



Los Alamos Study Group

Nuclear Disarmament • Environmental Protection • Social Justice • Economic Sustainability

US nuclear weapons since 2020: continuity and change

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1. Overall, there have been no significant changes in US nuclear weapons forces, policies, or programs

We see no significant changes in US nuclear weapons force structure, policies, or programs since the detailed US program descriptions provided in *Assuring Destruction Forever (ADF) 2020*.¹ We urge you to refer to that publication for background to the present update.

To some extent, this continuity expresses slow decision-making in the US government overall. Covid-19 and its ramifications are the main but not the only culprit. The new (Biden) administration was months late in proposing its first budget; Congress has not yet passed its annual military authorization bill this year, or *any* government appropriation bill including for nuclear weapons programs. The work of agencies that review nuclear issues has slowed dramatically as well, increasing government opacity.

The administration's Nuclear Posture Review (NPR) is not expected until early next year. All indications suggest the NPR will contain no major changes in nuclear posture, force structure, or declaratory policy.²

2. However, we see three dramatic changes in the nuclear weapons *situation*

There are however three dramatic changes in *the nuclear situation* to report since last year.

The *first* is the marked increase in the number and intensity of US military and proxy threats against Russia and China.

The cold war between NATO plus Ukraine and Russia could become hot at any time, within days or weeks. *The situation is now so volatile that we cannot be fully sure that war between nuclear powers will not break out before the 2022 NPT Review Conference*.³ This is the most important new element to bring forth at this time.

¹"Assuring destruction forever: 2020 edition" (ADF 2020), Allison Pytlak and Ray Acheson, eds., "United States" Greg Mello and Trish Williams-Mello, June 2020, <https://www.reachingcriticalwill.org/images/documents/Publications/modernization/us-2020.pdf>.

² See for example Joe Gould, "Biden hit with backlash over removal of Pentagon's top nuclear policy official," *Defense News*, 27 September 2021, <https://www.defensenews.com/congress/2021/09/27/biden-hit-with-backlash-over-removal-of-pentagons-top-nuclear-policy-official/>. September 24, 2021. Many examples of senior policymakers' nuclear conservatism vis-à-vis the NPR could be cited, for example see Dan Leone, "King Supports ICBM Refresh on Submarine Fears; Says China Weighs Heavy on Nuclear Posture Review," *Nuclear Security and Deterrence Monitor*, 24 September 2021, <https://www.exchangemonitor.com/king-supports-icbm-refresh-on-submarine-fears-says-china-weighs-heavy-on-nuclear-posture-review-2/>.

³ Myriad examples in the economic sphere, and in the military sphere on land, sea, and in the air could be provided. To take just one, see Reuters, "Moscow says US rehearsed nuclear strike against Russia in November: Report," 24 November, <https://www.hindustantimes.com/world-news/moscow-says-us-rehearsed-nuclear-strike-against-russia-in-november-report-101637688011310.html>.

The danger of war with China is equally grave, if also more cryptic. As one well-informed scholar recent put it, “the insanity of encouraging Ukraine to attack Donbass is matched by the insanity of encouraging Taiwan to tell China to go to hell.”⁴

There is a grave danger that the present collapsed state of diplomacy has been normalized in US and Western minds to such an extent that the very real risk of war has become invisible. Raising tensions to achieve geopolitical goals can easily pass an unseen point of no return, especially as there are many independent actors with diverse interests and strategies – some of which actually favor war. Political elites, apparently even more so in this administration than in the past, are leading us toward what Einstein and his colleagues called “unparalleled catastrophe.”⁵

The second dramatic change is a rapidly-rising, linked set of economic issues that directly and indirectly affect every aspect of US nuclear weapon policies and programs. Interrelated problems of energy supply, inflation, labor, debt, supply chains, public health, and governance have catapulted into prominence since the covid-19 pandemic and will continue to evolve and intensify.

