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Navy Next-Generation Attack Submarine (SSN[X]) Program: Background and Issues for Congress

Introduction and Issue for Congress

The Navy wants to begin procuring a new class of nuclear-powered attack submarine (SSN), called the Next-Generation Attack Submarine or SSN(X), in FY2031. The SSN(X) would be the successor to the Virginia-class SSN design, which the Navy has been procuring since FY1998. The Navy's proposed FY2022 budget requests $98.0 million in research and development funding for the SSN(X) program. An issue for Congress is whether to approve, reject, or modify the Navy's funding requests and acquisition strategy for the SSN(X) program.

Submarines in the U.S. Navy

The U.S. Navy operates three types of submarines—nuclear-powered ballistic missile submarines (SSBNs), nuclear-powered cruise missile and special operations forces (SOF) submarines (SSGNs), and nuclear-powered attack submarines (SSNs). The SSNs are general-purpose submarines that can perform a variety of peacetime and wartime missions.

Virginia-Class Program

Since FY2011, Virginia-class SSNs (**Figure 1**) have been procured at a rate of two boats per year, and a total of 34 have been procured through FY2021. Most Virginia-class boats procured in FY2019 and subsequent years are to be built with the Virginia Payload Module (VPM), an additional, 84-foot-long, mid-body section equipped with four large-diameter, vertical launch tubes for storing and launching Tomahawk cruise missiles or other payloads. When procured at a rate of two boats per year, VPM-equipped Virginia-class SSNs have an estimated procurement cost of about $3.4 billion per boat.

For additional information on Navy submarines, the Virginia-class SSN program, and the Columbia-class SSBN program, see CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report R41129, *Navy Columbia (SSBN-826) Class Ballistic Missile Submarine Program: Background and Issues for Congress*, by Ronald O'Rourke.

Submarine Construction Industrial Base

U.S. Navy submarines are built by General Dynamics' Electric Boat Division (GD/EB) of Groton, CT, and Quonset Point, RI, and Huntington Ingalls Industries' Newport News Shipbuilding (HII/NNS), of Newport News, VA. These are the only two shipyards in the country capable of building nuclear-powered ships. GD/EB builds submarines only, while HII/NNS also builds nuclear-powered aircraft carriers and is capable of building other types of surface ships.

In addition to GD/EB and HII/NNS, the submarine construction industrial base includes hundreds of supplier firms, as well as laboratories and research facilities, in numerous states. Much of the material procured from supplier firms for the construction of submarines comes from sole-source suppliers. For nuclear-propulsion component suppliers, an additional source of work is the Navy's nuclear-powered aircraft carrier construction program.

Figure 1. Virginia-Class Attack Submarine (SSN)

Source: Cropped version of photograph accompanying Dan Ward, "Opinion: How Budget Pressure Prompted the Success of Virginia-Class Submarine Program," *USNI News*, November 3, 2014. The caption states that it shows USS *Minnesota* (SSN-783) under construction in 2012, and credits the photograph to the U.S. Navy.

SSN(X) Program

Program Designation

In the designation SSN(X), the "X" means that the exact design of the boat has not yet been determined.

Procurement Schedule

Under the Navy's FY2020 30-year (FY2020-FY2049) shipbuilding plan, the first SSN(X) would be procured in FY2031, along with a single Virginia-class boat. In FY2032 and FY2033, the final four Virginia-class boats would be procured, at a rate of two per year. Procurement of follow-on SSN(X)s, at a rate of two per year, would then begin in FY2034. The 30-year plan's sustained procurement rate of two SSNs per year would achieve a force of 66 SSNs—the Navy's current SSN force-level goal—in FY2048.

A long-range Navy shipbuilding document released by the Trump Administration on December 9, 2020, proposed a new SSN force-level goal of 72 to 78 boats. To meet this goal by the latter 2040s, it projected an SSN procurement rate of three boats per year during the period FY2035-FY2041, and two and two-thirds boats per year (in annual

quantities of 2-3-3) during the period FY2042-FY2050. A long-range Navy shipbuilding document released by the Biden Administration on June 17, 2021, proposed a new SSN force-level goal of 66 to 72 boats and envisaged increasing the SSN procurement rate years from now to something more than two boats per year.

