



# Los Alamos Study Group

*Nuclear Disarmament • Environmental Protection • Social Justice • Economic Sustainability*

## Update on US Nuclear Modernisation for the International Disarmament Community

Greg Mello, 5 April 2018

(A version of this update will be published next week by Reaching Critical Will, a campaign of the Women's International League for Peace and Freedom, in the 2018 edition of *Assuring Destruction Forever*.)

### Introduction

#### **Nuclear modernisation and the doctrines it serves are incompatible with human development and survival.**

Nuclear weapons which are not retired will be maintained. If retained, sooner or later they must also be modernised or replaced, involving great expense and entailing decades of political commitment, for which massive institutional and ideological investments are necessary.

All the forces in government and US society necessary to produce these investments are now fully mobilized, as part of a surging militarism that assumes American global exceptionalism and dominance even as it fears weakness and decline. There is no significant opposition as yet.

*The proposed breadth of nuclear modernisation, and the doctrines and practice of aggressive war it supports, are incompatible with stable coexistence and human development. The international community must come to grips with this fact before it is too late.*

The US modernisation program is vast. It is expected to cost, along with maintaining and deploying nuclear weapons, at least \$1.2 trillion over 30 years.<sup>1</sup> Current US nuclear weapons expenditures, about \$30 billion (B) per year before planned modernisation increases, already exceed the total military expenditures of all but ten countries.<sup>2</sup>

US nuclear weapons expenses are a small but influential fraction of planned overall defense outlays, which in the absence of dramatic reform can be reasonably expected to reach \$27 trillion over the same 30-year period. Looking just at next year, President Trump has requested \$886 B for defense accounts, which is \$7,508 per US household or \$2,717 per capita, and a 13% increase over current levels.<sup>3</sup>

We cannot properly understand, nor can we successfully address, the challenge of nuclear modernisation without squarely facing the tremendous imbalance in security posed by US military spending overall. The US now spends more per capita on its "defense" than the total income available to almost half the people

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<sup>1</sup> Congressional Budget Office (CBO), "Approaches for Managing the Costs of U.S. Nuclear Forces, 2017 to 2046," 31 Oct 2017, <https://www.cbo.gov/publication/53211>. This total does not include the new weapons in the February 2018 Nuclear Posture Review, which have not been approved by Congress.

<sup>2</sup> Stockholm International Peace Research Institute (SIPRI), <https://www.sipri.org/databases/milex>. These ten countries are the USA, China, Russia, Saudi Arabia, India, France, UK, Japan, Germany, and South Korea. Planned US nuclear weapons expenditures exceed the *combined* military expenses of the 89 countries with the smallest overall military budgets.

<sup>3</sup> Kimberly Amadeo, "U.S. Military Budget: Components, Challenges, Growth," 15 Feb 2018, <https://www.thebalance.com/u-s-military-budget-components-challenges-growth-3306320>. Assuming no real growth or decline, thirty times \$886 B is \$27 trillion. This analysis includes more components of defense spending than SIPRI's. It does not however include any range of estimates for the substantial interest payments that have been incurred, and will be incurred, from federal borrowing for defense purposes.

in the world.<sup>4</sup> US defense expenditures – \$1.7 million per minute – exceed the combined military spending of the next eight biggest military spenders (most of which are US allies), as well as the combined military expenses of the entire rest of the world not counting these top nine.<sup>5</sup>

Especially considering the leading role of the US in international institutions, this deluge of money embodies devastating priorities. Our time in history is one of rapidly converging crises that threaten the very existence of civilization, the US included. Globally these crises include wars, resource shortages, mass migrations, extreme poverty and hunger, a collapsing global climate (with its attendant droughts, extreme storms, and rising seas)<sup>6</sup>, and collapsing ecosystems. Mass extinction of species has begun.

*Non-militarized, non-nuclear states have been remarkably passive in the face of these inverted security priorities, which threaten their very existence.*

This is not a distant concern. If not adequately addressed now, these crises, including runaway global warming, will overwhelm international institutions and one by one, each and every government. These events could easily occur within the careers of young diplomats today. Succeeding slowly is failing by another name.

For its part, US society is deeply divided, struggling, and demonstrably unstable. Symptoms include falling life expectancy, skyrocketing overdose deaths (now almost 200 per day), mass shootings (about five school shootings per month since 2012), failing infrastructure, and widespread economic precarity. Climate change is already hitting hard; large areas may become nearly uninhabitable within decades as water supplies fail.

Yet US military spending is larger than the sum of all other accounts in the discretionary budget set by Congress each year.