Despite their privileged position in the US polity, nuclear weapons programs cannot fully evade the triple dangers of a) inflation, b) local and industry-specific insufficiencies of trained, skilled and motivated labor, and c) instabilities in often narrow and therefore fragile supply chains.⁶

The Biden Administration is attempting to modestly rebalance national priorities toward long-neglected domestic needs by adding domestic spending. The new programs will compete with nuclear weapons programs for labor and materials and may be inflationary, as nuclear managers recognize.⁷ On a multiyear

Russian Defence Minister Sergei Shoigu said that Moscow had noted a significant increase in the activity by U.S. strategic bombers which he said had carried out 30 flights close to Russia this month. That, he said, was 2.5 times more than the same period last year.

Shoigu complained in particular of what he said was a simulated US nuclear strike against Russia earlier this month.

"The defence minister underlined that during the US military exercises 'Global Thunder', 10 American strategic bombers rehearsed launching nuclear weapons against Russia from the western and eastern directions," Shoigu was quoted as saying in a defence ministry statement.

"The minimum proximity to our state border was 20 km."

At the cruising speed of a B-52 heavy bomber (845 km/hour), 20 km is traversed in 1.4 minutes.

⁴ Steven Starr, email communication, 4 December 2021. This paper was also improved by other comments Steve made.

⁵ Albert Einstein, “The unleashed power of the atom has changed everything save our modes of thinking, and thus we drift toward unparalleled catastrophe.” Letter from Einstein and the Committee of Atomic Scientists, 1946, cited in Sandra Butcher, “The Origins of the Russell-Einstein Manifesto,” May 2005, Pugwash, https://pugwashconferences.files.wordpress.com/2014/02/2005_history_origins_of_manifesto3.pdf.

⁶ These three dangers were the ones emphasized by Robert Raines, Associate National Nuclear Security Administration (NNSA) Administrator for Acquisition and Project Management in an August 3, 2021 address to the Nuclear Deterrence Summit, Arlington VA, organized by ExchangeMonitor Publications. Authors’ notes and recording. Similar concerns were raised by other nuclear managers present.

⁷ Ibid.

time scale, funding uncertainty is rising, as the Congressional Budget Office (CBO) already noted before these new problems arose, in 2017.⁸

Beyond recent causes, US foreign policy, and US military structure and postures including nuclear weapons policies, always change slowly. US nuclear policies have changed little since the modernization commitments Obama made with the Senate in 2010 to secure ratification of New START.⁹ Obama's stance was in turn based on a 2009 strategic consensus among long-time nuclear and intelligence "graybeards," supported by nuclear bureaucrats and staff from defense institutions.¹⁰ This is more or less how US nuclear decisions are always made.

Defense and nuclear weapons policies are the responsibility of special bureaucracies anchored outside the original, constitutionally-established institutions of Congress and the Presidency.¹¹ These special, permanent bureaucracies, created by the National Security Act of 1947, respond not just to elected government but also to a complex web of vested interests within and outside government.¹² Legalized corruption is more a norm than an exception. Congress, for its part, is increasingly unwilling to provide meaningful oversight, especially over nuclear weapons programs and policies. And as noted last year, US citizens lack democratic agency.¹³

Because of these realities, US nuclear policy will only change as a result of overpowering forces external to government, e.g. the actions of other states, intractable economic changes, internal political crises, or natural disasters.

The US is a highly militarized country, on a uniquely large scale. The US is not just "a" nuclear weapons state. It is the predominant nuclear-military-political power in the world, which seeks to dominate or control all others. Until covid-19, the US spent about two-thirds of all congressional appropriations and about one-fifth of all federal expenditures on military functions. The military-related fraction of federal spending is likely to fall somewhat next year but the amount, measured in current dollars, will rise. Covid-19 temporarily changed the balance of US spending but these huge relief expenditures created no permanent institutions that could help rebalance US priorities.¹⁴

⁸ Congressional Budget Office, *Approaches for Managing the Costs of U.S. Nuclear Forces, 2017–2046*, pp. 9–10, <https://www.cbo.gov/system/files/115th-congress-2017-2018/reports/53211-nuclearforces.pdf>.

⁹ See for example http://lasg.org/budget/Sect1251_update_17Nov2010.pdf. The weapons plutonium facility that was a central feature of this plan was canceled as a result of civil society intervention.

