



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

Douglas Holtz-Eakin, Director

April 25, 2005

Honorable Roscoe G. 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 near-term and long-term demands for shipbuilding resources associated with sustaining either a 260-ship or 325-ship fleet.

CBO estimates that the Navy would need to spend an average of \$15 billion annually (in 2005 dollars) on ship construction to achieve a 260-ship fleet in 2035. Achieving a 325-ship fleet by that year would require an average shipbuilding budget of \$18 billion per year. 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 black ink that reads "Douglas Holtz-Eakin".

Douglas Holtz-Eakin

Enclosure

cc: Honorable Gene Taylor
Ranking Member

Resource Implications of the Navy's Interim Report on Shipbuilding

April 25, 2005

Congress of the United States
Congressional Budget Office

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On March 23, 2005, the Department of the Navy released *An Interim Report to Congress on Annual Long-Range Plan for the Construction of Naval Vessels for FY2006*. The report includes projected inventories for a 260-ship fleet and a 325-ship fleet through 2035, suggesting that the Navy's total future requirement for ships may fall within that range (see Table 1). A similar report sent to the Congress in 2003 called for a much larger fleet: 375 ships. However, in recent testimony before the Congress, the Chief of Naval Operations, Admiral Vern Clark, stated that the Navy's total requirement could be reduced to between 260 and 325 ships through increased use of technology, forward basing of ships in Guam and Japan, and crew rotation.¹ (The Navy's current fleet numbers 287 ships.) According to Admiral Clark, the 260-ship plan would cost about \$12 billion a year for ship construction, and the 325-ship plan would cost about \$15 billion a year for shipbuilding.² (Those figures exclude the cost of refueling nuclear-powered aircraft carriers and submarines.)

The Navy's report provides few details about how many ships the service would have to buy each year to implement either the 260- or 325-ship plan—and thus how big a budget it would need for ship construction. (The report states that the Navy will provide a more detailed final report in the summer of 2005 that will discuss the number of ships that would need to be built.) In this analysis, the Congressional Budget Office (CBO) uses the inventory tables in the Navy's interim report to estimate the annual ship purchases, ship-construction budgets, and fleet inventories that are implied by both plans. The results of the analysis, as presented here, are methodologically consistent with CBO's work in *The Long-Term Implications of Current Defense Plans: Detailed Update for Fiscal Year 2005* (September 2004), updated with information from the President's 2006 budget. The analysis does not address research and development costs for new ships that may be required in the future or operation and support costs for the two fleets.

The Navy's 260-ship and 325-ship plans are, for the most part, numerically consistent with the President's 2006 budget submission. In terms of ship purchases, the two plans are similar to each other until 2015.

The 260-Ship Plan

To achieve a fleet of 260 ships by 2035, the Navy would need to buy a total of 223 ships over the 2006-2035 period, CBO estimates—an average of about 7.4 ships per year. Those purchases would require an average annual shipbuilding budget of about \$15.0 billion (in 2005 dollars). That figure includes the costs of refueling nuclear-powered aircraft carriers and submarines. With

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1. See, for example, the statement of Admiral Clark before the Senate Armed Services Committee, February 10, 2005. Crew rotation is the practice of keeping a ship forward deployed for long periods while crews periodically rotate in and out by air, as opposed to the traditional practice of having one crew deploy and return home with the same ship (say, after six months).
 2. Navy officials say that those numbers are notional and will be developed and refined further. Ship construction includes the shipbuilding and conversion account (known as SCN); money spent on ship construction in the National Sealift Defense Fund; and money spent on ship construction in the Navy's research and development account.

Table 1.

Force-Structure Profiles for 260- and 325-Ship Fleets, Selected Years, 2006 to 2035

