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SUMMARY

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Coast Guard Polar Security Cutter (PSC) and Arctic Security Cutter (ASC) Icebreaker Programs: Background and Issues for Congress

A 2023 Coast Guard fleet mix analysis concluded that the service will require a total of eight to nine polar icebreakers, including four to five heavy polar icebreakers and four to five medium polar icebreakers, to perform the Coast Guard's polar (i.e., Arctic and Antarctic) missions in coming years.

The operational U.S. polar icebreaking fleet currently consists of two ships—the heavy polar icebreaker *Polar Star* and the medium polar icebreaker *Healy*. *Polar Star* entered service in 1976 and is now well beyond its originally intended 30-year service life. *Healy* entered service in 2000. A third ship is to be added to the operational U.S. polar icebreaking fleet. On December 11, 2024 the Coast Guard purchased *Aiviq*, a commercial polar ship with icebreaking capability that was built in 2012. The Coast Guard completed acceptance of *Aiviq* on December 20, 2024. The Coast Guard is modifying *Aiviq* to become a second Coast Guard medium polar icebreaker. When the ship is commissioned into Coast Guard service, the Coast Guard will rename the ship *Storis*. The Coast Guard has tentatively scheduled the ship's commissioning for August 2025 and reportedly aims to have it operating from its Alaska home port starting the summer of 2026. The Coast Guard purchased *Aiviq* for $125.0 million, using funding that the FY2024 Department of Homeland Security (DHS) Appropriations Act (Division C of H.R. 2882/P.L. 118-47 of March 23, 2024) provided for purchasing an existing commercially available polar icebreaker and modifying it into a Coast Guard polar icebreaker.

To recapitalize and expand its polar icebreaking fleet, the Coast Guard is planning to acquire new heavy polar icebreakers called Polar Security Cutters (PSCs) and new medium polar icebreakers called Arctic Security Cutters (ASCs). The Coast Guard initiated the PSC program in its FY2013 budget submission, and the program has received a total of $1,731.8 million in procurement funding through FY2024. The Coast Guard in April 2019 awarded the contract for designing and the building the first PSC to Halter Marine Inc. of Pascagoula, MS, a shipyard that was then owned by Singapore Technologies (ST) Engineering. In November 2022, ST Engineering sold Halter Marine to Louisiana-based Bollinger Shipyards. The former Halter Marine is now called Bollinger Mississippi Shipbuilding. The first PSC was originally scheduled to be delivered in 2024, and the Coast Guard in March 2025 estimated its total procurement cost as $2,397 million (i.e., about $2.4 billion). (The contract award to the shipbuilder, representing the shipbuilder's portion of the first PSC's total procurement cost, was for $745.9 million.) On April 11, 2025, the Coast Guard released a Request for Information (RFI) for ASCs.

The PSC program has experienced significant cost growth and schedule delay. In March 2025, the Coast Guard reportedly awarded the shipbuilder a contract modification for an additional $951.6 million for the first PSC to account for increasing time and cost to build the ship. Much or all of this figure might constitute cost growth above the Coast Guard's 2021 estimate for the total procurement cost of the ship. The ship's delivery date has been delayed repeatedly, and the Coast Guard now expects it to be delivered in 2030, about six years later than the originally scheduled date. Much of the schedule delay is due to the time it has taken to fully develop the design for the ship. As a result of the PSC program's cost growth and schedule delay, the PSC program has become a prominent oversight item in congressional reviews of Coast Guard budgets and programs.

On April 18, 2025, it was reported that the Coast Guard is negotiating with a Finnish shipbuilder for building three to five ASCs and possibly also three PSCs.

The Coast Guard also operates Great Lakes icebreakers. The Coast Guard's FY2024 budget initiated a program for procuring a new Great Lakes icebreaker (GLIB) that would have capabilities similar to those of *Mackinaw*, the Coast Guard's existing heavy GLIB. The Coast Guard estimates the total procurement cost of the ship at about $350 million. The FY2024 DHS Appropriations Act (Division C of H.R. 2882/P.L. 118-47 of March 23, 2024) provided $20.0 million in procurement funding for the GLIB program. The Coast Guard's proposed FY2025 budget requested no procurement funding for the program. The Coast Guard's FY2025 Unfunded Priorities List (UPL) included an item for $25.0 million in procurement funding for the program.

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Introduction

This report provides background information and issues for Congress on the Coast Guard's Polar Security Cutter (PSC) and Arctic Security Cutter (ASC) icebreaker programs. It also provides background information on the Coast Guard's Great Lakes icebreaker (GLIB) program.

The Coast Guard initiated the PSC program in its FY2013 budget submission, and the program has received a total of $1,731.8 million in procurement funding through FY2024. On April 11, 2025, the Coast Guard released a Request for Information (RFI) for ASCs. The Coast Guard's proposed FY2025 budget requested no procurement funding for the PSC, ASC, or GLIB programs. The Coast Guard's FY2025 Unfunded Priorities list (UPL) included an item for $25.0 million in procurement funding for the GLIB program.

The Coast Guard's FY2025 UPL also included an item for $25.0 million in procurement funding for the Commercially Available Polar Icebreaker (CAPI), a commercial polar ship with icebreaking capability named *Aiviq* that the Coast Guard purchased in December 2024 with funding provided in the FY2024 Department of Homeland Security (DHS) Appropriations Act (Division C of H.R. 2882/P.L. 118-47 of March 23, 2024). The Coast Guard is converting Aiviq into a medium polar icebreaker and plans to rename the ship *Storis*.

The PSC program has experienced significant cost growth and schedule delay. The issue for Congress is whether to approve, reject, or modify the Administration's procurement funding requests and acquisition strategies for the PSC, ASC, and GLIB programs. Congress's decisions on this issue could affect Coast Guard capabilities and funding requirements and the U.S. shipbuilding industrial base.

On May 7, 2024, CRS provided testimony on Coast Guard ship acquisition programs, particularly the PSC program, to the House Homeland Security Committee subcommittee on Transportation and Maritime Security.[1] Separate CRS reports cover acquisition of Coast Guard general-purpose cutters[2] and Coast Guard waterways commerce cutters (WCCs).[3] Another CRS report provides an overview of various issues relating to the Arctic.[4]

Background

Missions of Coast Guard Polar Icebreakers

Statutory Duties and Missions

The permanent statute that sets forth the Coast Guard's primary duties—14 U.S.C. §102—states that among other things, the Coast Guard shall (emphasis added) "develop, establish, maintain, and operate, with due regard to the requirements of national defense, aids to maritime navigation, **icebreaking facilities**, and rescue facilities for the promotion of safety on, under, and over the high seas and waters subject to the jurisdiction of the United States," and "pursuant to international agreements, develop, establish, maintain, and operate **icebreaking facilities** on,

[1] CRS Testimony TE10100, *Building the Fleet: Assessing the Department of Homeland Security's Role in the United States Coast Guard's Acquisitions Process*, by Ronald O'Rourke.

[2] CRS Report R42567, *Coast Guard Cutter Procurement: Background and Issues for Congress*, by Ronald O'Rourke.

[3] CRS In Focus IF11672, *Coast Guard Waterways Commerce Cutter (WCC) Program: Background and Issues for Congress*, by Ronald O'Rourke.

[4] CRS Report R41153, *Changes in the Arctic: Background and Issues for Congress*, coordinated by Ronald O'Rourke.

under, and over waters other than the high seas and waters subject to the jurisdiction of the United States."[5]

In addition, Section 888(a) of the Homeland Security Act of 2002 (H.R. 5005/P.L. 107-296 of November 25, 2002)—the law that established the Department of Homeland Security (DHS) and transferred the Coast Guard from the Department of Transportation to DHS—sets forth 11 specific missions for the Coast Guard (often referred to as the Coast Guard's 11 statutory missions), including the mission of "ice operations."[6]

Multiple Missions (Not Just Icebreaking)

The Coast Guard's polar icebreakers do not simply break ice—they are multimission cutters[7] that conduct a variety of other operations that are conducted in lower-latitude waters by the Coast Guard's general-purpose cutters. U.S. polar ice operations conducted in large part by the Coast Guard's polar icebreakers support 9 of the Coast Guard's 11 statutory missions.[8] The roles of U.S. polar icebreakers can be summarized as follows:

- conducting and supporting scientific research in the Arctic and Antarctic;
- defending U.S. sovereignty in the Arctic by helping to maintain a U.S. presence in U.S. territorial waters in the region;
- defending other U.S. interests in polar regions, including economic interests in waters that are within the U.S. exclusive economic zone (EEZ) north of Alaska;
- monitoring sea traffic in the Arctic, including ships bound for the United States; and
- conducting other typical Coast Guard missions (such as search and rescue, law enforcement, and protection of marine resources) in Arctic waters, including U.S. territorial waters north of Alaska.[9]

Polar (Not Just Arctic) Operations

The Coast Guard's large icebreakers are called polar icebreakers rather than Arctic icebreakers because they perform missions in both the Arctic and Antarctic. Operations to support National Science Foundation (NSF) research activities in both polar regions account for a significant portion of U.S. polar icebreaker operations.

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[5] 14 U.S.C. §102(4) and §102(5), respectively. This statute was previously 14 U.S.C. §2; it was renumbered as 14 U.S.C. §102 by Section 103 of the Frank LoBiondo Coast Guard Authorization Act of 2018 (S. 140/P.L. 115-282 of December 4, 2018). (Title I of P.L. 115-282, consisting of Sections 101-124, specified a general reorganization of Title 14.)

[6] The 11 missions set forth in Section 888(a) are marine safety; search and rescue; aids to navigation; living marine resources (fisheries law enforcement); marine environmental protection; ice operations; ports, waterways and coastal security; drug interdiction; migrant interdiction; defense readiness; other law enforcement.

[7] Cutters are commissioned Coast Guard vessels greater than 65 feet in length.

[8] For a list of the 11 missions, see footnote 6. The two statutory missions not supported by polar ice operations are illegal drug interdiction and undocumented migrant interdiction. (Department of Homeland Security, *Polar Icebreaking Recapitalization Project Mission Need Statement, Version 1.0*, approved by DHS June 28, 2013, p. 10.)

[9] This passage, beginning with "The roles of ... ," originated in an earlier iteration of this CRS report and was later transferred by the Government Accountability Office (GAO) with minor changes to GAO, *Coast Guard[:]Efforts to Identify Arctic Requirements Are Ongoing, but More Communication About Agency Planning Efforts Would Be Beneficial*, GAO-10-870, September 2010, p. 53.

Supporting NSF research in the Antarctic focuses on performing an annual mission, called Operation Deep Freeze (ODF), to break through Antarctic sea ice so as to reach and resupply McMurdo Station, the large U.S. Antarctic research station located on the shore of McMurdo Sound, near the Ross Ice Shelf. The Coast Guard stated in 2018 that *Polar Star*, the Coast Guard's only operational heavy polar icebreaker, "spends the [northern hemisphere] winter [i.e., the southern hemisphere summer] breaking ice near Antarctica in order to refuel and resupply McMurdo Station. When the mission is complete, the *Polar Star* returns to dry dock [in Seattle] in order to complete critical maintenance and prepare it for the next ODF mission. Once out of dry dock, it's back to Antarctica, and the cycle repeats itself."[10] In terms of the maximum thickness of the ice to be broken, the annual McMurdo resupply mission generally poses the greatest icebreaking challenge for U.S. polar icebreakers, though Arctic ice can frequently pose its own significant icebreaking challenges for U.S. polar icebreakers. The Coast Guard's medium polar icebreaker *Healy* spends most of its operational time in the Arctic supporting NSF research activities and performing other operations.

Although polar ice is diminishing due to climate change, observers generally expect that this development will not eliminate the need for U.S. polar icebreakers, and in some respects might increase mission demands for them. Even with the diminishment of polar ice, there are still significant ice-covered areas in the polar regions, and diminishment of polar ice could lead in coming years to increased commercial ship, cruise ship, and naval surface ship operations, as well as increased exploration for oil and other resources, in the Arctic—activities that could require increased levels of support from polar icebreakers, particularly since waters described as "ice free" can actually still have some amount of ice.[11] The Coast Guard's Arctic strategic outlook document, released in April 2019, states

> In order to prosecute its missions in the Arctic, the Coast Guard must fully understand and operate freely in this vast and unforgiving environment. Effective capability requires sufficient heavy icebreaking vessels, reliable high-latitude communications, and comprehensive Maritime Domain Awareness. In order to respond to crises in the Arctic, our Nation must also muster adequate personnel, aviation, and logistics resources in the region. The Coast Guard is the sole provider and operator of the U.S. polar capable fleet but currently does not have the capability or capacity to assure access in the high latitudes. Closing the gap requires persistent investment in capabilities and capacity for polar operations, including the Polar Security Cutter.[12]

Current Coast Guard Polar Icebreakers

Overview

The operational U.S. polar icebreaking fleet currently consists of two Coast Guard ships—the heavy polar icebreaker *Polar Star* (**Figure A-1** and **Figure A-3** in **Appendix A**) and the medium polar icebreaker *Healy* (**Figure A-4** in **Appendix A**). (A second Coast Guard heavy polar icebreaker, *Polar Sea*—a sister ship of *Polar Star*—suffered an engine casualty in June 2010 and has been nonoperational since then.) A third Coast Guard ship is to be added to the operational U.S. polar icebreaking fleet—a polar ship originally named *Aiviq* that is to be modified into a

[10] NyxoLyno Cangemi, "Coast Guard Icebreaker Crew Completes Second Arctic Mission; U.S. Interests in Arctic Domain Depends [sic] on Fleet Recapitalization," *DVIDS (Defense Visual Information Distribution System)*, October 19, 2018.

[11] For more on changes in the Arctic due to diminishment of Arctic ice, see CRS Report R41153, *Changes in the Arctic: Background and Issues for Congress*, coordinated by Ronald O'Rourke.

[12] United States Coast Guard, *Arctic Strategic Outlook*, April 2019, p. 6.

medium polar icebreaker and renamed *Storis*. The Coast Guard has tentatively scheduled the ship's commissioning for August 2025 and reportedly aims to have it operating from its Alaska home port starting the summer of 2026.

Heavy Polar Icebreaker *Polar Star*

Polar Star entered service in 1976 and is now well beyond its originally intended 30-year service life.[13] The Coast Guard in recent years has invested millions of dollars to overhaul, repair, and extend the service life of the ship, but as a result of its advancing age, the ship's material condition has nevertheless become increasingly fragile, if not precarious. During its annual deployments to McMurdo Station in Antarctica, shipboard equipment frequently breaks, and shipboard fires have occurred.[14] Replacements for many of the ship's components are no longer commercially available. To help keep *Polar Star* operational, the Coast Guard has used *Polar Sea* as a source of replacement parts.

Medium Polar Icebreaker *Healy*

Healy entered service in 2000. In February 2023, the Coast Guard issued a Request for Information (RFI) from companies interested in conducting a service life extension project (SLEP) for *Healy* that would begin in December 2025.[15] Responses to the RFI were due by March 16, 2023.[16] A December 19, 2024, GAO report on Coast Guard acquisition of polar ships states that the Coast Guard plans to conduct service life extension work on *Healy* in 2027-2031 at an estimated cost of $97 million, with the aim of extending the ship's life to at least 2035.[17]

Future Medium Polar Icebreaker *Storis*

On December 11, 2024, the Coast Guard purchased *Aiviq*, a U.S.-registered commercial ship that was originally built in 2012 to serve as an Arctic oil-exploration support ship, and that has an icebreaking capability sufficient for the ship to serve, following modification, as a Coast Guard medium polar icebreaker. The Coast Guard purchased *Aiviq* for $125.0 million from Offshore Service Vessels of Cut Off, LA, a subsidiary of Edison Chouest Offshore (ECO) of Cut Off, LA, a firm that operates more than 200 ships.[18]

The Coast Guard purchased *Aiviq* with $125.0 million in funding that the FY2024 Department of Homeland Security (DHS) Appropriations Act (Division C of H.R. 2882/P.L. 118-47 of March 23, 2024) provided for purchasing an existing commercially available polar icebreaker and

[13] *Polar Sea* entered service in 1977 and is similarly well beyond its originally intended 30-year service life.

[14] See, for example, Richard Read, "Meet the Neglected 43-Year-Old Stepchild of the U.S. Military-Industrial Complex," *Los Angeles Times*, August 2, 2019; Melody Schreiber, "The Only Working US Heavy Icebreaker Catches Fire Returning from Antarctica," *Arctic Today*, March 2, 2019; Calvin Biesecker, "Fire Breaks Out on Coast Guard's Aging, and Only, Heavy Icebreaker," *Defense Daily*, March 1, 2019.

[15] The project is envisaged as being accomplished through five annual work periods, each beginning in December of a given year and ending in April of the following year, with the first period beginning in December 2025 and ending in April 2026, and the fifth period beginning in December 2029 and ending in April 2030.

[16] See "Healy Service Life Extension Project (SLEP)," accessed November 19, 2024, at https://sam.gov/opp/63af5d5f7b9e492dbdc6b106210f5716/view.

[17] Government Accountability Office, *Coast Guard Acquisitions: Further Cost and Affordability Analysis of Polar Fleet Needed*, GAO-25-106822, Q&A Report to the Committee on Transportation and Infrastructure, House of Representatives, December 19, 2024, pp. 5-6.

[18] For more on ECO, see the firm's website at https://chouest.com/.

modifying it into a Coast Guard polar icebreaker.[19] In addition to its acquisition cost, the Coast Guard reportedly expects to spend $25 million modifying the ship before it enters service.[20] The Coast Guard's proposed FY2025 budget requested no procurement funding for the ship; the Coast Guard's FY2025 UPL included an item for $25.0 million in procurement funding for the ship.

The Coast Guard completed acceptance of *Aiviq* on December 20, 2024. When the ship is commissioned into service as a Coast Guard polar icebreaker, the Coast Guard will rename it *Storis* in honor of a previous Coast Guard cutter of that name.[21] On August 14, 2024, the Coast Guard announced that it plans to homeport the ship in Juneau, AK.[22] The Coast Guard has tentatively scheduled the ship's commissioning for August 2025[23] and reportedly aims to have it operating from its Alaska home port starting the summer of 2026.[24]

The Coast Guard states that

> acquisition of a commercially available polar icebreaker does not affect the acquisition of the PSCs, and the vessel will not be included in the PSC program of record…. The future Storis will provide near-term operational presence and support national security as a bridging strategy until the full complement of PSCs is delivered.[25]

For additional background information on current U.S. polar icebreakers and polar research ships, see **Appendix A**.

Required Numbers of Coast Guard Polar Icebreakers

A 2023 Coast Guard fleet mix analysis concluded that the service will require a total of eight to nine polar icebreakers, including four to five heavy polar icebreakers and four to five medium polar icebreakers, to perform the Coast Guard's polar (i.e., Arctic and Antarctic) missions in

[19] Prior to 2021, the Coast Guard plans did not include the acquisition of a commercially available polar icebreaker. The Coast Guard's FY2022 UPL, dated June 29, 2021, however, included a $150.0 million item for the lease or purchase of a commercially available vessel to provide polar icebreaking capability until the future delivery of PSCs. (U.S. Coast Guard, *FY 2022 Unfunded Priorities List, Report to Congress*, June 29, 2021, p. 3.) The following year, the Coast Guard as part of its proposed FY2023 budget requested $125.0 million in procurement funding for the purchase of a commercially available polar icebreaker. Congress, in acting on the Coast Guard's proposed FY2023 budget, denied the request. The Coast Guard once again requested the $125.0 million as part of its proposed FY2024 budget, and the FY2024 DHS Appropriations Act (Division C of H.R. 2882/P.L. 118-47 of March 23, 2024) approved the request.

[20] Malte Humpert, "Icebreaker 'Aiviq' to Join U.S. Coast Guard Before End of Year to Bolster Arctic Presence," *gCaptain*, November 14, 2024.

[21] U.S. Coast Guard, "Coast Guard Accepts Ownership of Commercially Available Polar Icebreaker," news release dated December 30, 2024; Kathy Murray, "Coast Guard Adds First Polar Icebreaker to Its Fleet in 25 Years," My CG (a U.S. Coast Guard publication), December 23, 2024.

[22] U.S. Coast Guard, "U.S. Coast Guard Announces Juneau Homeporting for Future Icebreaker," press release, August 14, 2024. See also Maritime Executive, "U.S. Coast Guard Closes In on Purchase of Icebreaker Aiviq," *Maritime Executive*, August 14, 2024; Heather Mongilio, "Coast Guard Names Juneau as Home Port for New Icebreaker," *USNI News*, August 15, 2024; James Brooks, "Coast Guard Confirms Plans to Buy Polar Icebreaker, Station It in Juneau," *Alaska Beacon*, August 17, 2024.

[23] Source: Coast Guard email to CRS, April 29, 2025.

[24] See, for example, Edward Lundquist, "Aiviq Becomes USCGC Storis, to Be Based in Juneau," *Marine News*, February 2025; Malte Humpert, "Icebreaker 'Storis' Officially Joins U.S. Coast Guard Fleet," *gCaptain*, January 6, 2025; Patricia Kime, "Coast Guard's Newest Icebreaker to Honor Storis, the Historic Cutter Known for 6 Decades of Service," *Military.com*, December 9, 2024; Cal Biesecker, "Coast Guard Awards $125 Million To Offshore Service Vessels For Commercial Icebreaker," *Defense Daily*, November 26, 2024.

[25] U.S. Coast Guard, "Coast Guard Accepts Ownership of Commercially Available Polar Icebreaker," news release dated December 30, 2024.

coming years.[26] Prior to this new fleet mix analysis, the Coast Guard had stated that it would need at least six polar icebreakers, including three heavy polar icebreakers. For additional background information on required numbers of U.S. polar icebreakers, see **Appendix B**.

Coast Guard Polar Icebreaker Programs

To recapitalize and expand its polar icebreaking fleet, the Coast Guard is planning to acquire new heavy polar icebreakers called Polar Security Cutters (PSCs) and new medium polar icebreakers called Arctic Security Cutters (ASCs).

Polar Security Cutter (PSC) Program

Overview

The PSC program was initiated in the Coast Guard's FY2013 budget submission. The first PSC is in the early stages of construction; the Coast Guard expects the ship to be delivered in 2030. The second and third PSCs reportedly are expected to be delivered in 2032 and 2034, respectively.[27]

Program Name and Name of First Ship

The PSC program was previously known as the polar icebreaker (PIB) program. Changing the program's name to the PSC program is intended to call attention to the fact that the Coast Guard's polar icebreakers perform a variety of missions relating to national security, not just icebreaking.[28] Although it is now called the PSC program, observers as a matter of convenience might refer to it as the polar icebreaker program. On February 24, 2022, the Coast Guard announced that the first PSC will be named *Polar Sentinel*, and that the Coast Guard has candidate names in mind for the second and third PSCs.[29]

[26] Source: spoken testimony of Coast Guard officials, as reflected in CQ hearing transcripts, of

- Admiral Linda L. Fagan, then-Commandant of the Coast Guard, at an April 18, 2023, hearing on the Coast Guard's proposed FY2024 budget before the Coast Guard and Maritime Transportation subcommittee of the House Transportation and Infrastructure Committee, for the total figure of eight to nine polar icebreakers;
- Admiral Steven D. Poulin, then-Vice Commandant of the Coast Guard, at a June 21, 2023, hearing before the same subcommittee on the on the Coast Guard's emerging challenges and statutory needs, again for the total figure of eight to nine polar icebreakers; and
- Vice Admiral Peter Gautier, then-Coast Guard Deputy Commandant for Operations, at a November 29, 2023, hearing before the House Homeland Security Committee on how U.S. Arctic strategy impacts homeland security, for both the total figure of eight to nine polar icebreakers and how that total includes four to five heavy polar icebreakers and four to five medium polar icebreakers.

[27] Cal Biesecker, "Coast Guard Approved For Full Production Of First Polar Security Cutter," *Defense Daily*, May 1, 2025.

[28] See, for example, Ben Werner and Sam LaGrone, "Coast Guard Renames New Icebreaker Program 'Polar Security Cutter,'" *USNI News*, September 27, 2018. See also Sydney J. Freedberg Jr., "With Funding In Peril, Coast Guard Pushes Icebreaker as 'Polar Security Cutter,'" *Breaking Defense*, October 29, 2018.

[29] See, for example, Richard R. Burgess, "Commandant Names Future Polar Security Cutter 'Polar Sentinel,'" *Seapower*, February 24, 2022.

Home Port

On June 17, 2019, the Coast Guard announced that it intends to homeport PSCs at Seattle, WA, where *Polar Star* and *Healy* are homeported.[30]

Coast Guard-Navy Integrated Program Office (IPO)

The PSC program is managed by a Coast Guard-Navy Integrated Program Office (IPO). A key aim in establishing the IPO was to permit the Navy to share its ship-procurement best practices with the Coast Guard so as to help the Coast Guard reduce the time and cost needed to design and procure the PSCs.

Lead Ship Delivery Date

The Coast Guard originally aimed to have the first PSC delivered in 2024. The ship's delivery date has been delayed repeatedly, and the Coast Guard now expects it to be delivered in 2030,[31] about six years later than the originally scheduled date. Much of the schedule delay is due to the time it has taken to fully develop the design for the ship. The second and third PSCs reportedly are expected to be delivered in 2032 and 2034, respectively.[32]

Procurement Cost

As shown in **Table 1**, the Coast Guard as of March 2025 estimated the total procurement cost of the first PSC at $2,397 million (i.e., about $2.4 billion). This figure is about 84.8% higher than the 2021 estimate also shown in **Table 1**.[33] The shipbuilder's contract-award costs for the ships, which relate to the shipbuilder's portion of the total procurement cost of the ships, are discussed in the next section.

