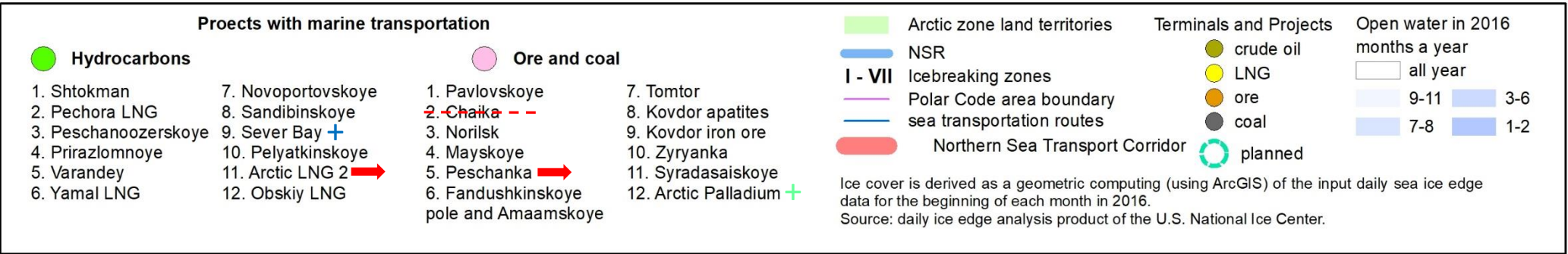
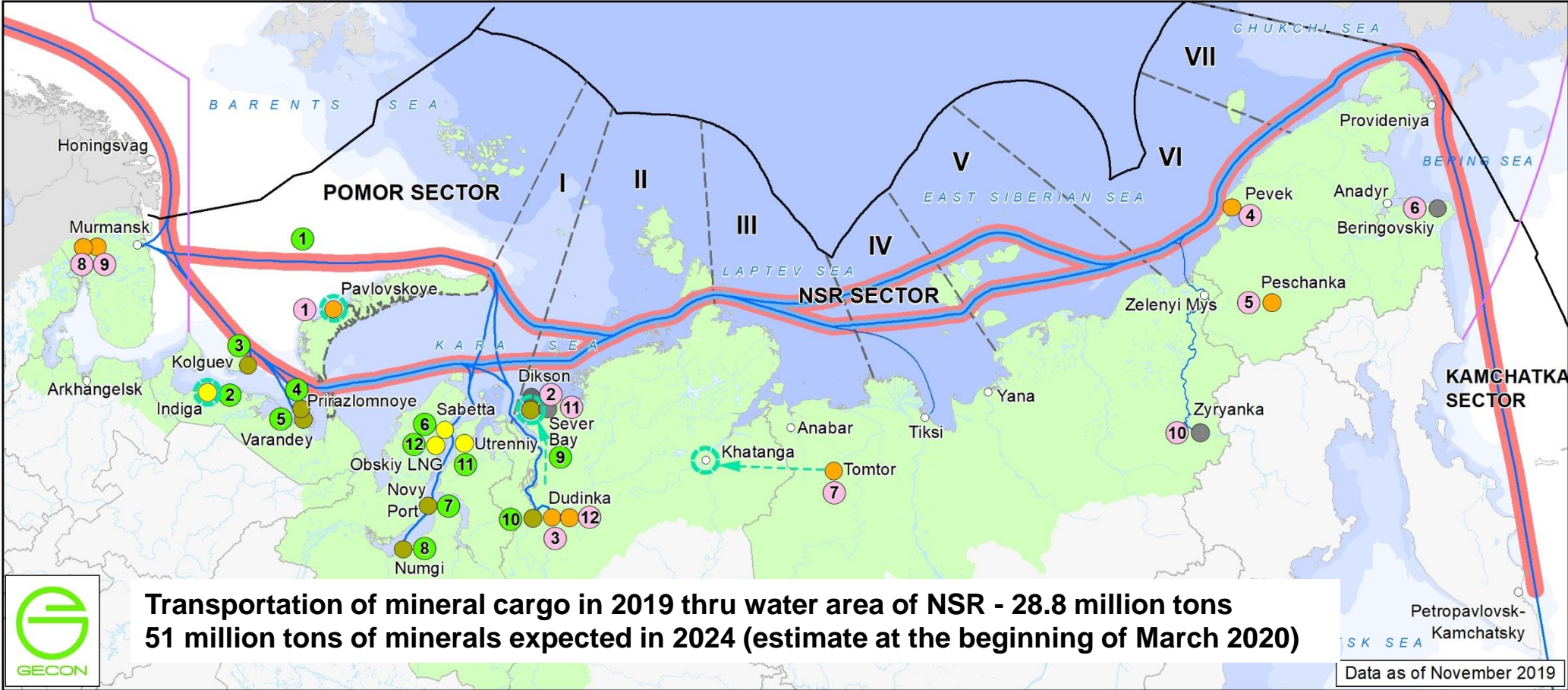


