Status of Coast Guard's Heavy Polar Icebreaker Acquisition

Information Provided to

Armed Services; Commerce, Science, and Transportation; Appropriation Defense Subcommittees; U.S. Senate

and

Armed Services; Transportation and Infrastructure; Appropriation Defense Committees; U.S. House of Representatives

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Introduction

- Since 1965, U.S. Coast Guard has been responsible for providing polar icebreaking capability for the United States. The Coast Guard has two active polar icebreakers including one heavy polar icebreaker that is nearing the end of its expected service life.
- To maintain its polar icebreaking capability, Coast Guard is seeking to acquire three new heavy polar icebreakers. It established the heavy polar icebreaker (HPIB) acquisition program in 2012 and anticipates delivery of the lead ship in 2023.
- In August 2016, Coast Guard established an integrated program office (IPO) with the Navy to leverage the Navy's shipbuilding expertise for acquiring the HPIBs. The IPO arrangement was memorialized in a 2017 Memorandum of Agreement.
- Coast Guard, as a component within the Department of Homeland Security (DHS), is generally required to follow the Federal Acquisition Regulation and DHS's acquisition policies.

Objectives

Section 122 of the National Defense Authorization Act for Fiscal Year 2018 (Pub. L. No. 115-91) included a provision for GAO to assess the cost of, and schedule for, the procurement of new HPIB vessels.

This briefing provides information on:

(1) The status of Coast Guard's and Navy's efforts to acquire new polar icebreakers.

(2) How DHS, Coast Guard, and Navy are planning to manage and oversee the polar icebreaker acquisition through an integrated program office.

GAO has an ongoing related review that will assess the cost and schedule risks of the HPIB acquisition, with a forthcoming report to be issued in summer 2018.

Scope and Methodology

- To determine the status of Coast Guard and Navy's efforts to acquire new polar icebreakers, such as what progress the services have made in setting cost and schedule baselines and planning for the HPIB's design and construction contract award, we reviewed HPIB acquisition documents, including the lifecycle cost estimate, draft and final solicitation documents, and requirements documents.
- To determine how DHS, Coast Guard and Navy are planning to manage and oversee the HPIB through an IPO, we reviewed DHS's, Coast Guard's, and Navy's acquisition policies; agreements between DHS, Coast Guard, and Navy for the IPO; the Federal Acquisition Regulation; Defense Federal Acquisition Regulation Supplement; and Department of Homeland Security Acquisition Regulation. We also conducted interviews with knowledgeable Coast Guard and Navy officials.

Summary

- DHS approved the HPIB program's cost, schedule, and requirements baselines in February 2018, with an estimated total program threshold cost—or the maximum amount the program should cost—of $9.8 billion.
- DHS oversees the HPIB's acquisition management activities while Coast Guard and Navy share responsibilities for executing the acquisition through an integrated program office, including plans to award a contract for design and construction of the ships in fiscal year 2019.

