TYPES OF SHIPS IN THE ARCTIC

ARCTIC SHIPPING STATUS REPORT (ASSR) #5
FEBRUARY 2024
More than 1660 unique ships sailed in the Arctic in 2022. These ships were of multiple types, each purpose-built for a specific activity.

This report identifies the total number of ships that sailed in the Arctic in 2022, categorizes them by type, and explains each of those types.
This ASSR report uses the geographic definition of the Arctic contained in the IMO International Code for Ships Operating in Polar Waters (Polar Code).

The Polar Code defines Arctic waters as the area in the figure.

Most larger commercial ships that operate in this area must comply with the Polar Code.
ARCTIC SHIPPING

PAME’s 2009 Arctic Marine Shipping Assessment (AMSA) Report identified four types of Arctic Shipping:

- **Destinational transport**, where a ship sails to the Arctic, performs some activity in the Arctic, and sails away.
- **Intra-Arctic transport**, a voyage that stays within the general Arctic region and links two or more Arctic States.
- **Trans-Arctic transport**, are transit voyages which are taken across the Arctic Ocean from the Pacific to the Atlantic Ocean or vice versa.
- **Cabotage**, to conduct trade or engage in marine transport in coastal waters between ports within an Arctic State.

Arctic shipping refers to all shipping activities within the area in question, unless otherwise stated.
Arctic Ship Traffic Data

All data in this report is from PAME’s Arctic Ship Traffic Data (ASTD) System (www.astd.is).

Only AIS signals from ships carrying AIS Class A transponders are included in the ASTD System. Many ships not required to carry AIS still opt to use it and are therefore captured in this report (e.g., fishing vessels, pleasure craft).

The type of information contained in the ASTD System and its sources are described in the ASTD Data Document, available online here.
This report explains each ship type operating in the Arctic Polar Code area in 2022.

The report identifies the number of vessels of each type and the percentage of each ship type for the overall number in 2022.

The Ship types are in the order from the most ships to the fewest and some of the ship types include case studies of ships, with pictures of each ship type as well.

As well as identifying the general ship types, further details are provided, based on the Statcode 5 Shiptype Coding System.

The Report also explains the methodologies and sources used to prepare it.
Ship Type Aggregation

• IMO Numbers: S&P Global is the source for the International Maritime Organization (IMO) Ship Number and is the sole authority with responsibility for assigning and validating these numbers. The ASTD System uses the IMO ship numbers to identify each ship, including its type.

• To identify ship types, S&P Global uses the Statcode 5 Shiptype Coding System. ASTD uses the same system to aggregate ship types to the “ASTD Ship Types”. See an example on next page.
  - ASTD Level 3 users can access the ASTD ship types (15 types)
  - ASTD Level 2 users can access ship types on Level 3 (50 types)
  - ASTD Level 1 users can access ship types on Level 5 (over 200 types)

A document showing how the ASTD System aggregates ship types is available online here.
# Ship Type Aggregation - Example