	2006	2007	2008	2009	2010	2011	2014	2019	2024	2029	2035
260-Ship Fleet											
Aircraft Carriers	11	11	11	11	11	11	11	11	11	11	10
Surface Combatants ^a	102	106	109	113	117	125	126	145	156	148	130
Attack Submarines ^b	58	57	58	59	58	58	57	53	49	43	41
Ballistic Missile Submarines	14	14	14	14	14	14	14	14	14	14	14
Amphibious Ships	35	35	35	35	35	35	32	31	31	27	17
Combat Logistics Force	34	36	38	37	34	30	30	32	25	25	24
Sea-Basing Ships	0	0	0	0	0	1	5	17	19	19	19
Mine-Warfare Ships	17	16	14	14	14	14	14	10	1	0	0
Support Forces	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>16</u>	<u>10</u>	<u>8</u>	<u>5</u>	<u>5</u>
Total	289	293	297	301	301	308	305	323	314	292	260
Memorandum:											
Littoral Combat Ships	0	1	2	4	7	12	27	52	61	63	63
325-Ship Fleet											
Aircraft Carriers	11	11	11	11	11	11	11	11	11	11	11
Surface Combatants ^a	102	106	109	113	117	125	126	145	176	176	174
Attack Submarines ^b	58	57	58	59	58	58	57	53	49	43	45
Ballistic Missile Submarines	14	14	14	14	14	14	14	14	14	14	14
Amphibious Ships	35	35	35	35	35	35	32	31	31	27	24
Combat Logistics Force	34	36	38	37	34	30	30	32	26	26	26
Sea-Basing Ships	0	0	0	0	0	1	5	17	25	25	25
Mine-Warfare Ships	17	16	14	14	14	14	14	10	1	0	0
Support Forces	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>16</u>	<u>10</u>	<u>9</u>	<u>6</u>	<u>6</u>
Total	289	293	297	301	301	308	305	323	342	328	325
Memorandum:											
Littoral Combat Ships	0	1	2	4	7	12	27	52	75	77	82

Source: Congressional Budget Office based on Department of the Navy, *An Interim Report to Congress on Annual Long-Range Plan for the Construction of Naval Vessels for FY 2006* (March 23, 2005).

Note: The inventories of the 260-ship and 325-ship fleets are identical through 2019.

a. Includes littoral combat ships.

b. Includes four guided missile submarines (SSGNs).

those costs excluded, the required shipbuilding budget would average \$14.0 billion a year, compared with the Navy's notional estimate of \$12 billion. Both of those figures are larger than what the Navy spent annually on ship construction between 2000 and 2005: an average of \$10.4 billion overall or \$9.5 billion excluding nuclear refuelings. To keep the fleet at 260 ships indefinitely (in "steady state"), the Navy would have to spend an average of \$14.7 billion on shipbuilding per year.³

Under the 260-ship plan, ship purchases and spending would show a peak-and-valley pattern over the 2006-2035 period (see Figure 1). Through 2015, the Navy would buy an average of 9.5 ships per year, at an annual cost of about \$14.4 billion. The peak in purchases reflects large numbers of littoral combat ships (LCSs), small warships that are expected to be relatively inexpensive (\$400 million apiece versus \$1.2 billion for destroyers of the current generation). The size of the fleet would initially rise as the first 63 LCSs purchased under this plan entered the inventory over the next 20 years.⁴ The fleet would peak at 326 ships in 2020 and then gradually decline to 260 by 2035 (see Figure 2).

The mid- to late 2020s would be a period of low ship purchases under the 260-ship plan. That procurement valley would directly result from purchasing and deploying large numbers of LCSs through 2020 and then not needing to buy many ships for about a decade thereafter, because fewer would be required to meet the 260-ship force goal by 2035. With LCSs excluded, the remaining fleet would number 197 ships under the 260-ship plan, compared with 287 today. Thus, 90 ships would not have to be replaced if the Navy wanted to aim for a 260-ship fleet. (A similar, but less pronounced, valley occurs in the 325-ship plan because that fleet numbers 243 ships excluding LCSs; thus, 44 ships would not need to be replaced, compared with 90 under the 260-ship plan.) By the 2030s, however, the Navy would have to buy large numbers of LCSs again, as well as new fleet air-defense surface combatants, to replace LCSs and Arleigh Burke class destroyers that had reached the end of their nominal service lives.

That pattern is similar to the decline in ship purchases that occurred in the 1990s, when the end of the Cold War caused the Navy to cut its total requirement for ships almost in half. The oldest ships were retired, leaving a relatively young fleet that did not need an influx of many new vessels to maintain its size.