### **The current stockpile: thousands of deployed and reserve nuclear weapons.**

As of September 30, 2017 the declared US nuclear weapons stockpile consisted of 3,822 warheads and bombs, of which an estimated 1,800 were “deployed” and 2,022 were “in reserve”<sup>7</sup> (For bombs and cruise missiles, the deployment of which is not counted in any treaty, these two categories are somewhat

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<sup>4</sup> Hauke Hillebrandt, “Median GDP per capita: how much does the typical person earn in different countries? A look at global inequality,” 25 May 2016, <https://www.givingwhatwecan.org/post/2016/05/giving-and-global-inequality/>. In 2013, median global per capita income was estimated at \$2,920. Glenn Phelps and Steve Crabtree, “Worldwide, Median Household Income About \$10,000,” Gallup, 6 Dec 2013, <http://news.gallup.com/poll/166211/worldwide-median-household-income-000.aspx>.

<sup>5</sup> SIPRI, “Biggest military spenders,” <http://visuals.sipri.org/>.

<sup>6</sup> This nuclear weapons update is not the place to document these crises. However, as this chapter goes to press, an excellent short review of the climate situation crisis has been published by Climate Cod Red. See David Spratt, “1.5°C of warming is closer than we imagine, just a decade away,” 5 Apr 2018, [http://www.climatecodered.org/2018/04/15c-of-warming-is-closer-than-we.html?utm\\_source=feedburner&utm\\_medium=email&utm\\_campaign=Feed%3A+ClimateCodeRed+%28climate+code+red%29](http://www.climatecodered.org/2018/04/15c-of-warming-is-closer-than-we.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+ClimateCodeRed+%28climate+code+red%29).

<sup>7</sup> Office of the Secretary of Defense (OSD), “Nuclear Posture Review,” Feb 2018, <https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>; Hans M. Kristensen & Robert S. Norris (K&N), “United States Nuclear Forces, 2018,” *Bulletin of the Atomic Scientists*, 74:2, 120-131, <https://doi.org/10.1080/00963402.2018.1438219>. I assigned all of the 178 warhead difference between the Kristensen and Norris (K&N) estimate and the DoD reported stockpile to the reserve arsenal, decreasing K&N’s estimate of reserves by that amount but leaving the deployed arsenal unchanged. Adding these 178 newly-retired warheads to K&N’s estimate of retired warheads, and then estimating that about 1 warhead was dismantled per day from February to April 2018 gives an estimate of 2,700 retired weapons.

arbitrary, which can easily lead to a misunderstanding of the numbers of these weapons actually available immediately or within a short time.<sup>8</sup>)

There are in addition to all these about 2,700 “retired but intact” warheads and bombs,<sup>9</sup> or roughly 6,500 US warheads and bombs in all.

The US currently deploys nuclear warheads on submarine-launched ballistic missiles (SLBMs), silo-based missiles (the “Ground-Based Strategic Deterrent,” GBSD), and on air-launched cruise missiles (ALCMs). The US also deploys five kinds of nuclear gravity bombs, which to deliver require overflying enemy territory. There are four distinct delivery modes, more than implied by the usual “triad” moniker. A future sea-launched cruise missile (SLCM) would make five basing and delivery modes.

The GBSD consists of 400 deployed Minuteman III missiles with one W78 or one W87 warhead each, with 50 empty silos kept in warm standby. At least one-half of these 400 (or 450) missiles could be uploaded to carry three W78 warheads.<sup>10</sup> Explosive yields are 335 kilotons (kt) for the W78 and 300 kt (or 475 kt) for the W87.

There are 280 Trident D5 ballistic missile tubes on 14 Ohio-class submarines, two of which are typically in refueling overhaul. The 20 D5 missiles on each boat can each carry up to 8 W76 or W88 warheads (100 and 455 kt, respectively). Each boat now carries an estimated 90 warheads for a total of 1,080 warheads on 12 active boats. There are roughly 384 higher-yield W88s available.<sup>11</sup>

There are 528 nuclear ALCMs available for 42 nuclear-capable B-52s, each of which can carry up to 20 ALCMs.<sup>12</sup> These missiles carry the adjustable-yield W80-1 warhead (5-150 kt). In 2007 there were 1,806 W80-1 warheads and 289 W80-0s extant.<sup>13</sup> It is likely that most of the former at least, if not both variants, are still available for further modification into W80-4 warheads for the Long Range Stand Off (LRSO) ALCM and potentially the new SLCM as well. There is apparently no dearth of W80-type warheads for future cruise missiles.

Strategic gravity bombs (the B61-7, the B61-11 earth penetrator, and the B83-1) are assigned to the stealthy B-2A bomber, with available yields of 340 kt for the B61-7/11 and from the low kiloton range up to 1,200 kt for the B83-1. Unless some have been dismantled in the last decade there could be more than 450 strategic B61-7/11s, many (all?) of which have through a life-extension program and as many as 600 B83s, at least half of which have been through a life-extension upgrade to become B83-1s.<sup>14</sup>

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<sup>8</sup> K&N (op. cit.) estimate that there are 300 “deployed” bomber weapons, but in addition to these an unknown (but significant) portion of the estimated 680 “reserve” bomber weapons could also be deployed in a matter of days. All “reserve” warheads and bombs are deployable on varying timescales on existing launchers, in theory nearly doubling deployments after accounting for spares.

