



CONGRESSIONAL BUDGET OFFICE
U.S. Congress
Washington, DC 20515

Douglas Holtz-Eakin, Director

December 16, 2005

Honorable Roscoe Bartlett
Chairman
Subcommittee on Projection Forces
Committee on Armed Services
U.S. House of Representatives
Washington, D.C. 20515-6035

Dear Mr. Chairman:

In response to your request, the Congressional Budget Office has assessed the short-term and long-term implications of the Navy's recently reported plan for a battle force fleet of 313 ships. Because the Navy has yet to provide detailed information about that plan to the Congress, CBO based its assessment on publicly available information, including press reports of the plan's contents.

CBO estimates that the Navy would need to spend an average of \$19.6 billion a year (in 2007 dollars) on new-ship construction to achieve a 313-ship fleet in 2035. If refuelings of nuclear-powered aircraft carriers and submarines were included, the Navy would need to spend an average of \$20.8 billion annually through 2035. Those estimates are based on a number of assumptions that CBO made about the size and characteristics of the various types of ships that the Navy would buy and when it would buy them. Different assumptions could produce different estimates.

The enclosure describes the analysis by CBO's National Security Division. If you would like further details, we would be pleased to provide them. The analysis was prepared by Eric J. Labs, who can be reached at (202) 226-2920.

Sincerely,

A handwritten signature in blue ink that reads "Douglas Holtz-Eakin".

Douglas Holtz-Eakin

Enclosure

cc: Honorable Gene Taylor
Ranking Member

Resource Implications of the Navy's 313-Ship Plan

December 16, 2005

Congress of the United States
Congressional Budget Office

Overview

When Admiral Mike Mullen became Chief of Naval Operations in the summer of 2005, he ordered a review of the Navy's ship requirements to reexamine the service's previous shipbuilding plan, which had been sent to the Congress in March 2005. That plan, *An Interim Report to Congress on Annual Long-Range Plan for the Construction of Naval Vessels for FY2006*, envisioned a fleet of between 260 and 325 battle force ships. (The Navy currently has 280 such ships.) Admiral Mullen said he ordered the review both to arrive at a single numerical requirement for the fleet and to provide stability in the year-to-year construction of naval ships, so that both the Navy and the shipbuilding industry could plan to build efficiently whatever ships were ordered. Although the Navy has not yet released detailed information about its latest shipbuilding plan to the Congress, recent press reports indicate that the service has nearly completed its review of requirements, with the result being a 313-ship plan.¹ That number would be the permanent requirement around which the actual number of ships would rise and fall, depending on when ships were retired from the fleet as well as on the budgetary resources available to buy new ships.²

In the absence of detailed information from the Navy, the Congressional Budget Office (CBO) has analyzed the short- and long-term implications of the Navy's plan on the basis of publicly available information. That information suggests that the 313-ship requirement includes 11 aircraft carriers; 62 Arleigh Burke class destroyers; seven DD(X) destroyers; 19 CG(X) cruisers; 14 strategic ballistic missile submarines; 48 attack submarines; four guided missile submarines; 55 littoral combat ships; one future maritime prepositioning force, or MPF(F), squadron with sea-basing capabilities; approximately 30 amphibious ships; and 50 support ships.

According to press reports, the Navy says the new plan would require spending an average of \$13.4 billion annually on new-ship construction (excluding conversion programs and refuelings of nuclear vessels) for 30 years to build up and sustain the 313-ship fleet.³ That estimate, which CBO assumes to be in 2005 dollars, is equivalent to \$14.4 billion in 2007 dollars. (This analysis uses 2007 dollars in anticipation of the President's budget for fiscal year 2007 and to be consistent with CBO's testimony on the DD(X) program in July 2005.)

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1. For a detailed discussion of that plan, see Geoff Fein, "Navy Sustains Carrier Requirement Under \$13.4 Billion Plan," *Defense Daily*, December 14, 2005.
 2. Christopher P. Cavas, "U.S. Ship Plan to Cost 20% More: Price Control Will Be Key to Funding 313-Vessel Fleet," *Defense News*, December 5, 2005.
 3. Fein, "Navy Sustains Carrier Requirement Under \$13.4 Billion Plan"; and Cavas, "U.S. Ship Plan to Cost 20% More." The Navy has also considered alternative shipbuilding schedules to support the 313-ship requirement that would cost more or less money. CBO did not have enough information to analyze those reported schedules in detail.