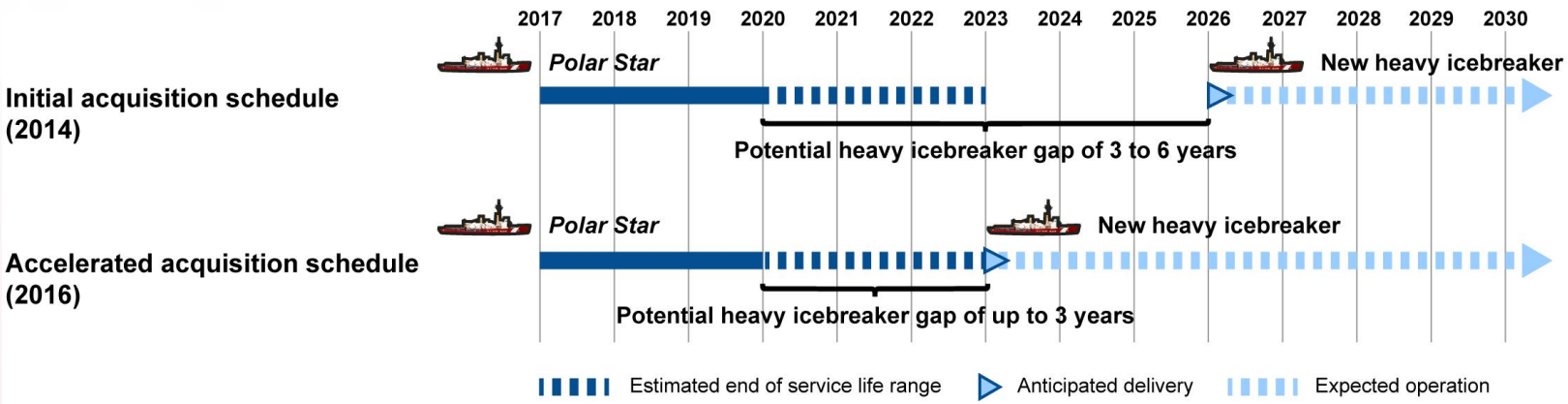
Background

- Coast Guard has two active polar icebreakers—the *Polar Star*, a heavy icebreaker, and the *Healy*, a medium icebreaker. An additional Coast Guard heavy icebreaker, the *Polar Sea*, has been inactive since 2010.
- According to Coast Guard planning documents, the *Polar Star's* useful service life will end between fiscal years 2020 and 2023. This creates a potential heavy polar icebreaker capability gap of up to three years between the end of the *Polar Star's* service life and the planned delivery of the lead replacement heavy icebreaker in 2023.

Background

- In September 2017, we found that Coast Guard accelerated its planned schedule for acquiring new heavy polar icebreakers since first identifying a schedule in 2014. Figure 1 compares the Coast Guard's initial and accelerated acquisition schedules for the heavy polar icebreaker acquisition program.

Figure 1: Coast Guard Potential Heavy Polar Icebreaker Capability Gap Under Initial and Accelerated Acquisition Schedules



Source: GAO analysis of U.S. Coast Guard documents. | GAO-18-385R

- Under the accelerated HPIB acquisition schedule, Coast Guard anticipates delivery of the three ships in 2023, 2025, and 2026.

Background

- The Coast Guard plans to further mitigate the potential heavy polar icebreaking capability gap by completing a life extension of the *Polar Star* to add three to five years to its service life. Coast Guard officials stated that they plan to keep the *Polar Star* operational until at least the delivery of the second HPIB.
- In September 2017, we recommended that Coast Guard should complete a comprehensive cost estimate for the *Polar Star's* service life extension that follows cost estimating best practices before committing to this approach for bridging the potential capability gap.
- Coast Guard agreed with this recommendation and anticipates completing a rough order of magnitude cost estimate for the *Polar Star's* service life extension project by June 2018 and the lifecycle cost estimate by June 2020.