April 2019 Contract Award

On April 23, 2019, the Coast Guard-Navy IPO for the PSC program awarded a $745.9 million fixed-price, incentive-firm contract for the detail design and construction (DD&C) of the first PSC to Halter Marine Inc. of Pascagoula, MS, a shipyard that was then owned by Singapore Technologies (ST) Engineering. Halter Marine was the leader of one of three industry teams that competed for the DD&C contract; the other two bidders reportedly were Bollinger Shipyards of Lockport, LA, and a partnership between Philly Shipyard of Philadelphia and Fincantieri/Marinette Marine, of Marinette, WI.[34] The DD&C contract includes options for building the second and third PSCs. If both of these options are exercised, the total value of the contract (excluding the March 2025 contract modification discussed below) would increase to

[30] See, for example, Ben Werner, "Coast Guard Polar Security Cutter Will Be Homeported in Seattle," *USNI News*, June 17, 2019; Navy Times Staff, "Coast Guard Picks Homeport for New Icebreaker Fleet," *Navy Times*, June 17, 2019.

[31] See, for example, Malte Humpert, "Icebreaker 'Aiviq' to Join U.S. Coast Guard Before End of Year to Bolster Arctic Presence," *gCaptain*, November 14, 2024; Cal Biesecker, "Coast Guard Expects DHS Approval Shortly To Begin Icebreaker Construction But Needs More Funding," *Defense Daily*, November 14, 2024.

[32] Cal Biesecker, "Coast Guard Approved For Full Production Of First Polar Security Cutter," *Defense Daily*, May 1, 2025.

[33] A GAO report that was released on April 20, 2023, and that reports on the status of major DHS acquisition programs as of September 30, 2022, states that as of June 2022, the combined estimated procurement cost of the three PSCs was $2,789 million. (GAO, *DHS Annual Assessment[:] Major Acquisition Programs Are Generally Meeting Goals, but Cybersecurity Policy Needs Clarification*, GAO-23-106701, April 2023, p. 50.)

[34] "Mississippi Shipyard Gets $746M Contract for Icebreaker," *Associated Press*, April 23, 2019.

$1,942.8 million (i.e., about $1.9 billion).[35] On December 29, 2021, the Coast Guard exercised a $552.7 million fixed price incentive option to its contract with Halter Marine Inc. for the second PSC.[36]

Table 1. Estimated PSC Procurement Costs

(In millions of then-year dollars)

	Estimate as of March 2025				Estimate as of 2021			
Cost element	**1st PSC**	**2nd PSC**	**3rd PSC**	**Total**	**1st PSC**	**2nd PSC**	**3rd PSC**	**Total**
Ship construction	2,209	n/a	n/a	n/a	899	612	605	2,116
Nonrecurring cost	*325*	*n/a*	*n/a*	*n/a*	*155*	*0*	*0*	*155*
Recurring cost	*1,884*	*n/a*	*n/a*	*n/a*	*744*	*612*	*605*	*1,961*
Other program costs, including GFE	101	n/a	n/a	n/a	322	232	333	887
Post-delivery costs	58	n/a	n/a	n/a	48	49	50	147
Costs for NTNO equipment	29	n/a	n/a	n/a	28	28	29	85
TOTAL	**2,397**	n/a	n/a	n/a	**1,297**	**921**	**1,017**	**3,235**

Source: U.S. Coast Guard emails to CRS of May 21, 2025 (for March 2025 estimate) and March 26, 2024 (for 2021 estimate). The email of March 26, 2024 states that the 2021 estimate was taken from the PSC 2021 LCCE v3 (Life Cycle Cost Estimate, version 3). The Coast Guard stated in that email that the 2021 LCCE v3 was, as of March 2024, the Coast Guard's current model for estimated PSC procurement costs.

Notes: n/a is not available. **GFE** is government-furnished equipment, meaning equipment that the government procures directly from supplier firms, and then provides to the shipbuilder for incorporation into the ship. **NTNO** is Navy-Type, Navy-Owned. The 2021 nonrecurring cost of $155 million for the 1st PSC includes $118 million for detail design costs for the class and $37 million for initial spares and repair parts for the 1st PSC.

The above figures of $745.9 million, $552.7 million, and $1,942.8 million cover only the shipbuilder's portion of the PSCs' total procurement cost; they do not include the cost of government-furnished equipment (or GFE, meaning equipment that the government purchases and then provides to the shipbuilder for incorporation into the ship), post-delivery costs, costs for Navy-specific equipment, or government program-management costs. They also do not include the March 2025 contract modification discussed below.

In November 2022, ST Engineering sold Halter Marine to Louisiana-based Bollinger Shipyards. The former Halter Marine is now called Bollinger Mississippi Shipbuilding.[37] The shipyard's former name of Halter Marine occurs in the remainder of this report in connection with developments prior to November 2022.

[35] See Naval Sea Systems Command, "Polar Security Cutter Contract Awarded to Recapitalize Nation's Arctic Capabilities," April 23, 2019; Department of Defense, "Contracts for April 23, 2019" (Release No. CR-076-19); Sam LaGrone, "VT Halter Marine to Build New Coast Guard Icebreaker," *USNI News*, April 23, 2019; Maria Armental, "U.S. Orders First Heavy Icebreaking Vessel in Decades, as Rivals Expand Arctic Presence," *Wall Street Journal*, April 23, 2019; "Mississippi Shipyard Gets $746M Contract for Icebreaker," Associated Press, April 23, 2019.

[36] U.S. Coast Guard, "Polar Security Cutter Integrated Program Office Exercises Option for Second Cutter," U.S. Coast Guard, December 30, 2021; Department of Defense, "Contracts for December 29, 2021."

[37] See, for example, Sam LaGrone, "Bollinger Closes $15M Acquisition of Halter Marine, New Name: 'Bollinger Mississippi Shipbuilding,'" *USNI News*, November 14, 2022; Cal Biesecker, "Bollinger Completes Acquisition of Halter Marine," *Defense Daily*, November 14, 2022; Justin Katz, "Why a Small Shipyard Merger Could Signal Bigger Problems for the US Military," *Breaking Defense*, November 14, 2022; Sam LaGrone, "Updated: Bollinger to Buy Halter Marine Shipyard, Oversee Coast Guard Polar Security Cutter Program," *USNI News*, November 6, 2022.

Reported March 2025 Contract Modification

In March 2025, the Coast Guard reportedly awarded Bollinger a contract modification for an additional $951.6 million for the first PSC to account for increasing time and cost to build the ship.[38] Much or all of this figure might constitute cost growth above the Coast Guard's 2021 estimate for the total procurement cost of the ship as shown in **Table 1**.

Ship Design

Figure 1, **Figure 2**, **Figure 3**, **Figure 4**, and **Figure 5** show renderings and a photograph of a model of Halter Marine's design (now Bollinger's design) for the PSC. An April 25, 2019, press report states that "the Coast Guard and Navy said VT Halter Marine's winning design for the new PSC 'meets or exceeds all threshold requirements' in the ship specification" for the PSC program.[39]

Figure 1. Rendering of Halter Marine Design for PSC

Source: Illustration accompanying Sam LaGrone, "UPDATED: VT Halter Marine to Build New Coast Guard Icebreaker," USNI News, April 23, 2019, updated April 24, 2019. The caption to the illustration states, "An artist's rendering of VT Halter Marine's winning bid for the U.S. Coast Guard Polar Security Cutter. VT Halter Marine image used with permission."

The horsepower generated by the propulsion plant in Halter Marine's design—more than 45,200, according to a May 7, 2019, press release from Halter Marine[40]—is roughly one-quarter less than

[38] See, for example, Sam LaGrone, "Bollinger Awarded $951.6M for Modification for First Polar Security Cutter," *USNI News*, March 27, 2025; Maritime Executive, "US Awards $951M in Contract Modifications for Polar Cutter Program," *Maritime Executive*, March 26, 2025; Cal Biesecker, "Coast Guard Awards $952 Million Contract Mod To Bollinger To Complete First Polar Icebreaker," *Defense Daily*, March 25, 2025.

[39] Rich Abott, "Polar Icebreaker Winner Meets Threshold Requirements, Has Incentives for Early Delivery," *Defense Daily*, April 25, 2019.

[40] Halter Marine press release, "VT Halter Marine Awarded the USCG Polar Security Cutter," May 7, 2019, updated May 29, accessed April 17, 2025, at https://web.archive.org/web/20201028114950/http://vthm.com/wp-content/uploads/2019/05/Press-Release_USCG-PSC_Singapore-Exchange-FINAL_updatedMay29.pdf.

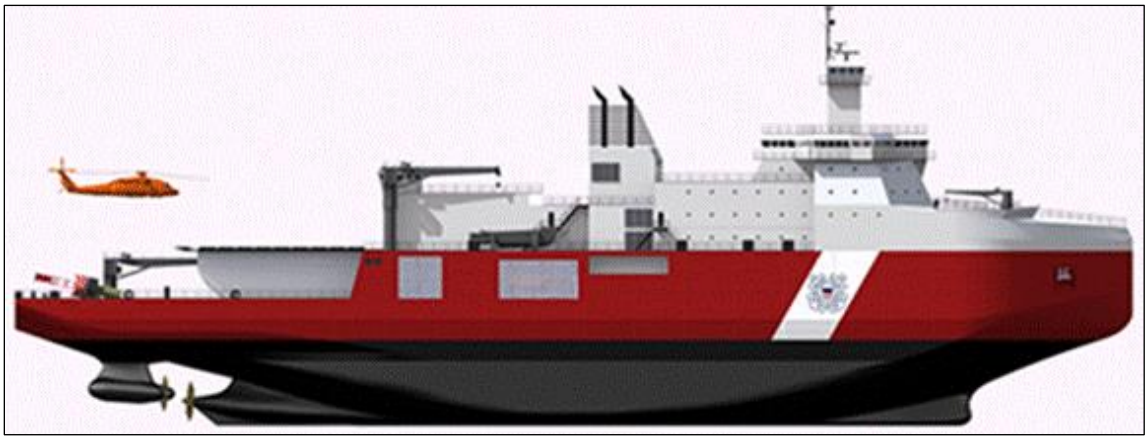
the 60,000 shaft horsepower of the propulsion plant in the Coast Guard's heavy polar icebreaker, *Polar Star*. As shown in **Figure 1** and **Figure 3**, however, Halter Marine's design includes a centerline shafted propeller flanked by two azimuthing (i.e., swiveling) podded propulsors—an arrangement that, along with other modern icebreaker hull design features, is expected to give Halter Marine's design a capability for breaking ice comparable to that of *Polar Star*.

Figure 2. Model of Halter Marine Design for PSC

(Photograph of model displayed at 2021 trade show)

Source: Cropped version of photograph accompanying Peter Ong, "USGC's Polar Security Cutters to Receive Mark 38 Mod 4 Guns," *Naval News*, April 21, 2022. The article credits the photograph to Naval News at the Sea Air Space exposition 2021.

Figure 3. Rendering of Halter Marine Design for PSC



Source: Illustration posted by Robert A. Socha, Senior Vice President, Halter Marine, accessed May 6, 2019, at https://www.linkedin.com/feed/update/urn:li:activity:6526621529113976832.

Figure 4. Rendering of Halter Marine Design for PSC

Source: Technology Associates, Inc. (cropped version of rendering posted at http://www.navalarchitects.us/pictures.html, accessed November 19, 2024). A similar image was included in Halter Marine press release, "VT Halter Marine Awarded the USCG Polar Security Cutter," May 7, 2019, accessed November 19, 2024, at https://web.archive.org/web/20190513165621/http://www.vthm.com/public/files/20190507.pdf.

Figure 5. Rendering of Halter Marine Design for PSC

Source: Photograph accompanying Connie Lee, "New Coast Guard Icebreaker Remains on Tight Schedule," *National Defense*, May 21, 2020. The article credits the photograph to Technology Associated, Inc.

Halter Marine's design for the PSC is considerably larger than the Coast Guard's current polar icebreakers. As shown in **Table A-1**, the Coast Guard's largest polar icebreaker, *Healy*, is 420 feet long and has a full load displacement of 16,000 tons. Halter Marine's 460-foot design for the PSC is 40 feet longer than *Healy*, and its 22,900-ton displacement is about 43% greater than *Healy*'s.

A May 8, 2019, press report states the following:

> "We picked the most modern icebreaker that was on the market, soon to be production-level design that roughly met the Coast Guard's requirements, and we took it and modified it," [Ron] Baczkowski [the shipyard's chief executive] said.
>
> "It has a contoured shape. The shape of the hull does the icebreaking. Instead of being a mass breaking ice, this actually slices the ice. The shape of the hull pushed the broken ice aside, so it doesn't interfere with your propulsion systems, with your instrumentation that's on the other side of the ship."
>
> The design of the cutter is optimized for seakeeping to support the long voyage from its homeport in Washington State to as far away as the Antarctic, he said.
>
> "It's an optimum design between icebreaking and seakeeping."
>
> "With the propulsors, with one fixed and two steerable, we were able to optimize the seakeeping capability so when you're going on long transits from Washington to Antarctica the crew is not beat to a pulp or heavily fatigued because of the stability characteristics in open water."[41]

Parent Design Approach

The PSC program is using the parent design approach, meaning that the design of the PSC is based on an existing icebreaker design. Bidders for the PSC program were required to show a parent design on which their proposed design was based. A key aim in using the parent design approach is to reduce cost, schedule, and technical risk in the PSC program. A May 7, 2019, press release from Halter Marine about its design for the PSC stated the following:

> VT Halter Marine is teamed with Technology Associates, Inc. [TAI] as the ship designer and, for over two years, has participated in the U.S. Coast Guard's Heavy Polar Icebreaker Industry Study. The ship design is an evolution from the mature "Polar Stern II" [German icebreaker] currently in design and construction; the team has worked rigorously to demonstrate its maturity and reliability. During the study, TAI incrementally adjusted the design and conducted a series of five ship model tank tests to optimize the design. The vessels are 460 feet in length with a beam of 88 feet overall, a full load displacement of approximately 22,900 long tons at delivery. The propulsion will be diesel electric at over 45,200 horse power and readily capable of breaking ice between six to eight feet thick. The vessel will accommodate 186 personnel comfortably for an extended endurance of 90 days.
>
> In addition to TAI, VT Halter Marine has teamed with ABB/Trident Marine for its Azipod propulsion system,[42] Raytheon for command and control systems integration, Caterpillar for the main engines, Jamestown Metal Marine for joiner package, and Bronswerk for the HVAC system. The program is scheduled to bring an additional 900 skilled craftsman and staff to the Mississippi-based shipyard.[43]

[41] Sam LaGrone, "VT Halter Marine Details Coast Guard Icebreaker Bid," *USNI News*, May 8, 2019.

[42] ABB is ASEA Brown Boveri, a multinational corporation headquartered in Zurich, Switzerland, that is, among other things, a leading maker of electric-drive propulsion systems for ships. (ASEA is an acronym for Allmänna Svenska Elektriska Aktiebolaget [i.e., General Swedish Electrical Limited Company], which merged with Brown, Boveri & Cie [BBC] in 1988 to create ABB.) Azipod is ABB's term for its azimuthing (i.e., swiveling) podded propulsors.

[43] Halter Marine press release, "VT Halter Marine Awarded the USCG Polar Security Cutter," May 7, 2019, updated May 29, accessed April 17, 2025, at https://web.archive.org/web/20201028114950/http://vthm.com/wp-content/uploads/2019/05/Press-Release_USCG-PSC_Singapore-Exchange-FINAL_updatedMay29.pdf. The original (May 7) version of the press release stated that the design's full load displacement at delivery would be approximately 33,000 tons. Halter Marine updated the press release on May 29 to provide a corrected figure of 22,900 tons for the design's full load displacement.

The German icebreaker design referred to in Halter Marine's press release is a design that was developed for *Polar Stern II* (also spelled *Polarstern II*) (**Figure 6**),[44] a ship that is to be built as the replacement for *Polarstern*, Germany's current polar research and supply icebreaker.[45]

Figure 6. Rendering of 2019 SDC Concept Design for *Polarstern II*

Source: Cropped version of SDC Ship Design & Consult GmbH, design SDC2187, 133m Research Vessel, accessed November 19, 2024, at http://www.shipdesign.de/html/index.php?navi=3&navi2=80&navi3=115. The image is enlarged at http://www.shipdesign.de/html/detail.php?id=396.

A May 9, 2019, press report states that the original design for *Polarstern II* was developed by Germany's Ship Design & Consult (SDC), a firm based in Hamburg, Germany, and that

> VT Halter's teammates on the PSC include ship designer Technology Associates, Inc. (TAI), which has been involved in the design for over two years and has made "a lot of modifications" in a number of areas to meet Coast Guard requirements, [Ronald Baczkowski, president and CEO of VT Halter Marine] said. The team went through six design spirals to refine the design and the major modifications include changes in the hull form to enhance the ship's icebreaking capabilities and keep the ice clear from the propulsors and sensors, habitability improvements for comfort particularly in open water, easier access to different areas of the ship, and maintenance and endurance capabilities….
>
> Raytheon [RTN] is the integrator for C5I capabilities[46] on the ship and the main engines will be supplied by Caterpillar [CAT]. Switzerland-based ABB and Netherlands-based Trident are supplying the Azipod propulsion system, Florida-based Jamestown Metal

[44] *Polarstern* is the German word for Polar Star—coincidentally, the same name as the U.S. Coast Guard's operational heavy polar icebreaker.

[45] For more on *Polarstern II*, see Alfred-Wegener-Institut (AWI), "The New Polarstern: Contract for New German Research Icebreaker Awarded," press release dated December 19, 2024.

[46] C5I stands for command, control, communications, computers, collaboration, and intelligence.

> Marine is supplying the joiner package, and Netherlands-based Bronswerk the heating, ventilation and cooling system.[47]

As shown in **Figure 7**, the design for *Polarstern II* as of December 2024 appears to have evolved in certain respects from the 2019 design shown in **Figure 6**.[48]

Figure 7. Rendering of 2024 Design for PolarStern II

Source: Cropped version of rendering accompanying Alfred-Wegener-Institut (AWI), "The New Polarstern: Contract for New German Research Icebreaker Awarded," press release dated December 19, 2024. The caption to the rendering credits it to "RV Polarstern New Construction 3D View in Ice (Photo: Alfred-Wegener-Institut/thyssenkrupp Marine Systems)."

April 18, 2025, Press Report About Negotiations with Finnish Shipbuilder

On April 18, 2025, it was reported that the Coast Guard is negotiating with a Finnish shipbuilder for building three to five ASCs and possibly also three PSCs. One of the press reports states

> In what could dramatically accelerate expansion of U.S. Arctic capabilities the Coast Guard is reportedly in negotiations with Finnish shipbuilder Rauma Marine Constructions (RMC) for three to five medium-sized icebreakers.
>
> Finland's largest newspaper Helsingin Sanomat reports that the potential five-vessel deal would be valued at 2.5 billion Euro, around $2.7 billion. In addition, the yard is also said to be exploring the possibility of delivering three heavy icebreakers, likely at a somewhat higher total price point.
>
> Finnish yards could complete a medium ice-breaker of ready design in as little as 36 months. The Coast Guard is reportedly aiming to place the first new icebreaker into service before the end of President Trump's time in office.[49]

[47] Calvin Biesecker, "Long-Lead Funding in FY '20 for Second Polar Security Cutter Would Help with Planning, Shipbuilder Says," *Defense Daily*, May 9, 2019. Abbreviations for firm names in brackets as in original.

[48] See also Chuck Hill, "'Elomatic awarded Polarstern 2 icebreaker design contract'—Marine Log / A Little Late for the Polar Security Cutter," *Chuck Hill's CG Blog*, February 19, 2025.

[49] Malte Humpert, "US Coast Guard Negotiating With Finland's Rauma Marine For Construction of Up to Five (continued...)

Procurement Funding Through FY2024

As shown in **Table 2**, the PSC program has received a total of about $1,731.8 million in procurement funding through FY2024. This total reflects a rescission of $150.0 million in unobligated prior-year funding in the Coast Guard's Procurement, Construction, and Improvements (PC&I) account that was made by Section 543(10) of the FY2024 DHS Appropriations Act (Division C of H.R. 2882/P.L. 118-47 of March 23, 2024). The Coast Guard applied the rescission to the PSC program's FY2021 PC&I account appropriation, reducing it from the originally enacted figure of $555.0 million to the figure shown in **Table 2** of $405.0 million.

FY2025 Procurement Funding Request

The Coast Guard's proposed FY2025 budget requested no procurement funding for the PSC program.

Table 2. Procurement Funding for PSC Program Through FY2024

(In millions of dollars)

Fiscal year	Appropriated			*Requested by Coast Guard for that year*
	Coast Guard funding	Navy funding	Total funding	
FY13	7.609		7.609	*8.0*
FY14	2.0		2.0	*2.0*
FY15	0.0		0.0	*6.0*
FY16	36.0		36.0	*4.0*
FY17	25.0	150.0	175.0	*147.6*
FY18	19.0	150.0	169.0	*19.0*
FY19	675.0		675.0	*750.0*
FY20	135.0		135.0	*35.0*
FY21	405.0		405.0	*405.0*
FY22	80.0		80.0	*170.0*
FY23	47.2		47.2	*167.2*
FY24	0		0	*170.0*
Total	**1,431.809**	**300.0**	**1,731.809**	*n/a*

Source: U.S. Coast Guard and Navy budget data. Figures reflect post-enactment adjustments due to reprogramming actions or recissions.

Notes: Coast Guard procurement funding shown in the table was provided through the PC&I account. (Prior to FY2019, the PC&I account was called the Acquisition, Construction, and Improvements [AC&I] account.) Navy procurement funding shown in the table was provided through the Shipbuilding and Conversion, Navy (SCN)

Icebreakers, Helsinki Press Reports," *gCaptain*, April 18, 2025. See also Daniel Michaels, "To Dominate the Arctic, Trump Needs Ice-Breaking Ships. Finland Wants to Help," *Wall Street Journal*, May 11, 2025; Maritime Executive, "Report: Finland is Frontrunner Negotiating for USCG Icebreaker Order," *Maritime Executive*, April 18, 2025; Yle News, "Rauma Shipyard in Talks with US Coast Guard over Icebreaker Deal," *Yle News*, April 18, 2025; Peter Rybski, "Finnish Shipyard RMC in Negotiations to Build up to Eight Icebreakers for the U.S. Coast Guard," *Arctic Today*, April 18, 2025.

account (i.e., the Navy's shipbuilding account). All procurement funding requested over the years for the PSC program has been requested by the Coast Guard for the Coast Guard's AC&I/PC&I account. The Navy procurement funding provided in FY2017 and FY2018 was not requested by the administration and was added by Congress in marking up the Navy's proposed FY2017 and FY2018 shipbuilding budgets. The FY2016 figure of $36.0 million includes $30.0 million that was added after enactment through a reprogramming action, as noted in the Coast Guard's FY2018 budget submission. Section 543(10) of the FY2024 DHS Appropriations Act (Division C of H.R. 2882/P.L. 118-47 of March 23, 2024) rescinded $150.0 million in unobligated prior-year funding for the Coast Guard's Procurement, Construction, and Improvements (PC&I) account. The Coast Guard applied the rescission to the PSC program's FY2021 PC&I account appropriation, reducing it from the originally enacted figure of $555.0 million to the figure shown in the table of $405.0 million.

Arctic Security Cutter (ASC) Program

Overview

As mentioned earlier, the Coast Guard refers to its planned new medium polar icebreakers as Arctic Security Cutters (ASCs).

April 2025 Request for Information (RFI)

On April 11, 2025, the Coast Guard released a Request for Information (RFI) for ASCs. The posting for the RFI states (emphasis as in original)

> The United States Coast Guard (USCG) is conducting market research to assess the current capabilities of the U.S. and international maritime industrial base to support Arctic Security Cutter (ASC) acquisition efforts. Specifically, the USCG is seeking to increase their understanding of existing icebreaking capable vessels or vessel designs that are ready for construction or already in production.
>
> The USCG is also interested in proven execution and build strategies and the ability of global shipyards to support the construction and subsequent launch of an icebreaking-capable vessel within 36-months of a contract award.
>
> **Responses are due no later than 5:00 PM ET on April 25, 2025.**[50]

A RFI document attached to the posting states the following (including the table of vessel preliminary capability parameters):[51]

> The purpose of this RFI is to increase the USCG's understanding of the current status and capability of both the U.S. and broader international maritime industrial base as it pertains to existing icebreaking capable vessels or vessel designs that are ready for construction or already in production.
>
> Specifically, the USCG seeks to understand what existing vessels or production ready vessel designs satisfy or closely satisfy the below preliminary capability parameters. Additionally, the USCG would like to gain insight on recently proven execution and build strategies as well as the current capability and availability of global shipyards that could

[50] "Request for Information—Arctic Security Cutter (ASC): Icebreaking Capable Vessels or Vessel Designs that are Ready for Construction," SAM.gov, accessed April 16, 2025, at https://sam.gov/opp/ee911f0016fd4bb0b98d589cfcfc3dca/view.

[51] U.S. Coast Guard, *Request For Information (RFI), Arctic Security Cutter (ASC): Icebreaking Capable Vessels or Vessel Designs that are Ready for Construction*, p. 1. (Document attached to ASC RFI posted at SAM.gov, accessed April 16, 2025, at https://sam.gov/opp/ee911f0016fd4bb0b98d589cfcfc3dca/view.) See also Nick Blenkey, "USCG Issues RFI for Icebreaking Arctic Security Cutter," *Marine Log*, April 15, 2025; Justin Katz, "Coast Guard Seeks Info on Medium Icebreaker Options from US, International Industry," *Breaking Defense*, April 15, 2025; John Grady, "Coast Guard Asking U.S., Foreign Yards for Arctic Security Cutter Pitches," *USNI News*, April 16, 2025.

support the construction and subsequent launch of an existing icebreaking capable vessel design within THIRTY-SIX (36) months of a contract award date.

