

**Resource Implications of the
Navy's Fiscal Year 2008
Shipbuilding Plan**

March 23, 2007

- 19 guided missile cruisers;
- 55 littoral combat ships;
- 48 attack submarines;
- 4 guided missile submarines;
- 14 ballistic missile submarines;
- 31 amphibious ships;
- 12 future maritime prepositioning force, or MPF(F), ships, constituting one MPF(F) squadron; and
- 50 logistics and support ships.

Under the new plan, the Navy would purchase 6 ships in 2008 (see Figure 1) and a total of 63 ships between 2008 and 2013 (the period covered by the Department of Defense's 2008 Future Years Defense Program). From 2014 to 2037, the Navy would buy another 230 vessels under its long-term plan—for a total of 293 ships, or an average of 9.8 per year, over 30 years.

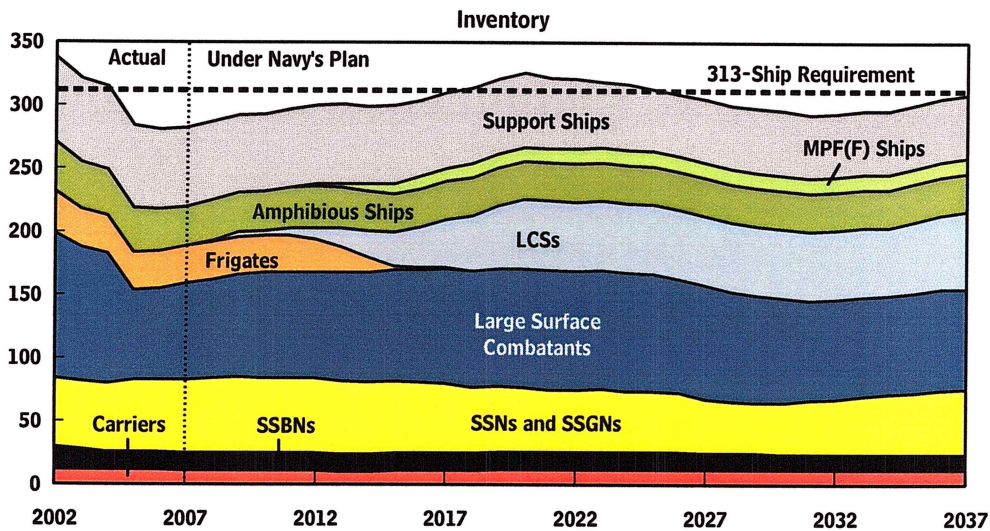
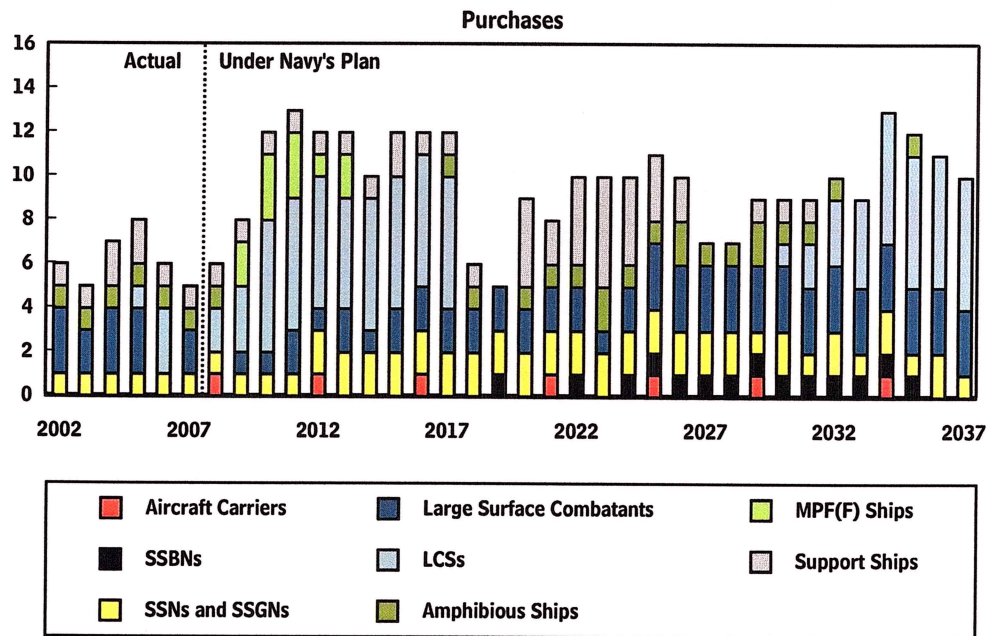
CBO adjusted the number of ships purchased under the Navy's plan to reflect the recent decision to alter the procurement schedule for littoral combat ships. The Navy now intends to forgo buying two LCSs in 2007 (in order to pay for cost overruns on the first four LCSs), to purchase two LCSs in 2008 instead of the planned three, and to buy three LCSs in 2009 rather than the six in the current shipbuilding plan. CBO assumed that the six ships removed from the Navy's short-term procurement plans would be purchased in 2017, at the end of the LCS program.