Background

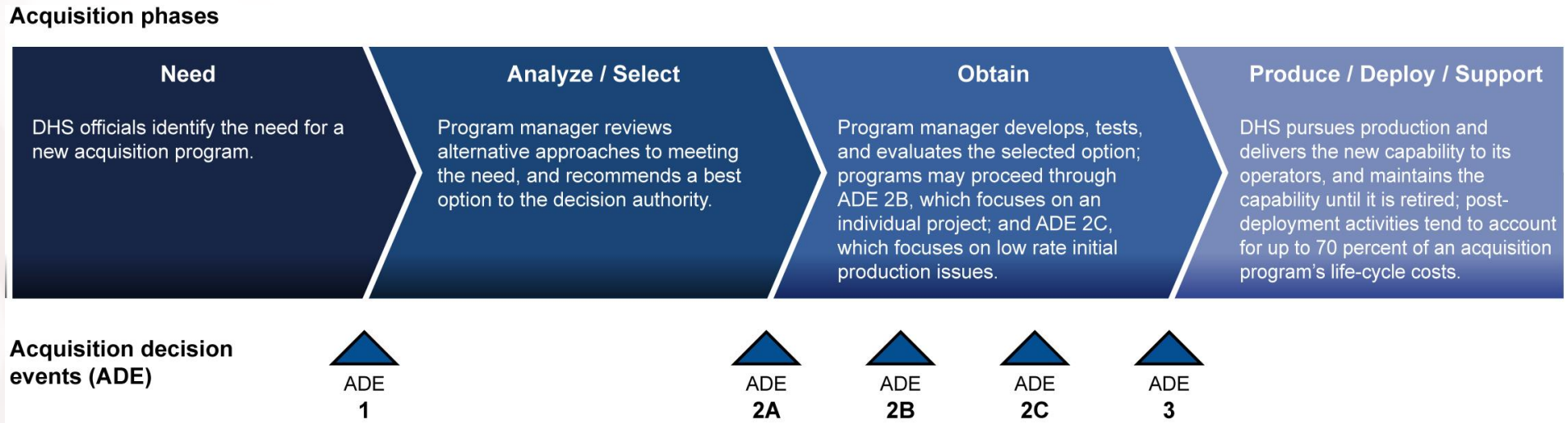
- Since establishing the integrated program office (IPO), DHS, Coast Guard, and Navy formalized their agreements on their approach for the HPIB acquisition in 3 memoranda:
  - January 2017 memorandum of understanding between the Coast Guard Component Acquisition Executive (Vice Commandant of Coast Guard) and the Assistant Secretary of the Navy for Research, Development, and Acquisition;
  - May 2017 memorandum of agreement between the Acting Under Secretary for Management of DHS and the Navy official performing the duties and functions of the Assistant Secretary of the Navy for Research, Development, and Acquisition; and
  - July 2017 memorandum of agreement between the Coast Guard Program Executive Officer, Navy's Program Executive Officer for Ships, and the Commander of the Naval Sea Systems Command.

Objective 1: DHS approved HPIB acquisition baselines

DHS Approved PIB Acquisition Baselines in February 2018

- DHS approved the HPIB program to enter into the Obtain Phase of the DHS Acquisition Framework (Acquisition Decision Event 2A/2B), which is when DHS approves the program's cost, schedule, and requirements baselines, in February 2018 (see Figure 2).

Figure 2: DHS Acquisition Life Cycle for Major Acquisition Programs



Source: GAO analysis of Department of Homeland Security (DHS) data. | GAO-18-385R

Data table for illustration showing acquisition phases and decision points for Figure 2: DHS Acquisition Life Cycle for Major Acquisition Programs

Need	Analyze / Select	Obtain	Produce / Deploy / Support
DHS officials identify the need for a new acquisition program. **ADE 1 occurs after Need phase**	Program manager reviews alternative approaches to meeting the need, and recommends a best option to the decision authority. ADE 2a occurs after the Analyze/select phase	Program manager develops, tests, and evaluates the selected option; programs may proceed through ADE 2B, which focuses on an individual project; and ADE 2C, which focuses on low rate initial production issues. ADE 2B and 2C occur during the obtain phase. ADE 3 occurs after this phase	DHS pursues production and delivers the new capability to its operators, and maintains the capability until it is retired; post- deployment activities tend to account for up to 70 percent of an acquisition program's life-cycle costs.

Objective 1: DHS approved HPIB acquisition baselines

DHS Approved PIB Acquisition Baselines in February 2018

- The HPIB program's cost baseline reflects a threshold cost—or the maximum amount the program should cost—of $9.827 billion, which includes acquisition, operations, and maintenance costs for the three heavy polar icebreakers over their entire 30-year lifecycle. Our ongoing review of the HPIB program will examine the cost risks facing the HPIB program, including an assessment of the cost estimate's reliability.
- DHS had previously planned to approve the program's baselines in December 2017. Coast Guard and Navy officials stated that DHS delayed the approval to February 2018 because Coast Guard and Navy had not yet approved the HPIB's ship specifications or request for proposals for the contract. According to officials, after Coast Guard and Navy approved these two documents in January 2018, DHS proceeded in approving the baselines.

