

Icebreaking needs and plans on the Northern Sea Route



Growth of shipping on the Northern Sea Route has been connected with the commercial exploration of the Arctic regions. Icebreaker fleet and duly ice-strengthened transport vessels successfully transport natural resources and deliver equipment, and commodities to and from the areas of difficult access. Although the NSR offers opportunities as a shorter transit route for shipping, the main growth forecasts in transportation are currently related to the exploration of new fields and exportation of raw materials from the Arctic shelf.

The seaway of Northern Sea Route (NSR) is running through Kara, Laptev, East Siberian, and Chukchi seas. The NSR can be entered from west through the Straits Yugorskiy Shar and Karskiye Vorota, or by passing North of Ostrova Novaya Zemlya around Mys Zhelaniya, and from East through the Bering Strait.

The main factor influencing navigation through the NSR is the presence of ice. Annual and seasonal variability of ice conditions is typical for all areas of the NSR. Navigation season for transit passages starts approximately at the beginning of July and lasts through to the second half of November. On the western parts, it is possible to operate year-round with the assistance of icebreakers, or with independently icebreaking vessels.

Current projects along the NSR

Since the winter of 1978-79, one of the most advanced Arctic marine transport systems in the Arctic has been the year-round Dudinka – Murmansk shipping line. Cargo flow on this route remains at a more or less stable level of about 1 million tonnes annually.

Besides projects involving sea transportation of hydrocarbons from the Russian Arctic offshore, at present the

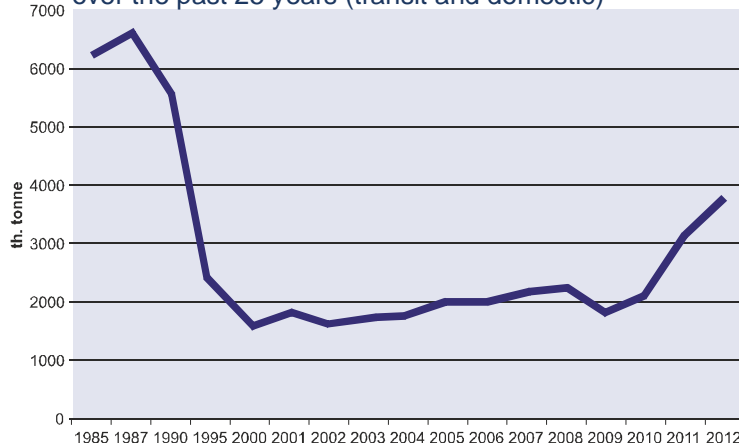
export of oil from the oil fields of the Timan-Pechora region through the stationary sea ice-resistant shipping terminal Varandey has been going on several years. The sea ice-resistant stationary platform Prirazlomnaya began production and shipping in 2014.

Construction of the natural gas liquefaction plant in Sabetta and the export of oil from the Novoportovskoe field from the single-point mooring in Ob Bay in the Cape Kamenny area are under active construction at present.

The first shipment of LNG from Sabetta is planned for 2017, putting into operation the first train with annual production of 5.5 million tonnes of LNG. Already in 2019 the total productivity of three trains could reach 16.5 million tonnes a year. It is additionally planned to extract up to 1 million tonnes of gas condensate from Sabetta.

At the end of May 2016, the "Arctic Gate" single point terminal began operation near Cape Kamenny. It is intended that during the first years the volume of the annual transshipment of oil would reach 5.5 million tonnes and from 2019, reaching full output, the terminal would be capable of shipping about 8.5 million tonnes of crude oil annually.

Dynamic of cargo volume on the NSR over the past 25 years (transit and domestic)



Source: http://www.arctic-lio.com/nsr_transits

NSR transit navigation

Since 2010, large-capacity ships of appropriate ice classes have carried out transit cargo transportation during summer-autumn navigation. These ships are sailing along the NSR under the escort of Russian nuclear icebreakers.

For the first time, the Aframax class tanker *SCF Baltica* made a transit voyage through the NSR from Murmansk to China in August 2010. The largest ship passing along the NSR in 2011 was the tanker *Vladimir Tikhonov* of the Suezmax class, with a deadweight of about 160 thousand tonnes. For the transit of such large ships, the deep-water high-latitude route to the north of the New Siberian Islands was used.

