Congressional Budget Office
Nonpartisan Analysis for the U.S. Congress

# Projected Costs of U.S. Nuclear Forces, 2025 to 2034

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## Summary

The Congressional Budget Office updates its projections of the 10-year costs of nuclear forces every two years. This report contains CBO's projections for the 2025–2034 period, which are based on the Department of Defense's (DoD's) and the Department of Energy's (DOE's) fiscal year 2025 budget requests, submitted in March 2024.

### Costs of Current Plans

If carried out, DoD's and DOE's plans to operate, sustain, and modernize current nuclear forces and purchase new forces would cost a total of $946 billion over the 2025–2034 period, or an average of about $95 billion a year, CBO estimates.

That total includes $357 billion to operate and sustain current and future nuclear forces and other supporting activities; $309 billion to modernize strategic and tactical nuclear delivery systems and the weapons they carry; $72 billion to modernize facilities and equipment for the nuclear weapons laboratory complex; $79 billion to modernize command, control, communications, and early-warning systems; and $129 billion to cover potential additional costs in excess of projected budgeted amounts estimated using historical cost growth (see Figure 1).

### How Costs Have Changed

CBO's current estimate of costs for the 2025–2034 period is 25 percent (or $190 billion) larger than its 2023 estimate of $756 billion, which covered the 2023–2032 period. Of that amount, $157 billion comes from differences in CBO's current and 2023 estimates of budgeted amounts for nuclear forces, and $33 billion comes from differences in the agency's estimates of potential additional costs based on historical cost growth.

Of the $157 billion increase in budgeted amounts, 59 percent (or $93 billion) is projected to occur from 2025 to 2032—the span of years that overlap in both estimates. The increase during those overlapping years is the result of higher costs for some programs, primarily for developing and fielding the new Sentinel intercontinental ballistic missile system, including modernizing silos and other infrastructure; modernizing DoD's command, control, communications, and early-warning systems; and modernizing DOE's production facilities. The remaining 41 percent (or $65 billion) of the $157 billion increase in budgeted amounts arises because the 10-year period covered by the current estimate begins and ends two years later than the period covered by the previous estimate.

## Background

Nuclear weapons have been an important component of U.S. national security since they were developed during World War II. During the Cold War, nuclear forces were central to U.S. defense policy, and a large arsenal was built. Since that time, nuclear forces have figured less prominently in defense policy than conventional forces have, and for several decades the United States did not develop and field new nuclear weapons or delivery systems, choosing instead to sustain or extend the life of existing ones. But the nation's current nuclear forces are reaching the end of their service life, and some delivery systems may not be capable of having their service life extended further.

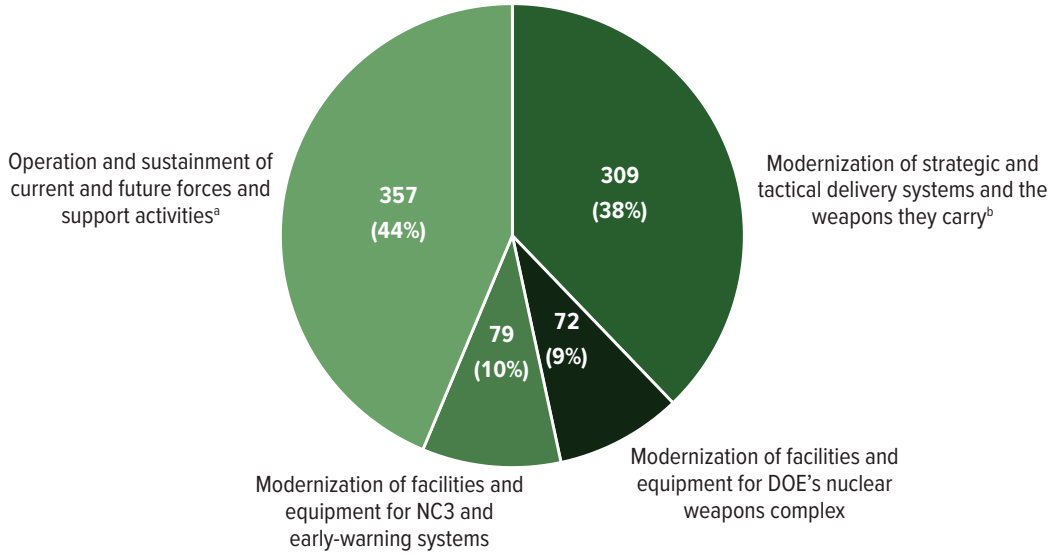
U.S. nuclear forces consist of submarines that launch ballistic missiles (SSBNs), land-based intercontinental ballistic missiles (ICBMs), long-range bomber aircraft, shorter-range tactical aircraft carrying bombs, and the nuclear warheads that those delivery systems carry. Over the next two decades, essentially all those systems will have to be refurbished or replaced with new systems if

All years referred to are federal fiscal years, which run from October 1 to September 30 and are designated by the calendar year in which they end. All costs are in nominal dollars (in other words, not adjusted for inflation). Numbers in the text, tables, and figures may not add up to totals because of rounding. In this report, "cost" refers to budget authority, the amount that would need to be appropriated to implement the Administration's plans.

Figure 1.

## Budgeted Amounts for Nuclear Forces, by Activity, 2025 to 2034

Billions of dollars




Source: Congressional Budget Office, using data from the Department of Defense and the Department of Energy. See www.cbo.gov/publication/61224#data.

The budgeted amounts shown do not reflect independent estimates by CBO of the costs of U.S. nuclear forces. Instead, they are based on CBO's analysis of DoD's and DOE's budget proposals and accompanying documents, as well as on CBO's projections of those budget figures beyond the next five years under the assumption that programs proceed as described in budget documentation. The amounts shown do not include CBO's estimate of $129 billion for potential additional costs in excess of projected budgeted amounts based on historical cost growth.

DoD = Department of Defense; DOE = Department of Energy; NC3 = nuclear command, control, and communications.

a. The costs of support activities in this category include all costs of nuclear weapons laboratories except for those allocated to modernization of specific warheads and for those allocated for modernization of facilities and equipment. Similarly, this category includes all costs of nuclear command, control, communications, and early-warning systems not allocated for modernization of those systems.

b. The costs of nuclear weapons in this category include only those costs allocated to modernization of nuclear warheads and bombs.

the United States is to continue fielding those capabilities. In addition, many of the capabilities that support those nuclear forces—including the command, control, communications, and early-warning systems that DoD operates and the complex of laboratories and production facilities that DOE operates—are slated to be modernized.

Over the coming years, lawmakers will need to decide what nuclear forces the United States should field in the future and therefore the extent to which the nation will continue to modernize, and perhaps expand, those forces. The Administration released its *Nuclear Posture Review* report in October 2022 describing the nuclear policies and forces it envisions.[1] In November 2024, citing an increased global nuclear threat, the Administration issued an update to its nuclear employment strategy.[2]

To help lawmakers make decisions about U.S. nuclear forces, the National Defense Authorization Act for Fiscal Year 2013 requires CBO to estimate the 10-year costs of operating, maintaining, and modernizing those

1. Every Administration in the post–Cold War era, beginning in 1994, has undertaken and published a nuclear posture review, which summarizes policies about nuclear weapons and the forces needed to execute those policies. For the full 2022 version of that report, see Department of Defense, *2022 National Defense Strategy of the United States of America, Including the 2022 Nuclear Posture Review and the 2022 Missile Defense Review* (October 2022), www.defense.gov/National-Defense-Strategy.