<sup>9</sup> “Retired” warheads, which officially are not in the “stockpile” at all, may nevertheless still be in “managed retirement” or “war reserve” status. See Los Alamos Study Group, “[U.S. claims of nuclear weapons retirement, dismantlement ‘may be misleading’ – GAO](http://www.lasg.org/press/2014/press_release_1May2014.pdf),” 1 May 2014, [http://www.lasg.org/press/2014/press\\_release\\_1May2014.pdf](http://www.lasg.org/press/2014/press_release_1May2014.pdf), explaining Government Accountability Office, “Actions Needed by NNSA to Clarify Dismantlement Performance Goal, GAO-14-449, 30 April, 2014, <http://www.gao.gov/products/GAO-14-449>.

<sup>10</sup> K&N, op. cit. In 2007 there were almost 800 W78 warheads available. There are likely to be nearly that many today. See note 13.

<sup>11</sup> Ibid. The yield of the W88 has been widely reported as 475 kt. K&N report it as 455 kt.

<sup>12</sup> Ibid.

<sup>13</sup> See p. 19 in Mello, “[U.S. Plutonium ‘Pit’ Production: Additional Facilities, Production Restart are Unnecessary, Costly and Provocative](http://www.lasg.org/press/2010/press_release_2Mar2010.pdf),” 2 Mar 2010, based heavily on Norris and Kristensen, “The U.S. nuclear stockpile, today and tomorrow,” and “U.S. Nuclear Forces, 2009,” *Bulletin of the Atomic Scientists*, Sep/Oct 2007 and Mar/Apr 2009, respectively.

<sup>14</sup> Ibid.

There are at least 300 so-called “tactical” or “sub-strategic” B61-3 and B61-4 gravity bombs<sup>15</sup>, with yields from 0.3 to 170 kt if all the original yields are still available. An estimated 150 are based at six European bases: in Germany (Buechel); Italy (Aviano and Ghedi); the Netherlands (Volkel); Belgium (Kleine Brogel); and Turkey (Incirlik). These bombs are available for delivery by F-15E, F-16, Tornado, and eventually F-35A aircraft. The air forces of the above countries, with the possible exception of Turkey, have agreed to carry out nuclear strike missions with US bombs.<sup>16</sup>

## **Modernisation**

### **1. Obama built the consensus and accelerated modernisation; Trump proposes new weapons.**

The present comprehensive nuclear modernisation began under President Obama in late 2010, when a broad political consensus came together for upgrading or replacing every kind of nuclear warhead, bomb, and delivery system in the US arsenal along with the specialized production facilities needed for warheads, as a condition for ratification of the New START treaty with Russia. This program is described in detail in previous editions of this book.<sup>17</sup>

Virtually all opposition to the treaty deal that cemented the modernisation program came from the political right, a political configuration that has endured. There is no significant opposition to the complete modernisation of US nuclear weapons in Congress or US civil society today.<sup>18</sup> Since by 2030 some US delivery systems will begin to “age out,” the only alternative to modernisation in some form is retiring the weapon systems in question. So far this has proven too high a political hurdle.

As modernisation commitments matured, Department of Energy (DOE) budgets for warhead design and production rose to unprecedented heights<sup>19</sup>, embedding the new consensus in long-lasting programs. Department of Defense (DoD) procurements for new bombers, missiles, and submarines began.<sup>20</sup>

By the time Obama left office, he had retired fewer warheads than any other post-Cold War president.<sup>21</sup> Relations with Russia, the US’s only peer nuclear competitor, had deteriorated to depths not seen since the Cold War. They have since continued to deteriorate. Warhead dismantlement under Obama

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<sup>15</sup> K&N, op. cit. for “300.” There were an estimated 790 of these two bombs 11 years ago, as well as 206 B61-10 tactical bombs (Mello, op. cit.).

<sup>16</sup> K&N, op. cit.

<sup>17</sup> See for example Greg Mello and Trish Williams-Mello, “United States,” Apr 2015, in *Assuring Destruction Forever, Reaching Critical Will*, <http://reachingcriticalwill.org/images/documents/Publications/modernisation/assuring-destruction-forever-2015.pdf>.

<sup>18</sup> Observers who have not worked on nuclear issues in the US for the past 20 or so years may not understand the degree to which the US is no longer a democracy, especially on nuclear and military issues. For background see for example the argument and links of Martin Gilens and Benjamin Page, “Critics argued with our analysis of U.S. political inequality. Here are 5 ways they’re wrong,” *Washington Post*, 23 May 2016, [https://www.washingtonpost.com/news/monkey-cage/wp/2016/05/23/critics-challenge-our-portrait-of-americas-political-inequality-heres-5-ways-they-are-wrong/?utm\\_term=.b8efd8d9702f](https://www.washingtonpost.com/news/monkey-cage/wp/2016/05/23/critics-challenge-our-portrait-of-americas-political-inequality-heres-5-ways-they-are-wrong/?utm_term=.b8efd8d9702f); and Sheldon Wolin, “Democracy Incorporated: Managed Democracy and the Specter of Inverted Totalitarianism,” Princeton, 2017; see also Wolin interview with Chris Hedges at <https://www.truthdig.com/articles/sheldon-wolin-and-inverted-totalitarianism/>.

