles.<sup>1</sup>

France is upgrading its M51.1 sea-launched ballistic missile that was first deployed on its missile submarines in 2010 with the new M51.2. The new missile has longer range and carries a new nuclear and more powerful 150-kilotons warhead known as the TNO (Tête Nucléaire Océanique). The M51.2 became operational on the *Triumphant* in 2016 following a successful launch

in the Atlantic Ocean. A third iteration of the missile – the M51.3 – is in development and scheduled for completion by 2025 and will incorporate a new third stage for extended range and “further improvement in accuracy”.<sup>2</sup>

France is also working on a third upgrade of the M51, known as M51.3, with improved accuracy and penetration capability against advanced missile defence systems, that is scheduled to become operational in the mid-2020s.<sup>3</sup> The upgraded missile is expected to arm a new class of ballistic missile submarines, known as SNLE 3G, to replace the current *Triumphant*-class in the 2030s.<sup>4</sup>

France's 54 nuclear medium-range ASMP-A (air-sol moyenne portée-améliorée) cruise missiles are assigned to two fighter-bomber squadrons: the *La Fayette* squadron at Istres Air Base with Mirage 2000N; and the *Gascogne* squadron at Saint Dizier Air Base with Rafale F3. The Mirage 2000N will be replaced in the nuclear role by Rafale F3 in September 2018. The ASMP-A is equipped with the 300-kiloton TNA (Tête Nucléaire Aéroportée) warhead.

France has begun design development of a stealthier, extended-range replacement for the ASMP-A, which will be called the ASN4G (air-sol nucléaire 4ème génération) and enter into service around 2035. Hypersonic technologies are among the potential ASN4G propulsion options, although this might increase the length of the missile beyond what the current Rafale aircraft can carry



(Pintat and Lorgeoux 2017). If so, decisions regarding the ASN4G would have to be paired with decisions regarding France's next generation of nuclear-capable aircraft.<sup>5</sup>

Estimates vary as to how much France spends on its nuclear weapons. The French government has indicated that it spends approximately US\$ 4.6 billion on its nuclear forces each year,<sup>6</sup> or about five percent.<sup>7</sup> Other sources suggest it spends US\$ 3.6 billion annually.<sup>8</sup> However, due to increasing costs of the modernisation programme, it is estimated that by 2025 that budget will have nearly doubled to US\$ 6 billion.<sup>9</sup>

Despite France's obligation to pursue negotiations toward nuclear disarmament, former-French President Hollande declared in 2015 that, "the time of the nuclear deterrent is not a thing of the past. There can be no question of lowering our guard, including in that area."<sup>10</sup> Moreover, Hollande said it is French policy that, "If the level of other arsenals, particularly those of Russia and the United States, were to fall one day to a few hundred weapons, France would respond accordingly, as it always has. But today, that

scenario is still a long way off."<sup>11</sup> These statements have been reaffirmed by the Macron government alongside assurances that, "France has not given up on the goal of disarmament, including nuclear disarmament."<sup>12</sup>

Nonetheless, despite reductions after the end of the Cold War, there seems to be no concrete plans to reduce forces further. That fact, combined with plans to modernise French nuclear forces further, appear to be in conflict with France's obligations under the nuclear Non-Proliferation Treaty (NPT) to negotiate disarmament. In recent months, Macron has been outspoken about the importance of maintaining the INF Treaty for reasons of security and stability in Europe.<sup>13</sup> It has also been observed that France has implicitly extended its nuclear deterrent to cover German territory in the case of armed aggression, as part of a recent pact signed between the two nations in which they commit to "providing aid and assistance by all means at their disposal, including armed forces, in case of aggression against their territory".<sup>14</sup> In early 2019, France conducted a rare simulation of a nuclear weapon mission.<sup>15</sup>

## Notes

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*ICAN action against investments in nuclear weapons, Melbourne, Australia, April 2012. © Tim Wright*



# India

## MV Ramana

In November 2018, India's Prime Minister Narendra Modi announced that an Indian nuclear-armed and nuclear-powered submarine had successfully completed its "first deterrence patrol".<sup>1</sup>