The Navy's plan to achieve a 313-ship fleet with \$14.4 billion in annual new-ship construction spending appears to assume that costs will somehow be controlled more stringently on future classes of ships than they have been on ships that the Navy is building now. According to press reports, such controls include reducing the cost of the Virginia class attack submarine from about \$2.6 billion today to \$2.0 billion; lowering the procurement cost of the second CVN-21 to \$8.8 billion, with additional ships costing around \$8 billion; reducing the procurement cost of the first two DD(X)s to \$3.1 billion, with successive ships at around \$2.0 billion; and buying the sea-basing MPF(F) squadron, which contains 12 new ships, for no more than \$15.3 billion. The plan also implies that the new strategic ballistic missile submarines that the Navy would need to begin buying in the 2020s would cost no more than \$3.5 billion each.

Even if those apparent cost targets for the 313-ship plan can be achieved, however, the \$14.4 billion figure does not appear to take into account the higher inflation that the naval shipbuilding industry in the United States has been experiencing in the past decade. An analysis by the Navy of the inflationary component of past cost increases in shipbuilding programs indicates that inflation in such programs is expected to be about 1.3 percent higher per year, on average, than the inflation anticipated for the Department of Defense's procurement programs as a whole, at least through 2011.⁴ CBO assumes that the difference between inflation for general procurement programs and inflation for ship programs represents real growth in the cost of building ships that should be included in future estimates.⁵ In addition, the Navy's estimate does not appear to include refuelings for nuclear-powered aircraft carriers and ballistic missile submarines, which are funded in the Navy's principal shipbuilding account (shipbuilding and conversion, Navy or SCN).⁶

According to press reports, the fleet would increase to 332 ships by 2019 under the Navy's plan and then decline to 312 ships in 2035. CBO estimates that to achieve a fleet of around 313 ships by the 2030s, the Navy would need to purchase 268 ships over the 2006-2035 period—an average of about 8.9 ships per year. Using its independently generated estimates of the costs of the ships that the Navy would buy (described in more detail below), CBO projects that those purchases would require an average annual budget of \$19.6 billion (\$18.3 billion in

4. Naval Sea Systems Command, "Shipbuilding Inflation" (briefing presented to Congressional Budget Office staff, June 28, 2005).

5. CBO assumes that such annual real growth will continue for the next 20 years before leveling off.

6. Dale Eisman, "Analysts Say Navy Ship Plan Faces Uncertainties," *Norfolk Virginian-Pilot*, December 6, 2005. Most Navy ships are bought through the SCN account, although most support ships are bought through the National Defense Sealift Fund account.

Table 1.

Summary of Average Annual Ship Construction Costs Implied by the Navy’s 313-Ship Plan

(Billions of 2007 dollars)

| | Average Annual Costs | |
|---|----------------------|-------------------|
| | 2006-2015 | 2006-2035 |
| New-Ship Construction Only | | |
| Reported Navy Estimate | 12.5 | 14.4 ^a |
| CBO’s Estimate | 14.7 | 19.6 ^b |
| Additional Costs | | |
| Refuelings of Nuclear-Powered Aircraft Carriers | 1.2 | 1.0 |
| Refuelings of Nuclear-Powered Attack Submarines and Ballistic Missile Submarines | 0.4 | 0.2 |
| Conversions of CG-47 Cruisers | 0.5 | 0.2 |
| Modernization of DDG-51 Destroyers | 0.3 | 0.5 |
| Mission Modules for Littoral Combat Ships | 0.5 | 0.2 |

Source: Congressional Budget Office.

a. The Navy’s estimate, as reported in the press, is \$13.4 billion. CBO assumed that figure was in 2005 dollars and inflated it to 2007 dollars for the purposes of this analysis.

b. In 2005 dollars, CBO’s estimate for the 2006-2035 period is \$18.3 billion.

