



ГОСУДАРСТВЕННАЯ КОРПОРАЦИЯ ПО АТОМНОЙ ЭНЕРГИИ «РОСАТОМ»

# **Development of Arctic Icebreaking Fleet** to Provide Navigation in the Russian Arctic



I. The History of the Northern Sea Route Development and Ecological Rehabilitation Activities.

# **Russian "route to India"** was named the Northern Sea Route in 16<sup>th</sup> century

**1525 year** – Dmitriy Gerasimov, the Envoy of Russian Tzar Vasiliy the III, compiled the first project of the Northern Sea Route and the map of the Arctic Ocean shores of Moscovia;

**50-s of the 16<sup>th</sup> century** – the first maritime expedition to discover sea route to China was organized in Moscow;

**1648 year** – researcher and seafarer Semen Dezhnev was the first to pass the straight that divides Asia and America;

18<sup>th</sup> century – Kamchatka expeditions were organized, the second of which made it into history as the Great Northern Expedition. The general map of the Great Northern Expedition was compiled in 1746.





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# In the beginning of the XX century development of the Northern Sea Route became an essential task for Russian economy

**July 02, 1918** – Order by Sovnarcom on appropriation of 1 mln. Roubles for the expedition to explore the Arctic Ocean.

May 21, 1919 – Russian Provisional Government of the Northern Area order "On establishing interdepartmental committee for organization of a maritime expedition to Siberia".

**1920 year** – Kara expeditions put start to regular navigation through the Kara sea. 11 thousand tons of bread and other goods were exported from Siberia during the first expedition.

from 1923 during 10 years period 19 polar radiometeorological stations were built on the coast and islands of the Arctic Ocean. During this period previous name Northern East Passage was replaced by the Northern Sea Route.

**1932** - the transit voyage of Otto Schmidt expedition onboard icebreaking steamship Alexander Sibiryakov was the starting point for transit navigation along the Northern Sea Route.

**1932 r.** – **Main NSR Department** established– manages all hydro-meteorological and radio stations on the islands and coast of the Arctic Ocean, icebreakers, transport vessels, ports and polar stations. Is charged with infrastructural and cultural development of the Far North areas including trade, natural resources extraction, science and research, transport.

Disbanded in 1964, functions transferred to Main Department of Navigation of Minmorflot of USSR.



# Lend-lease and repositioning of Pacific Fleet ships via NSR during World War II



Northern maritime transport routes: outer for transportation of cargoes to USSR from England and USA and inner via the NSR to provide supplies from USSR East and escort vessels from USA with lend-lease cargoes.

Northern Navy ships were escorting cargo vessels on particular parts of the NSR, especially in the Kara sea where 2568 vessels were escorted.

Totally during the War period Arctic Convoys transported about 22% of lend-lease cargoes -3964000 tons. Of them 120 vessels transited NSR with 450000 tons of cargo.



Destroyers Baku, Razumniy and Razyarenniy transtit from Vladivostok to the Kola Bay via the NSR 15.07 – 14.10.1942

# **Main Milestones of the Atomic Icebreaking Fleet Development**









#### Ib Lenin

November 20,1953 – the Decree of the Cabinet Council of USSR to commence construction **August, 25, 1956** – the IB is laid at A. Marti Shipyard (from 1957 – «Admiralty Shipyard») **December, 03, 1959** –accepted by the Ministry of Maritime Fleet 1989 year – decommissioned **Escorted: 3741 vessels** 

The necessity to provide and develop the functioning of Norilsk Industrial Area.

The demand for year-round navigation in the Wester Arctic.

Building of a powerful atomic icebreaking fleet and infrastructure on the coast of the Kara sea and Yenisey river.

August 17, 1977 – atomic IB Arktika reaches the North Pole as the first vessel to do it above surface.

Building of modern atomic icebreaking fleet, including Leader icebreakers, maintenance vessels and port fleet to provide the year-round export of Arctic products to Asian-Pacific and European markets.

Universal atomic icebreakers

<u>of 22220 projects (IB60)</u> Propulsion power – 60 MW; Water displacement 33530 / 25 540 t; Draught – 10,5 / 8,5 m; Icebreaking capability – 2,9 m <u>Icebreakers:</u> 1<sup>st</sup> IB60 – IIQ, 2020 2<sup>nd</sup> IB60 – IIIQ, 2021 3<sup>rd</sup> IB60 – IIIQ, 2022 II. Major Projects in the Northern Sea Route and Development of the Arctic Icebreaking Fleet.

## **State Policy in the Sphere of Arctic Development**





We are facing ambitious tasks of the Arctic and the Northern Sea Route development. This does not mean mineral resources production and creation of such gas liquefaction enterprises only, it means further development of nuclear shipbuilding. Development of the icebreaking fleet and the Northern Sea Route will make it possible to perform shipments from the Yamal LNG to all parts of the globe and all year round".