VESSEL PRELIMINARY CAPABILITY PARAMETERS	
Length	360ft or less
Beam	78ft or less
Draft	23ft or less
Icebreaking	Vessel shall be capable of independently breaking through ice with a thickness of 3ft at a continuous speed of 3 knots.
Range	6,500 nautical miles at 12 knots
Endurance	60 days
Aircraft	Flight deck and hangar to accommodate ONE (1) HH-60

Regarding the figure of 36 months in the above-quoted passage, an April 3, 2025, blog entry states that building icebreakers

> shouldn't be that hard. European shipyards, especially those located in Finland, routinely design and build these specialized ships for a variety of purposes….
>
> I recently wrote about Davie—the Canadian shipbuilder—and their plan to build their own design polar icebreaker for the Canadian Coast Guard. According to a press report, 30% of the ship will be built in Helsinki. Before the contract was awarded, Davie was advertising that they could build this design in Helsinki in only 36 months.
>
> How can the Finns do that? Often, U.S. Coast Guard Admirals and officials state before Congress that Finland doesn't build the kind of icebreakers they're talking about. This PC2 [class] icebreaker [i.e., heavy polar icebreaker in U.S. parlance]—for the Canadian Coast Guard—seems to be exactly that kind of icebreaker.[52]

April 18, 2025, Press Report About Negotiations with Finnish Shipbuilder

As noted in the section on the PSC program, on April 18, 2025, it was reported that the Coast Guard is negotiating with a Finnish shipbuilder for building three to five ASCs and possibly also three PSCs. One of the press reports states

> In what could dramatically accelerate expansion of U.S. Arctic capabilities the Coast Guard is reportedly in negotiations with Finnish shipbuilder Rauma Marine Constructions (RMC) for three to five medium-sized icebreakers.
>
> Finland's largest newspaper Helsingin Sanomat reports that the potential five-vessel deal would be valued at 2.5 billion Euro, around $2.7 billion. In addition, the yard is also said to be exploring the possibility of delivering three heavy icebreakers, likely at a somewhat higher total price point.
>
> Finnish yards could complete a medium ice-breaker of ready design in as little as 36 months. The Coast Guard is reportedly aiming to place the first new icebreaker into service before the end of President Trump's time in office.[53]

[52] Peter Rybski, "How to Build an Icebreaker in Three Years," *Arctic Today*, April 3, 2025.

[53] Malte Humpert, "US Coast Guard Negotiating With Finland's Rauma Marine For Construction of Up to Five Icebreakers, Helsinki Press Reports," *gCaptain*, April 18, 2025. See also Maritime Executive, "Report: Finland is Frontrunner Negotiating for USCG Icebreaker Order," *Maritime Executive*, April 18, 2025; Yle News, "Rauma (continued...)

May 6, 2025, Press Release from Bollinger Shipyards

A May 6, 2025, news release from Bollinger Shipyards states in part:

> Bollinger Shipyards, the largest privately-owned and operated shipbuilder and vessel repair company in the United States, and Edison Chouest Offshore (ECO), a global leader in advanced commercial vessel construction and operation, today announced the formation of a strategic partnership called United Shipbuilding Alliance (USA).
>
> This partnership is designed to offer a fully integrated solution to expedited design, construction, and delivery of next-generation icebreakers to directly meet the urgent Arctic operational needs. USA recently responded to the U.S. Coast Guard's April 11th [2025] Request for Information titled, "Arctic Security Cutter (ASC): Icebreaking Capable Vessels or Vessel Designs that are Ready for Construction," outlining the utilization of a commercial vessel for national security purposes acquisition process that spans 33 months from contract award to delivery.
>
> The viability and effectiveness of commercial vessel construction for national security purposes have been firmly demonstrated through the recent acquisition of the USCGC STORIS (WAGB-21) [ex-M/V AIVIQ]. The STORIS is an American-built icebreaker designed for Arctic conditions and delivered in under three years.
>
> The proposed commercial acquisition method will save U.S. taxpayers more than 40% by reducing and eliminating excess program bloat, government vendor source selection mandates, and redundant bureaucratic reporting mandates.[54]

Service Life Extension for *Polar Star*

The Coast Guard plans to extend the service life of *Polar Star* until the delivery of at least the second PSC.[55] The Coast Guard estimated the cost of *Polar Star*'s service life extension work at $75 million, a sum that was funded at a rate of $15 million per year for five years, with the final $15 million increment being provided in FY2023. The funding was included in the vessels portion of the Coast Guard's PC&I account, in a line item called "Polar Sustainment" that is separate from the line items for the PSC and CAPI programs.

Shipyard in Talks with US Coast Guard over Icebreaker Deal," *Yle News*, April 18, 2025; Peter Rybski, "Finnish Shipyard RMC in Negotiations to Build up to Eight Icebreakers for the U.S. Coast Guard," *Arctic Today*, April 18, 2025.

[54] Bollinger Shipyards, "Bollinger Shipyards and Edison Chouest Offshore Launch United Shipbuilding Alliance (USA) to Aggressively Accelerate U.S. Arctic Icebreaking Capabilities," news release dated May 6, 2025. See also Sam LaGrone, "Bollinger, Edison Chouest Offshore Team to Pitch Coast Guard Arctic Security Cutter Designs," *USNI News*, May 6, 2025; Alyssa Schonhaut, "Bollinger Teams Up with Edison Chouest Offshore to Deliver 'Next-Generation' Icebreakers," *Breaking Defense*, May 6, 2025; Cal Biesecker, "Bollinger, Edison Chouest Partner To Pursue Coast Guard's Arctic Security Cutter," *Defense Daily*, May 6, 2025.

[55] In February 2020, for example, the Coast Guard testified that

> The Coast Guard also understands that we must maintain our existing heavy and medium icebreaking capability while proceeding with recapitalization.... Maintenance of POLAR STAR will be critical to sustaining this capability until the new PSCs are delivered. Robust planning efforts for a service life extension project on POLAR STAR are already underway and initial work for this project will begin in 2020, with phased industrial work occurring annually from 2021 through 2023. The end goal of this process will be to extend the vessel's service life until delivery of at least the second new PSC.
>
> (Testimony of Admiral Charles W. Ray, Coast Guard Vice Commandant, on "Arctic Security Issues," before the House Homeland Security Subcommittee on Transportation & Maritime Security, February 5, 2020, p. 9.)

Trilateral Polar Icebreaker Collaboration Effort (ICE Pact)

July 2024 Announcement of ICE Pact

On July 11, 2024, the leaders of the United States, Canada, and Finland announced a trilateral partnership on polar icebreakers, called the Icebreaker Collaboration Effort (ICE Pact), to implement a "collaborative effort to continue building best-in-class Arctic and polar icebreakers and other Arctic and polar capabilities in each of our respective countries by sharing expertise, information, and capabilities." The joint statement announcing the partnership stated

> As leaders of Arctic nations, Canada, Finland, and the United States, recognizing the enduring importance of the region to our collective economic, climate, and national security, we resolve to deepen our cooperation to ensure the polar and Arctic regions remain peaceful, cooperative, and prosperous. As part of this effort, we are announcing an enhanced trilateral partnership called the Icebreaker Collaboration Effort or ICE Pact.
>
> Through ICE Pact, our governments will build on our longstanding and ongoing bilateral ties. As the first initiative under ICE Pact, we will commit to a collaborative effort to continue building best-in-class Arctic and polar icebreakers and other Arctic and polar capabilities in each of our respective countries by sharing expertise, information, and capabilities. Over the next six months, we also will jointly develop an implementation plan for this collaboration to build these highly complex and critical vessels for our allies and partners with interests and responsibilities in the Arctic and Antarctic regions.
>
> This partnership will strengthen the shipbuilding industries in each nation with the goal of creating good-paying jobs in shipyards, marine equipment manufacturers, and many other related services across all three countries. In the Arctic, new, faster shipping lanes hold the potential to create new economic opportunities and drive down shipping costs. And in the Antarctic, our partnership can also foster increased scientific research and international collaboration.
>
> This partnership is about more than the collective production of polar icebreakers and capabilities, including Arctic and polar-capable ships. It is about providing the capability for like-minded nations to uphold international rules, norms, and standards to sustain peace and stability in the Arctic and Antarctic regions for generations to come.[56]

November 2024 ICE Pact MOU

On November 13, 2024, officials from the three ICE Pact governments signed a memorandum of understanding (MOU) for implementing the ICE Pact. A November 13, 2024, DHS press release states

[56] White House, "Joint Statement on ICE Pact," July 11, 2024. See also Justin Katz, "ICE Pact: Why the US Had to Recruit Help in Race with Russia, China for Arctic Icebreakers," *Breaking Defense*, August 16, 2024; Rana Foroohar, "The New Maritime Statecraft," *Financial Times*, August 12, 2024; Katy Buda, Gregory Sanders, and Cynthia Cook, "Recruiting Friends for the Polar Icebreaker Express: Viewing the ICE Pact Through Broader Defense Industrial Cooperation," Center for Strategic and International Studies, August 1, 2024; Cal Biesecker, "Following ICE Pact, Canadian Shipbuilder Seeking to Partner in U.S.," *Defense Daily*, July 29, 2024; Howard Altman, "Allied Pact Aims to Close Yawning Icebreaker Gap with Adversaries," *The War Zone*, July 12, 2024; Eric Bazail-Eimil, Lee Hudson, and Kyle Duggan, "US, Canada and Finland to Challenge Russia and China in the Arctic," *Politico Pro*, July 11, 2024; Laura Dhillon Kane and Josh Wingrove, "US, Finland, Canada Forge Icebreaker Ship Pact to Counter Russia, China in Arctic," *Bloomberg*, July 11, 2024; Lee Ferran, "US Teams with Canada, Finland on Polar Icebreakers to Chill Russian, Chinese Power Up North" *Breaking Defense*, July 11, 2024; Michael Martina, "US, Canada, Finland Launch Effort to Build Ice-Breaking Ships as China and Russia Cooperate in Arctic," *Reuters*, July 11, 2024; Patrick Tucker, "US Agrees to Build Icebreakers with Canada, Finland," *Defense One*, July 11, 2024.

> Officials representing the Governments of the United States, Canada, and Finland today signed a Memorandum of Understanding (MOU) to begin working together to develop world-class Arctic and polar icebreakers through the exchange of knowledge, information, and resources in each of our countries….
>
> Each of our nations recognizes the need to enhance our Arctic and polar icebreaking capabilities to assert our collective presence in the Arctic and Antarctic regions. Building these specialized vessels at a faster pace, on a larger scale, and at competitive costs is a shared priority as we uphold safety and security in these strategically important areas.
>
> The ICE Pact includes four components: 1) enhanced information exchange between the United States, Canada, and Finland; 2) workforce development collaboration; 3) engagement with allies and partners, and; 4) research and development. Given the high costs of shipbuilding, long-term orders are essential for shipyard success in each of our countries. The collective investment in our domestic shipyards has the potential to scale production and reduce the cost of Arctic and polar icebreakers for our own use and for our allies and partners.
>
> By leveraging our collective expertise and resources, the MOU will facilitate knowledge, information, and resource sharing with shipyards, with the potential to create high-quality manufacturing jobs in the maritime infrastructure industry.[The] ICE Pact will help provide the stability necessary to support the production of Arctic and polar icebreakers and strengthen our shipbuilding industries.[57]

Coast Guard Great Lakes Icebreakers

Current Fleet

The Coast Guard's current Great Lakes icebreaker (GLIB) fleet consists of nine cutters:

- one heavy icebreaker—*Mackinaw* (WLBB-30), a 240-foot ship displacing 3,500 tons (**Figure 8**);
- six 140-foot *Bay*-class icebreaking tugs displacing 662 tons each; and
- two 225-foot *Juniper*-class seagoing buoy tenders displacing about 2,000 tons each that have a light icebreaking capability.[58]

[57] Department of Homeland Security, "United States, Canada, and Finland Sign MOU to Build Arctic and Polar Icebreakers," press release dated November 13, 2024. See also Cal Biesecker, "U.S., Canada And Finland Formalize Effort On Polar Icebreaker Development And Production," *Defense Daily*, November 13, 2024; Justin Katz, "US, Canada, Finland Ink Joint MOU, Latest Step in High North-Focused ICE Pact," *Breaking Defense*, November 13, 2024; Aaron-Matthew Lariosa, "U.S. Signs Icebreaker Pact with Finland, Canada," *USNI News*, November 13, 2024.

[58] Source: U.S. Coast Guard, "Ninth Coast Guard District," accessed November 19, 2024, at https://www.atlanticarea.uscg.mil/Atlantic-Area/Units/District-9/Ninth-District-Units/. A total of 10 cutters are assigned to the Ninth District, which is responsible for the Great Lakes, the Saint Lawrence Seaway, and parts of the surrounding states. The 10th cutter assigned to the Ninth District is a 100-foot inland buoy tender whose primary missions do not include icebreaking.

Figure 8. Great Lakes Icebreaker *Mackinaw*

Source: Cropped version of photograph at U.S. Coast Guard, "Coast Guard Assets, 240-foot Great Lakes Class," accessed April 15, 2025, at https://www.uscg.mil/Assets/Display/Article/1822555/240-foot-great-lakes-class/.

Although *Mackinaw* is referred to as a heavy icebreaker, the word *heavy* in this instance is being used in the context of Great Lakes icebreaking—*Mackinaw* is much larger and has more icebreaking capability than the eight other Great Lakes icebreaking ships listed above.[59] *Mackinaw* would not, however, qualify as a heavy polar icebreaker, as it is much smaller and has much less icebreaking capability than a heavy polar icebreaker.[60]

New Great Lakes Icebreaker (GLIB)

Overview

Since at least 2009, some Members of Congress have expressed interest in bolstering the Coast Guard's Great Lakes icebreaking fleet by procuring a second icebreaker with capabilities generally similar to those of *Mackinaw*.[61] Prior to October 2021, the Coast Guard generally stated

[59] At continuous speeds of 3 knots, *Mackinaw* can break ice up to 32 inches thick, the 140-foot icebreaking tugs can break ice up to 22 inches thick, and the 225-foot seagoing buoy tenders can break ice up to 14 inches thick.

[60] As discussed earlier in this report, the Coast Guard's two heavy polar icebreakers—the operational *Polar Star* and the nonoperational *Polar Sea*—are 399 feet long and displace about 13,200 tons each. *Polar Star* can break ice up to six feet (72 inches) thick at a continuous speed of 3 knots. The Coast Guard states that *Mackinaw* is equivalent to the Canadian Coast Guard ship *Samuel Risley*, a Great Lakes-homeported icebreaker and buoy tender that Canada classifies as a light icebreaker in a comparison conducted across its entire icebreaking fleet, including its Arctic icebreakers. (U.S. Coast Guard, *Great Lakes Icebreaking Mission Analysis, Fiscal Year 2016 Report to Congress*, August 30, 2016, p. 5.)

[61] See, for example, H.R. 1747 of the 111th Cong., the Great Lakes Icebreaker Replacement Act, which was introduced on March 26, 2009, reported by the Committee on Transportation and Infrastructure on April 21, 2009 (H.Rept. 111-

(continued...)

that it did not view the procurement of additional GLIBs as an urgent near-term acquisition need, given the capabilities of the current Great Lakes icebreaking fleet, the relatively young age of *Mackinaw* (which entered service in 2006), service life extension work being done on the ice-breaking tugs that is designed to add 15 years to their service lives, and Canada's own Great Lakes icebreaking capabilities.[62] In October 2021, then-Commandant of the Coast Guard Admiral Karl Schultz expressed support for procuring an additional heavy GLIB as part of a budget reconciliation bill.[63]

The Coast Guard's FY2024 budget initiated a program for procuring a new GLIB that would have capabilities similar to those of *Mackinaw*. The ship's total acquisition cost, the Coast Guard estimates, might be roughly $350 million, depending in part on the exact design that is developed for the ship.[64] (In January 2024, the Government Accountability Office [GAO] reported that the Coast Guard's 2022 Mission Need Statement for domestic icebreaking estimated the procurement cost of a heavy domestic icebreaker at $216.3 million as of 2020.[65])

March 1, 2024, Hearing

On March 1, 2024, the Oceans, Fisheries, Climate Change, and Manufacturing subcommittee of the Senate Commerce, Science, and Transportation Committee held a field hearing in Green Bay, WI, on the importance of Great Lakes icebreaking to the regional economy.[66] At this hearing, Admiral Linda Fagan, Commandant of the Coast Guard, testified:

> The Coast Guard recently completed a Fleet Mix Analysis which recommended a future fleet of in-kind capacity to replace [the Coast Guard's] current [Great Lakes icebreaking]

81), and agreed to by the House by voice vote on April 27, 2009. A similar bill, S. 1024, was introduced in the Senate on May 12, 2009.

[62] A 2016 Coast Guard report to Congress on the Great Lakes icebreaking mission, for example, stated the following:

> The current mix of heavy and medium [Great Lakes] icebreakers is capable of managing priorities and requests for icebreaking in Tier 1 and 2 waterways. When a severe ice season stresses Coast Guard asset capabilities, the existing agreement and partnership with Canada fills the capability gap and brings in extra heavy-icebreaking resources to manage the ice.... [T]he 2014 and 2015 ice seasons were a 20-year anomaly, consuming almost twice as many cutter resource hours as in any other year since 2005.
>
> The Coast Guard cannot reliably predict the economic impact of maintaining a single heavy Great Lakes icebreaker. Additionally, given the extreme conditions when ice coverage exceeds 90 percent, it is not clear that shipping delays would be significantly mitigated by an increase in icebreaking capability. Delays can be associated with several factors such as slow transit speeds, availability of pilots, and simultaneous and competing demand signals for icebreaking services across the Great Lakes.
>
> (U.S. Coast Guard, *Great Lakes Icebreaking Mission Analysis, Fiscal Year 2016 Report to Congress,* August 30, 2016, p. 11. The report was required by S.Rept. 114-68 of June 18, 2015, the Senate Appropriations Committee's report on S. 1619, the Department of Homeland Security Appropriations Bill, 2016 (see page 75).)

[63] Admiral Schultz expressed support for procuring an additional heavy Great Lakes icebreaker as part of a budget reconciliation bill as part of his testimony at an October 19, 2021, hearing on Coast Guard oversight before the Oceans, Fisheries, Climate Change, and Manufacturing subcommittee of the Senate Commerce, Science, and Transportation Committee.

[64] Source: Coast Guard email to CRS, May 1, 2024.

[65] GAO, *Coast Guard: Improved Reporting on Domestic Icebreaking Performance Could Clarify Resource Needs and Tradeoffs*, GAO-24-106619, January 16, 2024, Table 1 on page 8. In a footnote to the table, GAO states that "the actual costs [for items shown in the table] are likely to be higher than reported because the estimates do not include other costs, such as shore infrastructure costs at port locations that the Coast Guard has not yet determined."

[66] For details on this hearing, see https://www.commerce.senate.gov/2024/3/importance-of-great-lakes-icebreaking-to-the-regional-economy.

> fleet. The results showed a need for another heavy domestic icebreaker to meet future service needs across the Great Lakes. The ability to achieve continued success in this mission and reliably facilitate navigation within the MTS [marine transportation system] year-round requires sustainment and modernization of the Coast Guard's domestic icebreaking fleet, and I am committed to developing the next system of icebreaking assets.
>
> Consistent with Congressional direction, we are focused on acquiring a second heavy domestic icebreaker, at least as capable as CGC [Coast Guard cutter] *Mackinaw*. We established a Great Lakes Icebreaking Program Management Office to analyze requirements for the next generation of domestic icebreaking capability and have completed pre-acquisition activities, readying the Service to advance upon receipt of an appropriation. The FY 2024 President's Budget requests $55 million to fund initial acquisition activities and prepare for the purchase of long lead time materials for a second heavy domestic icebreaker. I look forward to continuing to work with Congress to support this acquisition.[67]

Funding

The FY2024 DHS Appropriations Act (Division C of H.R. 2882/P.L. 118-47 of March 23, 2024) provided $20.0 million in procurement funding for the GLIB program (i.e., $35 million less than the requested amount of $55.0 million mentioned in the above-quoted testimony from Admiral Fagan). The Coast Guard's proposed FY2025 budget requested no procurement funding for the GLIB program. The Coast Guard's FY2025 UPL included an item for $25.0 million in procurement funding for the ship.

January 2024 GAO Report

A January 16, 2024, GAO report on U.S. domestic icebreaking performance stated

> The Coast Guard conducts domestic icebreaking operations in three of its nine districts—the Great Lakes, New England, and the Mid-Atlantic.
>
> In the Great Lakes, 55 percent of the regional economy is dependent on key shipping channels, according to the Coast Guard. In 2020, industries shipped 100 million tons of iron ore, limestone, coal, and other commodities through the Great Lakes, according to data from the Army Corps of Engineers Waterborne Commerce Statistics Center. Some industry stakeholders who rely on these shipping channels have raised questions about whether the Coast Guard has adequate icebreaking resources available to facilitate commerce.
>
> Section 11212 of the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 [H.R. 7776/P.L. 117-263 of December 23, 2022] includes a provision for GAO to review Coast Guard icebreaking operations in the Great Lakes and examine proposed performance standards for the Coast Guard's Great Lakes icebreaking program. This report discusses the associations between ice coverage on the Great Lakes and effects on certain economic indicators, the Coast Guard's icebreaking resource needs, and the potential effects of the proposed standards on the Coast Guard's icebreaking efforts.
>
> **Key Takeaways**
>
> - Great Lakes vessel-based commerce declines during the winter, primarily due to lock closures and weather conditions. We found that the amount of ice coverage on the Great Lakes was generally not associated with selected economic indicators we

[67] Testimony of Admiral Linda L. Fagan, Commandant, U.S. Coast Guard, on "The Importance of Great Lakes Icebreaking to the Regional Economy" before the Senate Committee on Commerce, Science, and Transportation Subcommittee on Oceans, Fisheries[,] Climate Change, and Manufacturing, March 1, 2024, p. 4.

examined, such as regional unemployment rates and unfilled orders for steel production. Industries may mitigate the effects of delays caused by ice coverage, such as stockpiling iron ore inventory to maintain steel production throughout the winter.

- The Coast Guard identified heavy icebreaking capability gaps and its reliance on an aging fleet as risks to its ability to conduct its domestic icebreaking mission. As a result, the Coast Guard anticipates needing at least $3 billion in lifecycle costs to replace and acquire new vessels for domestic icebreaking.
- The proposed standards for the Coast Guard's domestic icebreaking program will largely not have an operational impact. The proposed standards may lead to improvements in data collection and reporting, which could help the Coast Guard better communicate its resource needs and tradeoffs. However, the data collection efforts may increase operating costs and information sharing needs with industry, according to the Coast Guard.
- We recommend that the Coast Guard, using data it already collects, report more complete information on its icebreaking performance to better articulate its resource needs and tradeoffs.[68]

Issues for Congress

ICE Pact Implementation

One issue for Congress concerns the implementation of the ICE Pact. Potential oversight questions for Congress include the following:

- What new legislative authorities, if any, are needed to implement the ICE Pact?
- What specific initiatives and activities will result from the ICE Pact?
- What is the timeline for negotiating and implementing these initiatives and activities?
- How, if at all, will these initiatives and activities affect
  - the PSC program,
  - the ASC program,
  - funding requirements for U.S. icebreaker modernization, and
  - the U.S. shipbuilding industrial base, including shipyards, supplier firms, and ship-design capabilities (i.e., naval architects and marine engineers)?

On March 10, 2025, the Maritime Administration (MARAD) of the Department of Transportation released a Request for Information (RFI) regarding the ICE Pact. The RFI

> requests information from the public to assist MARAD in determining which shipyards in the United States have the capacity, capability, and readiness to construct ships capable of operating in ice conditions and determining what factors would be necessary to further develop icebreaker ships in the United States. The objectives of the request are to increase the capacity of the United States to design, produce, and maintain polar icebreakers through trilateral collaboration while supporting each country's shipbuilding industrial base….

[68] GAO, *Coast Guard: Improved Reporting on Domestic Icebreaking Performance Could Clarify Resource Needs and Tradeoffs*, GAO-24-106619, January 16, 2024, pp. 1-2.

> Comments must be received on or before April 9, 2025.[69]

A January 2, 2025, blog post states that the November 2024 ICE Pact MOU "does not contain any concrete projects and does not bind the countries or their companies to anything."[70]

An October 2, 2024, letter to President Biden from Senator Christopher S. Murphy, Senator Cindy Hyde-Smith, and Senator Patty Murray regarding the ICE Pact states in part

> As work is underway with Canadian and Finnish counterparts to flesh out the Pact's details, we want to ensure the initiative achieves its fullest potential—with strong coordination across the U.S. federal government. To this end, we respectfully request responses to the following questions no later than 45 days from today to inform Congress's work on related authorization and funding issues:
>
> 1. What is the Pact's anticipated long-term impact to U.S. shipbuilding capacity and how will collaboration with Canadian and Finnish shipbuilders improve the efficiency and resiliency of our shipbuilding industrial base?
>
> 2. How will ICE Pact impact the procurement plan and construction timeline for the Polar Security Cutter program, as well as other U.S. Coast Guard shipbuilding programs? What are the potential benefits of ICE Pact to furthering existing and future Coast Guard shipbuilding efforts?
>
> 3. How will the ICE Pact initiative align with NATO's current icebreaker capability requirements, and will it be necessary to revise these targets in future budget cycles to encourage Allies and partners to purchase icebreakers built in American, Canadian, or Finnish shipyards?
>
> 4. What is the Administration's plan to solicit and incorporate feedback from all relevant stakeholders—including but not limited to the U.S. shipbuilding industry, workforce representatives, the Coast Guard-Navy Integrated Program Office, the Coast Guard, and the Department of Homeland Security—throughout negotiations over ICE Pact implementation?
>
> 5. What, if any, regulatory and statutory changes does the Administration anticipate will be needed to support ICE Pact's implementation—particularly in its workforce development and information sharing components?[71]

An August 28, 2024, blog post about the ICE Pact states in part

> The deal [i.e., the ICE Pact] remains in its early stages; July's announcement [of the pact] was merely a public commitment to begin negotiations toward a memorandum of understanding that will be announced by the end of the year….
>
> While the ICE Pact so far shows promise, its path to success will require deft negotiation around several potential sticking points.