2005 dollars) through 2035 for new-ship construction alone—about 35 percent more than the Navy’s estimate (see Table 1). With nuclear refuelings for carriers and submarines included, that figure would be \$20.8 billion per year (\$19.4 billion in 2005 dollars).⁷ Those amounts are larger than what the Navy spent annually on ship construction between 2000 and 2005: an average of \$11.7 billion overall, or \$10.2 billion excluding nuclear refuelings.⁸ To keep the fleet at 313 ships indefinitely (in “steady state”), the Navy would have to spend an average of \$19.4 billion per year, including the costs of refueling nuclear-powered ships.⁹

7. If conversions and modernizations of surface combatants and mission modules for the littoral combat ship were included, average annual costs through 2035 would be \$21.7 billion (\$20.2 billion in 2005 dollars), CBO estimates. The Navy plans to pay for those items from accounts other than the ones normally associated with shipbuilding.

8. Those historical numbers are higher than the ones cited in Congressional Budget Office, *Resource Implications of the Navy’s Interim Report on Shipbuilding* (April 25, 2005), because the current analysis incorporates the higher level of inflation that the naval shipbuilding industry has experienced recently.

9. The steady-state budget requirement equals the total number of ships in the fleet, divided by their estimated service lives, multiplied by the unit cost to procure the ships.

In CBO's analysis of the Navy's new plan, ship purchases and spending show a peak-and-valley pattern over the 2006-2035 period (see Figures 1 and 2). Through 2015, the Navy would buy an average of 9.6 ships per year, at an annual cost of about \$14.7 billion. The high level of purchases during that period reflects large numbers of littoral combat ships (LCSs)—small warships that are expected to be relatively inexpensive (\$400 million apiece, including mission modules, compared with \$1.2 billion for current-generation destroyers). The size of the fleet would initially rise as the 55 LCSs purchased under this plan went into service over the next 20 years. According to CBO's analysis, the number of battle force ships would peak at 330 in 2019 and decline to 310 by 2035. (Press reports indicate that the Navy's analysis shows 332 ships in 2019 and 312 by 2035.)¹⁰

After a brief respite at the end of the LCS purchases, the ship construction program would increase again in the 2020s, in terms of both the number of ships being bought and the amount of money required to buy them. During the 2020s and 2030s, the Navy will need to replace its current fleet of 14 ballistic missile submarines at a rate of one per year. The design of those replacement submarines is not yet known, but if they have the same capabilities as today's ballistic missile submarines, they are likely to be substantially more expensive than the Virginia class attack submarines now being built. Other warships, particularly Arleigh Burke class destroyers, will also need to be replaced in the 2020s.

CBO's Assumptions About Specific Types of Ships

In the absence of a formal report from the Navy to the Congress, CBO had to make numerous assumptions about how the Navy might implement its new plan in order to estimate the annual purchases, budgets, and inventories associated with a 313-ship fleet.