<sup>19</sup> Los Alamos Study Group, “AEC/ERDA/DOE/NNSA Annual Spending for Nuclear Weapons Research, Development, Testing, and Production,” Feb 2018, [http://www.lasg.org/budget/FY2019/LASG\\_budget\\_graph\\_12Feb2018.pdf](http://www.lasg.org/budget/FY2019/LASG_budget_graph_12Feb2018.pdf).

<sup>20</sup> For the details of DoD procurements see Amy Woolf, “U.S. Strategic Nuclear Forces: Background, Developments, and Issues,” Congressional Research Service RL33640, 6 Mar 2018, <https://fas.org/sgp/crs/nuke/RL33640.pdf>.

<sup>21</sup> Hans Kristensen, “Obama Administration Announces Unilateral Nuclear Weapon Cuts,” *Federation of American Scientists*, 11 Jan 2017, <https://fas.org/blogs/security/2017/01/obama-cuts/>.

continued at the slow pace set by G.W. Bush, much slower than that of Bill Clinton.<sup>22</sup> Future dismantlement was made partly contingent on the operation of as-yet unbuilt new factories. For reasons discussed below, dismantlement should be elevated as a measure of disarmament, rather than remain an afterthought, as at present.<sup>23</sup>

All-inclusive modernisation continues under Trump. In addition to the Obama program, the February 2018 Nuclear Posture Review (NPR) proposes to modify a small number of existing Trident SLBM warheads to become low-yield (“primary” explosive only) versions in the 2019-2021 timeframe by replacing their fusion component with inert materials, as is already done for test flights. These missiles and warheads will presumably be counted as “strategic” under New START, if that treaty continues, or under any successive treaty.

In the longer run and at much greater cost, this administration seeks a new “treaty-compliant” SLCMs, which it may argue is not a strategic weapon under current or future treaties. The variable-yield 1.2 megaton B83-1 bomb, previously slated for retirement in the early 2020s, is to be retained “until a suitable replacement is identified.”<sup>24</sup> Construction of specialized warhead factories is being heavily prioritized.<sup>25</sup>

These programs like all others must be authorized by Congress, and they must be funded annually to be realized. There is some congressional resistance to the two new weapons (but not to the Obama consensus supporting comprehensive modernization of the existing arsenal),<sup>26</sup> which may or may not be successful in the present climate of hysteria about Russia.

## **2. Nuclear modernisation is highly consequential – and unknowably risky.**

Modernisation is giving US ballistic missile warheads much greater accuracy and dramatically more hard-target kill capability, making them much more threatening – especially when fired at relatively short ranges from submarines with depressed trajectories that have relatively low visibility from ground-based radars.<sup>27</sup> All US ballistic missiles will soon have burst-height compensating fuzes, greatly increasing the number of possible hard targets that can be addressed by the same number of missiles, liberating others for additional targets or subsequent salvos.

In the case of gravity bombs, the highly-accurate B61-12, now in engineering development, is designed to be delivered by Dual-Capable Aircraft (DCA) including the stealthy F-35A, allowing much lower yields with

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<sup>22</sup> DoD, “Stockpile Numbers,” [http://open.defense.gov/Portals/23/Documents/frddwg/2017\\_Tables\\_UNCLASS.pdf](http://open.defense.gov/Portals/23/Documents/frddwg/2017_Tables_UNCLASS.pdf), published in response to request by the Federation of American Scientists.

<sup>23</sup> Los Alamos Study Group, op. cit.

<sup>24</sup> OSD, op. cit.

<sup>25</sup> Colin Demarest, “Trump’s nominee to lead NNSA defends pit production priority, MOX aversion,” *Aiken Standard*, 8 Feb 2018, [https://www.aikenstandard.com/news/trump-s-nominee-to-lead-nnsa-defends-pit-production-priority/article\\_8f601a16-0cfd-11e8-b78a-4b5fe80fb12e.html](https://www.aikenstandard.com/news/trump-s-nominee-to-lead-nnsa-defends-pit-production-priority/article_8f601a16-0cfd-11e8-b78a-4b5fe80fb12e.html).

<sup>26</sup> Caroline Houck, “Senators Signal Resistance to Proposed Low-Yield Nukes,” *Defense One*, 21 Mar 2018, <http://www.defenseone.com/politics/2018/03/senators-signal-resistance-proposed-low-yield-nukes/146826/>. Rep. Earl Blumenauer and 42 other Democratic House members, letter to President Trump, 26 Mar 2018, <https://blumenauer.house.gov/sites/blumenauer.house.gov/files/18-03-26%20Nuclear%20Posture%20Review%20Response%20Ltr%20.pdf>.