The Indian navy has had a long interest in submarines, acquiring its first submarine in 1967 in a deal with the Soviet Union. The first nuclear submarine to be designed and built in India was the INS Arihant, which was launched in July 2009 and whose reactor went critical in 2013. In addition to the INS Arihant submarine, a second nuclear submarine has been ready to undergo tests since 2012 and a third vessel has been under construction.<sup>2</sup> Even one of these has been in an accident. In March 2014, "the hatch of a "tank" to be installed in INS Aridhaman — the follow-on submarine to the first one, INS Arihant—blew off" during tests during construction, leading to one worker's death and injury to two others.<sup>3</sup> An unnamed officer told the press that the accident "would have been catastrophic if it had happened inside the submarine".<sup>4</sup>

These vessels are to be followed by two more, in order to complete a planned fleet of four nuclear-powered submarines to be armed with ballistic missiles carrying nuclear warheads. The third and fourth vessels are planned for launch by 2020 and 2022, and "final design work" has started on the follow-on generation of ballistic missiles submarines.<sup>5</sup> India's production capability for the highly enriched uranium that will be used as

nuclear reactor fuel for the submarine fleet is also being increased.<sup>6</sup>

The Arihant submarine is intended to carry up to 12 ballistic missiles each armed with one nuclear warhead. Currently, this missile is the B05, also known as the K-15, with a range of 700 to 750 kilometers. Naval planners want submarine launched missiles with longer ranges to be deployed.

The Indian navy in 2012 leased for ten years a nuclear attack submarine from Russia.<sup>7</sup> This submarine (INS Chakra) does not carry nuclear weapons but has likely been deployed with the Arihant during its tests. In December 2014, India decided to lease another nuclear submarine from Russia, again in the same class and with the same conditions, including not using it as a platform for nuclear weapons.<sup>8</sup> In December 2017, INS Chakra had an accident. The cause was given as "either a collision at sea or accidental scraping while entering the narrow channel into the naval base at Vishakhapatnam" and fixing it was reported to require "substantial repair work".<sup>9</sup>

In February 2015, India's government approved the construction of six nuclear-powered attack submarines.<sup>10</sup> The timing of the announcement may have to do with the defense establishment taking advantage of the more militaristic outlook of the Modi government, which seems willing to commit to the program's estimated cost of about 1 trillion Rupees.<sup>11</sup> Work on the attack submarines project started in 2017.

India's development of its naval capability appears to be driven in part by a long-standing attempt to demonstrate nuclear arsenal capabilities associated with states currently seen as great powers (the United States, Russia, Britain, France and China) as well as a more immediate strategic competition with China, with control of the Indian Ocean being a particular area of contention.<sup>12</sup>

From December 2013 to February 2014, a Chinese nuclear-powered attack submarine travelled from China through the Strait of Malacca into the Indian Ocean, passed by Sri Lanka on its way to the Persian Gulf and then returned home.<sup>13</sup> An almost identical area of operations for the Indian Navy

was described in 2017 by its Chief of Staff Admiral Lanba who observed that "regular deployment of naval ships and aircraft is being maintained in the North Arabian Sea, Gulf of Oman, Persian Gulf, the Andaman Sea and the approaches to the strategically important straits of Malacca, Lombok and Sunda".<sup>14</sup>

These developments create new additional paths by which conflict between India and Pakistan, who have already fought four wars, might escalate deliberately or inadvertently to nuclear war. These dangers add to the already fraught security landscape of South Asia.<sup>15</sup>

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# Israel

Sharon Dolev

Israel's general practice of opacity means there is no publicly accessible national doctrine on nuclear weapons. Far more is known about its approach to modernisation in the most general terms and in the military context than about its approach to nuclear weapons policy or strategy. Whatever factual information is publicly available relies on sources outside of Israel.