<table>
<thead>
<tr>
<th>StatCode Level 5</th>
<th>Level 5 Ship Type (Level 1 users)</th>
<th>Level 3 Ship Type (Level 2 users)</th>
<th>ASTD Ship Type (Level 3 users)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A12A2LP</td>
<td>Molten Sulphur Tanker</td>
<td>Chemical</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of molten sulphur in insulated tanks at a high temperature</td>
</tr>
<tr>
<td>A12A2TC</td>
<td>Chemical Tanker</td>
<td>Chemical</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of chemical cargoes, lube oils, vegetable/animal oils and other chemicals as defined in the International Bulk Chemical Code. Tanks are coated with suitable materials which are inert to the cargo.</td>
</tr>
<tr>
<td>A12B2TR</td>
<td>Chemical/Products Tanker</td>
<td>Chemical</td>
<td>Chemical tankers</td>
<td>A chemical tanker additionally capable of the carriage of clean petroleum products</td>
</tr>
<tr>
<td>A12C2LW</td>
<td>Wine Tanker</td>
<td>Chemical</td>
<td>Chemical tankers</td>
<td>A cargo ship designed for the bulk transport of wine in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers</td>
</tr>
<tr>
<td>A12D2LV</td>
<td>Vegetable Oil Tanker</td>
<td>Chemical</td>
<td>Chemical tankers</td>
<td>A cargo ship designed for the bulk transport of vegetable oils in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers</td>
</tr>
<tr>
<td>A12E2LE</td>
<td>Edible Oil Tanker</td>
<td>Chemical</td>
<td>Chemical tankers</td>
<td>A cargo ship designed for the bulk transport of edible oils in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers</td>
</tr>
<tr>
<td>A12F2LB</td>
<td>Beer Tanker</td>
<td>Chemical</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of beer</td>
</tr>
<tr>
<td>A12G2LT</td>
<td>Latex Tanker</td>
<td>Chemical</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of latex</td>
</tr>
<tr>
<td>A14E2LJ</td>
<td>Fruit Juice Carrier, Refrigerated</td>
<td>Other Liquids</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of fruit juice concentrate in refrigerated tanks. May be arranged for the additional carriage of containers on deck</td>
</tr>
<tr>
<td>A14F2LM</td>
<td>Molasses Tanker</td>
<td>Other Liquids</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of molasses</td>
</tr>
<tr>
<td>A14G2LO</td>
<td>Glue Tanker</td>
<td>Other Liquids</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of glue</td>
</tr>
<tr>
<td>A14H2LH</td>
<td>Alcohol Tanker</td>
<td>Other Liquids</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of alcohol</td>
</tr>
<tr>
<td>A14N2LL</td>
<td>Caprolactam Tanker</td>
<td>Other Liquids</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of caprolactam, a chemical used in the plastics industry for the production of polyamides</td>
</tr>
<tr>
<td>A22A2BN</td>
<td>Bulk/Caustic Soda Carrier (CABU)</td>
<td>Bulk Dry / Oil</td>
<td>Chemical tankers</td>
<td>A bulk carrier with certain holds arranged with tanks for the alternative (but not simultaneous) carriage of caustic soda</td>
</tr>
<tr>
<td>A22A2BX</td>
<td>Bulk/Sulphuric Acid Carrier</td>
<td>Bulk Dry / Oil</td>
<td>Chemical tankers</td>
<td>A bulk carrier arranged for the alternative (but not simultaneous) carriage of sulphuric acid</td>
</tr>
<tr>
<td>A22B2BG</td>
<td>Bulk/Oil/Chemical Carrier (CLEANBU)</td>
<td>Bulk Dry / Oil</td>
<td>Chemical tankers</td>
<td>A bulk carrier with arranged for the alternative (but not simultaneous) carriage of clean petroleum and chemical products</td>
</tr>
<tr>
<td>W11A5TC</td>
<td>Chemical Tanker, Inland Waterways</td>
<td>Tanker</td>
<td>Chemical tankers</td>
<td>A tanker for the bulk carriage of chemical cargoes, lube oils, vegetable/animal oils and other chemicals as defined in the International Bulk Chemical Code which is not suitable for trading in open waters. Tanks are coated with suitable materials,</td>
</tr>
</tbody>
</table>
THE 1661 SHIPS
IN THE ARCTIC POLAR CODE AREA 2022

Other Vessel Types
- Search and Rescue Ships: 6
- Container Ships: 8
- Ro-Ro Crgo Ships: 9
- Dredging Ships: 13
- Buoy Tender: 14
- Passenger Ships: 14
- Patrol Vessel: 16
- Crude Oil Tankers: 16
- Yacht: 21
- Gas Tankers: 26
- Offshore Supply Ships: 37
- Icebreaker: 32
- Oil Product tankers: 51
- Research Ships: 51
- Chemical Tankers: 55
- Cruise Ships: 78
- Refrigerated Cargo Ships: 81
- Tug: 103
- Bulk Carriers: 114
- General Cargo Ships: 182
- Fishing Vessels: 729

Other Vessels: 56%
Fishing Vessels: 44%
FISHING VESSELS

Fishing vessel
A vessel for catching fish whose method is other than trawling. Includes long liners, purse seiners, etc.