2. For an unclassified summary of the updated nuclear employment strategy, see Department of Defense, *Report on the Nuclear Employment Strategy of the United States*, B-56D699F (November 2024), https://tinyurl.com/htbj46vn.

forces.[3] CBO has updated that estimate every two years, as required by the National Defense Authorization Act for Fiscal Year 2015. This report is the sixth update.[4] In addition, in October 2017, CBO published an estimate of the 30-year costs of nuclear forces under existing plans and under various approaches for managing the costs of modernization.[5]

## Projected Costs of Nuclear Forces Through 2034

Over the 2025–2034 period, the plans for nuclear forces specified in DoD's and DOE's 2025 budget requests (submitted to the Congress in March 2024) would cost a total of $946 billion, CBO estimates (see Table 1).[6] Of that amount, $817 billion would be used to implement the plans for current and future delivery systems, warheads, command and control systems, and infrastructure as DoD and DOE have laid them out, CBO projects.

CBO's estimates for *individual* programs reflect the assumption that DoD's and DOE's plans will be executed successfully and on budget. In other words, those estimates do not incorporate any cost growth beyond the funding amounts planned by the two departments or any delays to program schedules. However, because programs often cost more than originally planned, CBO has incorporated cost growth into its *overall* estimate of the costs of nuclear forces. That growth amounts to $129 billion (the difference between the $817 billion cost for the plans as specified and the $946 billion total cost). That amount represents CBO's estimate of additional costs that would be incurred over the 2025–2034 period if the costs for nuclear programs grew at roughly the same rates that costs for similar programs have grown in the past.[7]

The projections in this report are not meant to predict DoD's and DOE's future budgets, because Administrations typically alter plans from year to year and programs often experience cost growth and delays. Rather, the projections extend the cost estimates that underlie the agencies' 2025 budget submissions under the assumption that there is no change in the planned size and composition of nuclear forces or in the type, quantity, and schedule of weapons development programs.

### Total Planned Costs

The $817 billion would fund the following items:

- **Strategic nuclear delivery systems and weapons ($454 billion).** This category consists of DoD's funding for operating, sustaining, and modernizing strategic nuclear delivery systems (the three types of systems that can deliver long-range nuclear weapons—SSBNs, ICBMs, and long-range bombers, often referred to collectively as the strategic nuclear triad). It also includes DOE's funding for activities related to the warheads used by those systems and the nuclear reactors that power SSBNs. About half of the costs in this category would be for ballistic missile submarines. CBO's estimate of the cost of ICBMs is based on the plans in the fiscal year 2025 budget submission and does not include the significant additional increase in costs identified in a recent legislatively mandated review of the Sentinel program (see Box 1 on page 6).
- **Tactical nuclear delivery systems and weapons ($15 billion).** This category consists of DoD's funding for operating, sustaining, and modernizing systems that can deliver nuclear weapons over shorter ranges and DOE's funding for activities related to the warheads that those systems carry. Those delivery systems consist of certain tactical aircraft and a new nuclear-armed sea-launched cruise missile (SLCM-N). Costs in this category are larger than those in CBO's 2023 estimate primarily because they include funding for the SLCM-N and the warhead it would carry, as mandated by the National Defense Authorization Act for Fiscal Year 2024.
- **DOE's nuclear weapons laboratories and supporting activities ($193 billion).** This category consists of funding for activities at nuclear weapons laboratories and production facilities that are not directly attributable to a specific type of warhead but that are related to maintaining current and future stockpiles of nuclear weapons. Those activities include

3. Previous editions of the report are available at https://tinyurl.com/mpnpys2j.

4. The most recent previous version is Congressional Budget Office, *Projected Costs of U.S. Nuclear Forces, 2023 to 2032* (July 2023), www.cbo.gov/publication/59054.

5. Congressional Budget Office, *Approaches for Managing the Costs of U.S. Nuclear Forces, 2017 to 2046* (October 2017), www.cbo.gov/publication/53211.

6. As directed by law, which requires CBO to estimate the costs of nuclear forces biennially in odd-numbered budget years, CBO's estimate is based on the plans contained in DoD's and DOE's 2025 budget requests, not on appropriated amounts.

7. CBO's estimate of potential additional costs in excess of projected budgeted amounts applies to the full 10-year period; the difference between the current and previous estimates cannot reliably be divided into overlapping and nonoverlapping years.

Table 1.

## Projected Costs of U.S. Nuclear Forces, by Department and Function

Billions of dollars

| | 2025 | | | Total, 2025–2034 | | |
|---|---|---|---|---|---|---|
| | DoD | DOE | Total | DoD | DOE | Total |
| CBO's projections of budgeted amounts for nuclear forces[a] | | | | | | |
| Nuclear delivery systems and weapons | | | | | | |
| Strategic nuclear delivery systems and weapons | | | | | | |
| Ballistic missile submarines | 16.0 | 1.4 | 17.4 | 204 | 23 | 228 |
| Intercontinental ballistic missiles | 7.9 | 1.3 | 9.2 | 126 | 14 | 140 |
| Bombers | 4.3 | 1.4 | 5.7 | 56 | 9 | 65 |
| Other nuclear activities[b] | 1.9 | n.a. | 1.9 | 21 | n.a. | 21 |
| Subtotal | 30.2 | 4.1 | 34.3 | 408 | 46 | 454 |
| Tactical nuclear delivery systems and weapons | 0.6 | 0.3 | 0.8 | 10 | 5 | 15 |
| Nuclear weapons laboratories and supporting activities | | | | | | |
| Stockpile services | n.a. | 1.4 | 1.4 | n.a. | 16 | 16 |
| Facilities and infrastructure | n.a. | 9.2 | 9.2 | n.a. | 110 | 110 |
| Other stewardship and support activities[c] | n.a. | 6.1 | 6.1 | n.a. | 67 | 67 |
| Subtotal | n.a. | 16.7 | 16.7 | n.a. | 193 | 193 |
| Subtotal, nuclear delivery systems and weapons | 30.7 | 21.0 | 51.8 | 418 | 245 | 663 |
| Command, control, communications, and early-warning systems | | | | | | |
| Command and control | 3.4 | n.a. | 3.4 | 35 | n.a. | 35 |
| Communications | 4.0 | n.a. | 4.0 | 41 | n.a. | 41 |
| Early warning | 6.7 | n.a. | 6.7 | 78 | n.a. | 78 |
| Subtotal, command, control, communications, and early-warning systems | 14.1 | n.a. | 14.1 | 154 | n.a. | 154 |
| **Total budgeted amounts for nuclear forces** | **44.8** | **21.0** | **65.9** | **572** | **245** | **817** |
| CBO's estimates of potential additional costs based on historical cost growth | n.a. | n.a. | n.a. | 78 | 51 | 129 |
| **Total estimated costs of nuclear forces** | **44.8** | **21.0** | **65.9** | **651** | **295** | **946** |

Source: Congressional Budget Office, using data from the Department of Defense and the Department of Energy. See www.cbo.gov/publication/61224#data.