Estimates about the size of Israel's nuclear arsenal are based on the power capacity of the nuclear reactor near Dimona. Experts and analysts outside of Israel estimate that Israel's current nuclear force ranges from 60–80 weapons at the low end to over 400 at the high end. The most recently cited figure is 80 warheads.<sup>1</sup> It is estimated that, Israel could have produced approximately 840kg of weapons-grade plutonium.<sup>2</sup> Estimates of highly enriched uranium (HEU) production are even more difficult to make though public information suggests Israel has a uranium enrichment programme.<sup>3</sup> A recent estimate has assumed Israel possesses approximately 300kg of HEU.<sup>4</sup>

It is assumed that Israel has a triad of delivery systems: land, air, and sea. The country is believed to have deployed a cumulative total of 100 Jericho-I (500 km range) and Jericho-II (1,500 km range) ballistic missiles, both of which are nuclear capable as well as mobile by land or rail. The range of the Jericho-II and its 1,000 kg payload "make it well suited for nuclear delivery."<sup>5</sup> Israel has been developing a new ballistic missile, the Jericho-III, which is believed to have a

maximum range of 4,000–6,500km. Foreign sources reported a test of the missile in 2013. More recent information is difficult to find though some media reports have suggested the JerichoIII is operational.<sup>6</sup>

The Israeli navy possesses five submarines, three Dolphins and two Dolphin AIP, built by ThyssenKrupp AG Germany. A new Dolphin AIP is scheduled to join the fleet in 2019, but now the deal (and a deal for three new submarines in addition) is pending investigation of corruption in Israel (file 3000).<sup>7</sup> Estimations are that the Dolphin Submarines are equipped with Popeye Turbo submarine launched cruise missile (SLCM) that can be armed with nuclear warhead and can reach the range of 1,500 km. The submarines are described in the Israeli media as Israel's "second strike".<sup>8</sup>

In light of current and planned nuclear capabilities, it seems that Israel is continuing to "enhance" its triad of delivery systems. Nuclear weapons modernisation is related to modernisation activities in the security sector generally, including in areas of information, advanced, and outer space technologies.

There is no reliable public estimate on nuclear weapon spending in Israel. Global Zero, and civil society organisation, estimates it could in the range of \$1.9 billion USD.<sup>9</sup>

The policy of opacity entails a nuclear weapons capability, which "everyone knows" about (domestically and internationally) but there is an

umbrella of secrecy concerning the physical and doctrinal elements of this capability. The secrecy surrounding Israel's nuclear programme has taken on a life of its own at the domestic level with Israelis practicing self-censorship on a wide range of nuclear issues. At the same time, a discourse does exist at the academic level and increasingly in the media, driven in large part by debate over

Iran's nuclear programme, and the existence of a small anti-nuclear campaign in Israel.<sup>10</sup> This discourse relies primarily on foreign sources. Historically, public opinion polls have indicated support for the nuclear option though a new survey has indicated that 65 percent of Israelis would prefer a nuclear weapon free Middle East to the current situation.<sup>11</sup>

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# Pakistan

Zia Mian

While Pakistan's navy does not have any nuclear-powered submarines, it has started preparing to put nuclear-armed cruise missiles on conventional submarines and may seek a nuclear-powered submarine capability of its own.

The Pakistan navy acquired its first submarine in 1964, three years before India. The current Pakistani submarine fleet consists of two Agosta-70 diesel-electric vessels bought from France and commissioned in 1979-1980, and three Agosta-90B diesel-electric vessels purchased in 1994, one of which was made in France, the second assembled in Pakistan, and the third made entirely in Pakistan.<sup>1</sup>

In 2016, Pakistan signed a deal with China for buying eight Yuan class diesel-electric attack submarines.<sup>2</sup> It is reported that China will build four of the submarines at Karachi Shipyard, and that China will also transfer submarine construction technology to Pakistan.<sup>3</sup> These submarines will include the air independent propulsion system. The submarines are expected to be completed between 2023 and 2028 at an estimated cost of up to US \$5 billion.<sup>4</sup>

Pakistan announced the setting up of a Naval Strategic Force Command headquarters in 2012, indicating an intention to put nuclear weapons at sea. The indications are these weapons will be nuclear armed cruise missiles on some of its current submarines. In 2018, Pakistan announced the successful underwater test launch of the Babur, a 450 km range cruise missile, which had

its first test in 2017.<sup>5</sup> Pakistan's Inter-Services Public Relations (ISPR) described this result as "the successful attainment of a second-strike capability".<sup>6</sup> Given Pakistan's efforts to match India, it is unlikely that the acquisition of a nuclear-armed submarine will lead to any reductions in its land-based nuclear-armed missile forces.