Objective 1: DHS approved HPIB acquisition baselines

Coast Guard Established HPIB Requirements in January 2016 and Revised Those Requirements in January 2018

- During the need phase of the DHS Acquisition Framework, Coast Guard identified icebreaking capability gaps in the 2010 High Latitude Mission Analysis Report and 2013 Polar Icebreaker Mission Need Statement.
- These documents established the need for 3 heavy polar icebreakers and 3 medium icebreakers to fulfill Coast Guard statutory missions.
- Based on the icebreaking capability gaps identified, in January 2016, the Coast Guard developed a HPIB Operational Requirements Document—a key acquisition document that provides the key performance parameters the HPIB must meet, such as icebreaking, endurance, and interoperability thresholds and objectives—through an integrated multi-agency team, including National Science Foundation and Navy.

Objective 1: DHS approved HPIB acquisition baselines

Coast Guard Established HPIB Requirements in January 2016 and Revised Those Requirements in January 2018

- The January 2016 HPIB Operational Requirements Document included four key performance parameter thresholds for the HPIB:
  - Independently break through ice with a thickness of 6 feet at a speed of 3 knots,
  - Independently break through ridged ice with a thickness of 21 feet,
  - Deploy without replenishment of subsistence or fuel for 80 days, and
  - Capability to exchange clear voice and data information with a number of entities, including DOD, DHS, and National Science Foundation.

Objective 1: DHS approved HPIB acquisition baselines

Coast Guard Established HPIB Requirements in January 2016 and Revised Those Requirements in January 2018

- In November 2016, Coast Guard began reviewing the Operational Requirements Document for potential tradeoffs that could be made between costs and capability to make the HPIB more affordable.
- Coast Guard officials stated that as part of this review, they examined and revalidated the HPIB's key performance parameters. As a result, they did not revise any of them.
- Instead, Coast Guard's revisions to the operational requirements included:
  - Adjusting the range of operating temperatures;
  - Reductions to science and survey requirements; and
  - Adding space, weight, and power reservations for Navy equipment, such as a multi-mode radar and minor caliber weapons.
- DHS approved the revisions to the Operational Requirements Document in January 2018. Coast Guard reported that due in part to the revisions, along with design refinements and industry interaction, they have reduced the estimated cost of the lead ship from over $1 billion to less than $900 million.

Objective 1: DHS approved HPIB acquisition baselines

Shipbuilders Examined HPIB Cost Drivers and Risks in Design Studies

- In February 2017, the Coast Guard awarded contracts to five shipbuilders—then valued at approximately $4 million each—to examine the major design cost drivers and technology risks for the HPIB program, thus informing the ship's specifications:
  - Bollinger Shipyards Lockport, L.L.C. in Lockport, LA;
  - Fincantieri Marine Group, L.L.C. in Washington, DC;
  - General Dynamics NASSCO in San Diego, CA;
  - Huntington Ingalls, Inc. in Pascagoula, MS; and
  - VT Halter Marine, Inc. in Pascagoula, MS.

Objective 1: DHS approved HPIB acquisition baselines

Shipbuilders Examined HPIB Cost Drivers and Risks in Design Studies

- As of February 2018, the five shipbuilders have completed the third iteration of their HPIB design studies, and Coast Guard extended the design study contracts so that the shipbuilders can complete a fourth iteration by July 2018.
- Coast Guard officials stated these design studies help to mitigate the program's schedule, cost, and technical risks by gaining knowledge before design and construction of the lead ship begins.
- Our ongoing review of the HPIB program will examine how the Coast Guard is mitigating schedule, cost, and technical risks.