DoD = Department of Defense; DOE = Department of Energy; n.a. = not applicable.

a. These budgeted amounts do not reflect independent estimates by CBO of the costs of U.S. nuclear forces. Instead, this category is based on CBO's analysis of DoD's and DOE's budget proposals and accompanying documents, as well as on CBO's projections of those budget figures beyond the next five years under the assumption that programs proceed as described in budget documentation.

b. This category includes nuclear-related research and operations support activities by DoD that CBO could not associate with a specific type of delivery system or weapon.

c. This category includes security forces, transportation of nuclear materials and weapons, and scientific research and high-performance computing to improve understanding of nuclear explosions. This category also includes about $600 million in 2025 and $6 billion over the 2025–2034 period for federal salaries and expenses.

modernization of several facilities that produce specialized materials and components used in nuclear weapons.

- **DoD's command, control, communications, and early-warning systems ($154 billion).** This category consists of funding for operating, sustaining, and modernizing the systems that allow operators to communicate with nuclear forces, issue commands that control their use, detect incoming attacks, and rule out false alarms. That funding would be used to operate and sustain those systems, as well as to modernize several of them.

Altogether, annual budgets for those programs (excluding the allowance for cost growth) would rise steadily from $66 billion in 2025 to a peak of $91 billion in 2031 before dropping slightly thereafter through 2034,

CBO estimates.[8] DoD would incur about two-thirds of those costs.

## Modernization Costs

CBO estimates that DoD's and DOE's modernization plans would cost $460 billion over the 2025–2034 period, or 56 percent of the $817 billion total costs; the remainder would be allocated for operation and sustainment of current and future forces and support activities. Those modernization costs would occur in three categories: nuclear weapons and delivery systems; DOE's nuclear facilities; and DoD's command, control, communications, and early-warning systems.

CBO projects that $309 billion would go toward modernizing nuclear weapons and delivery systems. Of that amount, $298 billion would be used to modernize the strategic nuclear triad; the remainder ($11 billion) would be used to modernize tactical nuclear weapons and delivery systems.[9] Divided another way, the $309 billion would provide $272 billion for DoD's programs for modernizing delivery systems and $37 billion for DOE's programs for refurbishing warheads and developing a reactor for the new SSBN.

DOE's facility modernization plans include several projects to refurbish or build new facilities for producing materials and components used in nuclear weapons. Those projects would cost $72 billion over the 10-year period, in CBO's estimation.

DoD's plans to modernize various command, control, communications, and early-warning systems are projected to cost $79 billion over the 2025–2034 period. That amount reflects new plans by the Space Force to significantly expand the number of missile warning and tracking satellites.

## The Share of Defense Funding Allocated to Nuclear Forces

As programs to modernize U.S. nuclear forces proceed, they will compete with other defense priorities for funding. To provide budgetary context for decisions, CBO has estimated two metrics that compare the costs of nuclear forces with the costs of other activities—namely, the fraction of total defense funding that is allocated to nuclear forces and the fraction of DoD's acquisition funding that is allocated to acquisition of nuclear forces.

**Share of Total Defense Funding.** Nuclear forces account for 8.4 percent of the total 10-year cost of the plans for national defense outlined in the Administration's 2025 budget submission, CBO estimates.[10] On an annual basis, that percentage is projected to rise from 7.4 percent in 2025 to a peak of 9.1 percent in 2031 before dropping slightly thereafter through 2034. Those values are slightly higher than CBO's estimates for the Administration's plans for the 2023–2032 period. By comparison, nuclear forces accounted for 3.9 percent of total defense funding in 2014 (the first year in the current series of CBO estimates of the costs of nuclear forces), when most of the major modernization programs were still in the planning stage.

**Share of DoD's Acquisition Funding.** The development and procurement of nuclear weapons and delivery systems, driven by nuclear modernization programs, would constitute an increasing share of DoD's projected acquisition funding over most of the 2025–2034 period.[11] CBO projects that the costs of nuclear acquisition programs would represent 11.8 percent of DoD's total planned acquisition costs over the next decade as outlined in the 2025 budget submission.[12] That fraction

8. For more details about annual costs, see the supplemental data posted with this report at www.cbo.gov/publication/61224.

9. For more details about modernization costs for the strategic nuclear triad, by type of delivery system and by year, see the supplemental data posted with this report at www.cbo.gov/publication/61224.

10. That estimate is based on CBO's estimate of projected budgets for nuclear forces and does not take into account CBO's estimate of potential additional costs in excess of projected budgeted amounts in those programs. If DoD's program costs increased, the share of national defense spending allocated to nuclear forces could be higher than CBO's estimates. The estimate of total defense spending (defined as all spending in budget function 050) is based on CBO's analysis of information in Office of Management and Budget, *Budget of the U.S. Government, Fiscal Year 2025: Analytical Perspectives* (March 2024), Table 25-1 (online version only), www.govinfo.gov/app/collection/budget/2025. Nuclear forces would account for a smaller percentage of total defense costs in the last few years of the projection period if CBO's projection of DoD's total budget was used in the calculation. See Congressional Budget Office, *Long-Term Implications of the 2025 Future Years Defense Program* (November 2024), www.cbo.gov/publication/60665.

11. Acquisition funding for DoD's programs is the sum of the appropriations for procurement and for research, development, test, and evaluation. Planned DoD funding used in CBO's analysis, by appropriation title, is available in Office of Management and Budget, *Budget of the U.S. Government, Fiscal Year 2025: Analytical Perspectives* (March 2024), Table 25-1 (online version only), www.govinfo.gov/app/collection/budget/2025.

12. Ibid. Acquisition costs for nuclear programs would account for a smaller percentage of DoD's total acquisition costs in the last few years of the projection period if CBO's projection of DoD's acquisition costs was used in the calculation. See Congressional Budget Office, *Long-Term Implications of the 2025 Future Years Defense Program* (November 2024), www.cbo.gov/publication/60665.

Box 1.

## Cost Growth in the Sentinel Program

The Sentinel intercontinental ballistic missile (ICBM) program has encountered significant cost growth in recent years. The full extent and timing of that growth remains uncertain, as the Department of Defense (DoD) is currently restructuring the program. As a result, the Congressional Budget Office's estimates of the program's 10-year costs do not include all of the cost growth that the program is likely to experience.

### Recent Estimates for the Sentinel Program

In January 2024, increases in the total costs of the Sentinel program triggered a legislatively mandated review of the program, known as a Nunn–McCurdy review.[1] Such a review is intended to determine whether a program that has experienced certain cost overruns should continue, and what, if any, changes should be made to control costs.