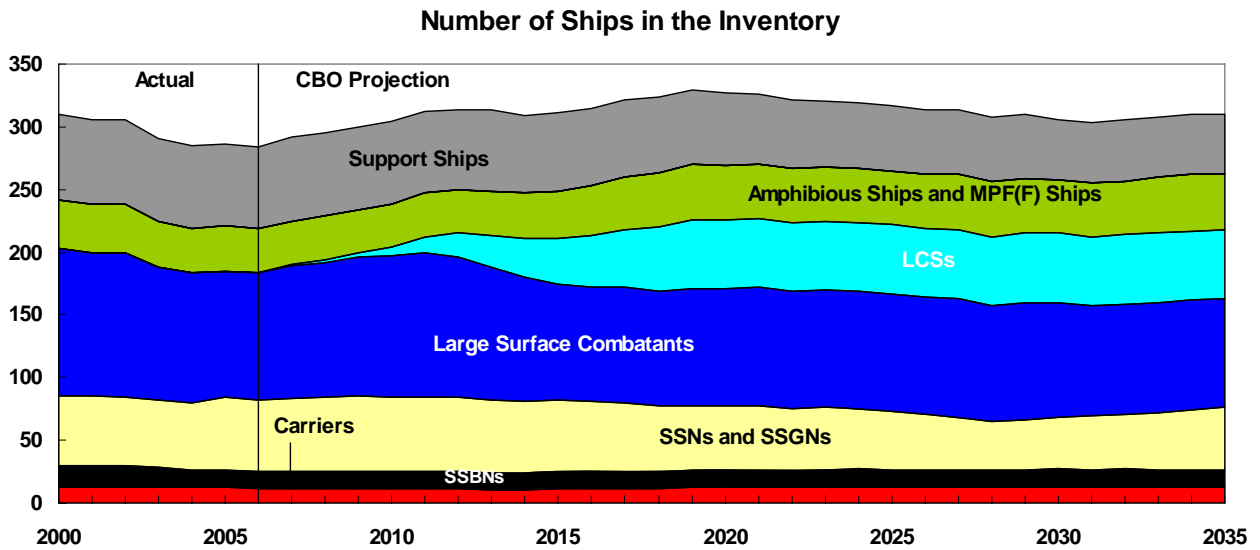
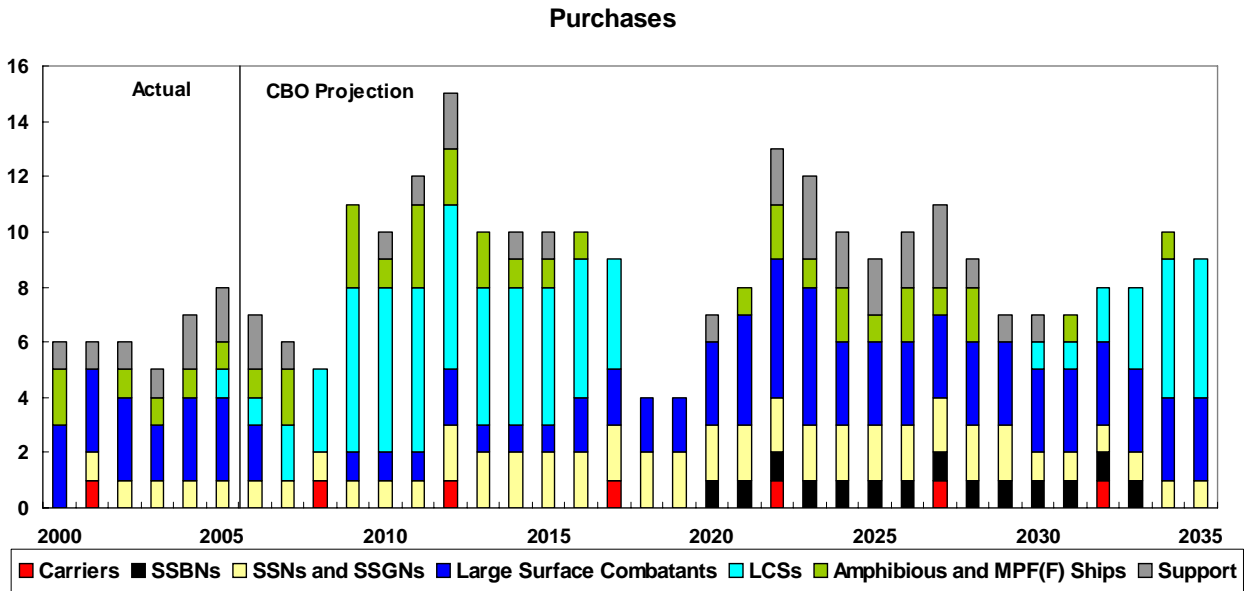
Aircraft Carriers

The 313-ship plan reportedly reduces the number of aircraft carriers to 11 from the current 12. CBO assumed that the reduction would occur by retiring the *John F. Kennedy*, as the Navy proposed in its 2006 budget. With respect to purchases of the Navy's new carrier, the CVN-21, CBO followed the building schedule in the CVN-21 Selected Acquisition Report provided to the Congress in December 2004. That schedule would build the first CVN-21 in 2008, the second in 2012, and the third in 2017. CBO assumed that subsequent CVN-21s would be built every five years thereafter. Thus, over the 2006-2035 period, a total of six CVN-21s would be purchased. All of the current Nimitz class carriers are assumed to operate for at least 50 years, with a refueling at about 23 years of age. Under those

10. Cavas, "U.S. Ship Plan to Cost 20% More."

Figure 1.