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[69] Federal Register, *Request for U.S. Industry Input Regarding the Icebreaker Collaboration Effort (ICE) Pact, A Notice by the Maritime Administration on 03/10/2025*, accessed April 17, 2025, at https://www.federalregister.gov/documents/2025/03/10/2025-03797/request-for-us-industry-input-regarding-the-icebreaker-collaboration-effort-ice-pact.

[70] Peter Rybski, "How Finland Views the ICE Pact: Commentary, Regardless of What Is Heard In DC, Finland Expects to Build Icebreakers in Finland for the United States," *Arctic Today*, January 2, 2025.

[71] Letter dated October 2, 2024, to The Honorable Joseph R. Biden, Jr. President of the United States, from Senator Christopher S. Murphy, Senator Cindy Hyde-Smith, and Senator Patty Murray. The full text of the letter is posted at https://www.murphy.senate.gov/imo/media/doc/ice_pact_letter.pdf. A press release regarding the letter that includes the above link is posted at https://www.murphy.senate.gov/newsroom/press-releases/murphy-hyde-smith-murray-urge-swift-ice-pact-implementation-to-boost-us-shipbuilding-and-bolster-security-in-polar-regions. See also Justin Katz, "In New Letter to White House, Senators Drill Down for Info on ICE Pact," *Breaking Defense*, October 2, 2024.

> First, several top Finnish firms involved in icebreaker design and production have significant operations in China. Aker Arctic, a world leader in ice-class ship design based in Helsinki, played a critical role in design and testing for the development of China's first domestically produced polar icebreaker, the Xue Long 2. Another major Finnish firm, Wartsila, helped build the ship's power system.
>
> Security-minded officials from the United States may be hesitant to partner with companies that are actively supporting the buildup of China's polar capabilities. The risk of sensitive technology transfer to Beijing's dual-use shipyards will likely prove a particularly strong point of concern.
>
> Another possible stumbling block is the ongoing dispute between the United States and Canada over the latter's claims to exclusive jurisdiction over vast swaths of Arctic waters along the critical Northwest Passage sea route, which connects the Atlantic and Pacific oceans through the islands of northern Canada. Until recently, the decades-old dispute—rooted in differing interpretations of the U.N. Convention on the Law of the Sea—had remained on the back burner. It has returned to the fore in recent years as politicians on both sides increasingly turn their attention to the Arctic's rising importance to global trade and security. Addressing these roadblocks is critical to the ICE Pact's long-term success.[72]

PSC Program Cost Growth, Schedule Delay, and Technical Risk

Another oversight issue for Congress concerns cost growth, schedule delay, and technical risk in the PSC program.

Cost Growth

Overview

Estimated PSC procurement costs have increased substantially since 2019:

- At a March 28, 2019, hearing on the Coast Guard's proposed FY2020 budget, then-Coast Guard Commandant Admiral Karl Schultz testified that as of that date, the cost of the first PSC was estimated at $925 million to $940 million, and that the cost of the second and third PSCs would be in the range of $700 million each, producing an estimated three-ship total of about $2,325 million to $2,340 million (i.e., about $2.3 billion).[73]
- As shown in **Table 1**, estimated PSC procurement costs as of 2021 increased to for the first PSC to cost $1,297 million (i.e., about $1.3 billion) for the first PSC, $921 million for the second PSC, and $1,017 million (i.e., about $1.0 billion) for the third PSC, producing an estimated three ship total $3,235 million (i.e., about $3.2 billion), a total that is about 39% higher than the total from the March 28, 2019, testimony.
- As also shown in **Table 1**, the estimated procurement cost of the first PSC as of March 2025 has increased to $2,397 million (i.e., about $2.4 billion), a figure that is about 84.8% higher than the Coast Guard's estimated procurement cost as of 2021, and about 155.0% to 159.1% higher than the estimated cost from the March 28, 2019, testimony.

[72] Matthew P. Funaiole and Aidan Powers-Riggs, "Can NATO Ice Out China and Russia in the Arctic? A New Pact Aims to Narrow the Gap between NATO Partners and Their Competitors in Icebreaker Production," *Foreign Policy*, August 28, 2024.

[73] Source: CQ transcript of hearing.

CBO May 2024 Testimony and August 2024 Report

Prior to the Coast Guard's March 2025 estimate, CBO in May and August 2024 had projected substantial further growth in the PSC procurement costs:

- At a May 7, 2024, hearing on Coast Guard ship acquisition programs, particularly the PSC program, before the House Homeland Security Committee subcommittee on Transportation and Maritime Security, the Congressional Budget Office (CBO) estimated that, in constant FY2024 dollars, the procurement cost of the first PSC would be $1.9 billion, and the procurement costs of subsequent PSCs would be about $1.6 billion each. Given these estimates, CBO testified that "the procurement cost of three PSCs would be about $5.1 billion. That amount is 60 percent greater than the Coast Guard's most recent publicly released estimate for the procurement cost of three heavy icebreakers, which was provided to CBO by the Coast Guard in March 2024."[74]
- A CBO report on the cost of the PSC program released on August 21, 2024, provided the same cost estimates as those in CBO's May 7, 2024, testimony; extended the estimates to include a PSC program of up to nine ships; and discussed the PSC program and CBO's costs estimates in further detail.[75] **Figure 9** presents the table in the CBO report that summarizes CBO's cost estimates for the program.

Figure 9. CBO Cost Estimates for PSC Program

Table from August 2024 CBO report on PSC program

Table 2.

CBO's Estimates of the Costs of the Coast Guard's Polar Security Cutter Program

	Acquisition		Operation and support	
	Cost (billions of 2024 dollars)	Duration[a]	Cost (billions of 2024 dollars)	Duration[b]
Lead ship	1.9	2017–2029	4.0	2029–2059
Three-ship program of record	5.1	2017–2033	12.4	2029–2063
Four-ship program	6.8	2017–2035	16.7	2029–2065
Five-ship program	8.4	2017–2037	21.2	2029–2067
Six-ship program	10.0	2017–2039	25.7	2029–2069
Nine-ship program	15.0	2017–2045	39.9	2029–2075

Data source: Congressional Budget Office. See www.cbo.gov/publication/60170#data.

a. Based on projected timelines for construction. CBO's projections reflect the assumption that once construction begins, each ship would take at least five years to complete.

b. Based on ships' designed 30-year service lives. If the ships remained in the Coast Guard's service for longer, their operation and support costs would be higher and would continue for a longer period.

Source: Congressional Budget Office, *The Cost of the Coast Guard's Polar Security Cutter*, August 2024, p. 6 (Table 2).

[74] Eric J. Labs, *The Cost of the Coast Guard's Polar Security Cutter*, Congressional Budget Office, Testimony Before the Subcommittee on Transportation and Maritime Security Committee on Homeland Security, U.S. House of Representatives, April 30, 2024 (for hearing of May 7, 2024), p. 2 (PDF page 3 of 4).

[75] CBO, *The Cost of the Coast Guard's Polar Security Cutter*, August 2024, 9 pp.

GAO December 2024 Report

A December 19, 2024, GAO report on Coast Guard acquisition of polar ships states

> Key Takeaways
>
> • The Coast Guard is considering multiple efforts to expand its polar icebreaker fleet from the current two to either eight or nine. However, it has yet to determine the mix of medium and heavy polar icebreakers, known as Arctic Security Cutters and Polar Security Cutters, respectively, or the associated costs that are a part of its long-term strategy.
>
> • To address near-term gaps, the Coast Guard plans to extend the service life of its two operational polar icebreakers. It also plans to purchase and convert a commercially available polar icebreaker (CAPI), something it has never done before. But it lacks information on the full cost to do so.
>
> • We recommend that the Coast Guard develop a detailed cost estimate for the CAPI and that it develop an analysis of the cost and sequencing for the planned polar icebreaker fleet expansion within the context of its larger acquisition portfolio and priorities. DHS did not concur with the first recommendation and did concur with the second….
>
> **What are some open questions that remain for the Coast Guard to answer as it plans its future polar icebreaker fleet?**
>
> The Coast Guard faces many questions as it expands its polar icebreaking fleet in the coming decades. However, it has already started planning this expansion without a complete understanding of how to achieve its goals. It will gain information to answer some questions as the planning progresses for a potential Arctic Security Cutter program. But other answers are external to that effort and have potential implications for other programs, such as any expansion of the Polar Security Cutter program to build more than three cutters. Some open questions that remain for the Coast Guard related to the polar icebreaker fleet expansion are listed below (see fig. 4).

Figure 4: Coast Guard Has Yet to Address Open Questions Related to Its Potential Polar Icebreaker Fleet Expansion

	Polar icebreaker fleet (as of November 2024)	Bridging strategy (~2026 to 2040s)	Future polar icebreaker fleet (starting in 2030s)
Polar icebreaker type			
Heavy	1 - *Polar Star*	1 - *Polar Star*	3 to 5 Polar Security Cutters
Medium	1 - *Healy*	2 - *Healy* and the CAPI	3 to 5 Arctic Security Cutters
Total polar icebreakers	**2**	**3**	**8 or 9**
Open questions			
	Service life for the *Healy* and *Polar Star*	Detailed cost estimate and planned modifications to convert the commercially available polar icebreaker (CAPI)	Number of acquisition programs needed to fill capability gaps in the Arctic and their costs and schedules
	Costs to operate and maintain the *Polar Star* until decommissioned	Number of years the CAPI will operate	Exact number of polar icebreakers the Coast Guard will acquire, either 8 or 9
	Costs to operate and maintain the *Healy* until decommissioned	Costs and logistics of crewing and maintaining the CAPI, which was not built as a Coast Guard ship	Exact number of Polar Security Cutters and Arctic Security Cutters the Coast Guard will acquire
		The CAPI's missions once full operational capability is achieved	Costs and schedules for building and operating Polar Security Cutters and Arctic Security Cutters and supporting an increased crew needed for a larger polar fleet
		Temporary homeport of the CAPI until its permanent homeport is ready	Operational requirements, such as scientific capabilities for Arctic Security Cutters
			Location, costs, and schedules to homeport additional polar icebreakers beyond the first three Polar Security Cutters

Source: GAO analysis of Coast Guard documentation and interviews with Coast Guard officials. | GAO-25-106822

Note: The Polar Security Cutter program is currently revising its cost and schedule baseline, which will update its planned operational dates for each icebreaker once completed. The notional Arctic Security Cutter is not yet a program. As such, it does not have a schedule baseline. Estimates above are subject to change and based on GAO analysis of how long past and current polar icebreaker programs have taken to deliver an operational ship as well as pending decisions on how long the Coast Guard will operate existing assets as new polar icebreakers are acquired.

… With so many questions unanswered, the Coast Guard has yet to make a business case to adequately support committing resources to expanding its polar fleet to its desired state of eight to nine polar icebreakers. As we have previously found, high levels of uncertainty set up programs for poor outcomes. In this case, any poor outcomes would be compounded because multiple programs are involved. Moving forward without better understanding the commitments, costs, and affordability may bind the Coast Guard to a portfolio that cannot be executed.

Conclusions

The Coast Guard is working to increase its presence in the Arctic region and expand the polar icebreaking fleet. Polar icebreaker programs take over a decade to deliver a capability, so the Coast Guard is trying to add an existing commercial icebreaker to its fleet sooner by purchasing and converting it within 2 years. But it does not understand the likely cost of this effort, such as the full cost of converting a commercially available polar icebreaker or what modifications it will need to make. The Coast Guard has prepared a rough estimate, which is not sufficient to inform a budget request, and lacks updated information now that a specific polar icebreaker has been identified. To meet its time frame of 2 years, it plans to purchase the icebreaker and figure out the detailed cost estimate for any modifications later.

The Coast Guard is already beset by affordability challenges in its portfolio of major acquisition programs within a constrained budget environment to support the missions it performs. However, it has not yet shown how it could achieve its goal to enlarge the polar fleet to eight or nine polar icebreakers.

It is not too late for the Coast Guard to get more information since it has yet to make financial commitments outside of the first three Polar Security Cutters. As the Coast Guard moves forward, it could develop more detailed cost estimates and determine if it can afford its plans within the context of its larger acquisition portfolio. Doing so could help the Coast Guard take a step in the right direction to determine what it can afford and when, among its many acquisition priorities. Finally, these plans will demonstrate whether the necessary resources will be there when the Coast Guard is ready to move forward or what trade-offs it can make to better position itself to fill its capability gaps.[76]

As mentioned earlier, in March 2025, the Coast Guard reportedly awarded the shipbuilder a contract modification for an additional $951.6 million for the first PSC to account for increasing time and cost to build the ship. Much or all of this figure might constitute cost growth above the Coast Guard's 2021 estimate for the total procurement cost of the ship.

Schedule Delay

As mentioned earlier, the Coast Guard originally aimed to have the first PSC delivered in 2024, but the ship's estimated delivery date has been delayed repeatedly and the Coast Guard now expects the ship to be delivered in 2030, about six years later than the originally scheduled date. As a result of the PSC program's cost growth (see previous section) and schedule delay, the PSC program has become a prominent oversight item in congressional reviews of Coast Guard budgets and programs.

A principal cause of the schedule delay has been the time needed to achieve design maturity (i.e., to complete the detail design of the ship). The parent design strategy used for the PSC program (i.e., the strategy of creating the PSC design by modifying the design of an existing polar-capable ship) was intended by the Coast Guard and Navy to reduce the PSC's design time. Six years after contract award, the expected reduction in design time does not appear have been realized. The time needed to mature the PSC design suggests that the parent design used for the PSC program—the design for the new German polar icebreaker *Polar Stern II*—might now more closely resemble a parent design in name only (PDINO).[77] In this regard, the PSC program

[76] Government Accountability Office, *Coast Guard Acquisitions: Further Cost and Affordability Analysis of Polar Fleet Needed*, GAO-25-106822, Q&A Report to the Committee on Transportation and Infrastructure, House of Representatives, December 19, 2024, pp. 1, 11-13.

[77] The phrase *parent design in name only* (with the resulting acronym PDINO) is only one possible shorthand way of referring to the situation. One possible way to pronounce the acronym PDINO would be pa-DEE-no.

appears somewhat similar to the Navy's Constellation (FFG-62) class frigate program, which the Navy initiated as a program that would use a parent design, but which observers might now characterize as having moved over time toward a PDINO situation.[78] Limited numbers of available naval architects and design engineers within the United States also appear to have contributed to delays in maturing the PSC design. A January 22, 2024, press report states (emphasis added)

> Rear Adm. Chad Jacoby, the assistant commandant of the Coast Guard for acquisition, said this month workforce challenges—specifically, needing more highly trained welders and **design engineers**—are contributing to delays on the Polar Security Cutter program at Bollinger Mississippi, formerly VT Halter Marine.
>
> "If you look across all of our construction programs, every shipyard says they're going to hire 1,000 or 2,000 more people prior to executing the contracts that we have in place. They all happen to be on the Gulf Coast, so if you add up all those numbers, it's probably physically impossible for every one of those individual shipyards to hire 2,000 more people" to support on-time ship deliveries, Jacoby said on a Jan. 11 panel at the Surface Navy Association annual conference.
>
> He told Defense News after the panel he is specifically concerned about Bollinger Mississippi in Pascagoula and its Polar Security Cutter; Eastern Shipbuilding Group in Panama City, Florida, which is building the first four Offshore Patrol Cutters [OPCs]; Austal USA in Mobile, Alabama, which will build the next 11 OPCs; and Birdon America, a Denver-based company that will build the Waterways Commerce Cutters with a number of Louisiana- and Alabama-based companies.
>
> "It is one workforce across many states," the admiral said of the Gulf Coast region. "As each shipyard says they're going to hire people, they're definitely competing against each other."[79]

Some observers have questioned the value of using parent designs in military shipbuilding programs. A 2015 journal article, for example, states

> The U.S. Navy has experimented with many approaches to design and build its ships. Using an existing design as the "parent" design, also referred to as "modified-repeat" design, is on its face an attractive option. Many acquisition executives, program managers and some ship design engineers believe that a design based on a parent has fewer technical risks than a new "clean sheet of paper" design and therefore the time and cost to design and build it will be reduced. They assume early in the ship acquisition program that "the design is mature" and because of that fewer problems will be encountered in completing the design and savings will thus be accrued. Yet, a number of naval ships based on a parent design have in fact experienced unanticipated cost and schedule growth during construction as well as technical problems during their in-service life. The authors will examine some of

[78] For more on the FFG-62 program, see CRS Report R44972, *Navy Constellation (FFG-62) Class Frigate Program: Background and Issues for Congress*, by Ronald O'Rourke. On the issue of the FFG-62's parent design strategy, the report states

> An April 2, 2024, press report states: "At one point the Constellation design shared about 85 percent commonality with the original [Italian-French] FREMM [Fregata Europea Multi-Missione parent] design, but the alterations [incorporated into the FFG-62 design] have brought that commonality down to under 15 percent, a person familiar with the changes told USNI News." If the FFG-62 design shares less than 15% commonality with the FREMM design, then some observers might characterize the FFG-62 program as having moved over time toward what might be termed a parent design in name only (PDINO) design approach.

[79] Megan Eckstein, "Coast Guard Ship Programs Facing Delays amid National Worker Shortage," *Defense News*, January 22, 2024.

these ship designs which were based on an existing design and/or prototypes and highlight the fallacies of such beliefs and assumptions.[80]

Potential oversight questions for Congress include the following:

- How fully developed was *Polarstern II*'s design at the time that it was adopted as the parent design for developing the PSC design? How much of *Polarstern II*'s detail design and construction plan was completed at that time?
- To what degree has *Polarstern II*'s design in practice served as the parent design for the PSC design? In developing the PSC's design, how many changes have been made from *Polarstern II*'s design? What technical, schedule, and cost risks, if any, might arise for the PSC program as a result of differences between the PSC's design and *Polarstern II*'s design?

Technical Risk

GAO has reported and testified multiple times about technical risk in the PSC program. Technical risk can lead to cost growth and schedule delay. A February 2025 GAO report assessing DHS acquisition programs states the following regarding the PSC program:

> **Key Findings**
>
> • Cost and Schedule. The program indicated in November 2023 that it would breach its cost and schedule goals. It planned to rebaseline those goals by seeking approval from DHS in December 2024. As of November 2024, the cost estimate is expected to grow by over 20 percent above the previous baseline of $3.3 billion but is not yet completed. Program officials stated that they plan to seek approval for the new baseline before completing ongoing contract negotiations with the shipbuilder.
>
> • Design and Construction. Design immaturity continues to delay the start of construction, which the program originally planned for 2021. With 81 percent of functional design complete more than 5 years after the award of the detail design contract, the Coast Guard has not yet met its standard of 95 percent completion before starting construction. As of November 2024, the Coast Guard reported authorizing six of the 85 total sections of the ship to help inform full production, but none are finished….
>
> **Program History and Acquisition Strategy**
>
> The Coast Guard established its initial acquisition program baseline for the PSC program in 2018 and has revised it twice, once in 2021 to reflect higher costs and a delayed schedule and in 2022 due to schedule delays related to COVID-19…. We previously made recommendations to help the program maintain its cost and schedule baselines. For example: (1) To implement recommendations we made in 2018, the program conducted a technology readiness assessment, reevaluated its cost estimate, and identified and mitigated schedule risks (GAO-18-600), and (2) In 2023, we made a priority recommendation to DHS to ensure design is mature prior to authorizing lead ship construction. DHS concurred with the recommendation. As of August 2024, this recommendation remains open (GAO-23-105949).
>
> **Cost and Schedule Status**
>
> In November 2023, the program notified DHS that it would breach its cost and schedule goals. As of November 2024, the program is planning to update its acquisition program

[80] Robert G. Keane Jr. and Barry F. Tibbitts, "The Fallacy of Using a Parent Design: 'The Design Is Mature,'" *Transactions (Society of Naval Architects and Marine Engineers [SNAME])*, 2015, No. 1 (January): 91-104, with additional discussion from the authors and other commentators on pages 105-122. The quoted passage appears at the start of the article, on page 91, where it forms part of an abstract or summary for the article.

baseline by the end of 2024. The program's notional schedule as of November 2023 indicates the lead PSC will be delivered in late 2029—a delay of over 5 years since initial plans. The program had planned to complete its cost estimate by September 2024 but still had not done so by November 2024. However, when the program declared the cost breach, it reported costs had exceeded at least 20 percent of the previous goal of $3.3 billion.

Program officials said that the cost and schedule increases are attributable to several factors including the lack of U.S. shipbuilding expertise for designing and constructing heavy polar icebreakers, the complexity of and changes to the design, and the effects of the COVID-19 pandemic on the program's planned activities.

In October 2023, the shipyard requested restructuring of the contract's detail design and construction line items because it determined it could not meet the original contract terms. In April 2024, the Coast Guard made several modifications to the contract, including changing the line item for advance planning, engineering, and design for the lead ship from a fixed-price incentive to a firm-fixed-price contract type. Program officials do not have an anticipated completion date for contract restructuring as negotiations are ongoing. However, officials said that they plan to finalize the updated acquisition program baseline before negotiations are completed, which introduces uncertainty with the forthcoming cost and schedule goals.

Design and Construction

Design immaturity continues to be a top program risk, even though program officials said they entered the critical design review in September 2024. As of September 2024, and after more than 5 years of work since the contract was awarded, functional design is approximately 81 percent complete. As a result, it is unlikely that the design will be mature enough to start construction on the lead PSC by the end of 2024. Program officials said they aim to have 95 percent of the functional design complete to start construction by that time, which is inconsistent with ship design leading practices we previously identified.

To address slower than expected design progress, program officials said that the shipyard brought on additional engineering personnel to accelerate design maturity. Program officials said that the shipyard demonstrated completion of significant design work as of the September 2024 critical design review. Further, they said that the Coast Guard will seek approval from DHS to begin lead ship construction in December 2024.

In July 2023, the Coast Guard reported authorizing production of the first of 85 total sections for the ship, an incremental approach to production. As of July 2024, the first section is over half complete. As of November 2024, the shipyard has since begun production on six total sections to build workforce capability, test new processes and equipment, and reduce production risk while design matures.

Coast Guard officials stated that the program conducted cybersecurity assessments in 2023 and 2024 and deemed the results as classified.

Program Office Comments

We provided a draft of this assessment to the program office for review and comment. The program office provided technical comments, which we incorporated where appropriate. In this assessment, we included information for key events as of November 2024 to the extent it was provided by the Coast Guard.[81]

[81] Government Accountability Office, *DHS Annual Assessment[;} Improved Guidance on Revised Acquisition Goals Would Enhance Transparency*, GAO-25-107317, February 2025, pp. 66-67.

Using a Foreign Shipyard to Build PSCs and/or ASCs

Overview

Another potential issue for Congress concerns the possibility of building PSCs and/or ASCs in a foreign shipyard with experience in the design and construction of polar icebreakers. Shipyards in Canada and Finland reportedly have expressed interest in building polar icebreakers for the U.S. Coast Guard (or in supporting the design or construction of icebreakers for the U.S. Coast Guard that are built in a U.S. shipyard).[82] Some observers believe that the Coast Guard's desired force of eight or nine polar icebreakers could be fielded sooner, at lower cost, and with less technical risk by building some of the PSCs and/or ASCs in a foreign shipyard with experience in the design and construction of polar icebreakers. Building PSCs and/or ASCs in a foreign shipyard (or building them in a U.S. shipyard with support from a foreign shipyard) might be undertaken under the trilateral Icebreaker Collaboration Effort (ICE Pact) discussed above. Two U.S. laws prohibit building U.S. military ships or major components of such ships in foreign shipyards, but those laws also include presidential waivers or exceptions for the national security interest.

Laws Relating to Building Ships in Foreign Shipyards

Some observers have suggested that a U.S. law known as the Jones Act prevents the U.S. Coast Guard from buying or operating a foreign-built polar icebreaker. The Jones Act, however, does not prevent the U.S. Coast Guard from buying or operating a foreign-built polar icebreaker, as the operations of Coast Guard polar icebreakers do not fall under the Jones Act.[83]

Two other laws, however, are of note in connection with the idea of building a U.S. Coast Guard polar icebreaker in a foreign shipyard. One is 14 U.S.C. §1151, which was added to the *U.S. Code* by Section 26(a) of the Coast Guard Authorization Act of 1988 (H.R. 2342/P.L. 100-448 of September 28, 1988). The provision states

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[82] See, for example, Elisabeth Gosselin-Malo, "Canada, Finland Tout Different Paths of 'Icebreaker Diplomacy' with US," *Defense News*, April 14, 2025; Elisabeth Gosselin-Malo, "Scorned by Trump, Canadian Shipbuilders Flash Their Icebreaker Skills," *Defense News*, March 6, 2025; Justin Ling, "Canada Tries to Break the Ice With Trump," *Foreign Policy*, February 17, 2025; Peter Rybski, "How Finland Views the ICE Pact: Commentary, Regardless of What Is Heard In DC, Finland Expects to Build Icebreakers in Finland for the United States," *Arctic Today*, January 2, 2025; Mary McAuliffe, "Finland Spent Years on Icebreaker Deal Before Memorandum with US, Canada," *Arctic Today*, November 26, 2024.

[83] The Jones Act (Section 27 of the Merchant Marine Act of 1920, P.L. 66-261) applies to vessels transporting "merchandise" from one U.S. point to another U.S. point. It requires that such transportation be performed in U.S.-built vessels owned by U.S. citizens and registered in the United States; U.S. registration, in turn, requires that crew members be U.S. citizens. Merchandise is defined to include "merchandise owned by the U.S. Government, a State, or a subdivision of a State; and valueless material" (46 U.S.C. §55102). Merchandise is further defined at 19 U.S.C. §1401(c) to mean "goods, wares, and chattels of every description." It is the waterborne transportation of merchandise domestically that triggers the Jones Act. A vessel wishing to engage in such transportation would apply to the U.S. Coast Guard for a "coastwise endorsement." Thus, an icebreaker strictly performing the task it is designed for and not transporting cargo from one U.S. point to another would not be subject to the Jones Act.