In July 2024, DoD completed that review and concluded that the Sentinel program should continue.[2] The department's analysis yielded a new estimate of total costs for the program of $141 billion in constant 2020 dollars (an estimate that includes years both before and after those covered by this report).[3] That total is 81 percent (or $63 billion) larger than the program's baseline estimate of $78 billion, generated in 2020. (All costs in this box are expressed in 2020 dollars so that they can be compared with that baseline estimate.) For a more recent comparison, the $141 billion estimate from the Nunn–McCurdy review is 33 percent (or $34 billion) larger than the $106 billion estimate included in DoD's December 2023 Selected Acquisition Report (SAR) for Sentinel; that SAR is aligned with the 2025 budget documents that form the basis for CBO's analysis in this report (see the table).

The Sentinel program includes a range of efforts in addition to the development and fielding of a new missile to replace the Minuteman III ICBM. All of the 450 existing silos would be refurbished or replaced and outfitted with new command, control, and communications equipment, as would the 45 launch control centers where missile controllers are located. The cabling that connects all of those sites would be replaced with fiber-optic connections. In addition, equipment to allow remote command of the ICBMs from certain aircraft would be developed and fielded. The Nunn–McCurdy review found that most of the recent cost growth is related to the modernization of the silos and launch control centers and the transition from the Minuteman III to the Sentinel ICBM, rather than to the new missile itself. The Nunn–McCurdy review also identified cost increases in the accounts for research, development, test, and evaluation; procurement; and military construction.

1. For more detail on the Nunn–McCurdy process, see Heidi M. Peters and Charles V. O'Connor, *The Nunn–McCurdy Act: Background, Analysis, and Issues for Congress*, Report R41293, version 20 (Congressional Research Service, May 12, 2016), https://tinyurl.com/3nez74f9.

2. Department of Defense, "Department of Defense Announces Results of Sentinel Nunn–McCurdy Review" (press release, July 8, 2024), https://tinyurl.com/k6duknhk.

3. Although the Sentinel program contains a wide array of activities, its costs do not constitute the full DoD costs related to fielding a new ICBM. The Nunn–McCurdy review was limited to the Sentinel acquisition program and did not include the costs of other, separate programs supporting ICBM modernization, such as developing and producing a new reentry vehicle and a fuze for the new warhead. The review also did not include the costs to operate and sustain the new ICBM after it has been fielded.

Continued

would rise from 10.1 percent in 2025 to 13.2 percent in 2031 before steadily declining to 10.7 percent by 2034, in CBO's estimation. Competition for funding among acquisition programs will force DoD to make difficult choices about which programs to pursue.

## Basis of CBO's Updated Estimates

CBO's estimate of total costs in this report consists of the costs of operating, maintaining, and modernizing U.S. nuclear forces. The agency prepared the report using the same approach it used in its original 2013 report and subsequent updates, considering only costs that it identified as directly associated with the nuclear mission.[13] CBO's estimate does not include costs indirectly associated with nuclear forces, such as costs to clean up DOE's former production facilities, which some other analyses include. As with all projections of future costs, CBO's estimates come with substantial uncertainty.

13. For more details about nuclear programs and CBO's approach to estimating their costs, see Congressional Budget Office, *Projected Costs of U.S. Nuclear Forces, 2014 to 2023* (December 2013), www.cbo.gov/publication/44968.

Box 1. Continued

## Cost Growth in the Sentinel Program

### Why CBO's Estimate Does Not Include Results of the Nunn–McCurdy Review

CBO's estimate for the Sentinel program includes only a portion of the $63 billion cost increase (relative to the 2020 program baseline) identified in the Nunn–McCurdy review. That is because CBO based its estimates on the most recent detailed information about the program; in this case, the amounts included in the Administration's budget request for fiscal year 2025 and associated documents. The SAR associated with the 2025 budget request was generated in December 2023, six months before the completion of the Nunn–McCurdy review. That SAR anticipates some cost growth ($29 billion over the life of the program) relative to the 2020 program baseline.

How the additional costs identified in the Nunn–McCurdy review would affect total costs over the 2025–2034 period is uncertain, for several reasons. The Sentinel program is in the process of being restructured, it will likely be delayed, and those delays could affect the costs of the Minuteman III program as well. According to public reports, DoD officials expect the restructuring effort to delay the Sentinel program by several years.[4] DoD's 2025 budget plans called for initial operating capability to be achieved in May 2029, a date that now looks unlikely. Recent statements by DoD officials suggest that the full transition from Minuteman III to Sentinel could take 15 years or more and that some Minuteman III missiles could still be in operation as late as 2050.[5]

Delays in the Sentinel program could reduce annual program costs initially, but they are likely to lead to higher costs in the later years of CBO's 10-year projection period. They could also lead to new costs for improvements to the Minuteman III missiles that would allow those missiles to remain operational longer than previously planned. How the additional $34 billion (or more) in costs relative to those laid out in the 2025 budget documents (and thus in this CBO report) would be distributed over time is uncertain. For that reason, none of those additional costs identified in the Nunn–McCurdy review or any additional costs associated with improvements to Minuteman III have been included in CBO's current estimate.

4. Cal Biesecker, "DoD Review of Sentinel Finds Further Cost Increases, Schedule Delays; Program to Be Restructured," *Defense Daily* (July 8, 2024), https://tinyurl.com/mr33djat.

5. Sarah Salem, "Last Minuteman III Decommissioned 2050 or Later, W87 Non-Sentinel Test Within Year," *Defense Daily* (January 27, 2025), https://tinyurl.com/yvbmwhcw.

**DoD's Estimates of Total Costs of the Sentinel Program, by Appropriation Title**

Millions of 2020 dollars

| | Program baseline (2020) | FY2024 SAR | FY2025 SAR | Post-NM |
|---|---|---|---|---|
| | | **Total program costs** | | |
| RDT&E | 22,978 | 21,235 | 28,894 | N.A. |
| Procurement | 47,858 | 43,546 | 57,665 | N.A. |
| MILCON | 6,904 | 6,342 | 18,950 | N.A. |
| Acquisition O&M | 0 | 0 | 918 | N.A. |
| **Total** | **77,740** | **71,123** | **106,427** | **140,900** |
| | | **Increase relative to program baseline** | | |
| Amount | n.a. | -6,617 | 28,687 | 63,160 |
| Percent | n.a. | -9 | 37 | 81 |
| | | **Unit costs and quantities** | | |
| Total quantity | 659 | 659 | 659 | 659 |
| Procurement quantity | 634 | 634 | 634 | 634 |
| Program average unit cost | 118 | 108 | 161 | 214 |
| Average procurement unit cost | 75 | 69 | 91 | N.A. |

Source: Congressional Budget Office, using data from the Department of Defense and the Department of Energy. See www.cbo.gov/publication/61224#data.

DoD = Department of Defense; FY = fiscal year; MILCON = military construction; NM = Nunn–McCurdy; O&M = operation and maintenance; RDT&E = research, development, test, and evaluation; SAR = Selected Acquisition Report; n.a. = not applicable; N.A. = not available.