Fish Factory Ship
Vessels fitted out with a factory for refrigerating, processing, and possibly canning. Includes trawlers.

Fish Carrier
A refrigerated cargo vessel for the carriage of fish at a controlled temperature.

Fishery Research Vessel
A vessel for conducting research into fish stocks and conservation. The vessel may catch fish for scientific purposes.

Fishery Patrol Vessel
A vessel for the protection of fish stocks and fishing vessels.

Seal Catcher
A vessel equipped for harvesting seals.

729 vessels in 2022
44%
CASE STUDY

Fish Factory Ship

Vessels fitted out with a factory for refrigerating, processing, and possibly canning fish.

Mersey Phoenix is a Trawler that was built in 2002 and is sailing under the flag of Canada. It “harvests and produces high-quality Northern Atlantic Cold-Water Shrimp.”

Vessel Length: 71 meters
Gross Tonnage: 3423
Ice class: 1B

Red lines show tracks of the Mersey Phoenix in 2022. Tracks from the ASTD System.
GENERAL CARGO SHIP

Carriage of various types of dry cargo.

Type: General Cargo Ship
Name: Thamesburg
Owner: Wagenborg
Length: 173m
Ice Class: 1A
Holds (2): 55*18*14m.
Navigation in 2022: Northwest Passage
A single or multi deck cargo vessel for the carriage of various types of dry cargo. Single deck vessels will typically have box shaped holds. Cargo is loaded and unloaded through weather deck hatches.

A vessel arranged for carrying unitized cargo on deck only. Access may be by use of a ro-ro ramp.

A cargo vessel able to carry heavy and/or outsized individual cargoes. Cargo may be carried on deck or in hold (maximum one) and may be loaded by crane and/or ro-ro ramps.

A general cargo ship with the additional capability to be loaded and unloaded by ro-ro access to a limited portion of the cargo space.
CASE STUDY
HEAVY LOAD CARRIER

A cargo vessel able to carry heavy and/or outsized individual cargoes. Cargo may be carried on deck or in hold (maximum one) and may be loaded by crane and/or ro-ro ramps.

Built by Aker Arctic in 2016, Audax and Pugnax are both Heavy Load Carriers that sailed in the Arctic Polar Code Area in 2022.

Audax delivered a massive prefabricated plant module for Novatek’s Arctic LNG 2 facility via the Northern Sea Route (NSR). The ship departed Tianjin, China on December 29, 2021, entered the NSR at Cape Dezhnev on January 25, 2022, and arrived in Murmansk, Russia on February 17, 2022, according to High North News.
BULK CARRIER

A single deck cargo vessel with an arrangement of topside ballast tanks for the carriage of bulk dry cargo of a homogeneous nature.

ORE/OIL CARRIER

An ore carrier constructed for the alternative (but not simultaneous) carriage of crude oil.

CEMENT CARRIER

A single deck cargo vessel fitted with pumping arrangements for the carriage of cement in bulk.

Bulk Carrier loaded with iron ore from the Mary River Mine in Baffinland, Nunavut. Image: Baffinland.
A bulk carrier transports cargo in specially designated compartments. The three major bulk cargoes worldwide are iron ore, coal, and grain. The size and design of bulk carriers varies depending on their use.
CASE STUDY
CEMENT CARRIER

Sunnanvik is a cement carrier navigating various routes in the Atlantic from the Secil-Outão cement production company in Portugal. In 2022 it made stops in Nuuk (Greenland) and at several ports in Iceland.

Sunnanvik can carry around 2500 tons of cement.