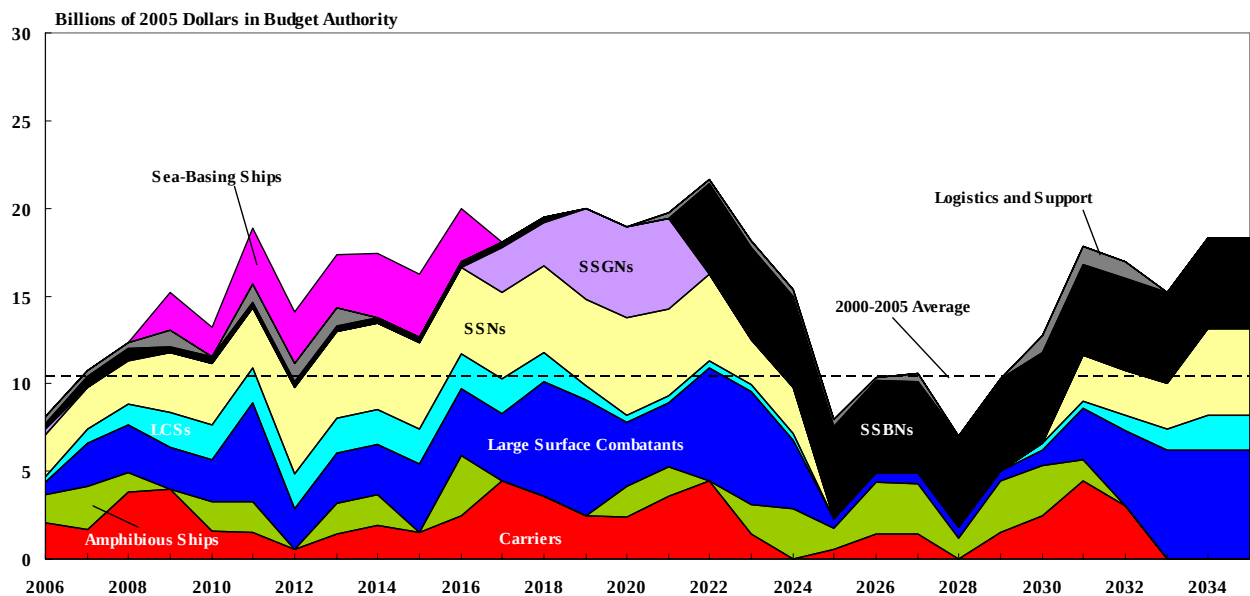
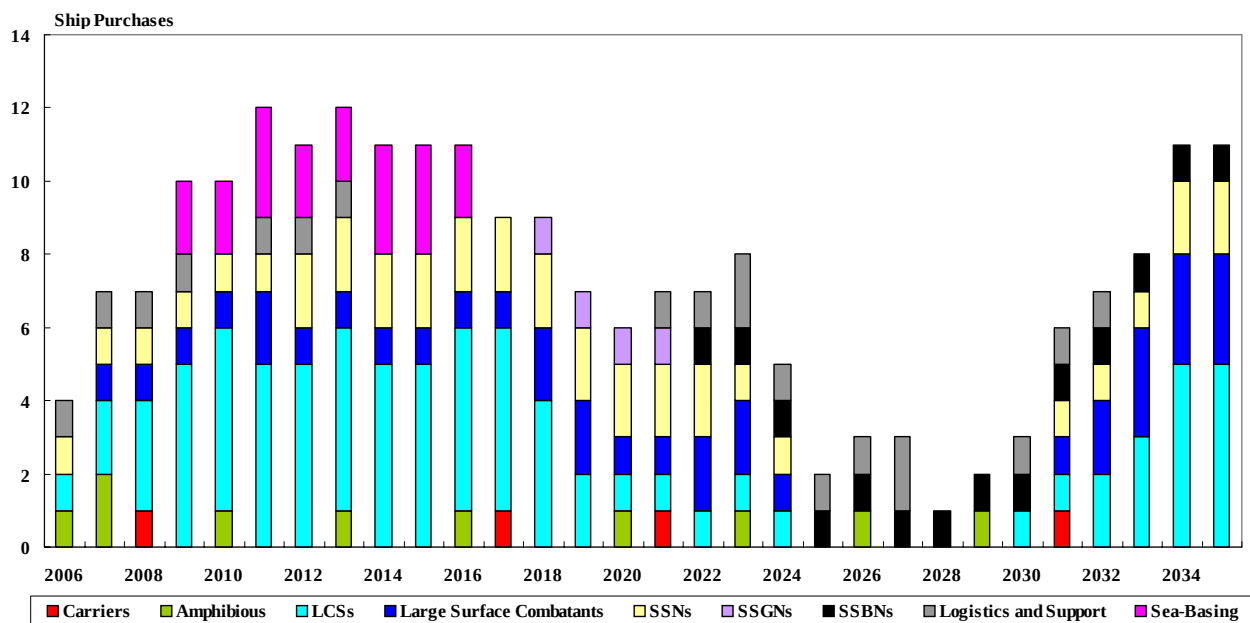
Policymakers could smooth out ship procurement to mitigate the effect of such a boom-and-bust cycle by delaying some of the ships scheduled to be purchased over the next 10 years. However, the resulting inventory schedule would be inconsistent with those in the Navy's interim report.