## Estimating Approach

Continuing with the same approach used in previous updates, for this update, CBO analyzed DoD's and DOE's 2025 budget requests and their associated justification documents, which include budgeted amounts planned for the next five years. To produce 10-year estimates, CBO identified the budget lines for programs related to nuclear forces and extended them beyond the five-year period by examining the departments' long-range plans for each program. For some systems (such as new SSBNs, air-launched nuclear cruise missiles, and new engines for the B-52 bomber), DoD has published estimates of the total program cost.[14] For those systems, CBO projected costs beyond the five-year period in a manner consistent with those total cost estimates and DoD's planned production and fielding schedules.

To project personnel costs and the costs of operation and maintenance activities for most programs from 2030 to 2034, CBO began with the levels of operation and maintenance activities and the number of military personnel planned for 2029 (the final year of DoD's latest five-year plan) and projected that they would remain the same for the last five years of the period. In CBO's estimation, the costs to maintain those same activities and personnel would grow slightly faster than inflation, a projection that is based on DoD's experience.

Some modernization programs that involve fielding new systems and retiring old ones will go through a transition period when fielded forces comprise a mix of both old and new systems. To estimate costs for that transition period, CBO used a model for operation and sustainment costs that incorporates a projection that, for both the new and old systems, half of the costs would be fixed and half would be proportional to the number of each type of delivery system in the force.[15]

To arrive at an estimate of overall cost growth, CBO estimated cost growth for the four categories of DoD's costs (military personnel, operation and maintenance, procurement, and research and development) and for various types of activities for DOE's costs as a whole, rather than program by program, on the basis of experience with DoD's and DOE's previous programs.[16]

## Excluded Costs

CBO's estimate does not include several categories of costs that are not directly related to developing and fielding nuclear forces over the next 10 years. For example, it does not include a prorated share of the military services' and DoD's overhead and support costs that are not specific to the nuclear mission—although such costs could change if DoD significantly altered the size of its nuclear forces.

CBO's estimate also does not include the costs of several related activities. For example, it excludes the costs of addressing the nuclear legacy of the Cold War (such as dismantling retired nuclear weapons and cleaning up environmental contamination from past activities at nuclear facilities); the costs of reducing the threat from other countries' nuclear weapons (including U.S. efforts to halt proliferation, comply with arms control treaties, and verify other countries' compliance with those treaties); and the costs of developing and maintaining active defenses against other countries' nuclear weapons (primarily ballistic missiles).[17]

## Sources of Uncertainty

CBO's estimates come with substantial uncertainty stemming mainly from two sources: Future plans may not be achievable, leading to cost growth and delays; and the costs of developing, producing, and operating weapon systems are uncertain even when the plans are fully determined.

Historically, modernization programs are challenging and susceptible to cost growth, which in some cases can be substantial. CBO has attempted to capture that

14. Bombers can be used for both nuclear and conventional missions. To reflect those dual roles, CBO used only a percentage of the costs of bombers. More detail is given in the section on bombers' costs.

15. Sustainment refers to minor modifications and upgrades that keep defense systems current, such as updating communications systems to be compatible with new satellite communications capabilities, rather than routine maintenance. In this report, sustainment comprises all acquisition costs (that is, procurement and research, development, test, and evaluation funding, except for major life-extension efforts) associated with existing systems, as well as DOE's costs for sustaining the relevant warheads and supporting naval reactors on current SSBNs.

16. For more details about CBO's approach to estimating cost growth, see Congressional Budget Office, *Projected Costs of U.S. Nuclear Forces, 2014 to 2023* (December 2013), p. 18, www.cbo.gov/publication/44968.

17. For CBO's most recent estimate of the 10-year costs of missile defense, see Congressional Budget Office, *Costs of Implementing Recommendations of the 2019 Missile Defense Review* (January 2021), www.cbo.gov/publication/56949.

trend by estimating potential additional costs in excess of projected budgeted amounts using the rates of cost growth that similar programs have experienced in the past. That calculation, however, is based on average historical growth, and the current group of modernization programs may experience more or less growth than the historical average.

Another source of uncertainty stems from how closely actual production schedules for new programs can meet planned schedules. Several major modernization programs are scheduled to move into full-scale production during the next decade. In some cases, the number of systems that will be produced each year is included in budget documentation. For other programs whose plans are not fully defined, CBO has used known milestones for fielding the systems and estimated the minimum production rates needed to reach those milestones. Deviations from production schedules could lead to higher or lower costs over the 2025–2034 period, even if the programs' total production costs did not change.

The costs of operating new weapon systems as they are phased into the force can also involve uncertainty. During the current 10-year projection period, several modernization programs will begin to field new systems. For about a decade or more after those initial deployments, DoD will operate fleets comprising a mix of new and old systems. CBO has accounted for that situation by using the same model to estimate operation and sustainment costs that it used to estimate the costs of current forces.

## How Estimated Costs Have Changed Since 2023

CBO's current estimate of $946 billion in total costs for nuclear forces over the 2025–2034 period is $190 billion, or 25 percent, more than the agency's 2023 estimate of $756 billion over the 2023–2032 period (see Table 2). The percentage increases for DoD and DOE are about the same: DoD's costs are projected to total $651 billion, or 24 percent more than CBO estimated in 2023, and DOE's costs are projected to total $295 billion, or 27 percent more than CBO estimated in 2023.

The $190 billion increase in costs has two components: The increase in CBO's estimates of budgeted costs for nuclear forces accounts for $157 billion, and the increase in CBO's estimates of potential additional costs in excess of budgeted amounts (based on historical cost growth) accounts for $33 billion.

The $157 billion increase in budgeted costs is mainly in two categories. First, costs are projected to be substantially greater (by $120 billion, or 22 percent) than CBO's 2023 estimate for nuclear delivery systems and weapons—particularly DoD's costs for SSBNs and ICBMs and DOE's costs for weapons laboratories and supporting activities, including modernization of DOE's production facilities. Second, projected costs for command, control, communications, and early-warning systems have also increased substantially (by $37 billion, or 32 percent).

### Sources of Change in Budgeted Costs

There are two different sources for the $157 billion increase in CBO's projected costs of nuclear forces: First, the costs of some of DoD's and DOE's programs have increased, and second, the 2023 and 2025 estimates cover two slightly different periods (see Figure 2).

**Increases Caused by Changes in Costs of Programs.** Fifty-nine percent (or $93 billion) of the $157 billion difference between CBO's current and previous projections involves the eight years in which the projections overlap (see Box 2 on page 12). That amount is 17 percent larger than CBO's previous projection for the overlapping years.

- DoD accounts for more than half of the increase ($58 billion, or 62 percent) during the years of overlap. The largest contributions to that increase come from higher expected costs to develop and produce new ICBMs and SSBNs and higher costs for modernization programs for command, control, communications, and early-warning systems than in CBO's 2023 estimate.
- DOE accounts for the remaining increase ($35 billion, or 38 percent) during the years of overlap. That increase is largely from higher expected costs for modernization of production facilities.

**Increases Resulting From Different Time Periods.** The higher estimates in this report do not necessarily signal an increase in programs' total costs. For example, 41 percent (or $65 billion) of the $157 billion difference between CBO's current and 2023 estimates of budgeted amounts for nuclear forces is attributable to the fact that the current projections cover a 10-year period that starts

Table 2.