Annual Purchases and Inventory Implied by the Navy's 313-Ship Plan



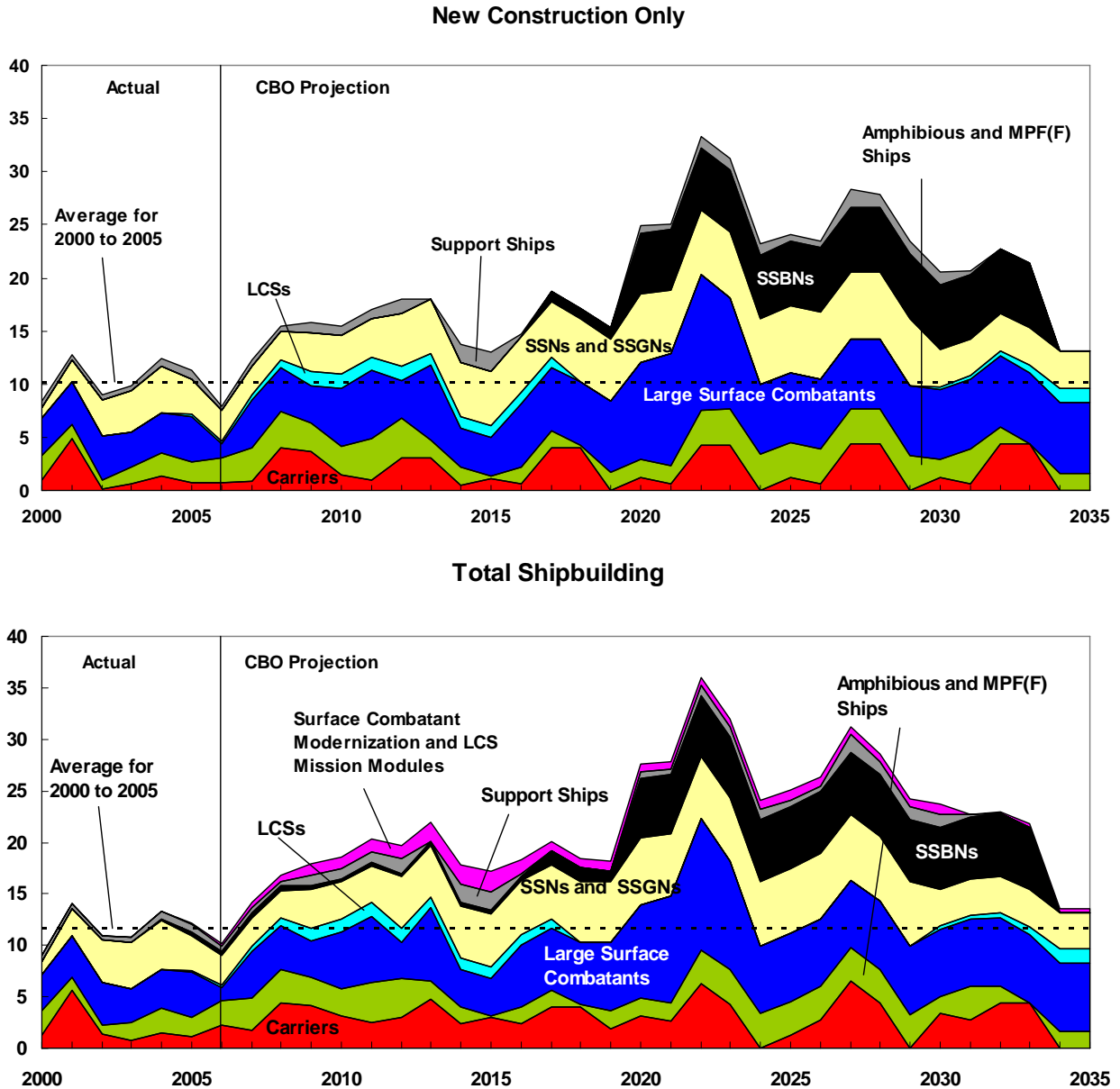
Source: Congressional Budget Office.

Note: SSBNs = ballistic missile submarines; SSNs = attack submarines; SSGNs = guided missile submarines; LCSs = littoral combat ships.

Figure 2.

Annual Costs Implied by the Navy's 313-Ship Plan

(Billions of 2007 dollars)



Source: Congressional Budget Office.

Notes: Total shipbuilding includes new-ship construction, refuelings of nuclear-powered ships, programs to modernize surface combatants, and the mission modules for the littoral combat ship. Surface combatant modernizations and LCS mission modules are expected to be funded in accounts other than those traditionally associated with shipbuilding.