If implemented as described, however, the Navy's current plan would not keep the fleet at or above the 313-ship goal over the long term. The number of battle force ships would increase initially, from today's level of about 276 to a peak of 326 in 2020. By 2031, however, the fleet would decline to 293 ships, before rising at the end of the 30-year period to 309 ships. In particular, relative to the goals for various components of the 313-ship fleet, the Navy would experience shortfalls in attack submarines (40 in 2028 and 2029 versus a stated requirement of 48), guided missile submarines (none after 2028 versus a stated requirement of 4), and guided missile destroyers (60 in 2037 versus a stated requirement of 69). The shortfalls would result from not buying enough ships at the right times to replace Los Angeles class attack submarines and Arleigh Burke class destroyers as they were retired in the 2020s and 2030s (see Figure 2). The Navy's plan is also short one LPD-17 amphibious transport dock.

In addition, the number of ballistic missile submarines (SSBNs) in the Navy's inventory would fall below the stated requirement of 14 beginning in 2027. That shortfall

Figure 1.

Annual Ship Purchases and Inventory Implied by the Navy's 2008 Shipbuilding Plan



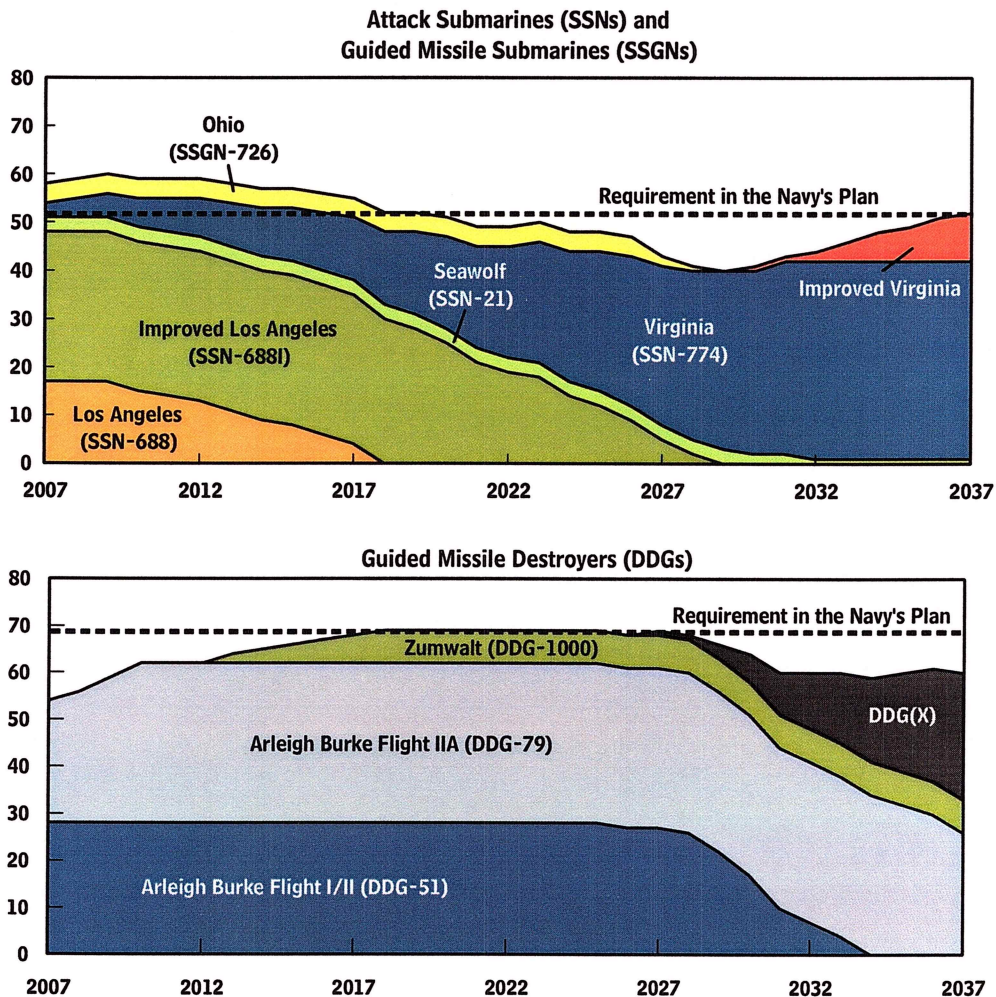
Source: Congressional Budget Office based on data from the Navy.