## Differences in 10-Year Costs Between CBO's Current and Previous Projections of the Costs of Nuclear Forces

Billions of dollars

| | 10-year costs | | | | | |
|---|---|---|---|---|---|---|
| | DoD | | DOE | | Total | |
| **CBO's previous projection** | | | | | | |
| Total estimated costs, 2023–2032 | 524 | | 232 | | 756 | |
| **Difference in 10-year total (current projection minus previous projection)[a]** | | | | | | |
| CBO's projections of budgeted amounts for nuclear forces[b] | Amount | Percent | Amount | Percent | Amount | Percent |
| Nuclear delivery systems and weapons | | | | | | |
| Ballistic missile submarines | 32 | 19 | 7 | 43 | 39 | 21 |
| Intercontinental ballistic missiles | 24 | 23 | -1 | -9 | 22 | 19 |
| Bombers | 4 | 8 | -2 | -18 | 2 | 3 |
| Other nuclear activities[c] | 2 | 10 | n.a. | n.a. | 2 | 10 |
| Tactical nuclear delivery systems and weapons | 6 | 123 | 4 | 243 | 9 | 152 |
| Nuclear weapons laboratories and supporting activities | n.a. | n.a. | 45 | 31 | 45 | 31 |
| Subtotal, nuclear delivery systems and weapons | 67 | 19 | 53 | 27 | 120 | 22 |
| Command, control, communications, and early-warning systems | 37 | 32 | n.a. | n.a. | 37 | 32 |
| Subtotal, CBO's projections of budgeted amounts for nuclear forces | 105 | 22 | 53 | 27 | 157 | 24 |
| CBO's estimates of potential additional costs based on historical cost growth | 22 | 39 | 11 | 27 | 33 | 34 |
| **Total difference** | **127** | **24** | **63** | **27** | **190** | **25** |
| **CBO's current projection** | | | | | | |
| Total estimated costs, 2025–2034 | 651 | | 295 | | 946 | |

Source: Congressional Budget Office, using data from the Department of Defense and the Department of Energy. See www.cbo.gov/publication/61224#data.

DoD = Department of Defense; DOE = Department of Energy; n.a. = not applicable.

a. A positive amount indicates that the current projection is greater than the previous one, which was published in Congressional Budget Office, *Projected Costs of U.S. Nuclear Forces, 2023 to 2032* (July 2023), www.cbo.gov/publication/59054.

b. These budgeted amounts do not reflect independent estimates by CBO of the costs of U.S. nuclear forces. Instead, this category is based on CBO's analysis of DoD's and DOE's budget proposals and accompanying documents, as well as on CBO's projections of those budget figures beyond the next five years under the assumption that programs proceed as described in budget documentation.

c. This category includes nuclear-related research and operations support activities by DoD that CBO could not associate with a specific type of delivery system or weapon.

and ends two years later than the period covered by the 2023 estimate. In the previous report, estimated costs in 2023 and 2024 totaled $109 billion; those years drop out in this report, and estimated costs in the added years of 2033 and 2034 total $174 billion. As a result, in the current estimate, new programs are two years further along in their development or production phases—both of which, in later stages, tend to be characterized by higher annual costs. Those increased activities account for $38 billion of the $65 billion increase resulting from the differing 10-year periods; inflation accounts for the rest.

### Nuclear Delivery Systems and Weapons

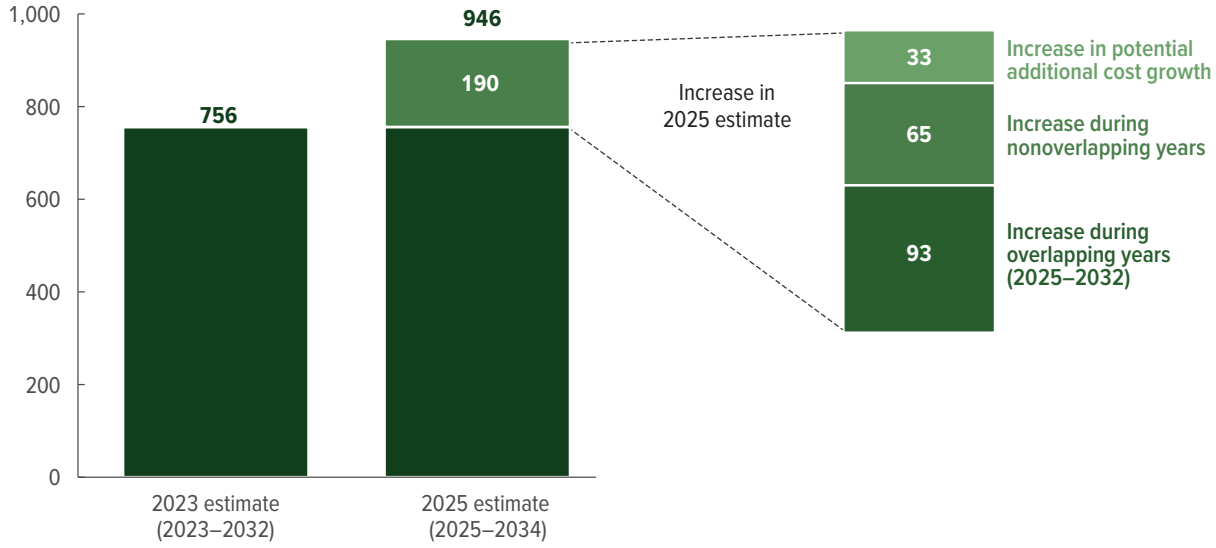
By CBO's estimate, the amounts needed to implement the plans for nuclear systems and weapons as DoD and DOE have laid them out in their 2025 budget submissions (provided those plans did not change or experience any cost growth or delays) would total $663 billion over the 2025–2034 period, $120 billion more than the $543 billion that CBO estimated in 2023 for the 2023–2032 period (an increase of 22 percent).

Several factors account for that increase. Some major modernization programs are completing development and

Figure 2.

## Comparison of CBO's 10-Year Projected Costs of Nuclear Forces, 2023 and 2025

Billions of dollars




Source: Congressional Budget Office, using data from the Department of Defense and the Department of Energy. See www.cbo.gov/publication/61224#data.

The budgeted amounts shown do not reflect independent estimates by CBO of the costs of U.S. nuclear forces. Instead, they are based on CBO's analysis of DoD's and DOE's budget proposals and accompanying documents, as well as on CBO's projections of those budget figures beyond the next five years under the assumption that programs proceed as described in budget documentation.

moving into full-scale production, and some modernization programs have experienced delays that have increased costs and led to further life extensions of existing systems to maintain force levels. Additional modernization efforts have been planned, particularly by DOE, and plans and expected costs for some activities have become clearer or have changed since the departments submitted their 2023 budget requests.

**Ballistic Missile Submarines.** DoD's and DOE's budgeted amounts for SSBNs would total $228 billion over 10 years, CBO projects. That total is $39 billion more than the 2023 estimate for the 2023–2032 period (see Table 2). Most of that increase would be for DoD's SSBN-related programs, which are projected to cost $204 billion over the next decade, $32 billion more than CBO's 2023 estimate.