LCSs = littoral combat ships; SSNs = attack submarines; SSGNs = guided missile submarines; SSBNs = ballistic missile submarines.

assumptions, the carrier force would increase to at least 12 ships between 2019 and 2035.

Surface Combatants

The Navy's plan would buy seven DD(X) destroyers at a rate of one per year starting in 2007. Press reports indicate that the Navy hopes to reduce the cost of the first two ships of that class to \$3.1 billion, with subsequent ships costing about \$2.0 billion. CBO estimates that the cost of the first ship would be \$4.7 billion and that the average cost for a seven-ship class of DD(X)s would be \$3.7 billion (see Table 2).

In addition, the Navy intends to begin buying a new missile-defense surface combatant, the CG(X) cruiser, in 2011. CBO assumes that a CG(X) would use the same hull—and cost about the same—as a DD(X) destroyer. However, the CG(X)s would have a lower average cost than the DD(X)s because more of them would be bought (19 between 2011 and 2023) and because some CG(X)s would be purchased at a rate of two per year, reducing their unit cost.

The Navy's 313-ship plan would also maintain a fleet of 62 Arleigh Burke class destroyers (DDG-51s). CBO assumes that those ships would be modernized and would serve for about 35 years, which is consistent with the Navy's plan. Under that assumption, the first replacement for the DDG-51s—a DDG(X)—would need to be purchased in 2020.¹¹ For this analysis, CBO assumed that the new DDG(X) would be somewhat larger than existing DDG-51s but smaller than DD(X) destroyers (since it would be unlikely to carry the advanced gun systems that DD(X)s have). In particular, CBO assumed the DDG(X) would displace about 11,000 tons at full load. In CBO's projection, those replacement destroyers cost an average of about \$2.2 billion apiece—the same cost per thousand tons as today's Arleigh Burke destroyers—assuming that they are bought at a rate of three per year.

Finally, CBO assumed for this analysis that the littoral combat ship would have a service life of 25 years, the midpoint of the Navy's goal of 20 to 30 years. As a result, by 2030, the Navy would have to start buying large numbers of LCSs again to replace those purchased between now and 2017.

Submarines

In CBO's projection, the attack submarine force continues to be a major source of demand on the Navy's resources. Under the 313-ship plan, the Navy would buy two attack submarines a year beginning in 2012 (including Improved Virginia

11. If the DDG-51s lasted only 30 years—generally, the Navy retires large surface combatants after 30 years or less even if their notional service lives are longer—replacements would need to start being purchased earlier.

Table 2.

**Comparison of the Navy's and CBO's Assumptions
for the Costs of Major New Ship Classes**

(Billions of 2007 dollars)

| Program | Average Per-Ship Cost Over the 2006-2035 Period^a | |
|---|--|------------------------|
| | Navy (Inferred)^b | CBO^c |
| CVN-21 Nuclear-Power Aircraft Carrier | 8.4 | 9.4 ^d |
| DD(X) Destroyer | 2.4 | 3.7 |
| CG(X) Cruiser | 2.2 | 3.3 ^e |
| DDG(X) Destroyer (Replacement for Arleigh Burke class) | 1.8 | 2.2 |
| Virginia Class Attack Submarine | 2.3 | 2.7 |
| SSBN(X) Ballistic Missile Submarine (Replacement for Ohio class) | 3.6 | 6.2 |
| LHA(R) Amphibious Assault Ship | 2.4 | 3.0 |

Source: Congressional Budget Office.

- a. The total amount of money spent on a ship program from 2006 to 2035 divided by the total number of ships bought in that program.
 - b. CBO's inference of the Navy's cost estimates based on press reports and cost objectives.
 - c. CBO's estimates are generally based on historical relationships between cost and weight for individual types of ships as well as on the higher inflation (compared with other Department of Defense procurement programs) in the naval shipbuilding industry.
 - d. For the CVN-21 program, CBO relied on Navy estimates, adjusted for the higher level of inflation expected in the shipbuilding industry.
 - e. The CG(X) has a lower average cost than the DD(X) because it is bought largely at a rate of two per year, reducing its average unit cost, whereas the DD(X) is bought at a rate of one per year.
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class submarines starting around 2020). That procurement rate would continue until 2029 and then drop to one per year.¹² Although the Navy is currently examining concepts that might eventually reduce the cost of submarines, CBO did not assume that the Improved Virginia class would cost less to build than the original Virginia class did (an average of \$2.6 billion apiece).