<sup>27</sup> Theodore Postol, “How the US Nuclear Weapons Modernisation Program Is Increasing the Chances of Accidental Nuclear War with Russia,” 25 Feb 2016, [http://www.lasg.org/Modernisation/Postol\\_Harvard\\_Peace\\_Action\\_longer\\_25Feb2016.pdf](http://www.lasg.org/Modernisation/Postol_Harvard_Peace_Action_longer_25Feb2016.pdf); Hans Kristensen, Matthew McKinzie, and Theodore Postol, “How US nuclear force modernisation is undermining strategic stability: The burst-height compensating super-fuze,” *The Bulletin of Atomic Scientists*, 1 Mar 2017, <https://thebulletin.org/how-us-nuclear-force-modernisation-undermining-strategic-stability-burst-height-compensating-super10578>; George Lewis and Ted Postol, “The Capabilities of Trident against Russian Silo-Based Missiles: Implications for START III and Beyond,” Massachusetts Institute of Technology, 2 February 1998, [http://www.lasg.org/Modernisation/Postol\\_Trident\\_2Feb1998.pdf](http://www.lasg.org/Modernisation/Postol_Trident_2Feb1998.pdf).

less collateral damage and therefore an expanded potential target set relative to existing bombs.<sup>28</sup> Aircraft flying from forward bases have short flight times to targets, further increasing the threat.

The stealthy B-21 “Spirit” heavy bomber, of which the Air Force expects to buy at least 80, is expected to bring new penetrating capability for bomber missions, augmenting and eventually replacing the B-2, of which “only” 18 are available for nuclear missions, as well as the non-penetrating B-52.

The proposed LRSO, now in early design, is to be a stealthy ALCM with a variable-yield warhead, able to approach and fly within target countries at low altitude along non-predictable paths, from many possible launch points.

These and other weapon-specific modernisations are being leveraged by forward basing and by improvements in target acquisition and in command and control – as well as by the steady accretion of forward-based missile defense capabilities on land and at sea. These capabilities are in turn leveraged by non-nuclear strike forces on land and sea, in the air and in space, in cyberspace, as well as in finance and in the rapidly-evolving informational and propaganda domains.

As a result of modernisation across *all* conflict domains, and other factors beyond the scope of this report, escalation risks have become not just unknown but *unknowable*, just when US nuclear doctrine, expressed in the 2018 NPR, claims that with new “just-right” nuclear weapons, defeat of US forces will be less likely.<sup>29</sup> Diverse, *low-yield* nuclear options are said to provide an aegis of protection over US and allied forces, better enabling US victories against Russia and China.

As noted above, the only alternatives to modernisation are a) the timely retirement of individual launch platforms (e.g. the oldest submarines first), b) entire weapons and weapon systems (e.g. Minuteman III, existing ALCMs), or c) units within a class of weapon (e.g. modernising only some of a particular warhead or bomb). In principle there is also d) limiting the degree of modernisation. In practice however, significant new capabilities usually can be added at little or no marginal cost once the decision to modernise has been made.

### 3. Extended deterrence plays an outsize role in driving modernisation.

The goals of US nuclear modernisation are more than just maintaining an adequate nuclear deterrent to protect the US from any conceivable nuclear adversary, which arguably would require at most a small monad of ballistic missile submarines.<sup>30</sup>

The US has formal or tacit “extended” nuclear deterrence agreements with 30 non-nuclear-weapon-state allies.<sup>31</sup> To appear “credible,” extended deterrence must involve theater-based nuclear war plans, and not “mutual assured destruction” (MAD) involving the US itself. For these regional nuclear war plans to be credible, a nuclear or other devastating strategic attack on the US “homeland” must be reliably deterred even in the circumstance of enemy defeat.

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<sup>28</sup> Hans Kristensen, “B61 LEP: Increasing NATO Nuclear Capability and Precision Low-Yield Strikes,” Federation of American Scientists, 15 June 2011, <http://fas.org/blogs/security/2011/06/b61-12/>; “General Confirms Enhanced Targeting Capabilities of B61-12 Nuclear Bomb,” 23 Jan 2014, [http://fas.org/blogs/security/2014/01/b61\\_capability/](http://fas.org/blogs/security/2014/01/b61_capability/); B61-12: The New Guided Standoff Nuclear Bomb,” presentation at the NPT Preparatory Committee meeting, 2 May 2014, [http://fas.org/programs/ssp/nukes/publications1/Brief2014\\_PREPCOM2.pdf](http://fas.org/programs/ssp/nukes/publications1/Brief2014_PREPCOM2.pdf).

<sup>29</sup> Michael Fitzsimmons, “The False Allure of Escalation Dominance,” *War on the Rocks*, 16 Nov 2017, <https://warontherocks.com/2017/11/false-allure-escalation-dominance/>.

<sup>30</sup> Benjamin Friedman, Christopher Preble, and Matt Fay, “The End of Overkill? Reassessing US Nuclear Weapons Policy,” Cato Institute, [https://object.cato.org/sites/cato.org/files/pubs/pdf/the\\_end\\_of\\_overkill\\_wp\\_web.pdf](https://object.cato.org/sites/cato.org/files/pubs/pdf/the_end_of_overkill_wp_web.pdf).