The federal agency in charge of deciding what kind of maritime activity must comply with the Jones Act, U.S. Customs and Border Protection (CBP), has confirmed that icebreaking is not one of those activities. In a 2006 ruling, which appears to be its most recent ruling on the subject, CPB informed Alcoa, Inc. that it could use foreign-built and foreign-flagged vessels for icebreaking on the Hudson River in New York State. CBP reasoned that the transporting of equipment, supplies, and materials used on or from the vessel in effecting its service is not coastwise trade, provided that these articles are necessary for the accomplishment of the vessel's mission and are usually carried aboard the vessel as a matter of course. The 2006 ruling cited earlier rulings in 1974, 1985, and 2000 as precedent.

For more on the Jones Act, see CRS Report R45725, *Shipping Under the Jones Act: Legislative and Regulatory Background*, by John Frittelli.

> §1151. Restriction on construction of vessels in foreign shipyards
>
> (a) Except as provided in subsection (b), no Coast Guard vessel, and no major component of the hull or superstructure of a Coast Guard vessel, may be constructed in a foreign shipyard.
>
> (b) The President may authorize exceptions to the prohibition in subsection (a) when the President determines that it is in the national security interest of the United States to do so. The President shall transmit notice to Congress of any such determination, and no contract may be made pursuant to the exception authorized until the end of the 30-day period beginning on the date the notice of such determination is received by Congress.

The other is 10 U.S.C. §8679, which was added to the *U.S. Code* by Section 824(b) of the FY1994 National Defense Authorization Act (NDAA) (H.R. 2401/P.L. 103-160 of November 30, 1993). The provision states

> §8679. Construction of vessels in foreign shipyards: prohibition
>
> (a) Prohibition.-Except as provided in subsection (b), no vessel to be constructed for any of the armed forces,[84] and no major component of the hull or superstructure of any such vessel, may be constructed in a foreign shipyard.
>
> (b) Presidential Waiver for National Security Interest.-(1) The President may authorize exceptions to the prohibition in subsection (a) when the President determines that it is in the national security interest of the United States to do so.
>
> (2) The President shall transmit notice to Congress of any such determination, and no contract may be made pursuant to the exception authorized until the end of the 30-day period beginning on the date on which the notice of the determination is received by Congress.
>
> (c) Exception for Inflatable Boats.-An inflatable boat or a rigid inflatable boat, as defined by the Secretary of the Navy, is not a vessel for the purpose of the restriction in subsection (a).

Remarks by President-Elect and President Trump

A January 7, 2025, press report stated

> President-elect Donald Trump on Tuesday [January 7] threw a wrench in U.S. plans to build icebreaker vessels with Canada and Finland, saying he told outgoing Canadian Prime Minister Justin Trudeau, "We don't need a partner."
>
> …The remarks, at a freewheeling press conference and part of a broader critique of Canada's reliance on the U.S., immediately cast a shadow on the future of the Icebreaker Collaboration Effort Pact, which was first announced at the NATO summit in Washington in July [2024].
>
> What Trump said: "I called him, Gov. Trudeau, I said, 'Listen, what would happen if we didn't subsidize you?' Because we give them a lot of money, we help them," Trump said. "As an example, we're buying icebreakers, and Canada wants to join us in the buying of icebreakers. I said, 'We don't really want to have a partner in the buying of icebreakers. We don't need a partner.'"

[84] 14 U.S.C. §101, which establishes the Coast Guard, states the following: "The Coast Guard, established January 28, 1915, shall be a military service and a branch of the armed forces of the United States at all times."

On January 24, 2025, President Trump stated

> You know, we ordered—we're going to order about 40 Coast Guard big icebreakers.[85] Big ones. And all of a sudden, Canada wants a piece of the deal. I say, "Why are we doing that?" I mean, I like doing that if they're a [U.S.] state, but I don't like doing that if they're a [separate] nation."[86]

A March 31, 2025, press report (with a dateline of March 29) states

> Finnish President Alexander Stubb made a surprise trip on Saturday [March 29] to meet with U.S. President Donald Trump in Florida, where the two leaders discussed strengthening their countries' bilateral partnership and played a round of golf.
>
> "President Stubb and I look forward to strengthening the partnership between the United States and Finland, and that includes the purchase and development of a large number of badly needed Icebreakers for the U.S., delivering Peace and International Security for our Countries, and the World," Trump posted on his Truth Social platform.[87]

April 18, 2025, Press Report About Negotiations with Finnish Shipbuilder

As noted in the sections on the PSC and ASC programs, on April 18, 2025, it was reported that the Coast Guard is negotiating with a Finnish shipbuilder for building three to five ASCs and possibly also three PSCs. One of the press reports states

> In what could dramatically accelerate expansion of U.S. Arctic capabilities the Coast Guard is reportedly in negotiations with Finnish shipbuilder Rauma Marine Constructions (RMC) for three to five medium-sized icebreakers.
>
> Finland's largest newspaper Helsingin Sanomat reports that the potential five-vessel deal would be valued at 2.5 billion Euro, around $2.7 billion. In addition, the yard is also said to be exploring the possibility of delivering three heavy icebreakers, likely at a somewhat higher total price point.
>
> Finnish yards could complete a medium ice-breaker of ready design in as little as 36 months. The Coast Guard is reportedly aiming to place the first new icebreaker into service before the end of President Trump's time in office.[88]

Accelerating Attainment of Eight- or Nine-Ship Polar Icebreaking Fleet

Another issue for Congress concerns potential options for accelerating the attainment of an eight- or nine-ship polar icebreaking fleet. Given the estimated 2030 delivery date for the first PSC, an acquisition strategy of building PSCs and ASCs using no more than one shipyard at a time would attain an eight- or nine-ship polar icebreaking fleet no earlier than the late 2030s (if ships were

[85] The origin of the figure of 40 icebreakers is not clear. One possibility is that it relates to the size of the Russian icebreaker fleet as shown in **Table B-1**. See also Lee Ferran, "After Trump's Promise of 40 'Big' Icebreakers, Coast Guard Says It'll Take Eight or Nine for Polar Ops," *Breaking Defense*, April 8, 2025.

[86] White House, "Remarks by President Trump During Hurricane Helene Briefing," January 24, 2025.

[87] Andrea Shalal and Anne Kauranen, "Finnish President Boosts Ties with Trump in Surprise Florida Visit," *Reuters*, march 31, 2025.

[88] Malte Humpert, "US Coast Guard Negotiating With Finland's Rauma Marine For Construction of Up to Five Icebreakers, Helsinki Press Reports," *gCaptain*, April 18, 2025. See also Maritime Executive, "Report: Finland is Frontrunner Negotiating for USCG Icebreaker Order," *Maritime Executive*, April 18, 2025; Yle News, "Rauma Shipyard in Talks with US Coast Guard over Icebreaker Deal," *Yle News*, April 18, 2025; Peter Rybski, "Finnish Shipyard RMC in Negotiations to Build up to Eight Icebreakers for the U.S. Coast Guard," *Arctic Today*, April 18, 2025.

delivered at one-year intervals) or the 2040s (if ships were delivered at 18-month or two-year intervals).

Potential Acquisition Strategy Options

Potential acquisition strategy options for accelerating the attainment of an eight- or nine-ship polar icebreaking fleet include

- accelerating the start of ASC procurement and building PSCs and ASCs at the same time, and/or
- selecting a second shipyard to build polar icebreakers, and building polar icebreakers in two shipyards at the same time.

The Coast Guard might be viewed as having taken a step toward the first option above by releasing on April 11, 2025, the previously discussed RFI for ASCs, and by stating in the RFI posting that the Coast Guard is "interested in proven execution and build strategies and the ability of global shipyards to support the construction and subsequent launch of an icebreaking-capable vessel within 36-months of a contract award."

Regarding the second option above, a second shipyard could be either a U.S. shipyard or a shipyard located in a foreign country such as Canada or Finland. The RFI posting's reference to "global shipyards" appears to allow for the possibility of building the ASCs in a foreign shipyard.

Potential Ship Design Options

In connection with the potential acquisition strategy options described above, potential options for the ship designs to be used in building PSCs and ASCs include but are not necessarily limited to the following:

- **Build all PSCs to the current PSC design, and all ASCs to a second design** that meets the Coast Guard's preliminary capability parameters for ASCs as outlined in the Coast Guard's April 11, 2025, RFI for ASCs. This might be considered a traditional or baseline option for building two classes of ships with differing desired capabilities.
- **Build ASCs to a variation of the PSC design.** This option could reduce design time and design cost for the ASCs, leverage PSC production learning curve benefits, permit batch orders of materials and components that are common to PSCs and ASCs (reducing procurement costs for both PSCs and ASCs), and streamline life-cycle logistics support for the polar icebreaking fleet. This approach, however, would result ASCs that would be larger than what is described in the Coast Guard's April 11, 2025, RFI for ASCs, and therefore (other things held equal) more expensive to procure. The PSC design has a length of 460 feet, a beam (maximum width) of 88 feet, and a draft (maximum depth below the waterline) of 36 feet,[89] while the April 11, 2025, RFI states that Coast Guard's preliminary capability parameters for ASCs include a length of 360 feet or less, a beam of 78 feet or less, and a draft of 23 feet or less. An ASC built to the dimensions listed in the RFI might have a displacement roughly half that of

[89] Source: Coast Guard fact sheet on the PSC, January 2023, accessed April 16, 2025, at https://www.dcms.uscg.mil/Portals/10/CG-9/Acquisition%20PDFs/Factsheets/PSC_0123.pdf.

the PSC design.[90] At a November 29, 2023, hearing before the House Homeland Security Committee on how U.S. Arctic strategy impacts homeland security, Vice Admiral Peter Gautier, Coast Guard Deputy Commandant for Operations, stated (emphasis added) that the Coast Guard in coming years will need to have "a mix of heavy icebreakers like the *Polar Star* and the Polar Security Cutters that we're building now, and medium icebreakers like the *Healy* **that have shallower drafts and can get into tighter spaces and shallower areas**."[91]

- **Build PSCs that are beyond those covered in the current three-ship PSC contract, as well as ASCs, to a common design that is different from the current PSC design** (or to two variations of this different design). The difference between this option and the baseline option described earlier is that the second design would be used to build not only the ASCs, but also some of the PSCs (i.e., those that are beyond the three PSCs covered in the current three-ship PSC contract). This option might offer some potential schedule or cost advantages in attaining an eight- or nine-ship polar icebreaker fleet, but some of the ships in the resulting fleet might not match the desired operational capabilities for PSCs and/or ASCs.

April 18, 2025, Press Report About Negotiations with Finnish Shipbuilder

As noted in the sections on the PSC and ASC programs and the section on using a foreign shipyard to build PSCs and/or ASCs, on April 18, 2025, it was reported that the Coast Guard is negotiating with a Finnish shipbuilder for building three to five ASCs and possibly also three PSCs. One of the press reports states

> In what could dramatically accelerate expansion of U.S. Arctic capabilities the Coast Guard is reportedly in negotiations with Finnish shipbuilder Rauma Marine Constructions (RMC) for three to five medium-sized icebreakers.
>
> Finland's largest newspaper Helsingin Sanomat reports that the potential five-vessel deal would be valued at 2.5 billion Euro, around $2.7 billion. In addition, the yard is also said to be exploring the possibility of delivering three heavy icebreakers, likely at a somewhat higher total price point.
>
> Finnish yards could complete a medium ice-breaker of ready design in as little as 36 months. The Coast Guard is reportedly aiming to place the first new icebreaker into service before the end of President Trump's time in office.[92]

[90] Source: CRS analysis of dimensions and displacements of the PSC design, *Polar Star*, *Healy*, and the ASC as shown in the Coast Guard's April 11, 2025 RFI for ASCs.

[91] CQ transcript of hearing.

[92] Malte Humpert, "US Coast Guard Negotiating With Finland's Rauma Marine For Construction of Up to Five Icebreakers, Helsinki Press Reports," *gCaptain*, April 18, 2025. See also Maritime Executive, "Report: Finland is Frontrunner Negotiating for USCG Icebreaker Order," *Maritime Executive*, April 18, 2025; Yle News, "Rauma Shipyard in Talks with US Coast Guard over Icebreaker Deal," *Yle News*, April 18, 2025; Peter Rybski, "Finnish Shipyard RMC in Negotiations to Build up to Eight Icebreakers for the U.S. Coast Guard," *Arctic Today*, April 18, 2025.

Legislative Activity for FY2025

Summary of Appropriation Action on FY2025 Funding Request

Table 3 summarizes congressional appropriation action on the Coast Guard's FY2025 procurement funding requests for icebreakers.

Table 3. Summary of Congressional Appropriations Action on FY2025 Procurement Funding Request

(In millions of dollars)

	Request	HAC	SAC	Enacted
Polar Security Cutter (PSC)	0	0		n/a
Commercially available polar icebreaker (CAPI)	0*	0		n/a
Great Lakes icebreaker (GLIB)	0*	0		n/a

Source: Table prepared by CRS, based on Coast Guard's FY2024 budget submission, HAC and SAC committee reports, and explanatory report on FY2025 DHS Appropriations Act.

Notes: HAC is House Appropriations Committee; **SAC** is Senate Appropriations Committee. * The Coast Guard's FY2025 UPL includes an item for $25.0 million in procurement funding for the CAPI program and another item for $25.0 million in procurement funding for the GLIB program. **n/a** means not available—the Full-Year Continuing Appropriations and Extensions Act, 2025 (H.R. 1968/P.L. 119-4 of March 15, 2025), a full-year continuing resolution (CR), does not specify procurement funding levels for individual Coast Guard acquisition programs.

FY2025 DHS Appropriations Act (H.R. 8752/H.R. 1968 /P.L. 119-4)

House

The House Appropriations Committee, in its report (H.Rept. 118-553 of June 14, 2024) on H.R. 8572, recommended the funding levels shown in the HAC column of **Table 3**. H.Rept. 118-53 states

> The Coast Guard is directed to continue to brief the Committee quarterly on all major acquisitions. In particular, the Committee remains concerned about the cost and schedule of the Offshore Patrol Cutter (OPC) and Polar Security Cutter (PSC) programs and the briefing should include additional detailed information on the progress of these programs….
>
> *Polar Security Cutter.*—The Committee remains supportive of the construction of the first PSC. The Committee notes that no funds are needed this fiscal year for the construction given appropriations designated in previous years for PSC. The Committee supports the Coast Guard using previously appropriated PSC funds for the construction of the first PSC….
>
> *Great Lakes Icebreaker.*—The recommendation does not provide funding for a Great Lakes Icebreaker. The $20,000,000 provided in fiscal year 2024 will allow the Coast Guard to continue the analyze and select phase of the acquisition for a Great Lakes Icebreaker. The Committee notes that icebreaking technology has advanced since the acquisition of the CGC Mackinaw and urges the Coast Guard to consider innovative technologies and advances in ship design as the program management office works to complete the necessary pre-acquisition activities. A failure to capitalize on these advancements would be a lost opportunity. Additionally, the Committee urges the Coast Guard to consider the

> limitations in the CGC Mackinaw's maneuverability and whether such limitations adversely impact the vessel's capability. Further, in order for the Coast Guard to leverage the capacity of the Nation's industrial base, including the Coast Guard's organic vessel repair capacity at the Coast Guard Yard, the Committee encourages the Service to prioritize designs that would allow the vessel to be able to fully exit the Great Lakes. (Pages 53 and 54)

Enacted

The Full-Year Continuing Appropriations and Extensions Act, 2025 (H.R. 1968/P.L. 119-4 of March 15, 2025), a full-year continuing resolution (CR), does not specify procurement funding levels for individual Coast Guard acquisition programs.

Section 1702 of H.R. 1968/P.L. 119-4 states

> Sec. 1702. Section 11223(b)(2) of the Don Young Coast Guard Authorization Act of 2022 (division K of P.L. 117-263) is amended by striking "shall apply" and inserting "shall not apply".

The Don Young Coast Guard Authorization Act of 2022 is Division K of the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 (H.R. 7776/P.L. 117-263 of December 23, 2022). Section 11223 of H.R. 7776/P.L. 117-263 authorized the Coast Guard to acquire or procure one U.S.-built available icebreaker. Subsection (b)(2) of Section 11223 states

> (2) Additional exceptions.--Paragraphs (1), (3), (4), and (5) of subsection (a) and subsections (b), (d), and (e) of section 1132 of title 14, United States Code, shall apply to an acquisition or procurement under subsection (a) [the subsection that provides the authority for the Coast Guard to acquire or procure one U.S.-built available icebreaker] until the first phase of the initial acquisition or procurement is complete and initial operating capacity is achieved.

14 U.S.C. 1132 is a provision relating to Coast Guard acquisition. Subsections (a) and (b) of 14 U.S.C. 1132 state

> (a) In General.-The Commandant may not establish a Level 1 or Level 2 acquisition project or program until the Commandant-
>
> (1) clearly defines the operational requirements for the project or program;
>
> (2) establishes the feasibility of alternatives;
>
> (3) develops an acquisition project or program baseline;
>
> (4) produces a life-cycle cost estimate; and
>
> (5) assesses the relative merits of alternatives to determine a preferred solution in accordance with the requirements of this section.
>
> (b) Submission Required Before Proceeding.-Any Coast Guard Level 1 or Level 2 acquisition project or program may not begin to obtain any capability or asset or proceed beyond that phase of its development that entails approving the supporting acquisition until the Commandant submits to the appropriate congressional committees the following:
>
> (1) The key performance parameters, the key system attributes, and the operational performance attributes of the capability or asset to be acquired under the proposed acquisition project or program.
>
> (2) A detailed list of the systems or other capabilities with which the capability or asset to be acquired is intended to be interoperable, including an explanation of the attributes of interoperability.

> (3) The anticipated acquisition project or program baseline and acquisition unit cost for the capability or asset to be acquired under the project or program.
>
> (4) A detailed schedule for the acquisition process showing when all capability and asset acquisitions are to be completed and when all acquired capabilities and assets are to be initially and fully deployed.

A December 19, 2024, GAO report on Coast Guard acquisition of polar ships states

> To expedite the acquisition process for the CAPI [Commercially Available Polar Icebreaker] to achieve operations within 18 to 24 months, the Coast Guard requested and received relief from Congress to acquire the CAPI without completing certain early-stage acquisition steps typically required pursuant to statute for Coast Guard major acquisition programs.[93] The relief also delays requirements for the Coast Guard to produce certain acquisition documentation required for major acquisition programs until after the icebreaker is purchased and achieves its initial operational capability. Some of these documents include operational requirements explaining what the Coast Guard expects the CAPI to be able to do, an acquisition program baseline showing costs and schedule information to modify it further, and a life-cycle cost estimate. The Coast Guard plans to acquire the CAPI without this information.[94]

Ensuring Naval Readiness Act (S. 406)

Senate

S. 406, introduced in the Senate on February 5, 2025, would amend 10 U.S.C. 8679, a statute that prohibits, with certain exceptions, the construction of vessels for the Armed Forces, and major components of the hull or superstructure of any such vessel, in foreign shipyards. The amendment would limit the countries in which any such foreign shipyards may be located and require the Navy to submit a certification to Congress regarding the ownership of any such foreign shipyard.

Ensuring Coast Guard Readiness Act (S. 407)

Senate

S. 407, introduced in the Senate on February 5, 2025, would amend 14 U.S.C. 1151, a statute that establishes a prohibition with exceptions for the construction of Coast Guard vessels in foreign shipyards that is similar to the prohibition with exceptions in 10 U.S.C. 8679. S. 407 would amend 14 U.S.C. 1151 in a manner similar to how S. 406 (see above) would amend 10 U.S.C. 8679. S. 407 also includes a conforming amendment to 10 U.S.C. 8679.

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[93] The GAO report at this point includes an end note on page 19 that states

> See the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, P.L. 117-263, § 11223 (2022). As provided in the Act, this authority and relief from specific documentation requirements will expire in December 2025. DHS defines major acquisition programs as those with life-cycle cost estimates of $300 million or more. In some cases, DHS may define a program with a life-cycle cost estimate less than $300 million as a major acquisition if it has significant strategic or policy implications for homeland security, among other things. See Department of Homeland Security, DHS Directive 102-01, Acquisition Management Directive (July 28, 2015) (incorporating change 1, Feb. 25, 2019); DHS Instruction 102-01-001, Acquisition Management (Jan. 10, 2023) (incorporating change 1, Apr. 17, 2024).

[94] Government Accountability Office, *Coast Guard Acquisitions: Further Cost and Affordability Analysis of Polar Fleet Needed*, GAO-25-106822, Q&A Report to the Committee on Transportation and Infrastructure, House of Representatives, December 19, 2024, p. 7.

Appendix A. Current U.S. Polar Icebreakers and Polar Research Ships

This appendix provides background information on current U.S. polar icebreakers and polar research ships.

Polar Icebreakers

Heavy Polar Icebreaker *Polar Star*

The heavy polar icebreakers *Polar Star* (WAGB-10) and *Polar Sea* (WAGB-11)[95] (**Figure A-1**, **Figure A-2**, and **Figure A-3**) are sister ships built to the same general design. *Polar Star* is operational; *Polar Sea* suffered an engine casualty in June 2010 and has been nonoperational since then.

Figure A-1. *Polar Star* and *Polar Sea*

(Side by side in McMurdo Sound, Antarctica)

Source: Coast Guard photograph that was accessed on November 19, 2024, at https://web.archive.org/web/20080917122344/http://www.uscg.mil/pacarea/cgcpolarsea/history.asp. The photograph accompanies Kyung M. Song, "Senate Passes Cantwell Measure to Postpone Scrapping of Polar Sea Icebreaker," *Seattle Times*, September 22, 2012, accessed November 19, 2024, at https://web.archive.org/web/20121116160404/http://

[95] The designation WAGB means Coast Guard icebreaker. More specifically, W means Coast Guard ship, A means auxiliary, G means miscellaneous purpose, and B means icebreaker.

blogs.seattletimes.com/politicsnorthwest/2012/09/22/senate-passes-cantwell-measure-to-postpone-scrapping-of-polar-sea-icebreaker/.

Figure A-2. *Polar Star*

Source: Cropped version of photograph accompanying U.S. Navy, Naval Sea Systems Command, "U.S. Coast Guard's Polar Star Cuts through Ice with help of NSWCPD," January 23, 2024, accessed April 17, 2024, at https://www.navsea.navy.mil/Media/News/Article-View/Article/3653655/us-coast-guards-polar-star-cuts-through-ice-with-help-of-nswcpd/. The caption to the photograph credits the photograph to "U.S. Navy photo by Senior Chief Mass Communication Specialist RJ Stratchko."

The two ships were procured in the 1970s as replacements for earlier U.S. icebreakers. They were designed for 30-year service lives, and were built by Lockheed Shipbuilding of Seattle, WA, a division of Lockheed that also built ships for the U.S. Navy, but which exited the shipbuilding business in the late 1980s.

The ships are 399 feet long and displace about 13,200 tons. They are among the world's most powerful nonnuclear-powered icebreakers, with a capability to break through ice up to 6 feet thick at a speed of 3 knots. Because of their icebreaking capability, they are referred to (in U.S. parlance) as heavy polar icebreakers. In addition to a crew of 134, each ship can embark a scientific research staff of 32 people.

Polar Star was commissioned into service in 1976, and consequently is well beyond its originally intended 30-year service life. Due to worn-out electric motors and other problems, the Coast Guard placed the ship in caretaker status on July 1, 2006.[96] Congress in FY2009 and FY2010 provided funding to repair *Polar Star* and return it to service for 7 to 10 years. The repair work

[96] Source for July 1, 2006, date: U.S. Coast Guard email to CRS on February 22, 2008. The Coast Guard's official term for caretaker status is "In Commission, Special."

was completed at a reported cost of about $57 million, and the ship was reactivated on December 14, 2012.[97]

Figure A-3. *Polar Sea*

Source: Coast Guard photograph that was accessed April 17, 2025, at https://web.archive.org/web/20160229010100/http://www.uscg.mil/pacarea/cgcpolarsea/img/PSEApics/FullShip2.jpg. The photograph accompanies Associated Press, "Reprieve for Seattle-Based Icebreaker Polar Sea," KOMO News, June 15, 2012, accessed April 17, 2025, at https://komonews.com/news/local/reprieve-for-seattle-based-icebreaker-polar-sea.

Although the Coast Guard in recent years has invested millions of dollars to overhaul, repair, and extend the service life of *Polar Star*, the ship's material condition, as a result of its advancing age, has nevertheless become increasingly fragile, if not precarious. During its annual deployments to McMurdo Station in Antarctica, shipboard equipment frequently breaks, and shipboard fires sometimes occur.[98] Replacements for many of the ship's components are no longer commercially available. To help keep *Polar Star* operational, the Coast Guard has used *Polar Sea* as a source of replacement parts.

Polar Sea was commissioned into service in 1977, and consequently is also well beyond its originally intended 30-year service life. In 2006, the Coast Guard completed a rehabilitation project that extended the ship's expected service life to 2014. On June 25, 2010, however, the Coast Guard announced that *Polar Sea* had suffered an engine casualty, and the ship was unavailable for operation after that.[99] The Coast Guard placed *Polar Sea* in commissioned, inactive status on October 14, 2011. The Coast Guard transferred certain major equipment from

[97] See, for example, Kyung M. Song, "Icebreaker Polar Star Gets $57 Million Overhaul," *Seattle Times*, December 14, 2012.

[98] See, for example, Richard Read, "Meet the Neglected 43-Year-Old Stepchild of the U.S. Military-Industrial Complex," *Los Angeles Times*, August 2, 2019; Melody Schreiber, "The Only Working US Heavy Icebreaker Catches Fire Returning from Antarctica," *Arctic Today*, March 2, 2019; Calvin Biesecker, "Fire Breaks Out on Coast Guard's Aging, and Only, Heavy Icebreaker," *Defense Daily*, March 1, 2019.