Pakistan also may be wanting to build a nuclear-powered submarine. In 2005, the head of Pakistan's navy Admiral Shahid Karimullah said, "Pakistan will have to make nuclear submarine itself because no one will give it to us. Our conventional capabilities are less than India. We have no nuclear submarine.... However, by 2015 we will be able to come at the level of India"<sup>7</sup> It was not clear, however, whether this claim referred to the development of a nuclear armed submarine or a nuclear-powered submarine. A former vice admiral in the Pakistan Navy has argued that Pakistan must build nuclear-powered and nuclear-armed submarines of its own.<sup>8</sup>

There are signs of some public support for a nuclear-powered submarine program in the media. One newspaper editorial in 2018 argued "We must also develop programmes to build sophisticated and advanced indigenous submarines, ultimately leading to the production of nuclear submarines".<sup>9</sup>

As India and Pakistan deploy nuclear weapons on submarines, the people of the area will confront a new set of dangers. Because they are deployed

below the ocean where communication with central command and control systems may not be guaranteed, it is possible that personnel on nuclear submarines might have pre-delegated authority to use nuclear weapons. There is thus the danger of accidental or inadvertent use of nuclear weapons. The second major danger has to do with submarine accidents, especially nuclear-powered submarines, which have both strategic consequences and impacts to public health and the environment because of the potential for radioactive releases.

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# Russia

## Pavel Podvig

Russia's nuclear modernisation programme includes a range of projects that aim to maintain its strategic and non-strategic nuclear forces. This includes continued deployment of multiple-warhead SS-27 Mod 2 (RS-24 Yars) inter-continental ballistic missiles (ICBMs), in silos as well as on road-mobile launchers, that are replacing older missiles that are reaching the end of their service lives. In 2018 Russia began tests of the Sarmat heavy ICBM that is being developed as a replacement for silo-based SS-18 (R-36M2) missiles that carry ten warheads.<sup>1</sup> It is likely that Russia will maintain the ICBM force of about 300 missiles that could carry as many as 1,000 warheads.<sup>2</sup>

By 2027 the Russian strategic navy will receive at least eight submarines of the Project 955 Borey class that carry Bulava SLBMs. Three submarines of this type are already in service and five more are at various stages of construction. Once this programme is completed, Russia will have the capability to deploy at least 128 Bulava missiles that could carry more than 700 warheads.

Russia's strategic aviation is likely to keep most of the 50 currently operational heavy bombers of the Tu-95MS and Tu-160 type. In addition to that, Russia is planning to resume production of an upgraded version of the Tu-160 bomber. Up to 50 aircraft of this type, known as Tu-160M2, may be eventually produced, but neither the final number nor the production schedule has been confirmed yet.



After the key components of the strategic modernisation programme are completed, Russia would probably have a force of 600-700 deployed strategic launchers and the capability to deploy about 3000 nuclear warheads. The actual number of deployed warheads, however, probably will not exceed the limit of 1550 established by the New Strategic Arms Reduction Treaty (New START) as Russia is likely to keep that capability in reserve whether or not the treaty is extended in 2021. Russia is also working on a number of non-traditional strategic delivery systems that are intended to complement its existing triad and, according to official statements, provide it with the capability to counter the missile defense deployed by the United States.

Russia's non-strategic nuclear forces are also undergoing modernisation and upgrade. A number

of old and new non-strategic ballistic and cruise missiles are believed to be nuclear-capable, although most are deployed with conventional warheads.

Development of new long-range cruise missiles became a subject of controversy when the United States accused Russia of testing and deploying a ground-launched cruise missile that violates the terms of the Intermediate-Range Nuclear Forces (INF) Treaty, a charge that Russia denied. After the attempts to resolve the issue by diplomatic means failed, in February 2019 the United States announced its intent to withdraw from the treaty.<sup>3</sup> In response, Russia announced that it is suspending its treaty obligations.<sup>4</sup> Unless the United States and Russia find a last-minute solution for the problem, the Treaty will be terminated in August 2019.

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# United Kingdom

Janet Fenton

Following votes in 2007 and 2016, the United Kingdom (UK) continues to drive forward its Defence Nuclear Enterprise (DNE) programme to replace its Vanguard class submarines with new Dreadnought class vessels.<sup>1</sup> 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.<sup>2</sup> The Scottish Government and parliament are strongly opposed the nuclear submarines and supportive of nuclear disarmament and the TPNW.