<sup>31</sup> These are the 27 non-nuclear NATO states plus Australia, Japan, and South Korea. We could add the UK and France here as well.

The more “credible” the extended deterrent, the more “usable” it must appear. The quest for “flexible” nuclear options to “defend the vital interests of the United States, its allies, and partners”<sup>32</sup> *abroad* is the main basis for the proposed new nuclear weapons of the Trump administration (the low-yield Trident warhead and the SLCM) as well as the new weapons carried over from the Obama administration (the B61-12 bomb and LRSO). US extended deterrence allies share a great deal of responsibility for the scale and complexity of US nuclear armaments, and their modernisation.

**4. The US nuclear modernisation timeline: a vast arsenal to last through most of this century.<sup>33</sup>**

<b>Delivery Platform</b>	<b>Program</b>	<b>First Production<sup>2</sup></b>	<b>Completion<sup>2</sup></b>
<b>Ballistic Missile Submarine (SSBN)</b>	Trident D-5 SLBM LEP <sup>1</sup>	2015?	2023
	Columbia Class submarine	2021	2040
	New SLBM	2035	2045
	W76-1 LEP	2008	2019
	W88 alterations	2020	2024
	W76-2 LEP (low-yield; new in 2018 NPR; not approved)	2020?	2021?
<b>ICBM/GBSD</b>	New ballistic missile	2024	2035
	Infrastructure & communications	2025	2033
	W87 alterations	2021	2027
	W78 LEP	2030	2043
<b>Long Range Bomber</b>	B-21 bomber	2022	2034
	LRSO cruise missile	2026	2036
	W80-4 LEP (for LRSO)	2025	2032
<b>Dual-Capable Aircraft (DCA)</b>	F-35A Block 4 certification	2020	n/a
	B61 tail kit	2018	2021
	B61-12 LEP (replaces B61-3, 4, 7, & 10)	2020	2024
	B61-13 (replaces B61-12)	late 2040s	late 2050s
<b>Naval platform(s)</b>	SLCM (the missile)	New in 2018 NPR; not approved by Congress yet	
	SLCM (the warhead)		
<b>(GBSD + SLBM)</b>	Interoperable warheads	Now only “studies” since 2018 NPR	

Notes: 1. LEP = Life Extension Program; 2. US fiscal years

This table does not include investments in specialized factories for nuclear weapon components made of special nuclear materials. For example, the US aims to invest billions of dollars in one or possibly two factories for the production of plutonium warhead cores (“pits”). Existing usable pits, of which there are approximately 10,000 to 13,000 including those in deployed, reserved, and retired warheads, will last past

<sup>32</sup> OSD, op. cit., p. 14.

<sup>33</sup> OSD, op. cit.; CBO, op. cit; National Nuclear Security Administration, *Fiscal Year 2018 Stockpile Stewardship and Management Plan*, Nov 2017; Amy Woolf, op. cit.

2063-2089, 85-100 years from the year of manufacture.<sup>34</sup> Large investments are also underway for uranium and lithium components as well as for tritium production.

##### **5. The February 2018 Nuclear Posture Review: nuclear hubris, and a milestone on the road to war.**

The Trump Administration NPR continues long-standing US nuclear weapons policies (notably, not forswearing first strike), but wraps them in newly-belligerent rhetoric in the context of a "hard power" approach to national security that subordinates diplomacy to military dominance. Disarmament aspirations are contemptuously dismissed. Further progress in arms control is "difficult to envision." The NPR candidly points out that "detering nuclear attack is not the sole purpose of nuclear weapons." *Instead those purposes include "achievement of U.S. objectives if deterrence fails" – which is to say, victory using nuclear arms. Use of nuclear weapons would be, the NPR claims, compliant with humanitarian law.*<sup>35</sup>

The new NPR would create additional low-yield nuclear weapons based at sea (to avoid reliance on foreign bases) to counter a perceived threat to US forces and allies from Russian tactical nuclear weapons.<sup>36</sup> There is also concern that China is "challenging traditional U.S. military superiority in the Western Pacific." Existing Ohio-class submarines would be the launch platform for the low-yield Trident weapon. Virginia-class submarines and/or surface ships would carry the nuclear SLCM.

The past two NPRs (2001 and 2010) were poor predictors of subsequent policy. The first was very hawkish both in rhetoric and in the specific weapons it proposed; the second seemed to portray more dovish aspirations. In the end, neither direction was supported by Congress. *NPRs do not authorize or fund nuclear weapons. Congress does that, so there is a chance the proposed new weapons will not be built.*

The political-military-propaganda context vis-a-vis Russia and to a lesser extent China have changed drastically since Obama's 2010 NPR. Both of these states now challenge assumptions of US dominance in their near-abroad – or as the NPR imperiously puts it, "they seek to substantially revise the post-Cold War international order and norms of behavior."<sup>37</sup> The authors of the NPR look to nuclear weapons provide an aegis of protective threat over US and allied forces, to aid in retaining and expanding US influence over the world's sources of wealth and power.<sup>38</sup>

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<sup>34</sup> Greg Mello, "Questions about projected U.S. plutonium pit production capability" and "Pit production in the United States: Background and issues," 22 Feb 2018, International Panel on Fissile Materials, [http://fissilematerials.org/blog/2018/02/questions\\_about\\_projected.html](http://fissilematerials.org/blog/2018/02/questions_about_projected.html) and <http://fissilematerials.org/blog/US%20pit%20production-background.pdf>.