[99] "Icebreaker POLAR SEA Sidelined by Engine Troubles," *Coast Guard Compass (Official Blog of the U.S. Coast Guard)*, June 25, 2010. See also "USCG Cancels Polar Icebreaker's Fall Deployment," *DefenseNews.com*, June 25, 2010; Andrew C. Revkin, "America's Heavy Icebreakers Are Both Broken Down," *Dot Earth (New York Times blog)*, June 25, 2010.

Polar Sea to *Polar Star* to facilitate *Polar Star*'s return to service,[100] and, as mentioned above, has since used *Polar Sea* as a source of repair parts for *Polar Star*.

Medium Polar Icebreaker *Healy*

Healy (WAGB-20) (**Figure A-4**) was funded in the early 1990s as a complement to *Polar Star* and *Polar Sea*, and was commissioned into service on August 21, 2000.

Figure A-4. *Healy*

Source: Coast Guard photograph accessed November 19, 2024, at https://www.history.uscg.mil/US-Coast-Guard-Photo-Gallery/igphoto/2002136680/.

The procurement of *Healy* was funded largely (about 89%) through the Navy's shipbuilding account (i.e., the Shipbuilding and Conversion, Navy, or SCN account).[101] The ship was built by

[100] Source: October 17, 2011, email to CRS from Coast Guard Congressional Affairs office. Section 222 of the Coast Guard and Maritime Transportation Act of 2012 (H.R. 2838/P.L. 112-213 of December 20, 2012) prohibited the Coast Guard from removing any part of Polar Sea and from transferring, relinquishing ownership of, dismantling, or recycling the ship until it submitted a business case analysis of the options for and costs of reactivating the ship and extending its service life to at least September 30, 2022, so as to maintain U.S. polar icebreaking capabilities and fulfill the Coast Guard's high latitude mission needs, as identified in the Coast Guard's July 2010 High Latitude Study. The business case analysis was submitted to Congress with a cover date of November 7, 2013. For more on the High Latitude Study, see **Appendix B**.

[101] The somewhat complicated funding history for the ship is as follows: The Coast Guard's proposed FY1990 budget requested $244 million for the acquisition of an icebreaker. The FY1990 DOD Appropriations Act (H.R. 3072/P.L. 101-165 of November 21, 1989) provided $329 million for the ship in the SCN account. (See pages 77 and 78 of H.Rept. 101-345 of November 13, 1989.) This figure was then reduced by $4.2 million by a sequester carried out under the Balanced Budget And Emergency Deficit Control Act of 1985, also known as the Gramm-Rudman-Hollings Act (H.J.Res. 372/P.L. 99-177 of December 12, 1985). Another $50 million was rescinded by the Dire Emergency Supplemental Appropriations for Disaster Assistance, Food Stamps, Unemployment Compensation Administration, and Other Urgent Needs, and Transfers, and Reducing Funds Budgeted for Military Spending Act of 1990 (H.R. (continued...)

Avondale Industries, a shipyard located near New Orleans, LA, that built numerous Coast Guard and Navy ships, and which eventually became part of Huntington Ingalls Industries (HII). HII subsequently wound down shipbuilding activities at Avondale, and the facility no longer builds ships.

Although it is referred to (in U.S. parlance) as a medium polar icebreaker, *Healy* is actually larger than *Polar Star* and *Polar Sea*—it is 420 feet long and displaces about 16,000 tons. Compared to *Polar Star* and *Polar Sea*, *Healy* has less icebreaking capability (which is why it is referred to as a medium polar icebreaker rather than a heavy polar icebreaker), but more capability for supporting scientific research. The ship can break through ice up to 4½ feet thick at a speed of 3 knots, and embark a scientific research staff of 35 (with room for another 15 surge personnel and 2 visitors). The ship is used primarily for supporting scientific research and conducting other operations in the Arctic.

Future Medium Polar Icebreaker *Storis* (*Aiviq*)

The 360-foot Arctic oil-exploration support ship *Aiviq* (**Figure A-5)** was built in 2012 to be used by the Royal Dutch Shell oil company in an oil exploration and drilling effort in Arctic waters off Alaska.

Figure A-5. Future *Storis* (former *Aiviq*)

Source: Photograph accompanying Nicholas Slayton, "The Coast Guard Is Building Up Its Arctic Fleet," Task & Purpose, December 26, 2024. A caption to the photograph credits the photograph to the U.S. Coast Guard.

4404/P.L. 101-302 of May 25, 1990). An additional $59 million for the ship was then appropriated in the FY1992 DOD Appropriations Act (H.R. 2521/P.L. 102-172 of November 26, 1991). Also, an additional $40.4 million in procurement funding for the ship was provided through a series of annual appropriations in the Coast Guard's Acquisition, Construction, and Improvements (AC&I) account (as it was known prior to FY2019) from FY1988 through FY2001. The resulting net funding for the ship was thus $374.2 million, of which $333.8 million, or 89.2%, was DOD funding, and $40.4 million, or 10.8%, was Coast Guard procurement funding. (Source: Undated Coast Guard information paper provided to CRS by Coast Guard legislative liaison office, March 3, 2016.)

The ship was owned by Edison Chouest Offshore (ECO) of Cut Off, LA, a firm that operates more than 200 ships.[102] It was used primarily for towing and laying anchors for drilling rigs but was also equipped for responding to oil spills. As discussed earlier in this report, the Coast Guard, under the Commercially Available Polar Icebreaker (CAPI) program, purchased *Aiviq* and is modifying it for use as a Coast Guard medium polar icebreaker. When commissioned into Coast Guard service, the ship will renamed *Storis* (WAGB-21), in honor of a previous Coast Guard cutter of that name.

A December 19, 2024, GAO report on Coast Guard acquisition of polar ships states that the ship

> is not configured like a traditional Coast Guard polar icebreaker. For example, the Aiviq's flight deck is mounted on the front of the icebreaker and not on the back like with other current or planned Coast Guard polar icebreakers and there is no aircraft hangar.
>
> The Coast Guard is acquiring and modifying the CAPI in two phases separated by a few years. The first phase will include inspecting and purchasing the polar icebreaker, making modifications to ensure it can operate in the Arctic, getting needed certifications, painting it in Coast Guard colors, and placing a commissioned officer in command. The goal of this phase is to reach initial operational capability to begin Arctic operations within 18 to 24 months after receiving the funding, or by the end of March 2026. The second phase will entail yet-to-be determined ship modifications to achieve full operational capability 7 years after the initial operational capability is achieved, or by the end of fiscal year 2033, according to the Coast Guard's April 2024 notional schedule. After operating the icebreaker a few years, the Coast Guard's acquisition strategy shows that it will achieve full operational capability after iterative modifications to the ship over the course of up to 5 years. The Coast Guard has yet to determine the extent of these modifications but they may include consideration of structural work like reconfiguring the helicopter pad and, in conjunction with National Oceanic and Atmospheric Administration requirements, add scientific capabilities.[103]

A January 23, 2025, article about the ship states

> The icebreaker Aiviq is a gas guzzler with a troubled history. The ship was built to operate in the Arctic, but it has a type of propulsion system susceptible to failure in ice. Its waste and discharge systems weren't designed to meet polar code, its helicopter pad is in the wrong place to launch rescue operations and its rear deck is easily swamped by big waves….
>
> The United States urgently needs new icebreakers in an era when climate change is bringing increased traffic to the Arctic, including military patrols near U.S. waters by Russia and China. That the first of the revamped U.S. fleet is a secondhand vessel a top Coast Guard admiral once said "may, at best, marginally meet our requirements" is a sign of how long the country has tried and failed to build new ones….
>
> The U.S. Coast Guard's problem with the Aiviq, retired officers told ProPublica, was the ship's design. Originally built for oil operations, it had a low, wet deck and a helipad near its bow, where it would be ill suited for launching rescue operations. Its direct-drive propulsion system was both less efficient and more likely to get jammed up in ice than the diesel-electric systems the Coast Guard used….

[102] For more on ECO, see the firm's website at https://chouest.com/.

[103] Government Accountability Office, *Coast Guard Acquisitions: Further Cost and Affordability Analysis of Polar Fleet Needed*, GAO-25-106822, Q&A Report to the Committee on Transportation and Infrastructure, House of Representatives, December 19, 2024, pp. 6-7.

> Former Coast Guard icebreaker captains were reluctant to criticize the purchase of the Aiviq when contacted by ProPublica, in part because it has taken impossibly long for the service to build the new heavy icebreakers it says it needs.
>
> "Is the Coast Guard getting the Aiviq a bad thing? No," said Rear Adm. Jeff Garrett, a former captain of the Healy icebreaker. But "is it the ideal resource? No."…
>
> Lawson Brigham[104] said he had questions about the Aiviq "since it's our tax dollars at work," but he granted that "it's bringing some capability into the Coast Guard at a time when we're awaiting whenever the shipbuilder can get the first ship out, which is still unknown."
>
> [Former Coast Guard Commandant Paul] Zukunft, who retired in 2018, stands by his past opposition to the Aiviq.
>
> "I remain unconvinced," he wrote in response to questions from ProPublica, that it "meets the operational requirements and design of a polar icebreaker that have been thoroughly documented by the Coast Guard." By acquiring the Aiviq, "the Coast Guard runs the risk that those requirements can be compromised."
>
> In a statement, the Coast Guard described the purchase of the Aiviq as a "bridging strategy" and said the ship "will be capable of projecting U.S. sovereignty in the Arctic and conducting select Coast Guard missions."
>
> The fuel vents that flooded during the [2012] Kulluk accident[105] have since been raised, a Chouest engineer has testified. The Coast Guard did not respond to questions about the Aiviq's fuel consumption or whether its waste systems will comply with polar code. It did not say whether its helicopter deck will be moved aft for safer search-and-rescue operations. It confirmed that there will be no changes to the propulsion system. "Initial modifications to the vessel will be minimal," the statement reads.[106]

National Science Foundation (NSF) Polar Research Ships

Nathaniel B. Palmer

Nathaniel B. Palmer (**Figure A-6**) was built for the NSF in 1992 by North American Shipbuilding, of Larose, LA. Called *Palmer* for short, it is operated for NSF by ECO. *Palmer* is 308 feet long and has a displacement of about 6,500 tons. It has a crew of 22 and can embark a scientific staff of 27 to 37.[107] It was purpose-built as a single-mission ship for conducting and supporting scientific research in the Antarctic. It is capable of breaking ice up to 3 feet thick at speeds of 3 knots, which is sufficient for breaking through the ice conditions found in the vicinity of the Antarctic Peninsula, so as to resupply Palmer Station, a U.S. research station on the peninsula. The ship might be considered less an icebreaker than an oceanographic research ship

[104] Brigham is identified earlier in the article as "a former Coast Guard heavy icebreaker commander who has a doctorate from Cambridge University and has researched polar shipping since the 1980s."

[105] This is a reference to an accident, discussed earlier in the article, that occurred when *Aiviq* was attempting to tow a polar drill rig named Kulluk.

[106] McKenzie Funk, "This Icebreaker Has Design Problems and a History of Failure. It's America's Latest Military Vessel," *ProPublica*, January 23, 2025.

[107] Sources vary on the exact number of scientific staff that can be embarked on the ship. For some basic information on the ship, see http://www.nsf.gov/od/opp/support/nathpalm.jsp; http://www.usap.gov/vesselScienceAndOperations/documents/prvnews_june03.pdfprvnews_june03.pdf; http://nsf.gov/od/opp/antarct/treaty/pdf/plans0607/15plan07.pdf; http://www.nsf.gov/pubs/1996/nsf9693/fls.htm; and http://www.hazegray.org/worldnav/usa/nsf.htm.

with enough icebreaking capability for the Antarctic Peninsula. *Palmer*'s icebreaking capability is not considered sufficient to perform the McMurdo resupply mission.

Figure A-6. *Nathaniel B. Palmer*

Source: Photograph accompanying Peter Rejcek, "System Study, LARISSA Takes Unique Approach for Research on Ice Shelf Ecosystem," *Antarctic Sun* (U.S. Antarctic Program), September 18, 2009. A caption to the photograph states "Photo Courtesy: Adam Jenkins."

Laurence M. Gould

Like *Palmer*, the polar research and supply ship *Laurence M. Gould* (**Figure A-7**) was built for NSF by North American Shipping. It was completed in 1997 and is operated for NSF on a long-term charter from ECO. It is 230 feet long and has a displacement of about 3,800 tons. It has a crew of 16 and can embark a scientific staff of 26 to 28 (with a capacity for 9 more in a berthing van). It can break ice up to 1 foot thick with continuous forward motion. Like *Palmer*, it was built to support NSF operations in the Antarctic, particularly operations at Palmer Station on the Antarctic Peninsula.

Sikuliaq

Sikuliaq (see-KOO-lee-auk; **Figure A-8**), which is used for scientific research in polar areas, was built by Marinette Marine of Marinette, WI, and entered service in 2015. It is operated for NSF by the College of Fisheries and Ocean Sciences at the University of Alaska Fairbanks as part of the U.S. academic research fleet through the University National Oceanographic Laboratory System (UNOLS). *Sikuliaq* is 261 feet long and has a displacement of about 3,600 tons. It has a crew of 22 and can embark an additional 26 scientists and students. The ship can break ice 2½ or 3 feet thick at speeds of 2 knots. The ship is considered less an icebreaker than an ice-capable research ship.

Figure A-7. *Laurence M. Gould*

Source: Photograph accompanying Alchetron, "RV Laurence M. Gould," updated August 25, 2018, accessed November 19, 2024, at https://alchetron.com/RV-Laurence-M.-Gould.

Figure A-8. *Sikuliaq*

Source: Photograph accompanying Lauren Frisch, "UAF Joins International Consortium of Icebreaker Operators," *UAF [University of Alaska Fairbanks] News and Information*, February 6, 2018. A caption to the photograph states in part: "Photo by Mark Teckenbrock. The research vessel Sikuliaq navigates through Arctic ice in summer 2016."

Summary of Above Ships

Table A-1 summarizes the above six ships.

Table A-1. Coast Guard and NSF Polar Ships

	Coast Guard			NSF		
	Polar Star **(operational) and** ***Polar Sea*** **(nonoperational)**	***Healy***	***Aiviq*** **(future** ***Storis*****)**	***Palmer***	***Laurence M. Gould***	***Sikuliaq***
Entered service	1976 (*Polar Star*) 1977 (*Polar Sea*)	2000	Built in 2012	1992	1997	2015
Length (feet)	399	420	361	308	230	261
Beam (feet)	83.5	82	80	60	56	52
Draft (feet)	31	29.25	28.25	22	19.4	19
Displacement (tons)	13,200	16,000	n/a	6,500	3,780	3,665
Icebreaking capability (ice thickness in feet) at 3 knots or other speed	6 feet	4.5 feet	n/a	3 feet	1 foot at continuous forward motion	2.5 or 3 feet at 2 knots
Icebreaking capability using back and ram (ice thickness in feet)	21 feet	8 feet	n/a	n/a	n/a	n/a
Operating temperature	-60° Fahrenheit	-50° Fahrenheit	n/a	n/a	n/a	n/a
Crew	155[a]	85[b]	About 60	22	16	22
Additional scientific staff	32	35[c]		27-37	26 to 28[d]	26

Sources: Prepared by CRS using data from U.S. Coast Guard, National Research Council, National Science Foundation, DHS Office of Inspector General, and (for *Palmer*) additional online reference sources.

Notes: n/a is not available.

a. Includes 24 officers, 20 chief petty officers, 102 enlisted, and 9 in the aviation detachment.

b. Includes 19 officers, 12 chief petty officers, and 54 enlisted.

c. In addition to 85 crew members 85 and 35 scientists, the ship can accommodate another 15 surge personnel and 2 visitors.

d. Plus 9 more in a berthing van.

Appendix B. Required Numbers of U.S. Polar Icebreakers

This appendix provides additional background information on required numbers of U.S. polar icebreakers.

2023 Coast Guard Fleet Mix Analysis

As discussed earlier in this report, the Coast Guard testified in April, June, and November 2023 that a new Coast Guard fleet mix analysis concluded that the service will require a total of eight to nine polar icebreakers, including four to five heavy polar icebreakers and four to five medium polar icebreakers, to perform the Coast Guard's polar (i.e., Arctic and Antarctic) missions in coming years.[108] Prior to this new fleet mix analysis, the Coast Guard had stated that it would need at least six polar icebreakers, including three heavy polar icebreakers.

Polar Icebreakers Operated by Other Countries as of 2022

In discussions of U.S. polar icebreakers, observers sometimes note the sizes of polar icebreaking fleets operated by other countries. **Table B-1** shows a 2022 Coast Guard summary of major polar icebreakers around the world. Some observers highlight the difference between the number of U.S. polar icebreakers and the much larger number of Russian polar icebreakers, and characterize the situation as an "icebreaker gap."[109] Other observers question the relevance of that comparison and characterization.[110] In considering the number of Russian polar icebreakers, factors that may

[108] Spoken testimony, as reflected in CQ hearing transcripts, of

- Admiral Linda L. Fagan, Commandant of the Coast Guard, at an April 18, 2023, hearing on the Coast Guard's proposed FY2024 budget before the Coast Guard and Maritime Transportation subcommittee of the House Transportation and Infrastructure Committee, for the total figure of eight to nine polar icebreakers;
- Admiral Steven D. Poulin, Vice Commandant of the Coast Guard, at a June 21, 2023, hearing before the same subcommittee on the on the Coast Guard's emerging challenges and statutory needs, again for the total figure of eight to nine polar icebreakers; and
- Vice Admiral Peter Gautier, Coast Guard Deputy Commandant for Operations, at a November 29, 2023, hearing before the House Homeland Security Committee on how U.S. Arctic strategy impacts homeland security, for both the total figure of eight to nine polar icebreakers and how that total includes four to five heavy polar icebreakers and four to five medium polar icebreakers.

[109] See, for example, Juliana Wheeler, "How Icebreakers Are Becoming the Litmus Test for the U.S. Arctic Strategy," *Arctic Today*, November 13, 2024; James Stavridis, "Putin Is Crushing the Arctic Ice While the US Is Barely Afloat," *Bloomberg*, July 13, 2024; Mike Glenn, "U.S. Icebreaker Gap with Russia a Growing Concern as Arctic 'Cold War' Heats Up," *Washington Times*, September 23, 2021; Lin A. Mortensgaard and Kristian Søby Kristensen, "The 'Icebreaker-Gap'—How US Icebreakers Are Assigned New, Symbolic Roles as Part of an Escalating Military Competition in the Arctic," Safe Seas, January 5, 2021; Christopher Woody, "As US Tries to Close 'Icebreaker Gap' with Russia, Its Only Working Icebreaker Is Making a Rare Trip North," *Business Insider*, November 9, 2020; Peter Kikkert, *Gaps and Bridges: The Case for American Polar Icebreakers*, North American Arctic Defence and Security Network, August 12, 2020, 5 pp.; Marc Lanteigne, "So What Is the 'Icebreaker Gap' Anyway?" *Over the Circle*, March 3, 2019; Charlie Gao, "The 'Icebreaker Gap': How Russia Is Planning to Build More Icebreakers to Project Power in the Arctic," *National Interest*, August 19, 2018; Dermot Cole, "The US Is Finally Picking Up the Pace to Build a Modern Heavy Icebreaker," *Arctic Today*, April 21, 2018; Craig H. Allen Sr., "Addressing the US Icebreaker Shortage," *Pacific Maritime*, December 2017: 30-33; Adam Lemon and Brian Slattery, "Standoff in the Arctic: Closing the Icebreaker Gap," *Newsweek*, August 14, 2016; Franz-Stefan Gady, "Will the US Coast Guard Close the 'Icebreaker Gap'?" *Diplomat*, January 14, 2016; Jen Judson, "The Icebreaker Gap," *Politico*, September 1, 2015.

[110] See, for example, Keith Johnson, "The Arctic Great Game Won't Be Won in U.S. Shipyards, The High North Is an (continued...)

be considered include the length of Russia's Arctic coastline and Russia's use of maritime transportation along its Arctic coastline to support numerous Russian Arctic communities. (Russia's Arctic population is roughly 2 million.[111]) Countries with interests in the polar regions have differing requirements for polar icebreakers, depending on the nature and extent of their polar interests and activities. (The term *icebreaker gap* is also sometimes used to refer to a potential gap in time between the end of *Polar Star*'s service life and the entry into service of the first PSC, or to discuss options, such as leasing existing icebreakers, for bolstering U.S. polar icebreaking capability prior to the entry into service of the first PSC.[112])

Table B-1. Major Polar Icebreakers as of April 4, 2022

	Government owned or operated			Privately owned and operated			
	PC1, PC2, or equiv.	**PC3, PC4, or equiv.**	**PC5, PC6, or equiv.**	**PC1, PC2, or equiv.**	**PC3, PC4, or equiv.**	**PC5, PC6, or equiv.**	**Total**
Russia	6 [+2 unavailable]	22	8		9	6	51 [+2 unavailable]
Canada		2	10				12
Finland		7	2				9
United States	1 (*Polar Star*) [+1 nonoperational (*Polar Sea*)]	2 (*Healy* and future *Storis* [*Aiviq*])				2 (*Sikuliaq* and *Palmer*)	5 [+1 nonoperational]
Sweden		4					4
China		1	3				4
Denmark			3				3
Norway		1	1				2
Estonia			2				2
France			1		1		2
United Kingdom		1					1
Japan		1					1
Australia					1		1
Italy			1				1
Latvia			1				1
South Korea			1				1
South Africa			1				1
Argentina			1				1
Chile			1				1
Germany						1	1

Arena of Great-Power Competition, but Russia Is the one with Something to Lose," *Foreign Policy*, September 3, 2024; Robert D. English, "Why an Arctic Arms Race Would Be a Mistake," *Arctic Today*, June 18, 2020; Paul C. Avey, "The Icebreaker Gap Doesn't Mean America Is Losing in the Arctic," *War on the Rocks*, November 28, 2019; Chuck Hill, "Horrors, It's the Icebreaker Gap (cringe)," *Chuck Hill's CG Blog*, December 21, 2017; Jeremy Hsu, "U.S. Icebreaker Fleet Is Overdue for an Upgrade," *Scientific American*, June 1, 2017; Andreas Kuersten, "Icebreakers and U.S. Power: Separating Fact from Fiction," *War on the Rocks*, October 11, 2016; Andreas Kuersten, "The Dangerous Myth of an 'Icebreaker Gap,'" *Defense One*, September 6, 2016; Andrew C. Revkin, "The U.S. Icebreaker Gap Is About Arctic Needs, Not About Chasing Russia," *New York Times (Dot Earth New York Times Blog)*, September 1, 2015.

[111] For additional discussion, see the "Background" section of CRS Report R41153, *Changes in the Arctic: Background and Issues for Congress*, coordinated by Ronald O'Rourke.

[112] See, for example, Liz Ruskin, "Trump Administration May Hire Private Ship to Fill Arctic 'Icebreaker Gap' by Year's End," *Alaska Public Media*, December 14, 2020; GAO, *Coast Guard Acquisitions[:] Polar Icebreaker Program Needs to Address Risks before Committing Resources*, GAO-18-600, September 2018, summary page; Norton A. Schwartz and James G. Stavridis, "A Quick Fix for the U.S. 'Icebreaker Gap,'" *Wall Street Journal*, February 3, 2016.

Source: Table prepared by CRS based on U.S. Coast Guard graphic of homeports of major polar icebreakers, updated April 4, 2022; provided to CRS by U.S. Coast Guard on August 11, 2022. (An earlier version of the graphic, reflecting data as of May 1, 2017, was posted at https://www.dco.uscg.mil/Portals/9/DCO%20Documents/Office%20of%20Waterways%20and%20Ocean%20Policy/20170501%20major%20icebreaker%20chart.pdf?ver=2017-06-08-091723-907 as of September 21, 2022.) The U.S. Coast Guard states that the vessels shown in the graphic "were selected and organized based on IACS Polar Class notation [see note below], or best equivalent based on publicly available estimates. All vessels included are believed to be capable of independent Arctic or Antarctic operations." The Coast Guard graphic includes the two unavailable Russian government-owned or -operated PC1 or PC2 icebreakers shown above, but it does not include the U.S. nonoperational PC1 or PC2 icebreaker *Polar Sea*, which was added by CRS.

Notes: PC1 through PC6 are IACS (International Association of Classification Societies) classifications for polar-class ships. PC1 through PC5 are ships capable of year-round operation in all polar waters (PC1); moderate multiyear ice conditions (PC2); second-year ice, which may include multiyear ice inclusions (PC3); thick first-year ice, which may include old ice inclusions (PC4); or medium first-year ice, which may include old ice inclusions (PC5). PC6 are ships capable of summer/autumn operation in medium first-year ice, which may include old ice inclusions. (An additional category not shown in the table, PC7, are ships capable of summer/autumn operation in thin first-year ice, which may include old ice inclusions.) Source: *Requirements concerning Polar Class*, International Association of Classification Societies, undated, including Revision 4 of December 2019, Table 1, entitled Polar Class descriptions, p. 11-2.