Objective 1: DHS approved HPIB acquisition baselines

Navy Released the HPIB Request for Proposals in March 2018

- The Navy released the final request for proposals for the detail design and construction contract in March 2018.
- Detail design work can include, for example, outlining the steel structure of the ship; determining the routing of systems, such as electrical and piping, throughout the ship; and developing work instructions for constructing elements of the ship, such as installation drawings and material lists.
- Construction work can include, for example, steel cutting, block fabrication, assembly and outfitting of blocks, keel laying, block erection, launch, sea trials, and delivery.
- IPO officials stated that although the release of the request for proposals precedes completion of the shipbuilders' fourth design study iteration, the IPO can incorporate any knowledge gained from this iteration in updates to the request for proposals.
- The Navy anticipates awarding the contract about a year after the request for proposals is released, or by third quarter of fiscal year 2019.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

With Coast Guard and Navy Input, DHS Makes Final Acquisition Decisions for the HPIB Acquisition

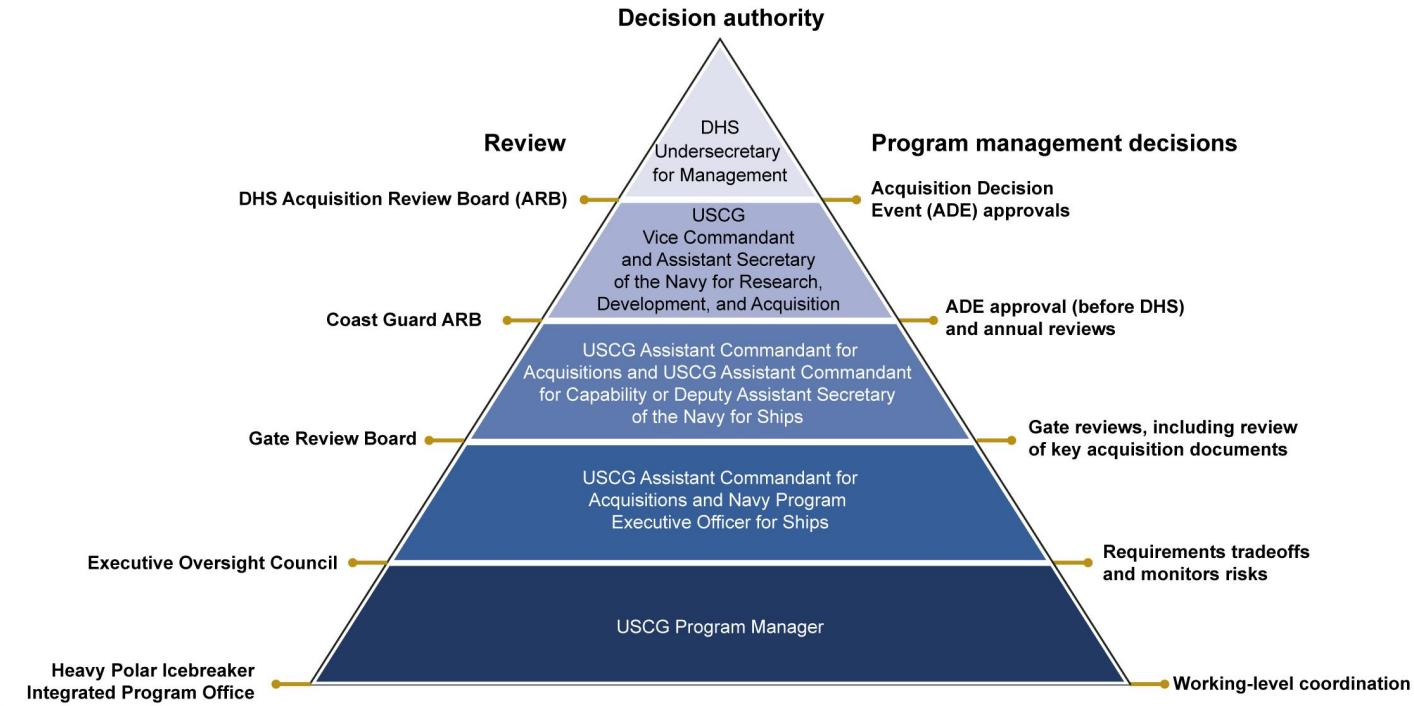
- Coast Guard and Navy have agreed to manage the HPIB program using a tailored acquisition approach that supplements DHS acquisition decision event reviews with additional “gate” reviews that were adopted from Navy’s acquisition processes.
- The DHS Undersecretary for Management retains final approval authority for all acquisition decision events.
- The gate reviews allow both Coast Guard and Navy leadership to review and approve key documents before proceeding to the acquisition decision events. For example, Coast Guard and Navy leadership approved the request for proposals for the detail design and construction contract in a January 2018 gate review prior to DHS approving Acquisition Decision Event 2A/2B in February 2018.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

With Coast Guard and Navy Input, DHS Makes Final Acquisition Decisions for the HPIB Acquisition

Each HPIB acquisition decision event and gate review is overseen by acquisition oversight boards which include members from both Coast Guard and Navy (see Figure 3).