<sup>35</sup> OSD op. cit. pp. i, vii, xvii, 21, 23.

<sup>36</sup> The NPR does not understand, or deliberately misrepresents, Russian policy. See for example Olga Oliner and Andrey Baklitskiy, "The Nuclear Posture Review and Russian 'De-Escalation:' A Dangerous Solution to a Nonexistent Problem," *War on the Rocks*, 20 Feb 2018, <https://warontherocks.com/2018/02/nuclear-posture-review-russian-de-escalation-dangerous-solution-nonexistent-problem/>.

<sup>37</sup> OSD op. cit. p. 6

<sup>38</sup> Ultrahawk Keith Payne was an original author of this NPR, officials have told me. His first publication of note, with Colin Gray (who is quoted in this NPR), was "Victory Is Possible" (*Foreign Policy* No. 39, Summer, 1980, pp. 14-27), which concluded that a nuclear war with the Soviet Union could be fought and won, with only 20 million US dead, "a level compatible with national survival and recovery." Later, Payne and his colleagues at the National Institute for Public Policy were highly influential in writing the 2001 NPR and, more broadly, in forming the policies of the G.W. Bush administration, including setting the stage for the Iraq War. As of this writing, President Trump has assembled what may be the most war-oriented set of senior national security officials ever seen in the US, drawn from the same faction of neoconservative ideologues. The influence of this group gradually rose during the second Obama administration to its present position of dominance. Leaving aside Trump's own views, whatever they may actually be (the question applies equally to his predecessors), Trump has been under constant, extreme pressure from the



Not just they but virtually the entire Washington policy establishment seeks to extend “the American Century” proclaimed at the end of World War II. It is an enduring goal, articulated (to take just one example) in the 1992 draft Defense Planning Guidance:

Our first objective is to prevent the re-emergence of a new rival. This is a dominant consideration underlying the new regional defense strategy and requires that we endeavor to prevent any hostile power from dominating a region whose resources would, under consolidated control, be sufficient to generate global power. These regions include Western Europe, East Asia, the territory of the former Soviet Union, and Southwest Asia.<sup>39</sup>

By merely existing and continuing to develop as sovereign states, Russia and China are inherently rivals to US power under this formulation, setting the stage for the present confrontation.

*It would be a mistake to imagine that with a different person in the White House, the specifically nuclear dangers described above would abate for long.* Veteran nuclear writer Fred Kaplan:

The shuddering thing about this document is that it reflects the views of officers and civilians, deep inside the Pentagon, who have been thinking about nuclear policy for decades. In other words, its premises and logic precede Trump; they have been woven into America’s nuclear-war machine for a very long time.<sup>40</sup>

The intersection of rising great power competition, looming resource shortages, and the long-standing nuclear “premises and logic” of which Kaplan speaks are among the factors bringing humanity to the brink of unimaginable catastrophe.

### **The nuclear modernisation budget: large, growing, and incomplete.**

In 2014, the 30-year cost of US nuclear weapons and their modernisation was independently estimated at \$1 trillion in 2014 dollars, not including cost overruns.<sup>41</sup> Three years later and prior to the new NPR, the 30-year cost of deploying and modernising US nuclear forces was estimated by the Congressional Budget Office (CBO) to have risen to \$1.2 trillion in 2017 dollars, an average of \$41.4 billion per year (\$10,525 per US household) over 30 years. CBO’s estimate includes modest estimated cost overruns but not DOE’s ever-growing environmental liabilities, which currently exceed one-half trillion dollars.<sup>42</sup>

In February of 2018, the Trump Administration requested a 19% increase in DOE warhead spending for fiscal year (FY) 2019, a jump not seen since 1962. Congress will grant most or all of this. DoD nuclear spending increases will also rise dramatically next year.

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intelligence community, Democrats, and the news media, as well as Republicans, to be more aggressive vis-à-vis Russia in particular. There are no establishment voices for détente.

<sup>39</sup> Public Broadcasting Service, “Excerpts from 1992 Draft “Defense Planning Guidance,” <https://www.pbs.org/wgbh/pages/frontline/shows/iraq/etc/wolf.html>. Original at <https://www.archives.gov/files/declassification/iscap/pdf/2008-003-docs1-12.pdf>.

<sup>40</sup> Fred Kaplan, “Nuclear Posturing: Trump’s official nuclear policy isn’t that different from his predecessors’; That’s what makes it so scary,” *Slate*, 22 Jan 2018, <https://slate.com/news-and-politics/2018/01/trumps-official-nuclear-policy-reaffirms-the-terrifying-status-quo.html>.