That increase in 10-year costs mostly results from the shift in end dates of CBO's projection period from 2032 to 2034. Under the plans in DoD's 2025 budget request, the program for developing and producing a new SSBN will be well past the halfway point of procurement by 2034, and those last two years include more procurement funding. As a result, during the next decade the program would spend more years near the peak of the construction effort, which extends to the mid-2030s. Other contributors to the rising costs include the following:

- Plans for the second phase of the effort to extend the life of the D5 submarine-launched ballistic missile (SLBM), which will allow that missile to be used throughout the lifetime of Columbia class submarines, will continue to ramp up and spend more years at peak activity than was the case in CBO's 2023 estimate. Likewise, two programs for research and development pertaining to reentry vehicles used to protect SLBM warheads as they reenter the atmosphere will also continue to ramp up and will have higher costs than they did in CBO's 2023 estimate.
- The Columbia class SSBN fleet will have incurred two more years of operation and sustainment costs than were included in CBO's 2023 estimate. The first submarine is slated to begin crew training and other preparations in the late 2020s, in advance of its scheduled deployment around 2031; under current plans, it would be followed by another new submarine reaching operational status each year from 2032 to 2034.

Box 2.

## Differences Between the Congressional Budget Office's Current and Previous Projections of the Costs of Nuclear Forces During the Years That Overlap

One of the goals of updating this report every two years is to assess the budgetary effects of changes in plans for nuclear forces, or changes in the execution of those plans, since the previous report was published. The most direct way to do that is to compare estimates only for the years that overlap, in this case 2025 through 2032 (see the table). That approach highlights the differences between sets of estimates that are the result of changes in plans. It does so by largely removing the effects of the natural ramp-up and ramp-down of activity typical of weapons development programs and the effects of economywide inflation in prices.

For the eight overlapping years, the projected budgets have risen by $93 billion since the Congressional Budget Office's last estimate in 2023. The categories with the largest differences in the projected budgets are command, control, communications, and early-warning systems and modernization of the Department of Energy's production facilities. Costs in the tactical nuclear weapons category are also larger than in CBO's 2023 estimate because the current estimate includes the cost of the nuclear-armed sea-launched cruise missile, which was not included in the Administration's 2023 budget request (see the discussion in the main text). Costs in the intercontinental ballistic missiles category experienced a smaller change: CBO was unable to include a full accounting of higher costs because the Department of Defense has not yet released its plans for the restructured Sentinel program.

Continued

In addition, DoD has increased funding for an initiative that provides support to the submarine industrial base as the shipyards prepare for an increase in future demand for submarine construction. That initiative is a major contributor to the increase in DoD's SSBN-related costs in the years that overlap in CBO's 2023 and 2025 estimates.

DOE's share of the amounts budgeted for SSBNs would be $23 billion over 10 years, CBO projects, $7 billion more than the 2023 estimate. Most of that increase comes from the W93 program to produce a new warhead to be carried on SLBMs, which would be two years further along in its development. The W93 program's costs are also higher during the years of overlap between CBO's current estimate and its 2023 estimate, which is consistent with an increase in DOE's estimates of the total costs over the life of the program.[18]

**Intercontinental Ballistic Missiles.** The amounts budgeted for ICBMs would total $140 billion over 10 years, CBO projects—$126 billion for DoD and $14 billion for DOE. That total is $22 billion more than CBO's 2023 estimate for the 2023–2032 period. All of the increase comes from DoD's share of the costs, which have increased by $24 billion; by contrast, DOE's costs for ICBMs have decreased.

For DoD, almost all of the $24 billion increase in CBO's estimate of ICBM costs over the projection period is for the Sentinel program (previously referred to as the Ground-Based Strategic Deterrent program). The Sentinel program includes development and fielding of a new ICBM, as well as refurbishment or replacement of the silos and elements of the infrastructure for command and control. The actual costs of the Sentinel program are highly uncertain, and the $24 billion increase between CBO's 2023 and 2025 estimates is unlikely to represent the full extent of the cost growth that will occur. CBO was not able to estimate the extent of that growth over the 2025–2034 period because DoD began to restructure the program after its 2025 budget request was submitted (see Box 1 on page 6).

**Bombers.** Under the plans in the departments' 2025 budget requests, the amounts allocated for the bomber portion of nuclear forces would total $65 billion over the 2025–2034 period, CBO projects, $2 billion more than CBO's earlier estimate for the 2023–2032 period. Of that total, $56 billion would go

18. See National Nuclear Security Administration, *Fiscal Year 2025 Stockpile Stewardship and Management Plan—Biennial Plan Summary* (September 2024), pp. 5-31–5-32, https://tinyurl.com/3scnvsct, and *Fiscal Year 2023 Stockpile Stewardship and Management Plan—Biennial Plan Summary* (April 2023), pp. 5-34–5-35, https://tinyurl.com/3scnvsct.

Box 2. Continued

## Differences Between the Congressional Budget Office's Current and Previous Projections of the Costs of Nuclear Forces During the Years That Overlap

**Differences in Costs for the Projections' Overlapping Years (2025 to 2032)**

Billions of dollars

| | 8-year costs | | | | | |
|---|---|---|---|---|---|---|
| | DoD | | DOE | | Total | |
| **CBO's previous projection** | | | | | | |
| Total estimated costs, 2025–2032[a] | 395 | | 156 | | 551 | |
| **Difference in 8-year total (current projection minus previous projection)[b]** | | | | | | |
| CBO's projections of budgeted amounts for nuclear forces[c] | Amount | Percent | Amount | Percent | Amount | Percent |
| Nuclear delivery systems and weapons | | | | | | |
| Ballistic missile submarines | 12 | 8 | 2 | 18 | 15 | 9 |
| Intercontinental ballistic missiles | 10 | 11 | -2 | -17 | 8 | 8 |
| Bombers | 3 | 6 | 1 | 10 | 3 | 7 |
| Other nuclear activities[d] | 1 | 4 | n.a. | n.a. | 1 | 4 |
| Tactical nuclear delivery systems and weapons | 4 | 101 | 3 | 438 | 7 | 161 |
| Nuclear weapons laboratories and supporting activities | n.a. | n.a. | 31 | 25 | 31 | 25 |
| Subtotal, nuclear delivery systems and weapons | 29 | 10 | 35 | 22 | 64 | 14 |
| Command, control, communications, and early-warning systems | 29 | 31 | n.a. | n.a. | 29 | 31 |
| **Total difference** | **58** | **15** | **35** | **22** | **93** | **17** |
| **CBO's current projection** | | | | | | |
| Total estimated costs, 2025–2032[a] | 453 | | 191 | | 643 | |

Source: Congressional Budget Office, using data from the Department of Defense and the Department of Energy. See www.cbo.gov/publication/61224#data.

This table does not include CBO's estimate of potential additional costs in excess of projected budgeted amounts. The estimate of potential additional cost growth applies to the full 10-year period, and the difference between the current and previous estimates cannot reliably be divided into the overlapping and nonoverlapping years.