Figure 3: HPIB Oversight Boards and Approval Authorities



DHS = Department of Homeland Security

Source: GAO analysis of Coast Guard data. | GAO-18-385R

Data for pyramid illustration for Figure 3: HPIB Oversight Boards and Approval Authorities

- Decision authority
  - DHS Undersecretary for Management
    - Review: DHS Acquisition Review Board (ARB)
    - Program management decisions: Acquisition Decision, Event (ADE) approvals
  - USCG Vice Commandant and Assistant Secretary of the Navy for Research, Development, and Acquisition
    - Review: Coast Guard ARB
    - Program management decisions: ADE approval (before DHS) and annual reviews
  - USCG Assistant Commandant for Acquisitions and USCG Assistant Commandant for Capability or Deputy Assistant Secretary of the Navy for Ships
    - Review: Gate Review Board
    - Program management decisions: Gate reviews, including review of key acquisition documents
  - USCG Assistant Commandant for Acquisitions and Navy Program Executive Officer for Ships
    - Review: Executive Oversight Council
    - Program management decisions: Requirements tradeoffs and monitors risks
  - USCG Program Manager
    - Review: Heavy Polar Icebreaker Integrated Program Office
    - Program management decisions: Working-level coordination

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

With Coast Guard and Navy Input, DHS Makes Final Acquisition Decisions for the HPIB Acquisition

- Since 2012, the HPIB program has completed several major acquisition decision events and gate reviews. See Table 1 for additional information.

Table 1: Coast Guard Heavy Polar Icebreaker Program Milestones Under Tailored Acquisition Framework

Event	Approval Authority	Date Completed
ADE 0 – Approve program	Coast Guard Deputy Commandant for Mission Support	July 2012
Gate 1 – Preliminary Operational Requirements Document approval	Gate Review Board	Completed at Gate 2
ADE 1 – Validate need	DHS Undersecretary for Management	June 2014
Gate 2 – Approve alternatives analysis	Gate Review Board	January 2017
Gate 3 – Approve Operational Requirements Document update	Gate Review Board	September 2017
Gate 4 – Approve ship specifications	Gate Review Board	January 2018
Gate 5 – Approve request for proposals for detail design and construction contract	Gate Review Board	January 2018
ADE 2A/2B – Entry into Obtain phase of acquisition	DHS Undersecretary for Management	February 2018

Source: GAO analysis of Coast Guard information. | GAO-18-385R

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

HPIB Acquisition Can Be Executed with Coast Guard or Navy Appropriations

- The July 2017 agreement between Coast Guard and Navy notes that the lead ship may be funded through Navy's Shipbuilding and Conversion, Navy appropriations or through the Coast Guard's Acquisition, Construction, and Improvement appropriations. The period of availability to incur obligations is normally 5 years for these appropriations.
- The July 2017 agreement between Coast Guard and Navy also notes:
  - Any cost overruns will be funded by the originating source of the appropriation and be the responsibility of the controlling organization.
  - The financial management and budget development and execution appendix to the agreement would be reviewed and updated upon receipt of funding for follow-on HPIBs.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

HPIB Acquisition Can Be Executed with Coast Guard or Navy Appropriations

- IPO officials told us that Congress could fund the second and third HPIB ships with Coast Guard's or Navy's appropriations, and the program is able to utilize funding from either source.
- Coast Guard and Navy officials stated that uncertainties with HPIB funding have made it challenging to plan the acquisition strategy.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