Unlike the Navy's previous 260- and 325-ship plans, the 313-ship plan does not envision the continued use of guided missile submarines (SSGNs) beyond the 2020s. Although four of those vessels are part of the 313-ship requirement, the Navy's plan would not replace them once the existing SSGNs retire in the 2020s.

The 313-ship plan would maintain a force of 14 ballistic missile submarines (SSBNs) throughout the 30-year projection period of this analysis. Consequently, beginning around 2020, the Navy would need to buy replacement SSBNs at a rate of one per year. The design, cost, and capabilities of that replacement vessel are one of the most significant uncertainties in CBO's (and the Navy's) analysis. Consistent with the Navy's plan, CBO assumed that 14 new SSBNs would be bought but that those submarines would be smaller than today's Ohio class SSBNs. Specifically, CBO assumed that the new SSBN would displace around 15,000 tons submerged—roughly twice the size of a Virginia, but nearly 4,000 tons less than an Ohio. Such a submarine could be equipped with 16 tubes for launching Trident missiles, down from the 24 tubes in the Ohio class.

CBO estimates that the average cost of the new SSBN would exceed \$6 billion. CBO does not have any information about the size or capabilities that were assumed for that ship in the Navy's plan. The service is reportedly considering various options to replace the Ohio class, including modular submarines that could carry conventional as well as nuclear payloads, or ballistic missile submarines with as few as eight missile tubes. Costs could vary considerably depending on the final design and weight of the replacement class.

Amphibious and Maritime Prepositioning Ships

The Navy's 313-ship plan calls for a force of 31 amphibious ships organized around nine expeditionary strike groups. Each group would include one large amphibious assault ship (LHA or LHD class ship), one amphibious transport dock (LPD), and one dock landing ship (LSD). That configuration implies that besides needing to purchase amphibious assault ships, the Navy would continue to require dock landing ships. Thus, it would need an LSD(X) program to replace the current LSDs, which will reach the end of their service lives in the 2020s. In addition, CBO assumed that all future amphibious assault ships would not be substantially

12. Continuing to buy attack submarines at a rate of two per year after 2029 would lead to a steadily increasing force that was larger than the requirement of 48 attack submarines.

larger than the first LHA(R), which is a variant of the existing LHD design. Should the Navy pursue a larger design for future LHA(R)s—as the President’s 2006 budget suggested—the costs for the 313-ship plan would be higher.

With respect to the future of the maritime prepositioning force, the Navy sent a report to the Congress in June 2005 describing the new MPF(F) squadron. It would include 12 new ships, most of which would be based on designs of existing amphibious or support ships. The squadron would include two LHA(R)s; an LHD; three modified large, medium-speed roll-on/roll-off ships (LMSRs); three modified-design T-AKE support ships; three mobile landing platforms; and two ships from existing maritime prepositioning squadrons. The Navy plans to buy one such squadron and estimates the total cost at about \$15.3 billion (in 2007 dollars). CBO’s estimate of the cost of that squadron is a little higher: about \$16 billion. The difference largely results from CBO’s slightly higher cost estimates for the LHA(R) and LHD.

Other Features of the Navy’s New Plan

In an April 2005 analysis submitted to the House Armed Services Committee, CBO noted that the Navy’s 260- and 325-ship plans envisioned significant reductions in the combat logistics and support forces.¹³ In contrast, the 313-ship plan would make only relatively minor changes to those forces. By 2035, the combat logistics force would be the same size that it is now (30 ships), compared with more than one-quarter smaller under the Navy’s interim report on shipbuilding. The number of support ships, which would have been cut by about 70 percent under the Navy’s previous plans, would also remain at essentially the current level under the 313-ship plan. The composition of the combat logistics and support forces would change somewhat over time as older ships were retired and new types entered the fleet, but those changes are relatively minor compared with the ones proposed in the 260- and 325-ship plans.

13. See Congressional Budget Office, *Resource Implications of the Navy’s Interim Report on Shipbuilding*.