Notes: SSBNs = ballistic missile submarines; SSNs = attack submarines; SSGNs = guided missile submarines; LCSs = littoral combat ships; MPF(F) = Maritime Prepositioning Force (Future).

CBO adjusted the number of ships purchased under the Navy's 2008 plan to reflect the recent decision to forgo buying two LCSs in 2007, to purchase two LCSs in 2008 instead of three, and to buy three LCSs in 2009 rather than six. CBO assumed that the six ships removed from procurement plans for those years would be bought in 2017, at the end of the LCS program.

Figure 2.

Submarine and Destroyer Inventories Under the Navy's 2008 Shipbuilding Plan



Source: Congressional Budget Office based on data from the Navy.

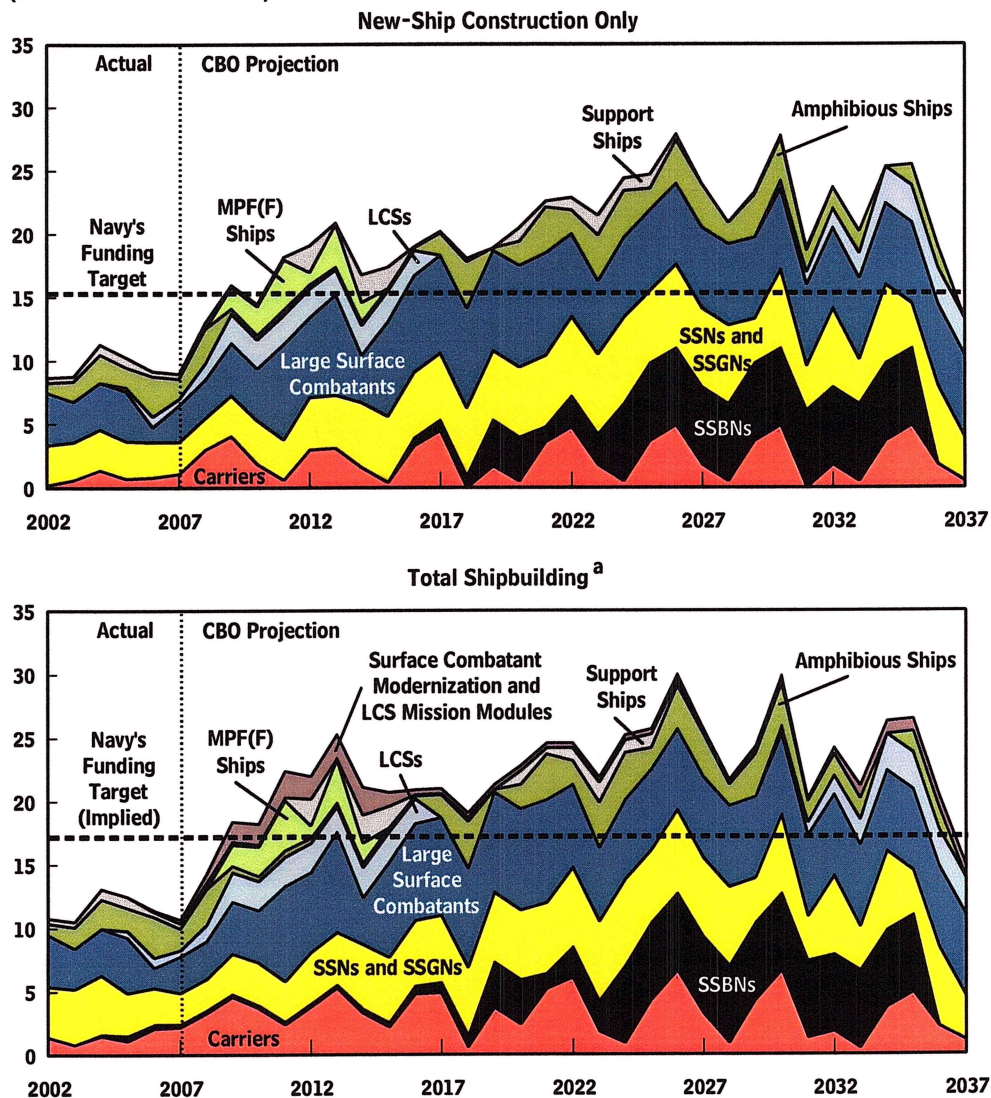
would not stem from buying an insufficient number of submarines to replace retiring SSBNs but rather from a procurement schedule that would not be fast enough to deliver new submarines to the fleet before the old ones were retired. By 2041, however, the Navy would again have 14 SSBNs in its inventory.