HPIB Acquisition's Funding Strategy Anticipates Incremental Funding

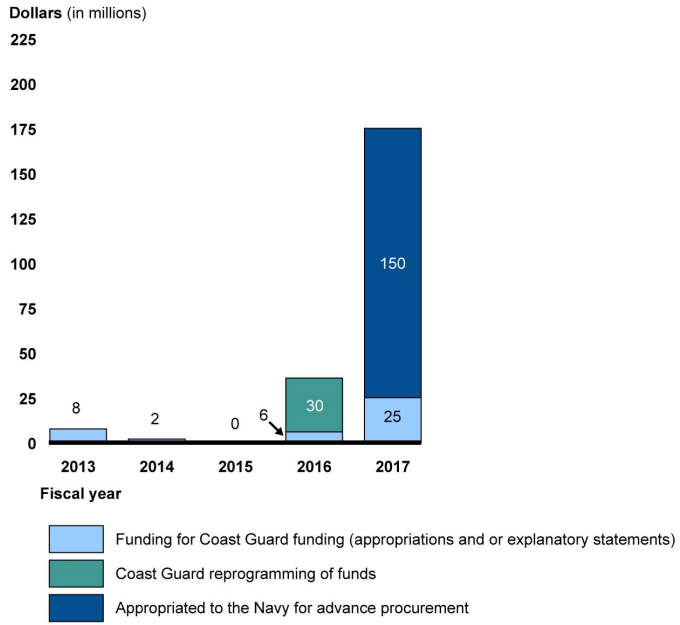
- The National Defense Authorization Act (NDAA) for Fiscal Year 2018 authorized procurement of one Coast Guard heavy polar icebreaker vessel.
- The IPO's HPIB funding strategy currently allows for incremental funding, which means the partial funding of a contract or an exercised option, with additional funds anticipated to be provided at a later time.
- Coast Guard has been congressionally authorized to use incremental funding for the HPIB.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

Since 2013, Nearly $200 Million in Funding Has Been Provided to HPIB Program Either Through Coast Guard or Navy

- For fiscal years 2013 through 2017, the Appropriations Acts, or associated explanatory materials, have reflected funding for the HPIB, including, in total, $41 million for Coast Guard for programmatic costs and $150 million for the Navy for advance procurement.
- According to Coast Guard officials, in fiscal year 2017, Coast Guard reprogrammed (shifted funds within the appropriation) $30 million in fiscal year 2016 appropriations for the HPIB from another program.
- See Figure 4 for more information.

Figure 4: HPIB Funding, Fiscal Years 2013 – 2017



Source: GAO analysis of U.S. Coast Guard information. | GAO-18-385R

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

Agreements Between Coast Guard and Navy in Contracting for HPIB

- The FY 2018 NDAA and 2017 agreements between Coast Guard and Navy establish parameters for how the IPO will contract for the HPIB. For example:
  - Coast Guard will serve as the source selection authority for contract awards, with both Coast Guard and Navy officials serving on the source selection evaluation board.
  - The source of appropriations for the HPIB acquisition determines which service has contracting authority to award and execute the contract.
  - Either Coast Guard or Navy can authorize an interagency acquisition, which is a procedure by which an agency needing supplies or services obtains them from another agency.
  - Any HPIBs acquired under Navy contracting authority will be transferred from the Navy to Coast Guard upon the contractor's delivery of the ship.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

Navy Plans to Competitively Award the HPIB Contract

- The IPO anticipates that the Navy will award the HPIB detail design and construction contract with its $150 million in advance procurement appropriations from fiscal year 2017.
- Assuming the Navy awards the HPIB contract as planned, Navy officials stated the contract would be subject to DOD and Navy contracting regulations and policies, including the Defense Federal Acquisition Regulation Supplement.
- Navy plans to competitively award a contract with options to a single shipyard for all three ships by the third quarter of fiscal year 2019. The contract would include design and long lead materials, with separate options for detail design and construction of the three ships.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