In November 2012, for the first time ever, the transportation of LNG on the NSR was carried out. The transportation was performed by LNG carrier *Ob River* with a capacity of 150,000 m³ and was escorted by two nuclear icebreakers during the period of intensive ice formation.

However, the results of 2014-2016 seasons navigations have shown that the transit cargo flows through the NSR remain unstable, and can easily be redirected to other routes.



Vessels transited NSR in year 2016

Source: http://www.arctic-lio.com/nsr_transits

| | Vessel name | Flag | Shipowner | Ice class | Type | Cargo | Qty (mt) / passengers | DWT (tons) | Max draught (m) | Port of departure | Port of destination | I/b assistance | WBNSR (Kara Gate) | WBNSR (Yugorskiy Shar) | WBNSR (Cape Zhelaniya) | EBNSR (Cape Dezhnev) | NSR passage time (days) | |
|------------|--------------------|-------------------|---|-------------|-----------------------|---|-----------------------|------------|-----------------|---------------------------|---------------------------|--------------------------|-------------------|------------------------|------------------------|----------------------|-------------------------|------|
| 1 | Kapitan Khlebnikov | Russia | PJSC "Far Eastern Shipping Company" | Icebreaker7 | Icebreaker | Passengers | 120 | 4 418 | 8,5 | Anadyr | Murmansk | No | | | | 27.07.16 21:35 | 16.07.16 2:30 | 11,8 |
| 2 | Brage Viking | Russia | LLC "Viking Supply" | Arc 5 | Tug | n/a | 0 | 4 352 | 7,4 | Kholmok | Aberdeen (Scotland) | Vaigach (Atomflot) | | | 06.08.16 7:00 | 21.07.16 18:30 | 15,5 | |
| 3 | Yong Sheng | Hong Kong | Casco Shipping Ltd | Arc 4 | General cargo carrier | Ore in bulk, steel | 13 514 | 19 150 | 8,3 | Shanghai (China) | Glasgow (Scotland) | Vaigach (Atomflot) | | | 06.08.16 13:26 | 28.07.16 7:00 | 9,3 | |
| 4 | Spasatel Karev | Russia | FBI "Marine Rescue Service of Rosmorrechflot" | Arc 5 | Rescue | n/a | 0 | 1 109 | | Saint-Petersbourg | Vladivostok | No | 30.07.16 6:30 | | | 20.08.16 9:50 | 21,1 | |
| 6 | Gretke Oldendorf | Portugal | Oldendorff Carriers GmbH & Co KG | Ice 2 | General cargo carrier | Coal | 76 175 | 80 444 | 14,3 | Vancouver (Canada) | Raah (Finland) | Yamal (Atomflot) | | | 28.08.2016 23:30 | 03.08.16 6:00 | 25,7 | |
| 7 | Winter Bay | St. Kitts & Nevis | Dariada Ltd | Ice 1 | Refeer | Frozen meat | 1 625 | 2 050 | 5,4 | Tromse (Norway) | Osaka (Japan) | No | | | 10.08.16 14:28 | 26.08.16 11:20 | 15,9 | |
| 8 | Tian Xi | Hong Kong | Casco Shipping Ltd | Ice 1 | General cargo | Paper pulp | 30 042 | 36 000 | 10,5 | Kotka | Qingdao | Yamal | | | 16.08.16 12:40 | 29.08.16 14:15 | 13,1 | |
| 9 | Vidar Viking | Russia | LLC "Viking Supply" | Arc 7 | Tug | n/a | 0 | 2 600 | 6,75 | Kholmok | Landskrona | No | | | 30.08.16 0:20 | 19.08.16 23:00 | 10,1 | |
| 10 | 50 let Pobedy | Russia | FSUE "Atomflot" | Icebreaker9 | Icebreaker | n/a | 0 | 3 505 | 11,0 | Murmansk | Anadyr | n/a | 20.08.16 4:20 | | | 26.08.16 13:50 | 6,4 | |
| 11 | Hanseatic | Bahamas | Hapag-Lloyd Kreuzfahrten GmbH | Arc 5 | Passanger | Passengers | 126 | 1 177 | 4,9 | Murmansk | Provideniya | No | | | 24.08.16 4:00 | 06.09.16 21:30 | 13,7 | |
| 12 | Georg Oldendorf | Portugal | Oldendorff Carriers GmbH & Co KG | Ice 2 | General cargo carrier | Coal | 78 347 | 81 400 | 14,5 | Vancouver (Canada) | Raah (Finland) | No | | | 08.09.16 19:00 | 30.08.16 13:45 | 9,2 | |
| 13 | Yaroslav Mudryi | Russia | Valkur Ltd | Arc 4 | General cargo carrier | Oil products | 8 470 | 10 463 | 8 | Arhangelsk | Petropavlovsk-Kamchatskiy | No | 02.09.16 18:00 | | | 12.09.16 11:41 | 9,7 | |
| 14 | BBC Lima | Germany | BBC Chartering Carriers | Arc 5 | General cargo | General cargo | 369 | 7 819 | 5,8 | Shanghai | Bremerhaven | No | | | 16.09.16 8:33 | 07.09.16 6:45 | 9,1 | |
| 15 | Winter Bay | St. Kitts & Nevis | Dariada Ltd | Ice 1 | Refeer | Frozen fish | 1 874 | 2 050 | 5,8 | Petropavlovsk-Kamchatskiy | Saint-Petersbourg | No | | | 11.10.16 11:45 | 03.10.16 1:25 | 8,4 | |
| 16 | Inzhener Trubin | Russia | Northern Shipping Company | Arc 5 | General cargo carrier | Ballast | 0 | 7 075 | 5,8 | Arhangelsk | Qingdao (China) | 50 let Pobedy (Atomflot) | 31.10.16 16:50 | | | 12.11.16 8:55 | 11,7 | |
| 17 | Normann | Liberia | LLC "Femko" | Arc 7 | Supply vessel | n/a | 0 | 2 600 | 7,6 | Bergen | Kholmok | | | | 02.11.16 12:00 | 17.11.16 17:45 | 15,2 | |
| 18 | HHL Vaiparaiso | Liberia | Hansa Heavy Lift | Arc 4 | General cargo carrier | Port, cranes, sand in big-bags, invertors | 4 097 | 19 413 | 8,8 | Saint-Petersbourg | Vostochniy | 50 let Pobedy (Atomflot) | | | 03.11.16 20:30 | 11.11.16 19:06 | 7,9 | |
| 19 | Pomor | Liberia | LLC "Femko management" | Arc 7 | Supply vessel | n/a | 0 | 2 600 | 6,1 | Bergen (Norway) | Kholmok | | | | 08.11.16 8:10 | 17.11.16 18:20 | 9,4 | |
| Total | | | | | | | 214 513 | Average | | | | | | | | | | 14,3 |
| Cargo | | | | | | | 214 513 | | | | | | | | | | | |
| Passengers | | | | | | | 246 | | | | | | | | | | | |