Design of the SSN(X)

The Navy states that the SSN(X)

> will be designed to counter the emerging threat posed by near peer adversary competition for undersea supremacy. Unlike the VIRGINIA Class Submarine, which was designed for multimission dominance in the littoral, SSN(X) will be designed for greater transit speed under increased stealth conditions in all ocean environments, and carry a larger inventory of weapons and diverse payloads. It will also be designed to retain multi-mission capability and sustained combat presence in denied waters, with a renewed priority in the anti-submarine warfare (ASW) mission against sophisticated threats in greater numbers. SSN(X) will be required to defend against threat UUVs [unmanned underwater vehicles], and coordinate with a larger contingent of off-hull vehicles, sensors, and friendly forces.
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> (Budget-justification book for FY2022 Research, Development, Test, and Evaluation, Navy account, Vol. 3 [Budget Activity 5], p. 1301.)

The Navy is examining three broad design options for the SSN(X)—a design based on the Virginia-class SSN design, a design based on the Columbia-class SSBN design, and a brand new design. An industry official stated that the SSN(X) might have a beam (i.e., hull diameter) greater than that of the Virginia-class design (34 feet), and closer to that of the Navy's Seawolf-class SSN design and Columbia-class SSBN design (40 and 43 feet, respectively).

Potential Procurement Cost

Based on the Navy's desired capabilities for the SSN(X), the Navy and the Congressional Budget Office (CBO) expect the SSN(X) to be substantially more expensive to procure than the Virginia-class design. An April 2021 CBO report on the December 9, 2020, 30-year Navy shipbuilding document states that in constant FY2021 dollars, the SSN(X)'s average unit procurement cost is estimated at $5.8 billion by the Navy and $6.2 billion by CBO.

FY2022 Funding

The Navy's proposed FY2022 budget requests $98.0 million in research and development funding for the SSN(X) program, including $29.8 million in Project 2368 (SSN[X] Class Submarine Development) within Program Element (PE) 0604850N (SSN[X]) and $68.1 million in Project 2370 (Next Generation Fast Attack Nuclear Propulsion Development). The SSN(X) program is also leveraging Virginia-class research and development work funded through Project 1947 (New Design SSN HM&E [hull, mechanical, and electrical]) within PE 0604558N (New Design SSN). (New Design SSN here refers to the Virginia-class SSN.)

Issues for Congress

Issues for Congress include the following:

- whether the Navy has accurately identified the SSN(X)'s required capabilities and accurately analyzed and incorporated the impact that various required capabilities can have on the SSN(X)'s cost;
- the potential impact of the SSN(X) program—given the design's currently estimated unit procurement cost and potential future Navy funding levels—on funding that will be available for other Navy program priorities;
- whether it would be technically feasible for the SSN(X) to be powered by a reactor plant using low-enriched uranium (LEU), rather than the highly enriched uranium (HEU) used on other Navy nuclear-powered ships, and if so, what impact using LEU in the SSN(X) would have on nuclear arms control and nonproliferation efforts and SSN(X) costs and capabilities.
- whether each SSN(X) should be built jointly by GD/EB and HII/NNS (the approach used for building Virginia-class SSNs and, in modified form, is to be used for building Columbia-class SSBNs), or whether individual SSN(X)s should instead be completely built within a given shipyard (the separate-yard approach used for building earlier Navy SSNs and SSBNs).

Regarding the third issue above, a July 2018 letter to Congress from Naval Reactors (the office within the Navy and the Department of Energy responsible for designing Navy reactor plants) stated that "substantial technology development of an advanced naval fuel [using LEU] would be needed to increase uranium loading in naval reactors while simultaneously meeting performance requirements of U.S. Navy warships," and that "initial ship concept design studies [for the SSN(X)] would need to occur no later than the mid 2020s, nearly a decade before sufficient advanced fuel information could be available to support reactor design efforts." The letter stated that "Naval Reactors provided a report to Congress in July 2016 outlining a 15-year test and development effort that would need to be done to support initiating a reactor design using advanced fuel."

Regarding the fourth issue above, the Navy and Congress chose the joint-production strategy for the Virginia-class program as a means of preserving two U.S. submarine construction shipyards during an expected period of relatively low annual submarine procurement rates. For the SSN(X) program, factors to consider include the expected future submarine procurement rate; the impact that shifting back to separate-yard production might have on the Navy's ability to use competition in awarding SSN(X) construction contracts; and the feasibility and cost of shifting back to separate-yard production after more than 20 years of joint production.

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