¹⁰ William J. Perry, James R. Schlesinger, et.al., *America's Strategic Posture, The Final Report of the Congressional Commission on the Strategic Posture of the United States*, 2009, https://www.usip.org/sites/default/files/America%27s_Strategic_Posture_Auth_Ed.pdf.

¹¹ The nuclear weapons bureaucracy is unique. For hints as to why see Office of Management and Budget, "Structural Features Making NNSA an Unusual Federal Agency," memo for Vice President Biden, 2016. <http://lasg.org/Modernization/StructuralFeaturesMakingNNSAUnusualFedAgency.pdf>

¹² Political scientist Michael Glennon calls this "double government," *National Security and Double Government*, Oxford University Press, 2016.

¹³ ADF 2020, pp. 118-120.

¹⁴ In fiscal year (FY) 2019, US military expenditures comprised about \$904 billion (B) out of \$1.34 trillion (T). "Why Military Spending Is More Than You Think It Is," Kimberly Amadeo, 3 September 2020, <https://www.thebalance.com/u-s-military-budget-components-challenges-growth-3306320>; Office of Management and Budget, [Table 8.7—Outlays for Discretionary Programs: 1962–2026](https://www.whitehouse.gov/wp-content/uploads/2021/05/hist08z7_fy22.xlsx) https://www.whitehouse.gov/wp-content/uploads/2021/05/hist08z7_fy22.xlsx. Amadeo includes \$934 B in FY21 military spending; a figure of \$1.174 T (based on the FY22 budget request) can be supported by

These conditions and others result in an uncanny continuity on national security issues – and nuclear weapons issues in particular – between seemingly different administrations.

Much is made in the US defense press about advances in Russian and Chinese hypersonic weapons, which have entered significant deployment in the case of both countries. These weapons are truly revolutionary, but not so much in the nuclear sphere as in conventional warfare. Their greatest relevance to nuclear weapons lies in the potential that the US might be more tempted to use nuclear weapons to prevent losing expeditionary wars. We do not address hypersonic weapons here – beyond the ballistic missiles the US already has.

Nuclear weapons are situated in the context of military forces overall, and that is how the Biden administration's NPR will be presented. In the NPT's Article VI, the responsibility of states parties to negotiate nuclear disarmament and overall disarmament are linked (and separated) by a comma. As we did in ADF 2020, we update here the important disparities in overall military commitments between the US and its rival nuclear powers, measured financially.

US military spending in 2020 was:

- More than the next 11 countries combined, eight of which are U.S. allies;
- More than three times China's;
- More than twelve times Russia's; and
- Two and half times that of Russia and China combined.

including more components. Mandy Smithberger and William Hartung, 29 June 2021, *Tomdispatch*, <https://tomdispatch.com/what-price-defense/>.

As of this writing, FY 2021 spending is continuing unchanged into FY2022 (with the exception of the 15 November 2021 "Infrastructure Investment and Jobs Act" and covid-19 relief, see below). Bipartisan majorities in the House and Senate favor increases of about \$25 B over the Administration's FY2022 baseline military spending request, but no FY2022 military spending bills have been enacted as yet. An active but small minority of lawmakers prefer lower defense budgets.

Total US federal outlays by year see <https://www.statista.com/statistics/200397/outlays-of-the-us-government-since-fiscal-year-2000/>.

The 15 November 2021 "Infrastructure Investment and Jobs Act," new infrastructure Act will add an average of \$58 B annually to non-defense spending over the coming decade. See "The True Costs of the \$1.2 Trillion Bipartisan Infrastructure Bill," Taxpayers for Common Sense, 12 November 2021, <https://www.taxpayer.net/infrastructure/the-true-costs-of-the-1-2-trillion-bipartisan-infrastructure-bill/>.

The proposed "Build Back Better" Act, if enacted, would add an average of \$168 B per year over the decade, nearly all to non-defense spending. See Congressional Budget Office (CBO), "Summary of Cost Estimate for H.R. 5376, the Build Back Better Act," <https://www.cbo.gov/publication/57627>.