Role of NSR Administration

Politics of the Russian Federation regarding Arctic navigation is based on the principle that the NSR is a historically established national integral transport communication in the Arctic. In order to resolve pending problems of the organisation of navigation, and to ensure safety in the water area of the NSR, in 2012 President Putin signed the Federal Law "On amendments to certain legislative acts of the Russian Federation regarding the state regulation of commercial navigation in the water area of the NSR".

The Federal state Institution "The Northern Sea Route Administration" was established with the main targets to ensure safe navigation and protection of marine environment from the pollution in the water area of the Northern sea route. The main functions are the following:

- Obtaining and considering the submitted applications and issuing the permissions for navigation through the NSR;
- Issuing the certificates of the ice conventional pilotage on NSR;
- Researching weather, ice, navigational and other conditions on NSR;
- Coordination of installation of navigational aids and harmonization of regions to carry out hydrographical survey operations on NSR;
- Assistance in the organization of search and rescue operations in the water area of NSR;
- Assistance in eliminating the consequences of pollution from vessels of harmful substances, sewage or garbage;
- Rendering the information services in relation to the water area of the NSR, for example, about the organisation of navigation, requirements of safe navigation and others;
- Making recommendations about development of routes of navigation and using icebreaking fleet in the water area of the NSR, ice and navigational conditions there;
- Timely data retrieval from Russian hydro meteorological service about hydro meteorological forecast and ice analysis.