The first new nuclear-armed submarine was scheduled to enter service by 2030 (the Vanguard-class will by then be 13 years beyond its design life). In addition to falling behind on the service dates, the programme has been dogged by escalating costs, unforeseen technical difficulties, shortages of skilled personnel, and inadequate management.<sup>3</sup> The political controversy that surrounds it is fraught with, but not eclipsed by, the constitutional crisis caused by Brexit and Scotland's highlighting the democratic deficit that exists in connection to its support of, but exclusion from joining the Treaty on the Prohibition of Nuclear Weapons (TPNW).<sup>4</sup>

The UK is also contributing financially to the US development of the new Trident D5 missiles and components, to ensure compatibility. All these projects are behind schedule.

While some information is in the public domain there are major gaps in the UK's transparency. The Mk4A warhead modernisation programme has

been largely concealed from the public and parliament, and the upgrade of nuclear warhead facilities was presented as if unrelated to UK Trident replacement.

The MOD does not release figures for the total cost of the nuclear weapons programme but estimates that DNE spending over the next 10 years will £50.9bn. In 2016 CND produced an estimate of the cost of renewal at £205bn. The House of Commons library estimated lifetime costs until 2065 as £140bn. Overall, lifetime costs rising from £15bn (2007) to £205bn (2018) have not been disputed by the government.

The Dreadnought into-service date has slipped from the original projection of 2024 to 2040, calling into question the provision of the "Continuous At Sea Deterrence" (CASD) which has been given as an absolute requirement of the system. Despite a series of major safety concerns and near accidents over many years, the fact that the government maintains CASD indicates its unwillingness to consider potential accidents or changed capacity in detecting submarines while on patrol.

In September 2018 the chair of the House of Commons Public Accounts Committee declared the infrastructure supporting the DNE as "not fit for purpose." It gives the programme an "Amber/Red" rating, meaning that successful delivery of the project is in doubt. Delivery of the new Astute class of submarines is also rated red.

Although the programme is incompatible with the UK's NPT disarmament obligations, the present UK government is committed to Trident renewal. The main opposition party, Labour, is also committed to the programme despite the personal views of the present party leader. While Brexit is creating shifting allegiances within the UK political spectrum, there does not appear to be any concerted political opposition towards nuclear disarmament. This means the shortest route to UK disarmament would be Scottish independence which would require removing the weapons from Scotland. Without any other viable base in the UK, decommissioning and dismantling would be the only remaining option.

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*Bairns Not Bombs Demo, George Square, 13 April 2015 © Scrap Trident*

# United States

Greg Mello

As far as can be discerned given classification barriers, United States' (US) nuclear weapon modernisation is largely proceeding as planned, with what appear to be minor delays so far. The first visible exception may come in the Columbia-class submarine program; congressional auditors now see the \$115 billion budget for this program as "overly optimistic".<sup>1</sup> In addition to former US President Barack Obama's extensive modernisation programme, the current administration under President Donald Trump now seeks at least two additional nuclear weapon capabilities. The first is a low-yield submarine-launched ballistic missile (SLBM) warhead (the W76-2). The W76-2 entered formal production in February 2018 and will be completed this fiscal year,<sup>2</sup> although funds for its deployment could still however be blocked by the US Congress. The second is a sea-launched cruise missile (SLCM), which is undergoing an Analysis of Alternatives (AoA) and has no defined schedule as yet.<sup>3</sup> The Navy may resist this weapon.<sup>4</sup>

Tests of two intermediate-range missiles—a ground-launched cruise missile (GLCM) and an intermediate range ballistic missile (IRBM)—are expected in August and November of 2019 respectively. GLCM deployment reportedly could occur as soon as within 18 months if based on the existing Tomahawk system; IRBM deployment would require at least five years.<sup>5</sup> The choice and status of warheads for these proposed missiles is not known. Twelve years ago, the US possessed more than 2,000 intact W80-0 and W80-1 cruise missile warheads;<sup>6</sup> the Long Range Stand Off

(LRSO) cruise missile warhead (W80-4) will be a variant of these designs. Any SLCM, if pursued, may use a similar warhead<sup>7</sup> and so may any GLCM.<sup>8</sup> In yet another change, the B83-1 high-yield gravity bomb is now being retained "until a suitable replacement is identified".