3. 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.

4. One of those ships would be purchased in 2005 and thus does not appear in the figures in this report. In addition, 17 replacement LCSs would be bought later in the 2006-2035 period.

Figure 1.

Annual Purchases and Costs Implied by the Navy's 260-Ship Plan

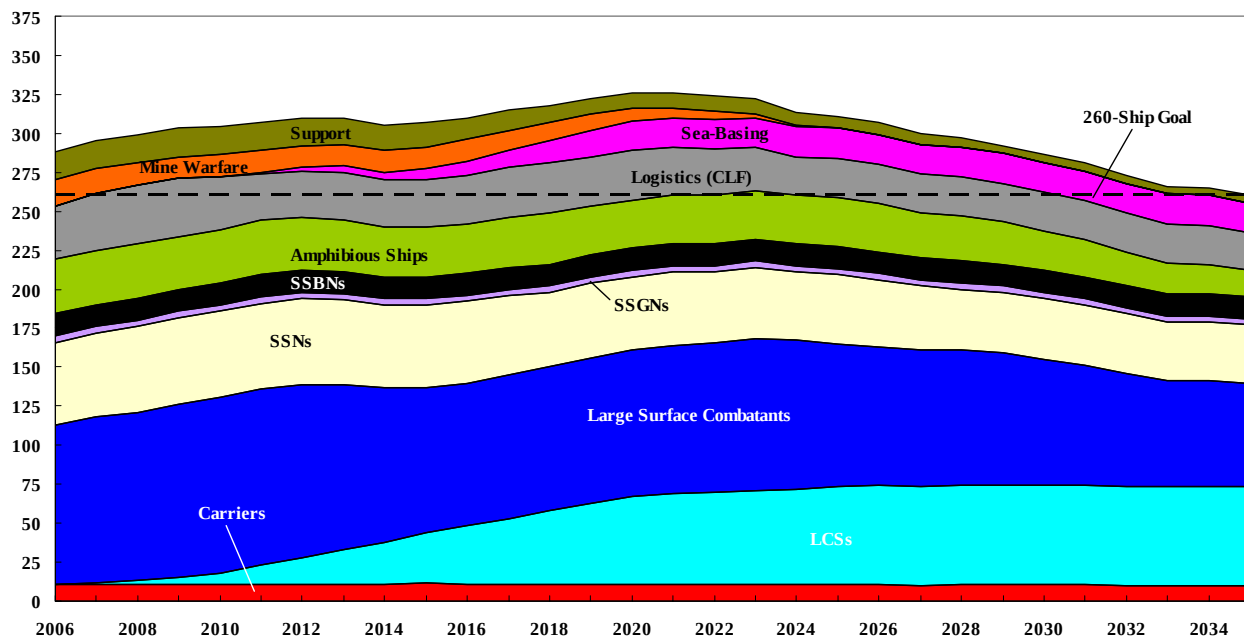


Source: Congressional Budget Office.

Note: LCS = littoral combat ship; SSN = attack submarine; SSGN = guided missile submarine; SSBN = ballistic missile submarine.

Figure 2.

Annual Inventory Implied by the Navy's 260-Ship Plan



Source: Congressional Budget Office

Note: CLF = combat logistics force; LCS = littoral combat ship; SSN = attack submarine; SSGN = guided missile submarine; SSBN = ballistic missile submarine.