Even with both pieces of new legislation, US military spending would consume as much of US fiscal resources as all other discretionary spending combined, assuming no other change in national priorities.

FY2020 and FY2021 were unusual years. Through four emergency laws in calendar year 2020, Congress allocated about \$4 trillion (T) in covid-19 funds. "Breaking Down \$3.4 Trillion in COVID Relief," Committee for a Responsible Federal Budget, 7 Jan 2021, <https://www.crfb.org/blogs/breaking-down-3-4-trillion-covid-relief>. By the end of FY2021, \$3.5 T had been spent across two fiscal years with \$0.5 T yet to be spent. "Covid-19 Spending," <https://www.usaspending.gov/disaster/covid-19?publicLaw=all>. These legislative acts radically changed the proportion of discretionary spending devoted to the military, from 68% in FY2019 to roughly 27% in FY2020 and FY2021, using the above sources. Military spending as a fraction of total spending fell from 20% in FY2019 to 13-14% in FY2020 and FY2021.

Over the 2016 – 2020 period, US military expenditures rose 12% in constant dollars, while Russia’s fell 16% over the same period. Chinese military expenditures rose 20% over the same period.¹⁵ In 2020, the total military expenditure by NATO countries was almost seventeen times that of Russia.¹⁶ By this measure alone, who are the aggressors here?

The *third* major change is at present poorly understood and documented. We believe there has been a major sociological, cultural, psychological change in the US population as a result of the pandemic and the public health measures enacted. Mental health has deteriorated; people are frightened, isolated, and more malleable. Our news media is far more accepting of government authority as well.¹⁷

In the 2020 ADF we pointed out the low popular salience of nuclear weapons and disarmament issues. This continues and if anything has increased.¹⁸ Nuclear disarmament has essentially no current electoral significance.

3. Other key changes and updates

A few days before 2 December 2021, the B61-12 gravity bomb entered serial production.¹⁹ Entry into service will shortly follow. Current plans are to make about 480 of these highly-accurate (30-meter circular-error-probable), 0.3 – 50 kiloton (kt) bombs, at a cost of roughly \$12 B.²⁰ It is likely that about 100 of these bombs will be forward-deployed at six European bases, assuming they replace current B61 variants on a one-to-one basis.²¹

The three or four dozen 400 kt B61-11 earth-penetrating strategic gravity bombs may or may not be eventually replaced by the B61-12, an issue related to the fate of the other US nuclear gravity bomb, the 1.2 megaton B83-1.

The future of the B83-1 remains uncertain. In June 2020, the US Nuclear Weapons Council decided to extend the service life of this bomb, and the administration’s FY2022 budget request included \$98.5 million (M) to begin this work in FY2022.²² This contravenes earlier assurances to retire this bomb when the B61-

¹⁵ Stockholm International Peace Research Institute, SIPRI Military Expenditure Database, updated April 2021, <https://www.sipri.org/databases/milex>.

¹⁶ NATO, “Defence Expenditure of NATO Countries (2014-2021),” 11 June 2021, https://www.nato.int/cps/en/natohq/news_184844.htm. SIPRI data was used for Russia in this comparison.

¹⁷ Many citations are possible but this is not the place to go into this important topic in the necessary depth.

¹⁸ Gallup, “Most Important Problem,” October 2021, <https://news.gallup.com/poll/1675/most-important-problem.aspx>.

¹⁹ Aaron Mehta, “Updated B61 nuclear warhead enters production,” *Breaking Defense*, 3 December 2021, <https://breakingdefense.com/2021/12/updated-b61-nuclear-warhead-enters-production/>.

²⁰ Hans M. Kristensen, Matt Korda, “United States nuclear weapons, 2021,” Taylor & Francis Online, 26 January 2021, <https://www.tandfonline.com/doi/full/10.1080/00963402.2020.1859865>, pp. 43-63. Hans M. Kristensen, “B61-12: The New Guided Standoff Nuclear Bomb,” Presentation to Side Event, Third Preparatory Committee Meeting for NPT, 2 May 2014, https://programs.fas.org/spp/nukes/publications1/Brief2014_PREPCOM2.pdf. Including the guidance tailkit raises the cost to \$12 B. Exchange Monitor, “NNSA Finishes First B61-12 Gravity Bomb,” *Nuclear Security and Deterrence Monitor*, 2 December 2021, <https://www.exchangemonitor.com/nnsa-finishes-first-b61-12-gravity-bomb/>.