President of the Russian Federation Vladimir Putin Sabetta, December 08, 2017

I already mentioned this but I would like to repeat – rephrasing the great Lomonosov who said that Russia will expand through Siberia. Now Russia should expand through the Arcrtic, since there we have our main supply of mineral resources.

President of the Russian Federation Vladimir Putin major press-conference December 14, 2017



# Natural Resources Reserve

### **Of Russian Federation**



### Northern Sea Route Cargo Traffic, Generated by the <u>Projects</u> <u>already Active</u> and <u>Potential Projects</u>



POCATOM



15. Government of the Russian Federation to prepare in accordance with Strategy of spatial development of Russian Federation in collaboration with regional public authorities and by 01 October adopt a comprehensive plan of modernization and expansion of backbone infrastructure, which should ensure by 2024::

a) Development of "West-East" and "North-South" transport corridors for cargo transportation, through, among others::

<...>

Development of Northern Sea Route and increase flow of goods through it to 80 million tons.



# The "Two Keys" Approach to Managing the Northern Sea Route according to the Federal Law #525 dd December 27, 2018





- Adopts the Rules of Navigation on the Northern Sea Route;
- Adopts the Plan of the Northern Sea Route Infrastructure Development.



- Regulation of navigation via the Northern Sea Route;
- International obligations of Russian Federation;
- Federal state supervision in the sphere of transport;
- State port control of vessels;
- Legislative regulation, control of navigation safety;
- Harbour masters management;
- List of port dues adoption.



- Management of state Arctic icebreaking fleet;
- Proposals for state policy implementation on the NSR, building sea ports and objects of infrastructure;
- Management of state property;
- Organization of navigation;
- Provision of safety of navigation.

#### Ministry of Transport adopts after approval from Rosatom

- Mandatory regulations in the seaport;
- Rules of icebreaking assistance on the NSR, rules of ice piloting of vessels, etc.;
- List of port dues charged in each NSR seaport;
- Decision to establish a seaport on the NSR, etc.





### It Is Possible to Reach 80 mln tons of the Northern Sea Route Traffic by 2024 Provided all Planned Projects are Launched



N⁰	Cargo	Project	Volume, mln tons		
1	Liquefied natural gas and condensate	Yamal LNG	19	41	
		Arctic LNG-2	22		
2	Crude Oil	Noviy Port Area, Arctic Gate terminal	7,1	7,1   5 17,1	
		Payakha Field	5		
		Vankor Field	5		
3	Уголь п-ва Таймыр	Lemberovskaya Area	19		
		Syradasayskoe Field	4	23	
4	Non-ferrous & precious metals General Cargo	Norilsk Nickel	1,5	;	
		Delivery building materials to projects and supplies to remote areas	1	3,5	
		Transit	1		
5	Railroad Cargoes for Maritime Export	Northern Latitudinal Way	8	8	
Total				2,6	

### YamalMax Tankers built for Yamal LNG





YamalMax Technical Data: Cargo capacity - **170 000 m3** Power - **45 MW** Ice class - **ARC7** Length - **299 m** Beam - **50 m** Draught - **13 m** 

### YamalMax at a loading berth and ib 50 Let Pobedy in the ice canal



### **Novy Port Tankers Icebreaking Pilotage**



Novy Port Tankers Tech Data: Deadweight – **41 455 t** Power – **22 MW** Ice class - **ARC7** Length - **249 m** Beam - **34 m** Draught – **9,5 m** 





# Pilotage of a Novy Port tanker b a low-draught atomic icebreaker

### **Norilsk Nickel**





Technical Characteristics of Arctic Express type vessel:

Deadweight – 18 095 tons Power - **13 MW** Ice Class - **ARC7** Length – **169 m** Beam – **23,1 m** Draught - **10 m**  Combined volume of final product (non-ferrous and precious metals) and supplies, transshipped through Port of Dudinka is 1,3 mln. tons per year.

Atomic icebreakers provide icebreaking support to Norilsk Nickel vessels during 80 days per year.



### **Arctic Fleet Positioning by 2035**





### Transportation of LNG from Obskaya Bay (Yamal Peninsula / Gydan Peninsula)





### Number of Icebreakers will be increased from 4 to 13 Vessels to Ensure Cargo Volume Growth and Year-Round Navigation via the Northern Sea Route





# **New Generation Icebreakers is the Basis for Year-round Navigation along the Northern Sea Route**





(IB60) with the propulsion power of 60 MW

#### KM <sup>O</sup> Icebreaker9 [2] AUT2-ICS EPP

Length - 173,3 m, beam - 34 m, draught Length - 209,0 m, beam - 47,5 m, maximum maximum - 10,5 m, minimum operating draught draught - 13,0 m, water displacement - 70 674 - 8,55 m. Water displacement - 33 540 tons .