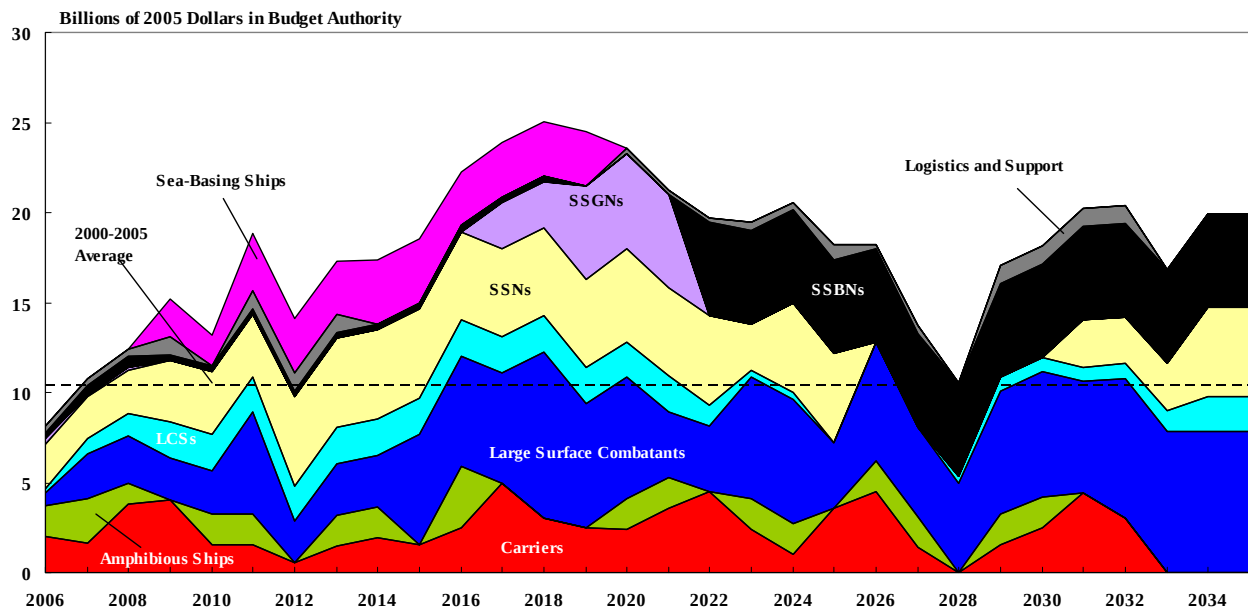
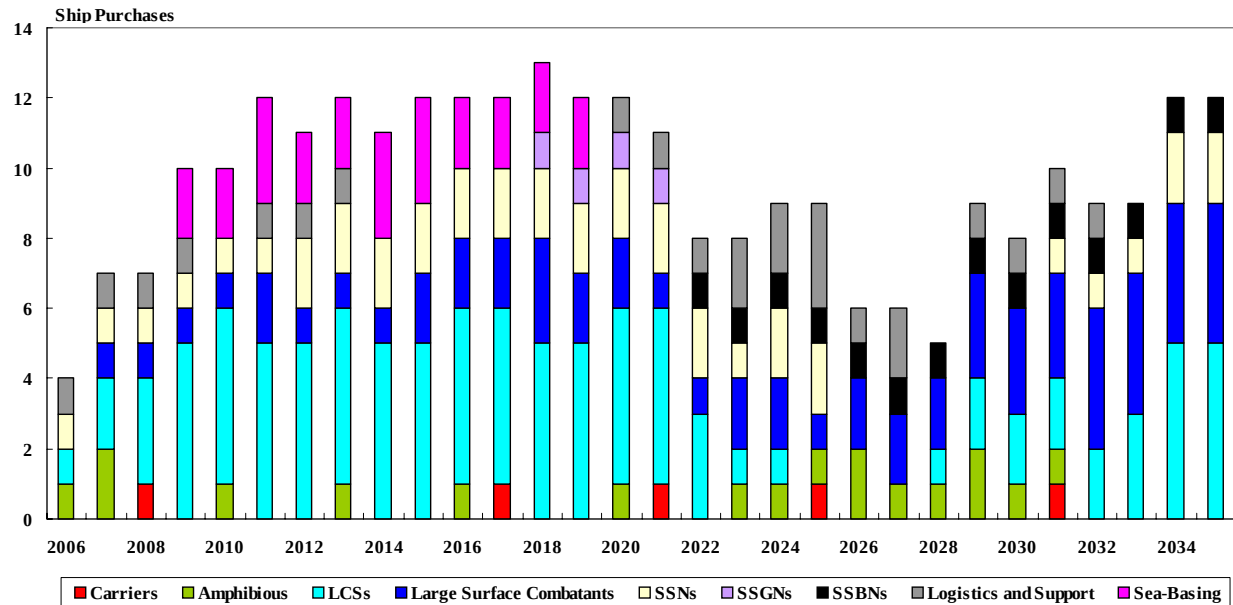
The 325-Ship Plan

To achieve a fleet of 325 ships by 2035, the Navy would need to buy a total of 288 ships by that year, CBO estimates—65 more than under the 260-ship plan (see Figure 3). Those purchases would average about 9.6 ships per year over the 2006-2035 period. To pay for those ships, plus expected nuclear refuelings, the Navy would require an average annual shipbuilding budget of \$18.3 billion. With nuclear refuelings excluded (to facilitate comparison the Navy's estimate of \$15 billion), the average budget requirement would be \$17.2 billion per year. Sustaining a 325-ship fleet in steady state would cost \$17.6 billion annually.