²¹ Kristensen and Korda, op. cit.

²² NNSA “FY2022 Congressional Budget Request,” May 2021, pp. 10, 147, <http://lasg.org/budget/FY2022/doe-fy2022-budget-volume-1.pdf>.

12 entered service.²³ The B61-12, having at most 4% of the B83-1's explosive yield, is thought to lack sufficient cratering and seismic effects to hold certain deeply buried targets at risk. At present, these targets are addressed via the heavily-built B61-11.

Alteration 370 of the 455 kt W88 submarine-launched ballistic missile (SLBM) warhead is on track to begin early next year, a year later than NNSA previously estimated. This operation will refresh high explosives and add a new "smart" arming, fuzing, and firing (AFF) assembly, greatly increasing the probability of hard-target kill.²⁴

There have been no significant changes in the total number of deployed and reserve US weapons over the past year. However, we believe the number of *deployed* US gravity bombs and air-launched cruise missiles could or should be reinterpreted to include most or all active bomber-delivered weapons, as these can be readily shifted to active bases and/or loaded onto nuclear-capable aircraft on short notice. Kristensen and Korda count 300 deployed and 550 reserve warheads and bombs in this category.²⁵ We believe all 850 should be considered deployed, raising the estimated total number of deployed warheads and bombs to 2,350 and lowering the estimated number of reserve weapons to 1,450.

Beyond the above projects, unspecified future NNSA warhead projects are now at "very high risk" of delay due to difficulties in producing uranium components.²⁶ The W87-1 warhead, to be deployed on the proposed silo-based Ground-Based Strategic Deterrent (GBSD), is among those at risk. That warhead also faces potential delays from insufficient or delayed production of plutonium warhead cores ("pits") (see below).

It is too early to see if any major nuclear delivery system replacements will be delayed, beyond the warning signs already visible last year. Of note, the Navy now says that if necessary, individual Ohio-class submarines could be life-extended by up to five years, contradicting previous statements, as Columbia-class production margins narrow.²⁷

²³ NNSA, "NNSA Reaches Important Milestone with B61-12 Life Extension Program," press release, 1 August 2016, <https://www.energy.gov/nnsa/articles/nnsa-reaches-important-milestone-b61-12-life-extension-program>. Department of Energy (DOE) Secretary Moniz:

Once completed, the B61-12 LEP will allow for the retirement of the B83-1—the last megaton-class weapon in America's nuclear arsenal—while supporting the nation's continued commitment to our national security and that of our allies and partners.

The earlier decision to retire the B83-1 is also visible in the Department of Defense *Nuclear Matters*, 2020 Edition (Revised), Figure 4.3, <https://www.acq.osd.mil/ncbdp/nm/NMHB2020rev/chapters/chapter4.html>.

²⁴ Hans Kristensen, Matthew McKinzie, and Theodore Postol, "How US nuclear force modernization is undermining strategic stability: The burst-height compensating super-fuze," 1 March 2017, <https://thebulletin.org/2017/03/how-us-nuclear-force-modernization-is-undermining-strategic-stability-the-burst-height-compensating-super-fuze/>.

²⁵ Kristensen and Korda, op. cit.

²⁶ Allison B. Bawden, *Nuclear Weapons: NNSA Plans to Modernize Critical Depleted Uranium Capabilities and Improve Program Management*, Government Accountability Office, GAO-21-16, 15 October 2020, <https://www.gao.gov/products/gao-21-16>.