HPIB Solicitation Has Flexibility to Accommodate Different Funding Scenarios

- According to the March 2, 2018 request for proposals, the detail design and construction contract includes:
  - An initial award for advanced planning, design, engineering and procurement of some long lead time materials and
  - Three options for detail design and construction of each of the three ships.
- Navy contracting officials stated that by structuring the construction of each of the ships as options, the request for proposals has flexibility to accommodate any type of additional funding the program may receive and gives the program the flexibility to award this work upon receipt of funding.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

HPIB Solicitation Has Flexibility to Accommodate Different Funding Scenarios

- The contract type for the initial award and all three options is fixed-price incentive (firm-target), which
  - Allows the government and shipbuilder to share cost savings and risk through a specified profit adjustment formula, also known as a share ratio;
  - Ties the shipbuilder's ability to earn a profit to performance by decreasing the shipbuilder's profit after costs reach the agreed upon target cost, and
  - Subject to other contract terms, fixes the government's maximum obligation to pay at a ceiling price.

Objective 2: DHS, Coast Guard, and Navy share oversight responsibilities for the HPIB acquisition

HPIB Solicitation Has Flexibility to Accommodate Different Funding Scenarios

- The March 2, 2018 request for proposals specifies some elements of the fixed-price incentive arrangement (see Table 2).

Table 2: Heavy Polar Icebreaker Detail Design and Construction Contract Details for Fixed-Price Incentive Contract Type

Scope of work	Share ratio	Target cost	Ceiling price as a percentage of target cost
Initial Award - Advanced planning, design, engineering, long lead time materials	50/50 for both cost overruns and underruns	To be proposed by offeror	125 percent and not to exceed $140 million
Option 1 – Detail design and construction of ship 1	50/50 for both cost overruns and underruns	To be proposed by offeror	125 percent
Option 2 – Detail design and construction of ship 2	50/50 for both cost overruns and underruns	To be proposed by offeror	120 percent
Option 3 – Detail design and construction of ship 3	50/50 for both cost overruns and underruns	To be proposed by offeror	120 percent

Source: GAO analysis of Navy information. | GAO-18-385R

Prior GAO Work

Prior GAO Work on Compressed Program Schedules

- Our work has found that pursuing compressed, optimistic schedules leads to Navy programs not following GAO's best practices for a knowledge-based acquisition approach, which often results in poor program outcomes. For example:
  - In June 2017, we found that CVN 78, the lead ship of the Ford-class aircraft carrier program, experienced cost growth of nearly 23 percent, or about $2.4 billion, and over a 1-year delay in delivery. We found that key drivers of the cost growth included an ambitious technology development plan; a high degree of concurrency between technology development and design; and inefficient, out-of-sequence construction work.

Prior GAO Work

Prior GAO Work on Compressed Program Schedules (continued)

- Since 2005, we have raised many concerns about the Littoral Combat Ship program, including risks related to concurrently designing and constructing the lead ships; an aggressive construction schedule which contributed to costly out-of-sequence work and rework, and challenges stemming from concurrent design, production, and testing activities. In April 2017, we noted that costs to construct the ships have more than doubled from initial expectations, with deliveries significantly delayed.
- In July 2007, we found that for LPD 17, the lead ship of the San Antonio class amphibious ships, the Navy's reliance on an immature design tool led to problems that affected all aspects of the design. Without a stable design, work was often delayed from early in the building cycle to later, during integration of the hull, a more costly stage of the build. The lead ship was delivered to the warfighter incomplete and with numerous mechanical failures, resulting in a lower than promised level of capability.

GAO's Ongoing Work on the HPIB Acquisition

- Our ongoing review of the HPIB acquisition will cover the following objectives:
  - How the Coast Guard and Navy's IPO plan to contract for and oversee the HPIB acquisition, and the risks, if any, with their approach;
  - The cost and schedule risks facing the polar icebreaker acquisition and sustainment efforts, and how the Coast Guard is mitigating those risks; and
  - The extent to which the Coast Guard has assessed tradeoffs between capability and affordability for acquiring polar icebreakers.
- We anticipate issuing a report on these objectives in the summer 2018 timeframe.

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