**Type:** Cement Carrier  
**Name:** Sunnanvik  
**Flag:** Sweden  
**GT:** 7454  
**Length:** 124m  
**Owner:** SMT Shipping
TUG VESSEL

Tugs help maneuver larger ships, for example in mooring or berthing, or helping with navigation in specific operations, for example in corridors or canals.

They do this either by **towing** or **pushing** vessels.

Tugs have enormous strength due to their powerful propulsion system. Their weight to power ratio is much higher than the ships they maneuver, hence they can move larger ships.

They also support disabled ships, oil platforms, and barges and can be used as icebreakers or salvage boats in addition to sometimes being equipped with fire-fighting equipment.

Some tugs are designed to only operate in ports, but larger ones can venture out into deeper waters.
CASE STUDY
TUG AND PUSHER

Four tugs and pushers maneuvering an LNG tanker in Russia
Refrigerated cargo ships, often called reefers, use temperature control to transport perishable goods such as fruit, meat, fish, vegetables, and dairy products. Their design differs from other cargo ships because of the temperature-controlled units, either in large compartments or in containers, where each container is individually temperature controlled.
CASE STUDY: REEFER CONTAINERS

Dry storage containers come in lengths of 10, 20, and 40 feet and are commonly used for transport of different goods, but do not allow for temperature controls, so they are not suited for moving food or chemicals that require refrigeration. Reefer containers serve that purpose.

To maintain a prescribed temperature, air is circulated in each container. Generally, chilled cargo is kept separate from frozen cargo due to different air circulating needs.

<table>
<thead>
<tr>
<th></th>
<th>DRY CONTAINER</th>
<th>REEFER CONTAINER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Airtight with no ventilation.</td>
<td>Container with a refrigeration unit, range from 40°C to -65°C.</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>Carry non-perishable food, textile, clothing, plastics, etc.</td>
<td>Carry temperature-sensitive goods like perishable foods, medicines and pharmaceuticals.</td>
</tr>
<tr>
<td><strong>Advantages</strong></td>
<td>Versatile, easy in operation, low maintenance, protection from bad weather and theft.</td>
<td>Provides fresh, dry and temperature-sensitive products, protects food from spoilage, real time tracking of temperature for the owner.</td>
</tr>
<tr>
<td><strong>Disadvantages</strong></td>
<td>No temperature control, not suitable for sensitive goods.</td>
<td>High maintenance, more expensive than dry containers.</td>
</tr>
<tr>
<td><strong>Look</strong></td>
<td>Can be any color.</td>
<td>Reefer Containers are white because the color white reflects all wavelengths of light and, thus absorbs the least amount of heat.</td>
</tr>
</tbody>
</table>
Cruise ships are large passenger ships used mainly for tourism. Cruise ships typically embark on roundtrip voyages, stopping at various ports where passengers enjoy shore excursions.

Cruise ships often enter the Arctic Polar Code area several times each year. In 2022, 78 cruise ships made 250 entries into the Arctic Polar Code area.
## ARCTIC OIL TANKERS

<table>
<thead>
<tr>
<th>CHEMICAL TANKER</th>
<th>OIL PRODUCT TANKER</th>
<th>CRUDE OIL TANKER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>55 SHIPS (3%) IN 2022</strong></td>
<td><strong>51 SHIPS (3%) IN 2022</strong></td>
<td><strong>16 SHIPS (1%) IN 2022</strong></td>
</tr>
<tr>
<td>A tanker carrying clean petroleum products.</td>
<td>A tanker carrying clean or dirty petroleum products.</td>
<td>A tanker carrying crude oil from its point of extraction to oil refineries.</td>
</tr>
<tr>
<td>Their tanks differ from Oil Product Tankers as they are often made of stainless steel, or the tanks are coated with suitable materials which are inert to the cargo.</td>
<td>Clean products include gasoline, diesel, and jet fuel. Dirty products include heavy fuel oil (HFO). Can carry different types of products in individual compartments. Have individual pumps for each tank.</td>
<td>Built to facilitate single kind of crude oil. Usually larger in size then other oil tankers.</td>
</tr>
</tbody>
</table>

**ALL THESE TANKERS CARRY OIL IN BULK**
CASE STUDY: OIL - FROM WELL TO MARKET

USING OIL TANKERS IN THE ARCTIC

EXTRACTION

After exploration and drilling, crude oil is pumped from either land-based or offshore oil wells.