June 9, 2020, Presidential Memorandum

On June 9, 2020, President Trump issued a memorandum entitled "Memorandum on Safeguarding U.S. National Interests in the Arctic and Antarctic Regions," which states

> To help protect our national interests in the Arctic and Antarctic regions, and to retain a strong Arctic security presence alongside our allies and partners, the United States requires a ready, capable, and available fleet of polar security icebreakers that is operationally tested and fully deployable by Fiscal Year 2029. Accordingly, by the authority vested in me as President by the Constitution and the laws of the United States of America, I hereby direct the following:
>
> Section 1. Fleet Acquisition Program. The United States will develop and execute a polar security icebreaking fleet acquisition program that supports our national interests in the Arctic and Antarctic regions.
>
> (a) The Secretary of Homeland Security, in coordination with the Secretary of State, the Secretary of Defense, the Secretary of Commerce, and the Director of the Office of Management and Budget (OMB), shall lead a review of requirements for a polar security icebreaking fleet acquisition program to acquire and employ a suitable fleet of polar security icebreakers, and associated assets and resources, capable of ensuring a persistent United States presence in the Arctic and Antarctic regions in support of national interests and in furtherance of the National Security Strategy and the National Defense Strategy, as appropriate. Separately, the review shall include the ability to provide a persistent United States presence in the Antarctic region, as appropriate, in accordance with the Antarctic Treaty System. The Secretary of Homeland Security and the Director of OMB, in executing this direction, shall ensure that the United States Coast Guard's (USCG) Offshore Patrol Cutter acquisition program is not adversely impacted.
>
> (b) The Secretary of Homeland Security, acting through the Commandant of the Coast Guard, in coordination with the Secretary of Defense, acting through the Secretary of the Navy, and the Secretary of Energy, as appropriate, shall conduct a study of the comparative operational and fiscal benefits and risks of a polar security icebreaking fleet mix that consists of at least three heavy polar-class security cutters (PSC) that are appropriately outfitted to meet the objectives of this memorandum. This study shall be submitted to the President, through the Director of OMB and the Assistant to the President for National Security Affairs, within 60 days from the date of this memorandum and at a minimum shall include:

(i) Use cases in the Arctic that span the full range of national and economic security missions (including the facilitation of resource exploration and exploitation and undersea cable laying and maintenance) that may be executed by a class of medium PSCs, as well as analysis of how these use cases differ with respect to the anticipated use of heavy PSCs for these same activities. These use cases shall identify the optimal number and type of polar security icebreakers for ensuring a persistent presence in both the Arctic and, as appropriate, the Antarctic regions;

(ii) An assessment of expanded operational capabilities, with estimated associated costs, for both heavy and medium PSCs not yet contracted for, specifically including the maximum use of any such PSC with respect to its ability to support national security objectives through the use of the following: unmanned aviation, surface, and undersea systems; space systems; sensors and other systems to achieve and maintain maritime domain awareness; command and control systems; secure communications and data transfer systems; and intelligence-collection systems. This assessment shall also evaluate defensive armament adequate to defend against threats by near-peer competitors and the potential for nuclear-powered propulsion;

(iii) Based on the determined fleet size and composition, an identification and assessment of at least two optimal United States basing locations and at least two international basing locations. The basing location assessment shall include the costs, benefits, risks, and challenges related to infrastructure, crewing, and logistics and maintenance support for PSCs at these locations. In addition, this assessment shall account for potential burden-sharing opportunities for basing with the Department of Defense and allies and partners, as appropriate; and

(iv) In anticipation of the USCGC POLAR STAR's operational degradation from Fiscal Years 2022-2029, an analysis to identify executable options, with associated costs, to bridge the gap of available vessels as early as Fiscal Year 2022 until the new PSCs required to meet the objectives of this memorandum are operational, including identifying executable, priced leasing options, both foreign and domestic. This analysis shall specifically include operational risk associated with using a leased vessel as compared to a purchased vessel to conduct specified missions set forth in this memorandum.

(c) In the interest of securing a fully capable polar security icebreaking fleet that is capable of providing a persistent presence in the Arctic and Antarctic regions at the lowest possible cost, the Secretary of State shall coordinate with the Secretary of Homeland Security in identifying viable polar security icebreaker leasing options, provided by partner nations, as a near- to mid-term (Fiscal Years 2022-2029) bridging strategy to mitigate future operational degradation of the USCGC POLAR STAR. Leasing options shall contemplate capabilities that allow for access to the Arctic and Antarctic regions to, as appropriate, conduct national and economic security missions, in addition to marine scientific research in the Arctic, and conduct research in Antarctica in accordance with the Antarctic Treaty System. Further, and in advance of any bid solicitation for future polar security icebreaker acquisitions, the Secretary of State shall coordinate with the Secretary of Homeland Security to identify partner nations with proven foreign shipbuilding capability and expertise in icebreaker construction.

(d) The Secretary of Defense shall coordinate with the Secretary of State and the Secretary of Homeland Security to continue to provide technical and programmatic support to the USCG integrated program office for the acquisition, outfitting, and operations of all classes of PSCs.

Sec. 2. General Provisions. (a) Nothing in this memorandum shall be construed to impair or otherwise affect:

(i) the authority granted by law to an executive department or agency, or the head thereof; or

> (ii) the functions of the Director of OMB relating to budgetary, administrative, or legislative proposals.
>
> (b) This memorandum shall be implemented consistent with applicable law and subject to the availability of appropriations.
>
> (c) This memorandum is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.[113]

A September 10, 2020, press report states

> The White House dropped a surprise directive in June calling for a new strategy in the High North, a move applauded by Arctic watchers who've been waiting for an administration to make the issue a priority….
>
> Yet a month after the report was due to the White House, it's not clear when, or if, anyone will see it.
>
> The report, which was to include new designs for a fleet of possibly nuclear-powered icebreakers, has been submitted to the National Security Council. Yet an NSC spokesperson did not respond to a query on the timing of a release, and would only say the report is "under review."[114]

A December 3, 2020, press report states

> The Coast Guard and its partners are assessing options for additional polar icebreaking capacity in the next decade beyond current plans pursuant to a directive from the Trump administration, Coast Guard Commandant Adm. Karl Schultz said on Thursday [December 3].
>
> The Coast Guard's current polar strategy calls for six new icebreakers, at least three of them heavy, and one immediately, and now "The good news is there's been a conversation beyond the 6-3-1 strategy," Schultz said during a virtual address hosted by the Navy League. "The president and his team have pressed us here since this past summer pulling together the energy of five cabinet level officials and OMB [Office of management and Budget] about saying, 'Hey, what does more capacity for high-latitude work between now and 2029 look like?'"…
>
> The Coast Guard hasn't looked favorably in the past on leasing options for ice breakers, at least not as a permanent solution to its polar requirements. But Schultz said leasing could fill near-term gaps.
>
> "We clearly don't want to be looking at leasing options as a replacement for the procurement of ships that are going to serve us for decades to come, but there might be some bridging strategies and some leasing options," he said. "So, we're working really hard on that, answering some deliverables over to the White House and hope we can keep some momentum."
>
> A Coast Guard spokesman told Defense Daily following Schultz's speech that the service and the Navy "have formed a joint working group to assess available foreign and domestic vessels that would meet short-term mission needs in the Arctic. The Coast Guard is

[113] White House, "Memorandum on Safeguarding U.S. National Interests in the Arctic and Antarctic Regions," June 9, 2020. For press reports about the memorandum, see, for example, David B. Larter, Joe Gould, and Aaron Mehta, "Trump Memo Demands New Fleet of Arctic Icebreakers Be Ready by 2029," *Defense News*, June 9, 2020; Paul McLeary, "White House Orders New Icebreaker Strategy For Coast Guard," *Breaking Defense*, June 9, 2020; Cal Biesecker, "Trump Wants Review of Polar Security Cutter Needs in Arctic, Antarctic," *Defense Daily*, June 9, 2020.

[114] Sarah Cammarata, "Trump's Arctic Plan Stuck in the Ice," *Politico Pro*, September 10, 2020.

> continuing to evaluate all options and provide detailed analysis of icebreaker capacity, lease options, and long-term strategies to protect vital economic and national security interests in the Polar Regions."[115]

A December 16, 2020, press report stated

> The White House National Security Adviser and the Navy may be on the verge of agreeing to move forward shortly with a plan to lease medium polar icebreakers to fill a near-term gap in the Coast Guard's icebreaking needs, Alaska Sen. Dan Sullivan (R) said last week.
>
> Sullivan, during a Dec. 8 hearing that he chaired that morning on the Coast Guard's capabilities in the Arctic, said he spoke earlier that day with White House National Security Adviser Robert O'Brien, who told him that the U.S. is looking at leasing polar icebreakers from Finland.
>
> "My understanding is the White House National Security Adviser [and] possibly the Navy with regard to some of their funding, are looking at moving forward on leases soon, hopefully as early as the end of this month," Sullivan told Adm. Charles Ray, vice commandant of the Coast Guard.
>
> Ray replied that discussions on leasing are part of a presidential directive issued in June, noting that a joint Coast Guard and Navy group are looking into this.
>
> Later during the hearing, in response to a question from Sen. Mike Lee (R-Utah) about potentially buying polar icebreakers from NATO allies or friendly Arctic nations, Ray said the "The bridging strategy that makes the most sense to the Coast Guard at this point is this potential to lease one of these icebreakers."
>
> Ray pointed out to Sullivan that the potential leasing strategy is not in place of the Coast Guard eventually acquiring new polar icebreakers.
>
> A Coast Guard spokesman on Wednesday told Defense Daily that the exact number if icebreakers that would be leased hasn't been determined and "depends on individual vessel availability and capabilities, crew availability, funding, and other factors." He also said the options only included medium icebreakers because no heavy icebreakers are currently available that meet the service's minimum requirements.…
>
> The Coast Guard spokesman said a bridging strategy is being examined because the first PSC won't begin operations until 2027. Any leased vessels, which potentially could be domestic or foreign flagged, would operate in the Arctic "to project U.S. sovereignty; protect vital economic and national security interests; and conduct maritime domain awareness, search and rescue, and other Coast Guard missions," he wrote in an email response to questions.…
>
> Ray said that a key shortfall of leasing commercial polar icebreakers is they aren't built to military specifications, highlighting communications, damage control and compartmentalization in case of an incident.
>
> "They're a different cat," Ray said. "We would have to do some work to them. It's not just, take one off the shelf. If it was, we probably would have done that a long time ago. So, there will be some work required to make these for the Coast Guard. But with that said, it is the commandant's position and our position we will certainly consider this and work to see what makes sense to bridge this gap."[116]

[115] Cal Biesecker, "Coast Guard, Partners Assessing Options for More Polar Icebreaking Capacity," *Defense Daily*, December 3, 2020.

[116] Cal Biesecker, "Senator Says Decision Could Come Soon to Lease Icebreakers for Coast Guard," *Defense Daily*, December 16, 2020. See also Liz Ruskin, "Trump Administration May Hire Private Ship to Fill Arctic 'Icebreaker Gap' by Year's End," *Alaska Public Radio*, December 14, 2020.

Coast Guard Statements Prior to 2023 Fleet Mix Analysis

Prior to the Coast Guard's 2023 fleet mix analysis, Coast Guard officials tended to refer to a total Coast Guard requirement for three heavy and three medium polar icebreakers. For example, in the October 25, 2016, summary of an RFI that the Coast Guard released the next day to receive industry feedback on its notional polar icebreaker acquisition approach and schedule, the Coast Guard states that "the United States Coast Guard has a need for three Heavy Polar Icebreakers and three Medium Polar Icebreakers with the priority being Heavy Polar Icebreakers."[117] A requirement for three heavy and three medium polar icebreakers was often abbreviated as 3+3.

Short of a 3+3 requirement, Coast Guard officials sometimes stated that, as a bare minimum number of heavy polar icebreakers, the Coast Guard needs two such ships. For example, at a November 17, 2015, hearing before the Europe, Eurasia, and Emerging Threats subcommittee and the Western Hemisphere subcommittee of the House Foreign Affairs Committee, then-Vice Admiral Charles Michel, the Vice Commandant of the Coast Guard, stated during the discussion portion of the hearing that the "Coast Guard needs at least two heavy icebreakers to provide year-round assured access and self-rescueability in the polar regions."[118] Similarly, at a June 14, 2016, hearing before the Coast Guard and Maritime Transportation subcommittee of the House Transportation and Infrastructure Committee, Admiral Michel testified that "our commandant also testified that we need self-rescue capability for our heavy icebreaker and that includes the existing *Polar Star* that we have out there now. So that means at least two [ships], [and] the High Latitude study says three heavy polar icebreakers is what the Coast Guard's requirement is. So that's kind of where we're talking about for heavy icebreakers."[119] (The High Latitude Study is discussed later in this appendix.)

July 2017 National Academies (NASEM) Report

A July 2017 report on the acquisition and operation of polar icebreakers by the National Academies of Sciences, Engineering, and Medicine (NASEM) that was directed by Congress in Section 604 of the Coast Guard Authorization Act of 2015 (H.R. 4188/P.L. 114-120 of February 8, 2016) concluded the following:

> INTRODUCTION
>
> The United States has strategic national interests in the polar regions. In the Arctic, the nation must protect its citizens, natural resources, and economic interests; assure sovereignty, defense readiness, and maritime mobility; and engage in discovery and research. In the Antarctic, the United States must maintain an active presence that includes access to its research stations for the peaceful conduct of science and the ability to participate in inspections as specified in the Antarctic Treaty. The committee's charge... was to advise the U.S. House of Representatives and the U.S. Senate on an assessment of the costs incurred by the federal government in carrying out polar icebreaking missions and on options that could minimize lifecycle costs. The committee's consensus findings and recommendations are presented below. Unless otherwise specified, all estimated costs and prices for the future U.S. icebreakers are expressed in 2019 dollars, since that is the year in which the contracts are scheduled to be made. Supporting material is found in the appendices.
>
> FINDINGS AND RECOMMENDATIONS

[117] Summary of RFI, October 25, 2016, page 2.

[118] Transcript of hearing.

[119] Transcript of hearing.

1. Finding: The United States has insufficient assets to protect its interests, implement U.S. policy, execute its laws, and meet its obligations in the Arctic and Antarctic because it lacks adequate icebreaking capability.

For more than 30 years, studies have emphasized the need for U.S. icebreakers to maintain presence, sovereignty, leadership, and research capacity—but the nation has failed to respond.... The strong warming and related environmental changes occurring in both the Arctic and the Antarctic have made this failure more critical. In the Arctic, changing sea ice conditions will create greater navigation hazards for much of the year, and expanding human industrial and economic activity will magnify the need for national presence in the region. In the Antarctic, sea ice trends have varied greatly from year to year, but the annual requirements for access into McMurdo Station have not changed. The nation is ill-equipped to protect its interests and maintain leadership in these regions and has fallen behind other Arctic nations, which have mobilized to expand their access to ice-covered regions. The United States now has the opportunity to move forward and acquire the capability to fulfill these needs....

2. Recommendation: The United States Congress should fund the construction of four polar icebreakers of common design that would be owned and operated by the United States Coast Guard (USCG).

The current Department of Homeland Security (DHS) Mission Need Statement (DHS 2013) contemplates a combination of medium and heavy icebreakers. The committee's recommendation is for a single class of polar icebreaker with heavy icebreaking capability. Proceeding with a single class means that only one design will be needed, which will provide cost savings. The committee has found that the fourth heavy icebreaker could be built for a lower cost than the lead ship of a medium icebreaker class....

The DHS Mission Need Statement contemplated a total fleet of "potentially" up to six ships of two classes—three heavy and three medium icebreakers. Details appear in the High Latitude Mission Analysis Report. The Mission Need Statement indicated that to fulfill its statutory missions, USCG required three heavy and three medium icebreakers; each vessel would have a single crew and would homeport in Seattle. The committee's analysis indicated that four heavy icebreakers will meet the statutory mission needs gap identified by DHS for the lowest cost. Three of the ships would allow continuous presence in the Arctic, and one would service the Antarctic.

As noted in the High Latitude Report, USCG's employment standard is 185 days away from home port (DAFHP) for a single crew. Three heavy icebreakers in the Arctic provide 555 DAFHP, sufficient for continuous presence. In addition, the medium icebreaker USCG Cutter Healy's design service life runs through 2030. If greater capacity is required, USCG could consider operating three ships with four crews, which would provide 740 DAFHP. The use of multiple crews in the Arctic could require fewer ships while providing a comparable number of DAFHP. For example, two ships (instead of the recommended three) operating in the Arctic with multiple crews could provide a similar number of annual operating days at a lower cost, but such an arrangement may not permit simultaneous operations in both polar regions and may not provide adequate redundancy in capability. More important, an arrangement under which fewer boats are operated more often would require more major maintenance during shorter time in port, often at increasing cost. In addition, if further military presence is desired in the Arctic, USCG could consider ice-strengthening the ninth national security cutter.

One heavy icebreaker servicing the Antarctic provides for the McMurdo breakout and international treaty verification. The availability of the vessel could be extended by homeporting in the Southern Hemisphere. If the single vessel dedicated to the Antarctic is rendered inoperable, USCG could redirect an icebreaker from the Arctic, or it could rely on support from other nations. The committee considers both options to be viable and believes it difficult to justify a standby (fifth) vessel for the Antarctic mission when the

total acquisition and lifetime operating costs of a single icebreaker are projected to exceed $1.6 billion. Once the four new icebreakers are operational, USCG can reasonably be expected to plan for more distant time horizons. USCG could assess the performance of the early ships once they are operational and determine whether additional capacity is needed.

USCG is the only agency of the U.S. government that is simultaneously a military service, a law enforcement agency, a marine safety and rescue agency, and an environmental protection agency. All of these roles are required in the mission need statement for a polar icebreaker. USCG, in contrast to a civilian company, has the authorities, mandates, and competencies to conduct the missions contemplated for the polar icebreakers. Having one agency with a multimission capability performing the range of services needed would be more efficient than potentially duplicating effort by splitting polar icebreaker operations among other agencies.

The requirement for national presence is best accomplished with a military vessel. In addition, USCG is fully interoperable with the U.S. Navy and the nation's North Atlantic Treaty Organization partners. USCG is already mandated to operate the nation's domestic and polar icebreakers. Continuing to focus this expertise in one agency remains the logical approach....

Government ownership of new polar icebreakers would be less costly than the use of lease financing (see Appendix C). The government has a lower borrowing cost than any U.S.-based leasing firm or lessor. In addition, the lessor would use higher-cost equity (on which it would expect to make a profit) to cover a portion of the lease financing. The committee's analysis shows that direct purchase by the government would cost, at a minimum, 19 percent less than leasing on a net present value basis (after tax). There is also the risk of the lessor going bankrupt and compromising the availability of the polar icebreaker to USCG. For its analysis, the committee not only relied on its extensive experience with leveraged lease financing but also reviewed available Government Accountability Office reports and Office of Management and Budget rules, examined commercial leasing economics and current interest rates, and validated its analysis by consulting an outside expert on the issue....

Chartering (an operating lease) is not a viable option.... The availability of polar icebreakers on the open market is extremely limited. (The committee is aware of the sale of only one heavy icebreaker since 2010.) U.S. experience with chartering a polar icebreaker for the McMurdo resupply mission has been problematic on two prior charter attempts. Chartering is workable only if the need is short term and mission specific. The committee notes that chartering may preclude USCG from performing its multiple missions....

In the committee's judgment, an enlarged icebreaker fleet will provide opportunities for USCG to strengthen its icebreaking program and mission. Although the number of billets that require an expert is small compared with the overall number of billets assigned to these icebreakers, more people performing this mission will increase the pool of experienced candidates. This will provide personnel assignment officers with a larger pool of candidates when the more senior positions aboard icebreakers are designated, which will make icebreaking more attractive as a career path and increase the overall level of icebreaking expertise within USCG. Importantly, the commonality of design of the four recommended heavy icebreakers will reduce operating and maintenance costs over the service life of these vessels through efficiencies in supporting and crewing them. Having vessels of common design will likely improve continuity of service, build icebreaking competency, improve operational effectiveness, and be more cost-efficient....

3. Recommendation: USCG should follow an acquisition strategy that includes block buy contracting with a fixed price incentive fee contract and take other measures to ensure best value for investment of public funds.

Icebreaker design and construction costs can be clearly defined, and a fixed price incentive fee construction contract is the most reliable mechanism for controlling costs for a program of this complexity. This technique is widely used by the U.S. Navy. To help ensure best long-term value, the criteria for evaluating shipyard proposals should incorporate explicitly defined lifecycle cost metrics....

A block buy authority for this program will need to contain specific language for economic order quantity purchases for materials, advanced design, and construction activities. A block buy contracting program with economic order quantity purchases enables series construction, motivates competitive bidding, and allows for volume purchase and for the timely acquisition of material with long lead times. It would enable continuous production, give the program the maximum benefit from the learning curve, and thus reduce labor hours on subsequent vessels.

The acquisition strategy would incorporate (a) technology transfer from icebreaker designers and builders with recent experience, including international expertise in design, construction, and equipment manufacture; (b) a design that maximizes use of commercial off-the-shelf (COTS) equipment, applies Polar Codes and international standards, and only applies military specifications (MIL-SPEC) to the armament, aviation, communications, and navigation equipment; (c) reduction of any "buy American" provisions to allow the sourcing of the most

suitable and reliable machinery available on the market; and (d) a program schedule that allows for completion of design and planning before the start of construction. These strategies will allow for optimization of design, reduce construction costs, and enhance reliability and maintainability....

4. Finding: In developing its independent concept designs and cost estimates, the committee determined that the costs estimated by USCG for the heavy icebreaker are reasonable. However, the committee believes that the costs of medium icebreakers identified in the High Latitude Mission Analysis Report are significantly underestimated.

The committee estimates the rough order-of-magnitude (ROM) cost of the first heavy icebreaker to be $983 million. (See Appendix D, Table D-6.) Of these all-in costs, 75 to 80 percent are shipyard design and construction costs; the remaining 20 to 25 percent cover government-incurred costs such as government-furnished equipment and government-incurred program expenses. If advantage is taken of learning and quantity discounts available through the recommended block buy contracting acquisition strategy, the average cost per heavy icebreaker is approximately $791 million, on the basis of the acquisition of four ships. The committee's analysis of the ship size to incorporate the required components (stack-up length) suggests an overall length of 132 meters (433 feet) and a beam of 27 meters (89 feet). This is consistent with USCG concepts for the vessel.

Costs can be significantly reduced by following the committee's recommendations. Reduction of MIL-SPEC requirements can lower costs by up to $100 million per ship with no loss of mission capability.... The other recommended acquisition, design, and construction strategies will control possible cost overruns and provide significant savings in overall life-cycle costs for the program.

Although USCG has not yet developed the operational requirements document for a medium polar icebreaker, the committee was able to apply the known principal characteristics of the USCG Cutter Healy to estimate the scope of work and cost of a similar medium icebreaker. The committee estimates that a first-of-class medium icebreaker will cost approximately $786 million. The fourth ship of the heavy icebreaker series is estimated to cost $692 million. Designing a medium-class polar icebreaker in a second shipyard would incur the estimated engineering, design, and planning costs of $126 million and would forgo learning from the first three ships; the learning curve would be restarted

with the first medium design. Costs of building the fourth heavy icebreaker would be less than the costs of designing and building a first-of-class medium icebreaker... . In developing its ROM cost estimate, the committee agreed on a common notional design and basic assumptions.... Two committee members then independently developed cost estimating models, which were validated internally by other committee members. These analyses were then used to establish the committee's primary cost estimate....

5. Finding: Operating costs of new polar icebreakers are expected to be lower than those of the vessels they replace.

The committee expects the operating costs for the new heavy polar icebreakers to be lower than those of USCG's Polar Star. While USCG's previous experience is that operating costs of new cutters are significantly higher than those of the vessels they replace, the committee does not believe this historical experience applies in this case. There is good reason to believe that operating costs for new ships using commercially available modern technology will be lower than costs for existing ships.... The more efficient hull forms and modern engines will reduce fuel consumption, and a well-designed automation plant will require fewer operation and maintenance personnel, which will allow manning to be reduced or freed up for alternative tasks. The use of COTS technology and the minimization of MIL-SPEC, as recommended, will also reduce long-term maintenance costs, since use of customized equipment to meet MIL-SPEC requirements can reduce reliability and increase costs. A new vessel, especially over the first 10 years, typically has significantly reduced major repair and overhaul costs, particularly during dry-dock periods, compared with existing icebreakers—such as the Polar Star—that are near or at the end of their service life.... The Polar Star has many age-related issues that require it to be extensively repaired at an annual dry-docking. These issues will be avoided in the early years of a new ship. However, the committee recognizes that new ship operating costs can be higher than those of older ships if the new ship has more complexity to afford more capabilities. Therefore, any direct comparisons of operating costs of newer versus older ships would need to take into account the benefits of the additional capabilities provided by the newer ship.

USCG will have an opportunity to evaluate the manning levels of the icebreaker in light of the benefits of modern technology to identify reductions that can be made in operating costs....

6. Recommendation: USCG should ensure that the common polar icebreaker design is science-ready and that one of the ships has full science capability.

All four proposed ships would be designed as "science-ready," which will be more cost-effective when one of the four ships—most likely the fourth—is made fully science capable. Including science readiness in the common polar icebreaker design is the most cost-effective way of fulfilling both the USCG's polar missions and the nation's scientific research polar icebreaker needs.... The incremental costs of a science-ready design for each of the four ships ($10 million to $20 million per ship) and of full science capability for one of the ships at the initial build (an additional $20 million to $30 million) are less than the independent design and build cost of a dedicated research medium icebreaker.... In briefings at its first meeting, the committee learned that the National Science Foundation and other agencies do not have budgets to support full-time heavy icebreaker access or the incremental cost of design, even though their science programs may require this capability. Given the small incremental cost, the committee believes that the science capability cited above should be included in the acquisition costs.