²⁷ Megan Eskstein, "Navy May Extend Life of Ohio SSBNs to Provide Cushion for Introduction of Columbia-class," 16 November 2020, *US Naval Institute News*, <https://news.usni.org/2020/11/16/navy-may-extend-life-of-ohio-ssbns-to-provide-cushion-for-introduction-of-columbia-class>. Dan Leone, "Columbia Could be Down to Two Months of Margin, Navy Program Exec Says," *Nuclear Security and Deterrence Monitor*, 18 November 2021, <https://www.exchangemonitor.com/columbia-could-be-down-to-a-month-of-margin-navy-program-exec-says/>.

The sea-launched cruise missile (SLCM) proposed by the Trump administration has died. Upon information and belief, the Navy's Analysis of Alternatives (AoA) concluded that any proposed SLCM provided no deterrence advantages and many practical problems. On 4 June 2021, acting Navy Secretary Thomas Harker cut all expenditures for this nascent program.²⁸ Some complained,²⁹ but the program is now dead before it ever started.

NNSA infrastructure upgrades are proceeding, with large estimated cost increases for long-term projects, specifically pit production infrastructure. Current early estimates of pit production costs through FY2033 now lie in the staggering \$33-39 B range.³⁰

Los Alamos National Laboratory (LANL) estimates its pit costs over the present decade at \$18 B, exclusive of other plutonium programs.³¹ The cost of pit production at LANL in the 2020s increases overall W87-1 warhead costs by a factor of at least three, making that warhead at least three times as expensive as the B61-12 and by far the most expensive warhead ever, if it is built.³²

This dramatic cost inflation is a harbinger of serious trouble in NNSA's long-term plans, as we warned in ADF 2020.

The total labor force working on US nuclear weapons is increasing rapidly. We have no specific labor data on DoD nuclear contracting, though expenses are rising as production begins. NNSA and its contractors are meanwhile hiring apace. By 30 September 2019, NNSA's site contractors employed 44,444 people, up 3,926 employees over the previous year. Including all worker categories, NNSA's total federal and contract workforce had reached 50,000 by that same date.³³

We believe the total NNSA workforce lies in the vicinity of 54,000 to 58,000 today, two years later. Over just the past year, and despite covid-19, LANL hired 1,277 people, the most in at least 30 years.³⁴ Other sites are also expanding their workforces, although none quite as fast as this.

²⁸ Mallory Shelbourne and Sam LaGrone, "SECNAV Memo: New Destroyer, Fighter or Sub: You Can Only Pick One; Cut Nuclear Cruise Missile," *US Naval Institute News*, 8 June 2021, <https://news.usni.org/2021/06/08/secnav-memo-new-destroyer-fighter-or-sub-you-can-only-pick-one-cut-nuclear-cruise-missile>

²⁹ For example, "Top Pentagon Brass Hadn't Seen Acting NavSec Memo Calling for Cancellation of SLCM-N," *Nuclear Security and Deterrence Monitor*, 11 June 2021, <https://www.exchangemonitor.com/top-pentagon-brass-hadnt-seen-acting-navsec-memo-calling-cancellation-slcm-n/>

³⁰ Los Alamos Study Group, "Plutonium expenses based on FY22 Congressional Budget Request," 24 August 2021, <http://lasg.org/MPF2/Pu-expenses-per-FY22-CBR-final.pdf>.

³¹ Los Alamos Study Group, Bulletin 286: "Demonstration and workshops Nov. 5 in Santa Fe; LANL estimates \$18 billion in pit costs this decade, ≥\$80 million/pit," 28 October 2021, <https://www.lasg.org/ActionAlerts/2021/Bulletin286.html>.

³² Los Alamos Study Group, "NNSA pit production strategy: no clear goals, plans, or likelihood of success

Production at LANL has high risks and costs, few or no program benefits," on-line congressional seminar, 1 October 2020, http://lasg.org/presentations/PlutoniumPitWorkshop_1Oct2020.pdf. Further resources are available at http://lasg.org/MPF2/first_page.html.

³³ NNSA, *FY2021 Stockpile Stewardship and Management Plan*, p. 4-7, http://lasg.org/documents/FY2021_SSMP_Dec2020.pdf.

³⁴ Scott Wyland, "Mason: LANL gearing up to produce nuclear triggers," *Santa Fe New Mexican*, http://lasg.org/press/2021/SFNM_2Dec2021.html.