TRANSPORT TO REFINERY

Crude Oil Tankers are used to transport the oil from offshore sites to a refinery.

The refinery transforms the crude oil to products, such as gasoline, diesel fuel, and fuel oils.

TRANSPORT TO DEPOTS

The products are then transported to oil depots or oil terminals by pipelines, trains, or ships, such as chemical and oil product tankers.

TRANSPORT TO MARKETS

The various products are then shipped to markets and consumers, including to gas stations.
NATURAL RESOURCES AND SHIPS IN THE ARCTIC

- AS PAME has shown, natural resource exploration is one of the drivers for shipping in the Arctic (ASSR Report #1).

- Ships directly involved in such work made up 18% of unique ships in the Arctic Polar Code area in 2022. These ships are:
  - Bulk carriers (114)
  - Chemical tankers (55)
  - Oil product tankers (51)
  - Offshore supply ships (29)
  - Gas tankers (26)
  - Crude oil tankers (16)

- Other ship types are also likely to support natural resource exploration, including tugs and icebreakers.
A ship designed, modified, or equipped to carry out research at sea. Research vessels carry out a number of roles, depending on each mission, including oceanography, hydrography, marine biology, geology, and other research activities.

Kranprins Haakon. Image: Institute of Marine Research
THE KRONPRINS HAAKON

In 2022, The research vessel Kronprins Haakon became only the second Norwegian vessel to reach the North Pole.

“Kronprins Haakon departed Tromsø with 27 researchers and technicians on board on July 19 and arrived at the North Pole just nine days later, encountering only limited ice, as part of its 2022 Arctic Expedition. The vessel met up with Le Commandant Charcot, a luxury ice-capable cruise ship, which also accommodates scientific researchers on board.

According to Ponant, the French company which operates Le Commandant Charcot, the two vessels’ captains coordinated the encounter ahead of time. In what is likely a first in the Arctic, the cruise ship opened up a channel in the ice and “escorted” the Haakon which followed behind en route to the pole.”

High North News, 1. August 2022

CAPABILITIES:

• 15 laboratories, that can play host to most research disciplines, and with some of the most comprehensive equipment packages supplied to any research vessel.

• The vessel is equipped with sonar that can provide information about details on the seabed.

• It also has a remote-controlled submarine that can go down to a depth of 6,000 metres, a helicopter deck, seismic and trawling equipment, as well as weather balloons that can establish profiles of the atmosphere.

• The vessel has considerable carrying capacity, sufficient for containers, cargo, and extensive supplies for working in the field.

• The ship also has a “moon pool”, which makes it possible to open a hatch in the bottom and send equipment down into the water, even if the ship is encased in sea ice.

• The ship is constructed from steel plate with a thickness of up to 40 mm. The icebreaker bow, combined with considerable propulsion power, allows the vessel to maintain a steady 3.5 knots through solid ice up to a thickness of one metre.

• In more severe conditions, the hull is dimensioned to allow the vessel to pick up speed, ram into the ice and drive up onto it, breaking the ice under the weight of the ship.
ICEBREAKERS

An icebreaker is a special-purpose ship designed to move and navigate through ice-covered waters, and provide safe waterways for other ships.
Offshore supply ships provide operational services to oil and gas exploration activities and construction work at sea. They transport necessary supplies to the exploitation and construction units and carry crew as well as providing other support.