Science-ready design includes critical elements that cannot be retrofitted cost-effectively into an existing ship and that should be incorporated in the initial design and build. Among these elements are structural supports, appropriate interior and exterior spaces, flexible accommodation spaces that can embark up to 50 science personnel, a hull design that accommodates multiple transducers and minimizes bubble sweep while optimizing

> icebreaking capability, machinery arrangements and noise dampening to mitigate interference with sonar transducers, and weight and stability latitudes to allow installation of scientific equipment. Such a design will enable any of the ships to be retrofitted for full science capability in the future, if necessary....
>
> Within the time frame of the recommended build sequence, the United States will require a science-capable polar icebreaker to replace the science capabilities of the Healy upon her retirement. To fulfill this need, one of the heavy polar icebreakers would be procured at the initial build with full science capability; the ability to fulfill other USCG missions would be retained. The ship would be outfitted with oceanographic overboarding equipment and instrumentation and facilities comparable with those of modern oceanographic research vessels. Some basic scientific capability, such as hydrographic mapping sonar, should be acquired at the time of the build of each ship so that environmental data that are essential in fulfilling USCG polar missions can be collected.
>
> **7. Finding: The nation is at risk of losing its heavy polar icebreaking capability—experiencing a critical capacity gap—as the Polar Star approaches the end of its extended service life, currently estimated at 3 to 7 years.**
>
> The Polar Star, built in 1976, is well past its 30-year design life. Its reliability will continue to decline, and its maintenance costs will continue to escalate. Although the ship went through an extensive life-extending refit in 2011–2012, the Polar Star's useful life is estimated to end between 2020 and 2024. As USCG has recognized, the evaluation of alternative arrangements to secure polar icebreaking capacity is important, given the growing risks of the Polar Star losing its capability to fulfill its mission....
>
> **8. Recommendation: USCG should keep the Polar Star operational by implementing an enhanced maintenance program (EMP) until at least two new polar icebreakers are commissioned.**
>
> Even if the committee's notional schedule for new polar icebreakers is met, the second polar icebreaker would not be ready until July 2025.... The committee's proposed EMP could be designed with planned—and targeted—upgrades that allow the Polar Star to operate every year for its Antarctic mission. The necessary repairs could be performed in conjunction with the ship's current yearly dry-docking schedule within existing annual expenditures, estimated to average $5 million. In particular, the EMP would require improvements in the ship's operating systems, sanitary system, evaporators, main propulsion systems, and controllable pitch propellers. In the committee's judgment, the EMP could be accomplished within USCG's average annual repair expenditures for the Polar Star, which currently range between $2 million and $9 million.[120]

June 2013 DHS Polar Icebreaker Mission Need Statement

DHS in June 2013 approved a Mission Need Statement (MNS) for the polar icebreaker recapitalization project. The MNS states the following (emphasis added):

> This Mission Need Statement (MNS) establishes the need for polar icebreaker capabilities provided by the Coast Guard, to ensure that it can meet current and future mission requirements in the polar regions....
>
> Current requirements and future projections based upon cutter demand modeling, as detailed in the HLMAR [High Latitude Mission Analysis Report], indicate **the Coast Guard will need to expand its icebreaking capacity, potentially requiring a fleet of up to six icebreakers (3 heavy and 3 medium) to adequately meet mission demands in the**

[120] National Academies of Sciences, Engineering, and Medicine, Division on Earth and Life Studies and Transportation Research Board, *Acquisition and Operation of Polar Icebreakers: Fulfilling the Nation's Needs*, Letter Report, with cover letter dated July 11, 2017, pp. 9-20.

> **high latitudes**.... The analysis took into account both the Coast Guard statutory mission requirements and additional requirements for year-round presence in both polar regions detailed in the Naval Operations Concept (NOC) 2010.... The analysis also evaluated employing single and multi-crewing concepts.... Strategic home porting analysis based upon existing infrastructure and distance to operational areas provided the final input to determine icebreaker capacity demand.[121]

The sentence in bold in the above-quoted passage from the MNS includes the terms "potentially" and "up to." These terms make the key sentence less ironclad as a requirements statement than it would have been if the terms had not been included, and could be interpreted as an acknowledgment that the requirement might amount to something less than three heavy and three medium polar icebreakers.

The above-quoted passage states that the MNS was informed by the High Latitude Mission Analysis Report (HILMAR), and that the HLMAR took into account not only Coast Guard statutory mission requirements, but additional DOD requirements for year-round presence in both polar regions as detailed in the 2010 Naval Operations Concept (NOC). This is potentially significant, because DOD appears to have subsequently dropped its 2010 requirement for year-round presence in the polar regions.[122]

Coast Guard High Latitude Study Provided to Congress in July 2011

In July 2011, the Coast Guard provided to Congress a study on the Coast Guard's missions and capabilities for operations in high-latitude (i.e., polar) areas. The study, commonly known as the High Latitude Study, is dated July 2010 on its cover. The High Latitude Study concluded the following:

> [The study] concludes that future capability and capacity gaps will significantly impact four [Coast Guard] mission areas in the Arctic: Defense Readiness, Ice Operations, Marine Environmental Protection, and Ports, Waterways, and Coastal Security. These mission areas address the protection of important national interests in a geographic area where other nations are actively pursuing their own national goals....

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[121] Department of Homeland Security, *Polar Icebreaking Recapitalization Project Mission Need Statement, Version 1.0*, approved by DHS June 28, 2013, pp. 1, 2, 9, 10, 11, 12.

[122] A September 25, 2017, GAO report on polar icebreakers states the following (emphasis added):

> In December 2016, DOD reported to Congress that it had no specific defense requirement for icebreaking capability because Navy Arctic requirements are met by undersea and air assets which can provide year-round presence.
>
> —DOD reported in April 2017 that its only potential defense requirement—for the Thule Air Force Base resupply [mission] in Greenland—is met by the Canadian Coast Guard through a Memorandum of Understanding with USCG.
>
> —USCG's 2013 Polar Icebreaker Mission Needs Statement identified polar icebreaker capacity needs as partly based on the 2010 Naval Operations Concept—[a document that provides] joint maritime security strategy implementation guidance for the Navy, Marine Corps, and USCG—which stated that U.S. naval forces had a demand for year-round polar icebreaking presence in the Arctic and Antarctic.
>
> —In April 2017, DOD joint staff officials confirmed that DOD and Naval defense strategy had been updated and does not include icebreaking requirements. DOD officials in charge of operations in the Pacific said that although they do not have a requirement for a heavy icebreaker, icebreakers play a key role in aiding the icebreaking mission to McMurdo.
>
> (GAO, *Coast Guard: Status of Polar Icebreaking Fleet Capability and Recapitalization Plan*, GAO-17-698R, September 25, 2017, p. 20 (briefing slide 11).)

The common and dominant contributor to these significant mission impacts is the gap in polar icebreaking capability. The increasing obsolescence of the Coast Guard's icebreaker fleet will further exacerbate mission performance gaps in the coming years....

The gap in polar icebreaking capacity has resulted in a lack of at-sea time for crews and senior personnel and a corresponding gap in training and leadership. In addition to providing multi-mission capability and intrinsic mobility, a helicopter-capable surface unit would eliminate the need for acquiring an expensive shore-based infrastructure that may only be needed on a seasonal or occasional basis. The most capable surface unit would be a polar icebreaker. Polar icebreakers can transit safely in a variety of ice conditions and have the endurance to operate far from logistics bases. The Coast Guard's polar icebreakers have conducted a wide range of planned and unscheduled Coast Guard missions in the past. Polar icebreakers possess the ability to carry large numbers of passengers, cargo, boats, and helicopters. Polar icebreakers also have substantial command, control, and communications capabilities. The flexibility and mobility of polar icebreakers would assist the Coast Guard in closing future mission performance gaps effectively....

Existing capability and capacity gaps are expected to significantly impact future Coast Guard performance in two Antarctic mission areas: Defense Readiness and Ice Operations. Future gaps may involve an inability to carry out probable and easily projected mission requirements, such as the McMurdo resupply, or readiness to respond to less-predictable events. By their nature, contingencies requiring the use of military capabilities often occur quickly. As is the case in the Arctic, the deterioration of the Coast Guard's icebreaker fleet is the primary driver for this significant mission impact. This will further widen mission performance gaps in the coming years. The recently issued Naval Operations Concept 2010 requires a surface presence in both the Arctic and Antarctic. This further exacerbates the capability gap left by the deterioration of the icebreaker fleet....

The significant deterioration of the Coast Guard icebreaker fleet and the emerging mission demands to meet future functional requirements in the high latitude regions dictate that the Coast Guard acquire material solutions to close the capability gaps....

To meet the Coast Guard mission functional requirement, the Coast Guard icebreaking fleet must be capable of supporting the following missions:

- **Arctic North Patrol.** Continuous multimission icebreaker presence in the Arctic.
- **Arctic West Science.** Spring and summer science support in the Arctic.
- **Antarctic, McMurdo Station resupply.** Planned deployment for break-in, supply ship escort, and science support. This mission, conducted in the Antarctic summer, also requires standby icebreaker support for backup in the event the primary vessel cannot complete the mission.
- **Thule Air Base Resupply and Polar Region Freedom of Navigation Transits.** Provide vessel escort operations in support of the Military Sealift Command's Operation Pacer Goose; then complete any Freedom of Navigation exercises in the region.

In addition, the joint Naval Operations Concept establishes the following mission requirements:

- **Assured access and assertion of U.S. policy in the Polar Regions.** The current demand for this mission requires continuous icebreaker presence in both Polar Regions.

Considering these missions, the analysis yields the following findings:

- **The Coast Guard requires three heavy and three medium icebreakers to fulfill its statutory missions.** These icebreakers are necessary to (1) satisfy Arctic winter

and transition season demands and (2) provide sufficient capacity to also execute summer missions. Single-crewed icebreakers have sufficient capacity for all current and expected statutory missions. Multiple crewing provides no advantage because the number of icebreakers required is driven by winter and shoulder season requirements. Future use of multiple or augmented crews could provide additional capacity needed to absorb mission growth.

- **The Coast Guard requires six heavy and four medium icebreakers to fulfill its statutory missions and maintain the continuous presence requirements of the Naval Operations Concept.** Consistent with current practice, these icebreakers are single-crewed and homeported in Seattle Washington.
- **Applying crewing and home porting alternatives reduces the overall requirement to four heavy and two medium icebreakers.** This assessment of nonmaterial solutions shows that the reduced number of icebreakers can be achieved by having all vessels operate with multiple crews and two of the heavy icebreakers homeporting in the Southern Hemisphere.

Leasing was also considered as a nonmaterial solution. While there is no dispute that the Coast Guard's polar icebreaker fleet is in need of recapitalization, the decision to acquire this capability through purchase of new vessels, reconstruction of existing ships, or commercial lease of suitable vessels must be resolved to provide the best value to the taxpayer. The multi-mission nature of the Coast Guard may provide opportunities to conduct some subset of its missions with non government-owned vessels. However, serious consideration must be given to the fact that the inherently governmental missions of the Coast Guard must be performed using government-owned and operated vessels. An interpretation of the national policy is needed to determine the resource level that best supports the nation's interests....

The existing icebreaker capacity, two inoperative heavy icebreakers and an operational medium icebreaker, does not represent a viable capability to the federal government. The time needed to augment this capability is on the order of 10 years. At that point, around 2020, the heavy icebreaking capability bridging strategy expires.[123]

At a July 27, 2011, hearing on U.S. economic interests in the Arctic before the Oceans, Atmosphere, Fisheries, and Coast Guard subcommittee of the Senate Commerce, Science, and Transportation Committee, the following exchange occurred:

SENATOR OLYMPIA J. SNOWE: On the high latitude study, do you agree with—and those—I would like to also hear from you, Admiral Titley, as well, on these requirements in terms of Coast Guard vessels as I understand it, they want to have—I guess, it was a three medium ice breakers. Am in correct in saying that? Three medium ice breakers.

ADMIRAL ROBERT PAPP, COMMANDANT OF THE COAST GUARD: I agree with the mission analysis and as you look at the requirements for the things that we might do up there, if it is in the nation's interest, it identifies a minimum requirement for three heavy ice breakers and three medium ice breakers and then if you want a persistent presence up there, it would require—and also doing things such as breaking out (inaudible) and other responsibilities, then it would take up to a maximum six heavy and four medium.

SNOWE: Right. Do you agree with that?

PAPP: If we were to be charged with carrying out those full responsibilities, yes, ma'am. Those are the numbers that you would need to do it.

SNOWE: Admiral Titley, how would you respond to the high latitude study and has the Navy conducted its own assessment of its capability?

[123] *United States Coast Guard High Latitude Region Mission Analysis Capstone Summary*, July 2010, pp. 10-13, 15.

REAR ADMIRAL DAVID TITLEY, OCEANORGRAPHER AND NAVIGATOR OF THE NAVY: Ma'am, we are in the process right now of conducting what we call a capabilities based assessment that will be out in the summer of this year.

We are getting ready to finish that—the Coast Guard has been a key component of the Navy's task force on climate change, literally since day one when the Chief of Naval Operations set this up, that morning, we had the Coast Guard invited as a member of our executive steering committee.

So we have been working very closely with the Coast Guard, with the Department of Homeland Security, and I think Admiral Papp—said it best as far as the specific comments on the high latitude study but we have been working very closely with the Coast Guard.[124]

January 2011 DHS Office of Inspector General Report

A January 2011 report on the Coast Guard's polar icebreakers from the DHS Office of the Inspector General stated the following:

> The Coast Guard does not have the necessary budgetary control over its [polar] icebreakers, nor does it have a sufficient number of icebreakers to accomplish its missions in the Polar Regions. Currently, the Coast Guard has only one operational [polar] icebreaker [i.e., *Healy*], making it necessary for the United States to contract with foreign nations to perform scientific, logistical, and supply activities. Without the necessary budgetary control and a sufficient number of icebreaking assets, the Coast Guard will not have the capability to perform all of its missions, will lose critical icebreaking expertise, and may be beholden to foreign nations to perform its statutory missions. The Coast Guard should improve its strategic approach to ensure that it has the long-term icebreaker capabilities needed to support Coast Guard missions and other national interests in the Arctic and Antarctic regions.[125]

Regarding current polar icebreaking capabilities for performing Arctic missions, the report states the following:

> The Coast Guard's icebreaking resources are unlikely to meet future demands. [The table below] outlines the missions that Coast Guard is unable to meet in the Arctic with its current icebreaking resources.

Arctic Missions Not Being Met

Requesting Agency	Missions Not Being Met
United States Coast Guard	—Fisheries enforcement in Bering Sea to prevent foreign fishing in U.S. waters and overfishing —Capability to conduct search and rescue in Beaufort Sea for cruise line and natural resource exploration ships —Future missions not anticipated to be met: 2010 Arctic Winter Science Deployment

[124] Source: Transcript of hearing.

[125] Department of Homeland Security, Office of Inspector General, *The Coast Guard's Polar Icebreaker Maintenance, Upgrade, and Acquisition Program*, OIG-11-31, January 2011, p. 1 (Executive Summary).

NASA	Winter access to the Arctic to conduct oceanography and study Arctic currents and how they relate to regional ice cover, climate, and biology
NOAA and NSF	Winter research
Department of Defense	Assured access to ice-impacted waters through a persistent icebreaker presence in the Arctic and Antarctic[126]

The report also states the following:

> Should the Coast Guard not obtain funding for new icebreakers or major service life extensions for its existing icebreakers with sufficient lead-time, the United States will have no heavy icebreaking capability beyond 2020 and no polar icebreaking capability of any kind by 2029. Without the continued use of icebreakers, the United States will lose its ability to maintain a presence in the Polar Regions, the Coast Guard's expertise to perform ice operations will continue to diminish, and missions will continue to go unmet.[127]

Regarding current polar icebreaking capabilities for performing Antarctic missions, the report states the following:

> The Coast Guard needs additional icebreakers to accomplish its missions in the Antarctic. The Coast Guard has performed the McMurdo Station resupply in Antarctica for decades, but with increasing difficulty in recent years. The Coast Guard's two heavy-duty icebreakers [i.e., *Polar Star* and *Polar Sea*] are at the end of their service lives, and have become less reliable and increasingly costly to keep in service....
>
> In recent years, the Coast Guard has found that ice conditions in the Antarctic have become more challenging for the resupply of McMurdo Station. The extreme ice conditions have necessitated the use of foreign vessels to perform the McMurdo break-in....
>
> As ice conditions continue to change around the Antarctic, two icebreakers are needed for the McMurdo break-in and resupply mission. Typically, one icebreaker performs the break-in and the other remains on standby. Should the first ship become stuck in the ice or should the ice be too thick for one icebreaker to complete the mission, the Coast Guard deploys the ship on standby. Since the Polar Sea and Polar Star are not currently in service, the Coast Guard has no icebreakers capable of performing this mission. [The table below] outlines the missions that will not be met without operational heavy-duty icebreakers.

Arctic Missions Not Being Met

Requesting Agency	Missions Not Being Met
NSF	Missions not anticipated to be met: 2010-2011 Operation Deep Freeze – McMurdo Station Resupply

[126] Department of Homeland Security, Office of Inspector General, *The Coast Guard's Polar Icebreaker Maintenance, Upgrade, and Acquisition Program*, OIG-11-31, January 2011, p. 9.

[127] Department of Homeland Security, Office of Inspector General, *The Coast Guard's Polar Icebreaker Maintenance, Upgrade, and Acquisition Program*, OIG-11-31, January 2011, p. 10.

Department of State	Additional inspections of foreign facilities in Antarctica to enforce the Antarctic Treaty and ensure facilities' environment compliance[128]

The report's conclusion and recommendations were as follows:

> **Conclusion**
>
> With an aging fleet of three icebreakers, one operational and two beyond their intended 30-year service life, the Coast Guard is at a critical crossroads in its Polar Icebreaker Maintenance, Upgrade, and Acquisition Program. It must clarify its mission requirements, and if the current mission requirements remain, the Coast Guard must determine the best method for meeting these requirements in the short and long term.
>
> **Recommendations**
>
> We recommend that the Assistant Commandant for Marine Safety, Security, and Stewardship:
>
> **Recommendation #1:** Request budgetary authority for the operation, maintenance, and upgrade of its icebreakers.
>
> **Recommendation #2:** In coordination with the Department of Homeland Security, request clarification from Congress to determine whether Arctic missions should be performed by Coast Guard assets or contracted vessels.
>
> **Recommendation #3:** In coordination with the Department of Homeland Security, request clarification from Congress to determine whether Antarctic missions should be performed by Coast Guard assets or contracted vessels.
>
> **Recommendation #4:** Conduct the necessary analysis to determine whether the Coast Guard should replace or perform service-life extensions on its two existing heavy-duty icebreaking ships.
>
> **Recommendation #5:** Request appropriations necessary to meet mission requirements in the Arctic and Antarctic.[129]

The report states that

> The Coast Guard concurred with all five of the recommendations and is initiating corrective actions. We consider the recommendations open and unresolved. The Coast Guard provided information on some of its ongoing projects that will address the program needs identified in the report.[130]

2010 U.S. Arctic Research Commission Report

A May 2010 report from the U.S. Arctic Research Commission (USARC) on goals and objectives for Arctic research for 2009-2010 stated the following:

> To have an effective Arctic research program, the United States must invest in human capital, research platforms, and infrastructure, including new polar class icebreakers, and

[128] Department of Homeland Security, Office of Inspector General, *The Coast Guard's Polar Icebreaker Maintenance, Upgrade, and Acquisition Program*, OIG-11-31, January 2011, pp. 10-11.

[129] Department of Homeland Security, Office of Inspector General, *The Coast Guard's Polar Icebreaker Maintenance, Upgrade, and Acquisition Program*, OIG-11-31, January 2011, p. 12.

[130] Department of Homeland Security, Office of Inspector General, *The Coast Guard's Polar Icebreaker Maintenance, Upgrade, and Acquisition Program*, OIG-11-31, January 2011, p. 13.

> sustained sea, air, land, space, and social observing systems.... The Commission urges the President and Congress to commit to replacing the nation's two polar class icebreakers.[131]

2007 National Research Council Report

A 2007 National Research Council (NRC) report, *Polar Icebreakers in a Changing World: An Assessment of U.S. Needs*, assessed roles and future needs for Coast Guard polar icebreakers.[132] The study was required by report language accompanying the FY2005 DHS appropriations act (H.R. 4567/P.L. 108-334).[133] The study was completed in 2006 and published in 2007. Some sources refer to the study as the 2006 NRC report. The report made the following conclusions and recommendations:

> Based on the current and future needs for icebreaking capabilities, the [study] committee concludes that the nation continues to require a polar icebreaking fleet that includes a minimum of three multimission ships [like the Coast Guard's three current polar icebreakers] and one single-mission [research] ship [like Palmer]. The committee finds that although the demand for icebreaking capability is predicted to increase, a fleet of three multimission and one single-mission icebreakers can meet the nation's future polar icebreaking needs through the application of the latest technology, creative crewing models, wise management of ice conditions, and more efficient use of the icebreaker fleet and other assets. The nation should immediately begin to program, design, and construct two new polar icebreakers to replace the POLAR STAR and POLAR SEA.
>
> Building only one new polar icebreaker is insufficient for several reasons. First, a single ship cannot be in more than one location at a time. No matter how technologically advanced or efficiently operated, a single polar icebreaker can operate in the polar regions for only a portion of any year. An icebreaker requires regular maintenance and technical support from shipyards and industrial facilities, must reprovision regularly, and has to effect periodic crew changeouts. A single icebreaker, therefore, could not meet any reasonable standard of active and influential presence and reliable, at-will access throughout the polar regions.

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[131] U.S. Arctic Research Commission, *Report on Goals and Objectives for Arctic Research 2009-2010, May 2010*, p. 4.

[132] National Research Council, *Polar Icebreakers in a Changing World, An Assessment of U.S. Needs*, Washington, 2007, 122 pp.

[133] H.R. 4567/P.L. 108-334 of October 18, 2004. The related Senate bill was S. 2537. The Senate report on S. 2537 (S.Rept. 108-280 of June 17, 2004) stated the following:

> The Committee expects the Commandant to enter into an arrangement with the National Academy of Sciences to conduct a comprehensive study of the role of Coast Guard icebreakers in supporting United States operations in the Antarctic and the Arctic. The study should include different scenarios for continuing those operations including service life extension or replacement of existing Coast Guard icebreakers and alternative methods that do not use Coast Guard icebreakers. The study should also address changes in the roles and missions of Coast Guard icebreakers in support of future marine operations in the Arctic that may develop due to environmental change, including the amount and kind of icebreaking support that may be required in the future to support marine operations in the Northern Sea Route and the Northwest Passage; the suitability of the Polar Class icebreakers for these new roles; and appropriate changes in existing laws governing Coast Guard icebreaking operations and the potential for new operating regimes. The study should be submitted to the Committee no later than September 30, 2005.

The conference report on H.R. 4567 (H.Rept. 108-774 of October 9, 2004) stated the following:

> As discussed in the Senate report and the Coast Guard authorization bill for fiscal year 2005, the conferees require the National Academy of Sciences to study the role of Coast Guard icebreakers.

The earlier House report on H.R. 4567 (H.Rept. 108-541 of June 15, 2004) contained language directing a similar report from the Coast Guard rather than the National Academies. (See the passage in the House report under the header "Icebreaking.")

A second consideration is the potential risk of failure in the harsh conditions of polar operations. Despite their intrinsic robustness, damage and system failure are always a risk and the U.S. fleet must have enough depth to provide backup assistance. Having only a single icebreaker would necessarily require the ship to accept a more conservative operating profile, avoiding more challenging ice conditions because reliable assistance would not be available. A second capable icebreaker, either operating elsewhere or in homeport, would provide ensured backup assistance and allow for more robust operations by the other ship.

From a strategic, longer-term perspective, two new Polar class icebreakers will far better position the nation for the increasing challenges emerging in both polar regions. A second new ship would allow the U.S. Coast Guard to reestablish an active patrol presence in U.S. waters north of Alaska to meet statutory responsibilities that will inevitably derive from increased human activity, economic development, and environmental change. It would allow response to emergencies such as search-and-rescue cases, pollution incidents, and assistance to ships threatened with grounding or damage by ice. Moreover, a second new ship will leverage the possibilities for simultaneous operations in widely disparate geographic areas (e.g., concurrent operations in the Arctic and Antarctic), provide more flexibility for conducting Antarctic logistics (as either the primary or the secondary ship for the McMurdo break-in), allow safer multiple-ship operations in the most demanding ice conditions, and increase opportunities for international expeditions. Finally, an up-front decision to build two new polar icebreakers will allow economies in the design and construction process and provide a predictable cost reduction for the second ship....

The [study] committee finds that both operations and maintenance of the polar icebreaker fleet have been underfunded for many years, and the capabilities of the nation's icebreaking fleet have diminished substantially. Deferred long-term maintenance and failure to execute a plan for replacement or refurbishment of the nation's icebreaking ships have placed national interests in the polar regions at risk. The nation needs the capability to operate in both polar regions reliably and at will. Specifically, the committee recommends the following:

- The United States should continue to project an active and influential presence in the Arctic to support its interests. This requires U.S. government polar icebreaking capability to ensure year-round access throughout the region.
- The United States should continue to project an active and influential presence in the Antarctic to support its interests. The nation should reliably control sufficient icebreaking capability to break a channel into and ensure the maritime resupply of McMurdo Station.
- The United States should maintain leadership in polar research. This requires icebreaking capability to provide access to the deep Arctic and the ice-covered waters of the Antarctic.
- National interests in the polar regions require that the United States immediately program, budget, design, and construct two new polar icebreakers to be operated by the U.S. Coast Guard.
- To provide continuity of U.S. icebreaking capabilities, the POLAR SEA should remain mission capable and the POLAR STAR should remain available for reactivation until the new polar icebreakers enter service.
- The U.S. Coast Guard should be provided sufficient operations and maintenance budget to support an increased, regular, and influential presence in the Arctic. Other agencies should reimburse incremental costs associated with directed mission tasking.
- Polar icebreakers are essential instruments of U.S. national policy in the changing polar regions. To ensure adequate national icebreaking capability into the future, a

> Presidential Decision Directive should be issued to clearly align agency responsibilities and budgetary authorities.[134]

The Coast Guard stated in 2008 that it "generally supports" the NRC report, and that the Coast Guard "is working closely with interagency partners to determine a way forward with national polar policy that identifies broad U.S. interests and priorities in the Arctic and Antarctic that will ensure adequate maritime presence to further these interests. Identification and prioritization of U.S. national interests in these regions should drive development of associated USCG [U.S. Coast Guard] capability and resource requirements." The Coast Guard also stated the following: "Until those broad U.S. interests and priorities are identified, the current USG [U.S. Government] polar icebreaking fleet should be maintained in an operational status."[135]

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Disclaimer

[134] National Research Council, *Polar Icebreakers in a Changing World, An Assessment of U.S. Needs*, Washington, 2007, pp. 2-3.

[135] Coast Guard point paper provided to CRS on February 12, 2008, and dated with the same date, providing answers to questions from CRS concerning polar icebreaker modernization.