DoD = Department of Defense; DOE = Department of Energy; n.a. = not applicable.

a. Total does not include potential additional costs based on historical cost growth.

b. A positive amount indicates that the current projection is greater than the previous one, which was published in Congressional Budget Office, *Projected Costs of U.S. Nuclear Forces, 2023 to 2032* (July 2023), www.cbo.gov/publication/59054.

c. These budgeted amounts do not reflect independent estimates by CBO of the costs of U.S. nuclear forces. Instead, this category is based on CBO's analysis of DoD's and DOE's budget proposals and accompanying documents, as well as on CBO's projections of those budget figures beyond the next five years under the assumption that programs proceed as described in budget documentation.

d. This category includes nuclear-related research and operations support activities by DoD that CBO could not associate with a specific type of delivery system or weapon.

to DoD ($4 billion more than CBO estimated in 2023), and $9 billion would go to DOE ($2 billion less than in CBO's 2023 estimate).[19]

19. Bombers can be used for both nuclear and conventional missions. In these 10-year cost estimates, CBO attributes 25 percent of the costs of the B-52 bomber and the new B-21 bomber to the nuclear mission and 75 percent to the conventional mission. By contrast, for the B-2 bomber and nuclear-capable cruise missiles, CBO attributes all costs to the nuclear mission. If the full cost of B-52 and B-21 bombers was included, the 10-year costs of bombers would increase to $149 billion (from $65 billion), and the total costs of nuclear forces, including projected cost growth, would be $1,040 billion over the 2025–2034 period. The 25 percent scale factor for the nuclear mission was determined through discussions with operational personnel and on the basis of the Air Force's force structure. For more detail, see Congressional Budget Office, *Projected Costs of U.S. Nuclear Forces, 2014 to 2023* (December 2013), p. 18, www.cbo.gov/publication/44968.

Most of the increase in DoD's bomber costs is for the planned initial deployments of the Long-Range Standoff Weapon (LRSO), a new nuclear-capable air-launched cruise missile, and the new B-21 bomber. Those programs would begin to incur operation and sustainment costs as they enter the fleet in the late 2020s.

For DOE, the decrease in projected costs is primarily because two warhead programs are winding down: the B61-12 life extension program, which is slated to finish around 2026; and the W80-4 warhead program, which is set to conclude around 2033.

**Other Nuclear Activities.** This category comprises DoD's supporting activities for strategic nuclear forces that CBO could not associate with a particular weapon system. Costs for those activities would total $21 billion over 10 years, $2 billion more than CBO's 2023 estimate, mainly because of small increases in the costs of several support programs.

**Tactical Nuclear Delivery Systems and Weapons.** CBO estimates that tactical nuclear capability would cost $15 billion over the next 10 years, $9 billion more than the agency's 2023 estimate. Almost all of that increase stems from the inclusion of a new sea-launched cruise missile and its associated warhead. The Administration had recommended canceling the SLCM-N in its 2022 *Nuclear Posture Review* and did not request any funds for that missile program in subsequent budgets (including the 2025 submission); however, in the National Defense Authorization Act for Fiscal Year 2024, the Congress directed DoD to make the SLCM-N a program of record and appropriated funds for DoD and DOE to begin work on the program.[20] CBO's estimate reflects the assumption that the SLCM-N will be based on the design of the LRSO, a new air-launched cruise missile under development, and that the warhead will be an alteration of the W80-4, the warhead being developed for the LRSO. That approach is the same one CBO used in its 2021 estimate of nuclear costs and is consistent with DoD's and DOE's plans from that time. However, the departments could take a different approach moving forward.

**Nuclear Weapons Laboratories and Supporting Activities.** DOE's budgeted amounts for its nuclear weapons laboratories and supporting activities would total $193 billion over the 2025–2034 period, CBO projects, $45 billion more than the 2023 estimate for the 2023–2032 period.[21] (More than two-thirds, or $31 billion, of the $45 billion increase would occur in the eight overlapping years, reflecting increases in the costs of DOE's programs over those years.)

About 60 percent of the total increase comes from higher expected costs for operation and modernization of infrastructure, including establishing and operating new pit production facilities, secondary production facilities, tritium production facilities, and domestic uranium enrichment facilities. About 30 percent comes from support programs, such as scientific research to improve the weapon production and sustainment process, and federal employee oversight of contractors operating laboratories.

## Command, Control, Communications, and Early-Warning Systems

The amounts budgeted by DoD for nuclear command, control, communications, and early-warning systems would total $154 billion over 10 years, CBO projects, $37 billion (or 32 percent) more than the 2023 estimate. That cost increase is largely for modernization programs that either are ramping up efforts or for which plans have become more defined.

Programs that are ramping up include replacement of the E-4B National Airborne Operations Center aircraft (on which senior civilian and military leaders can maintain communications with nuclear forces during a crisis); replacement of the E-6B Take Charge and Move Out aircraft (which relay communications to ballistic missile submarines); and replacement of the Advanced Extremely High Frequency communications satellites (which handle secure communications, including those for nuclear forces) with new satellites, which constitute the Evolved Strategic SATCOM system.

Programs that have firmed up their plans since 2023 include new satellite constellations for missile warning and missile tracking. Those programs will supplement the existing Space-Based Infrared System but will operate at lower orbital altitudes, specifically in

20. For a more detailed account of the sequence of events regarding SLCM-N, see Anya L. Fink, *Nuclear-Armed Sea-Launched Cruise Missile (SLCM-N)*, Report IF12084, version 12 (Congressional Research Service, February 12, 2025), https://tinyurl.com/44sdwbn2.

21. That total does not include funding for sustaining and modernizing specific nuclear warheads. Those amounts are grouped with the delivery systems that carry them.

medium-Earth orbit (from about 2,000 kilometers to 36,000 kilometers above the Earth's surface) and low-Earth orbit (from about 300 kilometers to 2,000 kilometers above the surface).[22]

### Potential Additional Costs Based on Historical Cost Growth

Weapons programs frequently cost more than originally budgeted amounts for a variety of reasons. Historically, technical challenges have often led to program delays and increased total costs; more recently, problems with workforce shortages and supply chain delays have often been cited as driving cost growth. If nuclear force programs exceeded planned amounts at roughly the same rates that costs for similar programs have grown in the past, they would cost an additional $129 billion over the next decade, $33 billion more over 10 years than CBO estimated in 2023.

22. Missile warning satellites also provide tracking information that can be useful to missile defense systems, especially satellites that operate at low orbital altitudes. To account for their dual mission, CBO has only included half of the costs of the satellites in low-Earth orbit in its estimate of the costs of nuclear forces.

This Congressional Budget Office report was prepared as required by the National Defense Authorization Act for Fiscal Year 2015. In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

Michael Bennett prepared the report with guidance from David Mosher and Edward G. Keating. Lara Robillard and Molly Sherlock provided comments.

Jeffrey Kling reviewed the report, and Ryan Snyder fact-checked it. Brett Kessler and John Skeen edited the report, and Jorge Salazar created the graphics and prepared the text for publication. The report is available at www.cbo.gov/publication/61224.

CBO seeks feedback to make its work as useful as possible. Please send comments to communications@cbo.gov.

Phillip L. Swagel
Director
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