The 2008 shipbuilding plan also would not replace the Navy's four current guided missile submarines (SSGNs). Those ships—former Ohio class ballistic missile submarines that were converted to a guided missile configuration—are scheduled to be retired in the 2020s. The Navy notes the absence of planned replacements, stating: "Plans for the recapitalization of the OHIO Class submarines that have been

Figure 3.

Annual Costs Implied by the Navy's 2008 Shipbuilding Plan

(Billions of 2008 dollars)



Source: Congressional Budget Office based on data from the Navy.

Notes: SSBNs = ballistic missile submarines; SSNs = attack submarines; SSGNs = guided missile submarines; LCSs = littoral combat ships; MPF(F) = Maritime Prepositioning Force (Future).

Amounts for 2006 exclude supplemental funding related to Hurricane Katrina.

a. Total shipbuilding costs include costs for new-ship construction, refuelings of nuclear-powered ships, programs to modernize existing large surface combatants, and mission modules for littoral combat ships. The modernization of surface combatants and the mission modules for LCSs are expected to be funded from Navy accounts other than those traditionally associated with shipbuilding.

submarines could then be bought in the mid- to late 2020s and 2030s than under the Navy's plan.

- To maintain its force of four guided missile submarines, the Navy would have to develop and buy replacements for the Ohio class SSGNs when they retired from the fleet in the 2020s.
- No additional ballistic missile submarines would need to be purchased to prevent that force from falling below 14, but the construction schedule would have to be adjusted to buy some SSBNs two years earlier than the Navy intends.
- The shortfall in amphibious ships could be filled by purchasing an additional LPD-17 in 2009.

Incorporating those changes into the Navy's plan would raise the required average annual budget to about \$21.9 billion for new-ship construction and \$23.8 billion for shipbuilding overall. (Other approaches to filling the shortfalls from the 313-ship requirement would have different costs.)

Individual Ship Programs

To estimate the costs of the 2008 shipbuilding plan, CBO used Navy data on actual costs for ships now under construction and historical relationships between the cost and weight of ships. To apply those relationships to ships for which the Navy has yet to develop even a notional design—such as the prospective replacements for the Arleigh Burke class destroyers and the Ohio class ballistic missile submarines—CBO had to make assumptions about the size and capabilities of future ships.

Aircraft Carriers

Under the Navy's plan for a 313-ship fleet, the number of aircraft carriers (CVNs) would decline from 12 to 11. That reduction comes from retiring the *John F. Kennedy* in 2007. To maintain that size force, the Navy's plan would buy seven CVN-78 Gerald R. Ford class aircraft carriers over the 2008–2037 period at a target cost of about \$10.1 billion apiece (see Table 3).¹¹

To estimate the cost of those new aircraft carriers, CBO relied on the cost of the Navy's most recent carrier, the CVN-77, and adjusted that amount to account for historical levels of cost growth and for the higher level of inflation expected in the shipbuilding industry. The first two ships of the new CVN-78 class would require substantial funding for nonrecurring detail design, but subsequent ships would not need any money for that purpose. CBO estimates that the seven carriers in the Navy's 2008 shipbuilding plan would have an average cost of about \$10.1 billion each, the same as the Navy's target.

11. The program to build that new class of nuclear-powered aircraft carriers was formerly called the CVN-21 (for 21st century) program.