Over the next 10 years, ship purchases under the 325-ship plan would also average 9.6 per year, but the average cost would be just \$14.6 billion annually because many of those purchases would be of relatively inexpensive littoral combat ships. Under this plan, the Navy would buy an initial 82 LCSs (compared with 63 under the 260-ship plan) as well as 17 replacements through 2035. As a result, the total fleet size would grow to 344 ships by 2023 before gradually falling to 325 by 2035 (see Figure 4).

Figure 3.

Annual Purchases and Costs Implied by the Navy's 325-Ship Plan

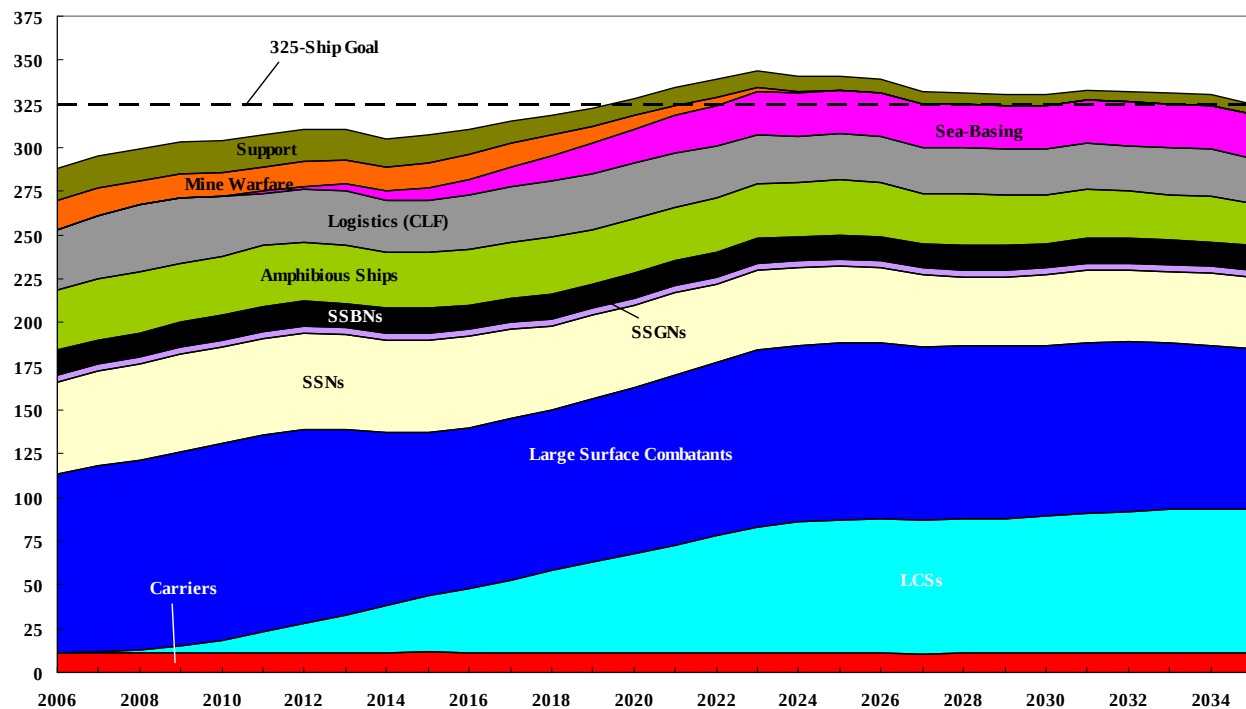


Source: Congressional Budget Office

Note: LCS = littoral combat ship; SSN = attack submarine; SSGN = guided missile submarine; SSBN = ballistic missile submarine.

Figure 4.