<sup>41</sup> Jon Wolfsthal, J. Lewis, and M. Quint, “The One Trillion-Dollar Triad – US Strategic Nuclear Modernisation Over the Next Thirty Years,” James Martin Center for Nonproliferation Studies, Jan 2014, [http://www.nonproliferation.org/wp-content/uploads/2016/04/140107\\_trillion\\_dollar\\_nuclear\\_triad.pdf](http://www.nonproliferation.org/wp-content/uploads/2016/04/140107_trillion_dollar_nuclear_triad.pdf).

<sup>42</sup> CBO, op. cit.; Robert Alvarez, “Yesterday is tomorrow: estimating the full cost of a nuclear buildup,” 3 Nov 2017, *Bulletin of the Atomic Scientists*, <https://thebulletin.org/yesterday-tomorrow-estimating-full-cost-nuclear-buildup11264>. It is incorrect to estimate inflation of future-year costs and then add together successively-inflated future-year costs, as some have done.

The huge cost of US nuclear modernisation is often justified to potential critics as being relatively *small* in comparison to *overall* US military spending, which is true as far as it goes. Nuclear weapons currently comprise 4% of defense spending, a fraction expected to rise to about 6% of total defense spending during the peak nuclear modernisation years in the mid-2020s.

**Conclusion: The US must lead in disarmament. Right now it is critical to restrain the US appetite for war.**

To be relevant and effective, the nuclear disarmament community cannot avert its eyes from the uniquely enormous force projection capability of the US, as Mikhail Gorbachev has warned.<sup>43</sup> While the US and Russia possess 93% of the world's nuclear weapons<sup>44</sup>, and both are modernising their forces, the security situations of the two countries are very different. The US has *ten times* the military budget of the Russian Federation<sup>45</sup>, and has many other well-practiced ways to exert national power. The US maintains a global garrison of nearly 800 US military bases in more than 70 countries; a great many of which are in Eurasia near Russia.<sup>46</sup> These forces have been and are being used to wage illegal, aggressive wars such as the 2003 invasion of Iraq, the 2014 destruction of Libya, and the present partial occupation of Syria. Additional wars of aggression and other assaults on sovereignty initiated by the US are very likely if the US is not restrained.

*Given the collapse of domestic restraints, and the nearly complete takeover of government by the most aggressive advocates for regime changes and wars, it is frankly critical for the continued existence of humanity that US allies and trading partners fully embrace a restraining role at this time.*

*To reverse the present nuclear arms race, and to prevent nuclear war and further proliferation, we must acknowledge the total threat faced by countries, not just the threat from nuclear weapons.* Given its huge military superiority and its global reach, its by-far-superior power projection capability overall, and its leading or dominant role in most international institutions, *the US must lead in reductions of both nuclear and conventional arms, and must be pressed by the international community to do so,* for its own sake as well as for the security and survival of the world.

\*\*\*ENDS\*\*\*

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<sup>43</sup> Gorbachev: "The alternative is clear: Either we move toward a nuclear-free world or we have to accept that nuclear weapons will continue to spread, step by step, across the globe. And can we really imagine a world without nuclear weapons if a single country amasses so many conventional weapons that its military budget nearly tops that of all other countries combined? This country would enjoy total military supremacy if nuclear weapons were abolished." SPIEGEL: You're talking about the US? Gorbachev: "You said it. It is an insurmountable obstacle on the road to a nuclear-free world. That's why we have to put demilitarization back on the agenda of international politics. This includes a reduction of military budgets, a moratorium on the development of new types of weapons and a prohibition on militarizing space. Otherwise, talks toward a nuclear-free world will be little more than empty words. The world would then become less safe, more unstable and unpredictable. Everyone will lose, including those now seeking to dominate the world." "US Military an 'Insurmountable Obstacle to a Nuclear-Free World', *Der Spiegel*, 6 Aug 2015, <http://www.spiegel.de/international/world/gorbachev-calls-for-nuclear-free-world-on-hiroshima-day-a-1046900.html>

<sup>44</sup> Hans Kristensen and Robert Norris, "Status of World Nuclear Forces," 2018, Federation of American Scientists, <https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/>.

<sup>45</sup> SIPRI, op. cit.; "Putin pledges to reduce Russia military spending this year," *Agence France-Presse*, <http://www.straitstimes.com/world/europe/moscow-seeks-no-arms-race-putin>; Craig Caffrey, "Russian defence budget expected to be cut by 5% in 2018," *IHS Jane's Defence Industry*, 20 Sep 2017, <http://www.janes.com/article/74248/russian-defence-budget-expected-to-be-cut-by-5-in-2018>.

<sup>46</sup> David Vine, "Where in the world is the US military," *Politico*, Jul/Aug 2015, <https://www.politico.com/magazine/story/2015/06/us-military-bases-around-the-world-119321>.