This vessel, Thor Omega, operated in the Arctic Polar Code Area in 2022. It is owned by Thor, a shipping company in the Faroe Islands.
GAS TANKER

Only one type of gas tanker ship operated in the Arctic Polar Code area in 2022 – Liquid Natural Gas (LNG) tankers. This photo is of the Christophe de Margerie in Yamal, Russia.
CASE STUDY

Gas Tanker Traffic to Yamal

Prior to the launch of the Yamal Megaproject in Russia, the traffic of gas tankers in the Arctic Polar Code area was minimal. Now, several tankers transport gas from Yamal directly to foreign markets, including to Asia.

A total of 15 LNG carriers were custom-designed and built for the Yamal LNG Project to support year-round navigation without icebreaker assistance along westbound navigation routes, and during summer navigation season eastbound via the Northern Sea Route.
YACHTS

Yachts in the Arctic Polar Code area in 2022 range from superyachts like the Nord (pictured) to smaller pleasure craft. Smaller yachts and pleasure crafts often do not carry AIS Class A and are not reported in these numbers.
There is no one definition of patrol vessel other than they are used for patrol duties. They vary greatly in size, design, and operation.
Passenger ships in the Arctic Polar Code area in 2022 were fairly limited in size. Most operated around Svalbard and Greenland, almost exclusively near shore. Typically, they take shorter excursion trips, in contrast with cruise ships which are more common for longer cruises. Cabins are not always available in passenger ships but always in cruise ships.
BUOY TENDERS

Buoy Tenders build and maintain Aids to Navigation (ATONs). ATONs provide traffic information to facilitate safe and efficient voyages.
DREDGER SHIPS

Dredging is the removal of seabed sediment. Dredging is undertaken to reclaim land, maintain ports, and create or maintain shipping lanes of safe and adequate depths.

Dredger fizzes water which is filtered from the soil dredged onboard.
CASE STUDY: HOW DREDGERS WORK

The dredger draws, sucks, excavates, or scrapes sediment such as sand, silt, gravel, trash, rocks, and debris from the ocean floor. Hopper dredgers use a trailing suction pipe. The material may be carried on board and discharged elsewhere.
Roll-on/roll-off (ro-ro) ships are cargo ships designed to carry wheeled cargo, such as cars, motorcycles, trucks, semi-trailer trucks, buses, trailers, and railroad cars, that are driven on and off the ship on their own wheels or using a platform vehicle, such as a self-propelled modular transporter. This is in contrast to lift-on/lift-off (LoLo) vessels, which use a crane to load and unload cargo.
A container ship is a cargo ship that carries all its load in truck-size intermodal containers in a technique called containerization. Container ships are the cargo ships that carry most seagoing non-bulk cargoes (90%). The container ships in the Polar Code area in 2022 were limited to three locations: several voyages to Nuuk (Greenland), one vessel to Murmansk (Russia) and a few vessels to Chukotka (Russia).
SEARCH AND RESCUE VESSEL

How these vessels are equipped varies greatly but they are used for many purposes in search and rescue operations.
CASE STUDY: SEARCH AND RESCUE VESSEL

The vessel on the previous page is the Murman, a multipurpose Russian salvage vessel. It has an ice-strengthened hull, a helideck, and can perform oil recovery activities. It is 97 meters long and is equipped with diving equipment, multiple boats, and a special fire-fighting system. As the map of Murman’s tracks in 2022 shows, it participated in two large scale operations in 2022.
ABOUT THIS REPORT

This is the fifth report generated by PAME’s Arctic Ship Status Report (ASSR) Project. The goal of the ASSR Project is to use PAME’s Arctic Ship Traffic Data (ASTD) System to highlight topical issues related to commercial shipping in the Arctic. Launched in 2019, the ASTD System is PAME’s database for Arctic shipping activities.

All use of this report is allowed. Please cite as PAME – Arctic Shipping Status Report # and provide a link to this report.

Due to data updates and slight differences in analytical methodologies, the overall number of ships may differ slightly from ASSR to ASSR.

All images are from Getty Images – Shutterstock unless stated otherwise.

The project gratefully acknowledges funding from the Nordic Council of Ministers.