Table 3.**Comparison of the Navy's Goals and CBO's Estimates of the Costs of Major New Ships**

(Billions of 2008 dollars)

Program	Average per-Ship Cost over the 2008-2037 Period ^a	
	Navy's Cost Target ^b	CBO's Estimate ^c
CVN-78 Gerald R. Ford Class Aircraft Carrier	10.1	10.1
DDG-1000 Zumwalt Class Destroyer	2.3	3.9
CG(X) Cruiser	2.9	4.0
DDG(X) Destroyer (Replacement for Arleigh Burke class)	1.6 ^d	2.2
Virginia Class Attack Submarine	2.3	2.7
SSBN(X) Ballistic Missile Submarine (Replacement for Ohio class)	3.3	6.3
Amphibious Ships	1.5	2.3

Source: Congressional Budget Office.

- The total amount of money spent on a ship program from 2008 to 2037 divided by the total number of ships bought in that program—except in the case of the DDG-1000 destroyer, in which the average cost per ship reflects the costs of all seven ships in that program.
- Based on a briefing by the Navy for CBO and the Congressional Research Service, February 10, 2006.
- CBO's estimates are generally based on historical relationships between cost and weight for individual types of ships; they also incorporate the higher inflation that the naval shipbuilding industry has experienced (compared with that in other Department of Defense procurement programs).
- The Navy's 2008 plan added 12 DDG(X)s and removed 4 large logistics ships compared with the 2007 plan, but it indicated that overall shipbuilding costs would not change. Thus, CBO assumed that the Navy's per-ship cost target for the DDG(X) was lowered to reflect those changes. (CBO also assumed that the funding not allocated to the logistics ships would be spent on the new destroyers.)

Finally, in estimating costs for the aircraft carrier program, CBO assumed that all of the current Nimitz class carriers would be operated for at least 50 years, with a three-year period for nuclear refueling at about 23 years of age.

Surface Combatants

The Navy's current plan would buy one DDG-1000 Zumwalt class destroyer each year from 2009 to 2013, in addition to the two authorized in 2007. The service's 2008 budget suggests that the Navy expects the first two ships to cost \$3.0 billion each and the next five to cost an average of \$2.0 billion apiece—for an average

for the next Virginia class submarine. Approximately 30 percent of that amount (or about \$800 million) is for equipment furnished by the government, with the remainder to be spent by the shipyard building the vessel. If the necessary savings are intended to come from the shipyard, its expenses will have to be reduced by more than 20 percent to meet the Navy's cost goal for Virginia class submarines.

CBO estimates that the Virginia class attack submarines built during the 2008–2037 period would have an average cost of \$2.7 billion apiece, on the basis of the prices that the Navy is currently paying for Virginia class submarines, the effects of producing two subs per year starting in 2012, and the real cost growth affecting naval shipbuilding. In addition, CBO assumes that the Improved Virginia class would cost about 20 percent more to build than the original Virginia class did, largely because of the historical cost growth in the shipbuilding industry.

In addition to the attack submarine force, the 2008 plan calls for a force of 14 ballistic missile submarines through 2037. Consequently, the Navy intends to buy its first replacement SSBN in 2019 and purchase one per year starting in 2024 (three years earlier than under the 2007 plan). The design, cost, and capabilities of that replacement submarine are one of the most significant uncertainties in the Navy's and CBO's analyses. The Navy's plan assumes that the first ship of a new class of ballistic missile submarines—an SSBN(X)—would cost \$4.1 billion and that subsequent ships would cost about \$3.2 billion each. The average cost for 14 SSBN(X)s would be about \$3.3 billion.

Some senior Navy officials who oversee submarine programs have stated that the most cost-effective strategy for designing a new ballistic missile submarine would be to rely heavily on the Virginia class design. Much of the bow and stern of a Virginia class submarine, as well as the nuclear reactor, could be incorporated into the new SSBN. New missile-compartment sections would have to be developed, however, and integrated into the submarine's design. The practicality of that option has not yet been explored, and the Navy is only beginning to think about how to design an SSBN(X). No notional design or displacement estimate exists. Most participants in the process and observers agree that the new ballistic missile submarine would probably be substantially smaller than the existing Ohio class submarines.

Adopting an approach consistent with that thinking, CBO assumed that the Navy would buy 14 SSBN(X)s and that those submarines would be smaller than Ohio class submarines. CBO assumed that the SSBN(X) would be designed to carry 16 missile tubes (instead of 24 on existing submarines) and would displace around 15,000 tons submerged—making it roughly twice the size of a Virginia but nearly 4,000 tons smaller than an Ohio. On the basis of what the Navy is currently paying for a Virginia class submarine, CBO estimated that the average cost of the SSBN(X) would be about \$6.3 billion. A smaller design with only 12 or 8 missile tubes could cost \$700 million or \$1.4 billion less, respectively.