The intent is also towards a more justified fee policy. Fee rates for icebreaker escorts and ice pilotage of ships in the water of NSR are determined based on ship capacity, ice



class, distance of escorting, and season of navigation. Payment is collected based on the amount of services rendered.

The new "Rules of the navigation in the water area of the Northern Sea Route" approved in 2013, state that icebreaker escort on the NSR is carried out only by icebreakers navigating under the flag of the Russian Federation. These rules also contain a list of documents, which ship owners have to attach to the application for the permission to navigate in the water area of the NSR, and criteria for admission of ships into the NSR in compliance with their ice class.

Icebreaker assistance

The NSR extends for about 3000 nautical miles. The length of the route with icebreaker assistance in each case depends on ice conditions, and on the choice of particular variants of passage of different stretches of the route.

According to a report by Arild Moe and Lawson Brigham published in the *Geographical Review* 2016, it is the responsibility of each captain to plan and carry out the voyage along NSR based on requirements and information received from the NSR Administration in Moscow. Practical planning must be negotiated with the icebreaker company.

Although there are many providers of icebreaking and ice pilotage services (the full list can be found at www.nsra.ru), for long hauls only Atomflot is relevant. Moe and Brigham further state in their report that they believe there will be a lack of strong icebreakers in the future if investments in new powerful icebreakers are not advancing.

"The eastern NSR-route across Laptev, East Siberian and Chukchi Seas to the Bering Strait is where the length of the ice navigation season remains uncertain. While it may be technically feasible with nuclear icebreakers to escort ships year-round along the eastern NSR, the safety and economical issues of doing so have not been fully

addressed," the report says.

In recent years, modern icebreaking vessels of Norilsk Nickel class operate year-round without icebreaker escort. The new LNG-carriers departing the port of Sabetta are also capable of winter voyages without icebreaker escort. However, users preferring independent navigation will still need icebreaker services for emergency situations. It is currently unclear how many new icebreakers would be needed to maintain service, not only for the extension of the NSR navigation season but also to provide marine access to the Russian Navy and resupply of remote coastal communities. According to the report, it is also unclear how IMO's Polar Code will be implemented in Russian waters.

Planned icebreakers

According to Rosatomflot, the following new building projects are now on-going: Three universal Atomic icebreakers (Project 22220) will be acquired for year-round navigation on NSR. These icebreakers will have a propulsion capacity of 60 MW. The first should be delivered in 2017, the second in 2019, and the third at a later date.

An Atomic-leader icebreaker (Project 10510) is currently at the planning stage. It is intended for year-round icebreaking pilotage of heavy tonnage vessels (deadweight above 100 000 t and breadth above 50 m) along the whole distance of the Northern Sea Route, with an economically effective speed (~10 knots) in 2 m thick ice.

Also proposed is a Multipurpose Atomic icebreaker (Project 10570) for ice pilotage in the shallow waters of the Arctic shelf.

Rosmorport is planning to start operation in the Arctic of a powerful diesel-electric icebreaker (25 MW) with a wide range of functional capabilities including escort of convoys along the Northern Sea Route and assistance of ships in shallow Arctic areas in 2018. The icebreaker Victor Chernomyrdin (project 22600) was laid down in 2012 and launched late December 2016 at

Baltiysky Zavod shipyard in Saint Petersburg.

The various exploration projects have all ordered specific icebreakers to support their operations. Aker Arctic has participated in most of the projects designing icebreakers, support tugs, port icebreakers, tankers, module carriers, and has also assisted in port planning.