Inventory Implied by the Navy's 325-Ship Plan



Source: Congressional Budget Office

Note: CLF = combat logistics force; LCS = littoral combat ship; SSN = attack submarine; SSGN = guided missile submarine; SSBN = ballistic missile submarine.

CBO's Assumptions About Specific Types of Ships

To estimate the annual purchases, budgets, and inventories associated with the Navy's plans, CBO had to make numerous assumptions about how the Navy might go about implementing the 260- or 325-ship plan that would be consistent with the inventory tables contained in the interim report.

Aircraft Carriers

The 260-ship plan would reduce the number of aircraft carriers in the Navy to 10 (from the current 12), and the 325-ship plan would reduce that force to 11. CBO assumed that those reductions would be accomplished by buying fewer next-generation aircraft carriers (CVN-21s) over the coming 30 years. In that case, once the first CVN-21 had been authorized in 2008, the Navy would not build another one until 2017 under either plan. Another gap would occur in the 2020s: of 10 years under the 260-ship plan or six years under the 325-ship plan.

Alternatively, the Navy could choose to retire Nimitz class aircraft carriers early and build more CVN-21s. Doing that, however, would increase the budgetary requirements of both plans. Retiring a Nimitz class ship before its reactors needed refueling would save more than \$3 billion in procurement costs, whereas a CVN-21 would cost about \$8 billion, according to Navy estimates, once the class was in regular production.

Surface Combatants

The Navy intends to eventually have 62 Arleigh Burke (DDG-51) class destroyers. CBO assumed that under either plan, those ships would be modernized, and most would serve for about 40 years, although some were assumed to be retired early to match the inventory tables in the Navy's interim report. Starting around 2030, Arleigh Burke class destroyers would need to be replaced as they reached the end of their service life. In this analysis, CBO assumed that the successor to those ships would have roughly the same size and cost as the Navy's planned new destroyer, the DD(X). That destroyer will have a displacement of about 14,000 tons and is currently expected to cost about \$2.3 billion, on average. (By comparison, an Arleigh Burke class destroyer displaces about 9,000 tons and costs about \$1.2 billion.)

The Navy intends to begin buying a new missile-defense surface combatant, the CG(X), in 2011. CBO assumed that the CG(X) would be slightly larger than the DD(X), displacing about 16,000 tons. Under both the 260- and 325-ship plans, four years would elapse after 2011 before the Navy purchased a second CG(X).

The littoral combat ship was assumed for this analysis to have a service life of 25 years, the midpoint of the Navy's goal of 20 to 30 years. As a result, replacements for the LCS would need to be purchased starting around 2030.

Submarines

Under the assumptions that CBO made, the attack submarine force would continue to be a major source of demand on Navy resources. Under both plans, the Navy would buy two attack submarines per year beginning in 2012 as well as Improved Virginia class submarines starting around 2020. Although the Navy is currently examining concepts that could reduce the cost of submarines, CBO did not assume that the Improved Virginia would cost less to build than the original Virginia class did (an average of \$2.6 billion apiece).

Both plans envision the continued use of guided missile submarines (SSGNs) through 2035. The Navy's current SSGNs are scheduled to retire in the 2020s, however, when they reach the end of their 42-year service life. Consequently, CBO assumed that the Navy would build a replacement SSGN as part of a new class of submarines that, ultimately, would also replace Ohio class ballistic missile submarines (SSBNs), which will start to reach the end of their service life in the late 2020s. Alternatively, the Navy could choose to replace SSGNs with a smaller submarine, such as the Improved Virginia class. Another possibility is that the Navy could convert four more Ohio class SSBNs to an SSGN configuration. However, doing that would require building a replacement for the SSBNs sooner in order to maintain a force of 14 ballistic missile submarines, con-

sistent with the Navy's plans.⁵ Finally, the Navy might be able to extend the service life of current SSGNs and SSBNs beyond 42 years, which would reduce the demand for budgetary resources in the 2020s and 2030s by about \$5 billion per year relative to CBO's projection.