MW.

#### **Icebreaking capability:**

The icebreaker navigates with even speed of 1,5-2 kn at full draught and power through flat solid ice with maximum thickness of 2,9 - 3,0 m.



Universal atomic icebreaker Project 22220 Atomic turbo-electric icebreaker Project 105010 (IB Leader) with the propulsion power of 120 MW

#### KM <sup>(2)</sup> Icebreaker9 [2] AUT2-ICS EPP SDS<60 **HELIDECK-H** Special purpose ship

tons

IB60 is equipped with dual-reactor nuclear power IB Leader is equipped with dual-reactor nuclear plant RITM-200 with the overall power of 175 power plant RITM-400 with the overall power of 315 MW.

#### **Icebreaking capability:**

The icebreaker navigates with even speed of 1,5-2 kn at full draught and power through flat solid ice with maximum thickness of 4,1 m.



Line Icebreaker Aker ARC 123

Ice class: Icebreaker8 (designed for RMRS) Propulsion power: 40 MW Length overall: 154,8 m (with towing notch – 160.0 m) Beam: 31,4 m Draught max: 9.0 m

Main fuel type: Liquefied Natural Gas

**Icebreaking capability**: flat ice 2,85 m thick with constant speed 2 knots

III. Development of International Transit Navigation along the Northern Sea Route

# Pilotage of mt Vladimir Tikhonov via the NSR The Largest Vessel that Transited NSR





Tanker deadweight: 160 000 tons (Suezmax) Cargo: 120 000 tons gas condensate of JSC NOVATEK NSR navigation period: 23.08 – 30.08.2011 Average speed: 14,0 knots Atomic Icebreaker Escorts mv Nordic Orion via the NSR with the cargo of 66 000 tons of Iron Ore Concentrate from Murmansk to Lanshan, China July 07, 2013





Bulker deadweight: 75 000 tons (Panamax) Cargo: 66 000 tons iron ore of JSC EUROCHEM Ice Class: ARC 4

### mt Propontis deadweigth: 117 055 t



Caro: naphtha 79 846 rt Port of load: Mongstad, Norway Port of discharge: Mizushima, Japan NSR time: July, 24 – August, 05 2013





Cargo: gasoil 109 090 t Port of load: Ulsan, Korea Port of discharge: Skaw, Denmark NSR time: Sept. 25 – Oct. 06, 2013

# NSR Caravan Escorted by Atomic Icebreakers July 2012 Eastbound





Mv Nordic Odyssey, ttb Vengeri, mt Marilee, mv Kapitan Danilkin escorted by ib Yamal and Vaygach July 12 – 22, 2012

# NSR Caravan Escorted by Atomic Icebreakers July 2013 Eastbound





# Mt Two Million Ways with 61 000 tons of gas condensate is the part of the caravan escorted by ib Vaygach and Taimyr

# LNG Transit via the Northern Sea Route



LNG Ob River Ice Class: 1A (Arc 4) Cargo capacity: 149 755 m3 Ballast: Westbound 08-16.10.2012 Cargo: Eastbound 09-18.11.2012



LNG Arctic Aurora Ice Class: 1A (Arc 4) Cargo capacity: 150 000 m3 Ballast: Westbound 06-18.08.2013 Cargo: Eastbound 22.09-06.10.2013



### **International Transit Voyages via the Northern Sea Route in 2018**







### International Transit Voyages via the Northern Sea Route in 2018

Cargo Total: 491 342 tons



### Number of Vessels: 27

Russian Flag: 8

China: 8

Portugal: 2

Panama: 2

Liberia: 2

Denmark: 1

Netherlands: 1

Finland: 1

Antigua & Barbuda: 1

St. Kitts & Nevis: 1

Average Time on NSR: 9,7 days 1<sup>st</sup> Voyage Start: July 24 Eastbound Last Voyage Completed: December 04 Westbound

# Bulk: 306 620 Liquid: 98 977 General: 48 738 Container: 32 716 Fish: 4 291

### Largest Vessel: 76 180 dwt bulk



### **Ice Conditions During Winter-Spring Period of 2018**





Ice Concentration 1-6 points	Ice Concentration 7-10 points
Nilas	Old Ice
Young Ice (10-30 cm)	Fast Ice
One-Year Ice (30-200 cm)	Open Water
 Ice Limits	

### **Ice Conditions During Summer-Autumn Period of 2018**





Ice Concentration 1-6 points	Ice Concentration 7-10 points
Nilas	Old Ice
Young Ice (10-30 cm)	Fast Ice
One-Year Ice (30-200 cm)	Open Water
 Ice Limits	



# Thank you for your attention!



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