"The Northern Sea Route remains the most important part of the infrastructure of the economic system of the Far North of Russia," says development manager Alexey Shtrek, Aker Arctic. "For the last decade, we have seen steady development of Arctic shipping projects connected with navigation in the NSR water area, although projected plans have not always advanced as fast as wished. Completely new types of icebreaking cargo vessels have been designed and built for this purpose. The potential of NSR transit shipping has been tried, and has proven its economical feasibility provided there is appropriate support and further development of infrastructure."

"All this gives us hope of seeing the realisation of more Arctic production and transportation projects demanding more highly sophisticated icebreaking ships in the near future. A powerful Arctic icebreaker fleet will by all means remain key to ensuring safe navigation, and to facilitating traffic through the Northern Sea Route," Shtrek adds.

Transportation projects with Aker Arctic involvement



Arctic container vessels

The container vessels designed for Norilsk Nickel in 2006 used the new revolutionary Double-Acting ship (DAS™) concept Aker Arctic developed. Today this technology is more or less the standard in Arctic vessels used in year-round traffic. These were among the first ships able to operate year-round in the Kara Sea without icebreaking support.



Varandey

The seaport of Varandey is located on the shore of the Barents Sea near Varandey Bay. At present the oil export from the fields of the Timan-Pechora region through the stationary, sea-ice resistant shipping terminal Varandey has been taking place for several years. Aker Arctic designed the pioneering trio of Arctic tankers for transportation of crude oil without icebreaker escort.



Prirazlomnaya

The sea-ice resistant stationary platform Prirazlomnaya started production and shipping in 2014. Aker Arctic designed the vessels used in transporting the oil.



Port of Sabetta

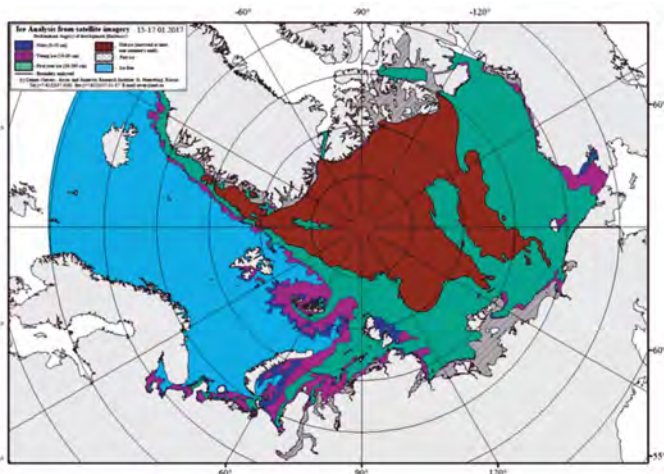
Sabetta seaport is located in the north-eastern part of the Yamal Peninsula, on the western coast of the Ob Bay. The port is under construction, as are the natural gas liquefaction plant and the Novoportovskoe oil field. The first shipment of LNG from Sabetta is planned for 2017. Aker Arctic began development work for the Yamal LNG project already in the 1990s. We have also been involved in the planning and design development of the LNG-carriers, Sabetta harbour, and design of the port icebreakers to ensure efficient year-round operations. In addition Aker Arctic designed the two PC3 class module carriers, which currently deliver construction modules for the LNG-plant from Europe and Asia, as well as an Arctic gas condensate tanker.

Arctic Gate

At the end of May 2016, a single point terminal started to operate near Cape Kamenny. It is intended that during the first years the volume of annual transshipment of oil would reach 5.5 million tonnes and from 2019 reaching the full output the terminal would be able to ship about 8.5 million tonnes of crude oil. Aker Arctic has been involved in developing the transport solutions for the oil shipments from Novy Port, as well as the powerful icebreakers to secure safe operations.

Sources:

- Northern Sea Route Information Office website <http://www.arctic-lio.com>
- The Northern Sea Route Administration website <http://www.nsr.ru>
- Organization and management challenges of Russia's icebreaker fleet, article by Arild Moe and Lawson Brigham in Geographical Review 2016
- Presentation by Rosatomflot 2016
- Report by Alexey Shtrek, Aker Arctic Technology



The NSR Administration publishes ice charts for different periods on their website to facilitate planning of vessel traffic and icebreaker assistance.

Source: <http://www.nsr.ru>