Amphibious and Maritime Prepositioning Ships

Both plans imply that the Navy would have eight expeditionary strike groups (ESGs) in the future, but the number of amphibious ships in those groups would differ. Currently, ESGs contain an amphibious assault ship (LHA or LHD), an amphibious transport dock (LPD), a dock landing ship (LSD), three surface combatants, and an attack submarine. The 260-ship plan suggests that expeditionary strike groups would be composed of one LHA(R), which would replace the LHAs and LHDs, and one LPD-17 in addition to the surface combatants and submarines. ESGs could also include a maritime prepositioning ship.⁶ Under the 325-ship plan, expeditionary strike groups would include three amphibious ships—implying a continued requirement for dock landing ships in those groups and thus for an LSD(X) program to replace the Navy's current LSDs, which will reach the end of their service life in the 2020s. With respect to the LHA(R) amphibious assault vessel, all ships of the class except for the first one are assumed to be capable of operating 30 Joint Strike Fighters. (The first ship is expected to be smaller and carry only 23 Joint Strike Fighters.)

Under the 260-ship plan, the Navy would buy 14 future maritime prepositioning ships, commonly known as MPF(F)s, and under the 325-ship plan, it would purchase 20 MPF(F)s. The design and cost of that ship are highly uncertain. For this analysis, CBO used the Navy's cost goal of about \$1.5 billion per ship, which is consistent with the President's 2006 budget submission. Some of the designs for the MPF(F) that the Navy is considering could cost considerably more than that goal, however, which would increase the demand for budgetary resources relative to CBO's projection.

Other Features of the Navy's New Plans

The Navy's 260- and 325-ship plans have several other noteworthy features:

- Both plans would cut the Navy's logistics and support forces substantially. Under the 260-ship plan, the combat logistics force (ships that resupply surface combatants) would shrink by 29 percent over 30 years—compared with 10 percent for the fleet as a whole—and the number of support ships would drop by 72 percent. In particular, the Navy's two submarine tenders (which provide support to a variety of ships) would be retired without replacement under the 260-ship plan, which makes greater use of forward basing and crew rotation than the 325-ship plan does. However, ships using crew rotation could stay

5. Further, if the service life of Ohio class submarines is 42 years, converting the four youngest subs to SSGNs would leave them with only 12 to 14 years of service life remaining and would cost a total of about \$2 billion to \$3 billion.

6. For more details about options for using amphibious and maritime prepositioning ships, see Congressional Budget Office, *The Future of the Navy's Amphibious and Maritime Prepositioning Forces* (November 2004).

overseas for up to two years, which could increase (rather than substantially decrease) their need for maintenance support from tenders. Under the 325-ship plan, the combat logistics force would shrink by 26 percent and support ships by 67 percent. One submarine tender would be retained or replaced.

- A total of 11 T-AKE logistics ships would be purchased under both plans, but three would be retired by 2024 with less than 20 years of service. (The nominal service life of logistics ships is 35 to 40 years.)
- Most Wasp class (LHD-1) amphibious assault ships would be retired with around 35 years of service or less, whereas most cruisers and destroyers would be retained for 40 years.
- Both plans would buy two high-speed ships and three high-speed connectors to support the Navy's sea-basing concept.⁷ Although sea basing is described by Navy officials as the service's most transformational concept, the requirement for connectors implied by the Navy's plans appears to be too low, judging from the results of analyses of sea basing that are being performed inside and outside the Navy.

The Budgetary Impact of Producing Less Expensive Ships

Because of increased pressure to reduce the resources needed to sustain the current fleet, the Navy continues to examine ways to lower the costs of ship construction. In particular, Navy and industry officials have indicated that the potential exists to build less expensive attack submarines and destroyers. CBO does not have enough information from the Navy to independently assess the Navy's claims or plans to achieve such savings. However, if the Navy could successfully build attack submarines for about \$1.8 billion apiece (rather than the \$2.6 billion that it estimates as the average price for Virginia class submarines), build destroyers to replace the Arleigh Burke class around 2030 for about \$1.5 billion each (compared with the \$2.3 billion that it estimates as the average for DD(X)s destroyers), and replace its four SSGNs with the smaller, less expensive attack submarines, the resources required to implement the 260- and 325-ship plans would decline by about 10 percent, CBO estimates. Even with those reductions, budgetary requirements would still be much higher than the roughly \$10 billion a year that the Navy has spent for ship construction, on average, over the 2000-2005 period.

7. Little is known about those ships at this time. One possible use for the high-speed ships is to transport additional helicopters from bases in the United States to marine brigades deploying quickly from MPF(F)s to a theater of operations. Another possible use is as fast resupply ships. The high-speed connectors might transport troops or supplies from advance bases that were several thousand nautical miles away from the theater of operations. For an explanation of the sea-basing concept, see Congressional Budget Office, *The Future of the Navy's Amphibious and Maritime Prepositioning Forces*.