Meanwhile the warhead labs, test facilities, and warhead production sites now have parallel operations underway, often in aging legacy facilities some of which are undergoing extensive modernization, a new and challenging management development that will intensify dramatically in the early 2020s even without the proposed additional weapons. Across the warhead complex, thousands of new technicians are being hired. Some production lines at the Kansas City Plant, where a half million additional square feet of space is being leased, are working with three labor shifts per day.<sup>9</sup>

New scope has been added to (or filled into) existing modernisation programmes, notably in nuclear command, control, and communication (NC3), in the Ground Based Strategic Deterrent (GBSD) programme (including a new reentry vehicle, the Mark21A); in plutonium warhead core ("pit") production (now at two proposed sites instead of one); in maintenance of existing warheads; and for strategic bombers (new engines for the existing B52s).<sup>10</sup>

Projected warhead and delivery system schedules appear more or less unchanged from last year, though the provision of new plutonium warhead

core (“pit”) production capacity has been delayed 1-2 years for additional studies.<sup>11</sup> Completion of the full scope of NC3 upgrades for silo-based missiles, a high priority for Congress, is now expected only by 2037.<sup>12</sup> The W76-1 Life Extension Program (LEP), which uses a new fuze to enable greater accuracy and an implied expanded target set for these submarine-launched warheads<sup>13</sup>—and makes the low-yield W76-2 warhead feasible—was completed in late 2019. The new fuze technology will be added to higher-yield W88 submarine-launched warheads during maintenance operations starting in 2020. It has been procured for existing Minuteman missiles and installation is advanced or complete.<sup>14</sup>

Current-year costs and estimated future costs have both risen significantly. In this fiscal year (FY2019), overall nuclear weapons expenditures have risen to about US \$34 billion per year,<sup>15</sup> up 13 per cent from FY2018. Nuclear weapons now comprise about 4 per cent of US \$892 billion in overall US defense account spending, a figure expected to rise to 6-7 per cent by the late 2020s.<sup>16</sup> Congress’ estimates for nuclear weapons outlays over the coming decade (US \$494 billion) are 24 per cent higher than they were two years ago (US \$400 billion),<sup>17</sup> not only because the decade ahead now includes more production but also because costs have risen, and more modernisation elements are included. If production of a SLCM or either of the two proposed intermediate-range missiles are funded, they will add to these totals.

The expected overall 30-year cost of US nuclear weapons now exceeds US \$2 trillion, if Department of Energy (DOE) estimates of its environmental liabilities and updated weapon costs are used without however including the proposed intermediate-range missiles and their warheads.<sup>18</sup> This year’s DOE budget request for nuclear warheads is 12 per cent greater than FY2019’s in constant dollars—making it the 7th year of cost escalation in this work and another all-time US warhead spending record.<sup>19</sup> Late 2018 DOE warhead cost estimates imply 25-year costs roughly \$45 B greater than what was estimated in 2017.<sup>20</sup> Rapidly-rising deficits and interest payments, and possible implementation of spending limits under the Budget Control Act, or other deficit-limiting initiatives, add to fiscal uncertainty and programme competition.

The Trump Administration replaced the Obama “interoperable” warhead (IW) program with an Air Force-only warhead (the W87-1) for GBSD. The W87-1, which like IW would provide multiple-warhead upload capability, requires all new components including the Mark 21A reentry vehicle, and would use new pits, which requires operational pit facilities of sufficient capacity. Acquisition of the B61-12 gravity bomb, the LRSO with its W80-4 warhead, and the B21 “Raider” bomber fleet are for the moment more or less on schedule, as far as can be seen.<sup>21</sup> There is some visible risk of delay in the Columbia-class ballistic missile submarine programme.<sup>22</sup>

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*Paper cranes © Tim Wright*



## Reaching Critical Will

Reaching Critical Will is the disarmament programme of the Women's International League for Peace and Freedom (WILPF), the oldest women's peace organisation in the world.

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