Year-round Shipping of Mineral Products from the Water Area of the NSR: Plans and Risks

Mikhail Grigoryev
GECON

15th ARCTIC PASSION SEMINAR
March 5th , 2020, Helsinki

MINERAL RESOURCES DEVELOPMENT PROJECTS WITH MARITIME TRANSPORTATION SCHEME



LOGISTICS SCHEMES FOR THE EXPORT OF MINERALS
FROM THE WATER AREA OF THE NORTHERN SEA ROUTE



Projects of development of the mineral resources		Cargo	Navigation	Logistic schemes		Markets of the Atlantic	RUSSIAN FEDERATION																				Markets of the Pacific Rim	Icebreakin Atomflot assistance					
							Northern maritime transport corridor																										
							Pomor sector										Northern Sea Route sector												Kamchatka sector				
							port Murmansk			Isl. Kildin	port Arkhangelsk	new port Indiga	Prirazlomnaya plt.	Varandey	port Sabetta			Cape Trekhbugorny	IWW		port Dikson		port Dudinka	port Khayanga	IWW	port Tiksi			Isl. Ayon	port Pevek	Beringosky	Petropavlovsk - Kamchatsky	
							Ura-Guba	Murmansk	Kolguyev Isl.						Sabetta	#2 Utrennee	Arctic Gate		Ob river	Numgi	Chaika	Sever Bay				Zyryanka							Tiksi
1	Mayskoye	Au concentrate	seasonal	Operating	1																					TTW							
2	Zyryanka	coal			2																												
3	Sandibinskoye	crude oil			3																												
4	Novoportovskoye	crude oil	year-round		4																												
5	Norilsk	Cu, Ni feinstein, metal			5A																												
					5B																												
6	Pelyatkinskoye	gas condensate		6A																													
				6B																													
7	Yamal LNG	gas condensate		7																													
		LNG	8A																														
			8B																														
			8B																														
			8Г																														
			8Д																														
8	Arctic LNG 2	LNG		9A																													
		9B																															
		10																															
9	Obskiy LNG	LNG		11A																													
		11B																															
		12																															
10	Peschanka	Cu Au concentrate		13																					TTW								
11	Tomtor	REM concentrate		14																					TTW								
12	Sever Bay	crude oil		15																													
13	Severnaya Zvezda	coal		16																													

shipment transshipment shuttle scheme vessels of an ice class vessels without ice class

Abbreviations: IWW- ilnternal waterways; RV - river vessels; FSO - Floating Storage and Offloading ; STS - transfer according to the scheme "ship-to-ship"; TTW - transfer through a warehouse.

FORECAST OF DEVELOPMENT OF LINEAR ARCTIC ICEBREAKER FLEET OF RUSSIA



Number of active linear ice breakers at the beginning of the year

Including active and under construction as of March 2020

decision on construction

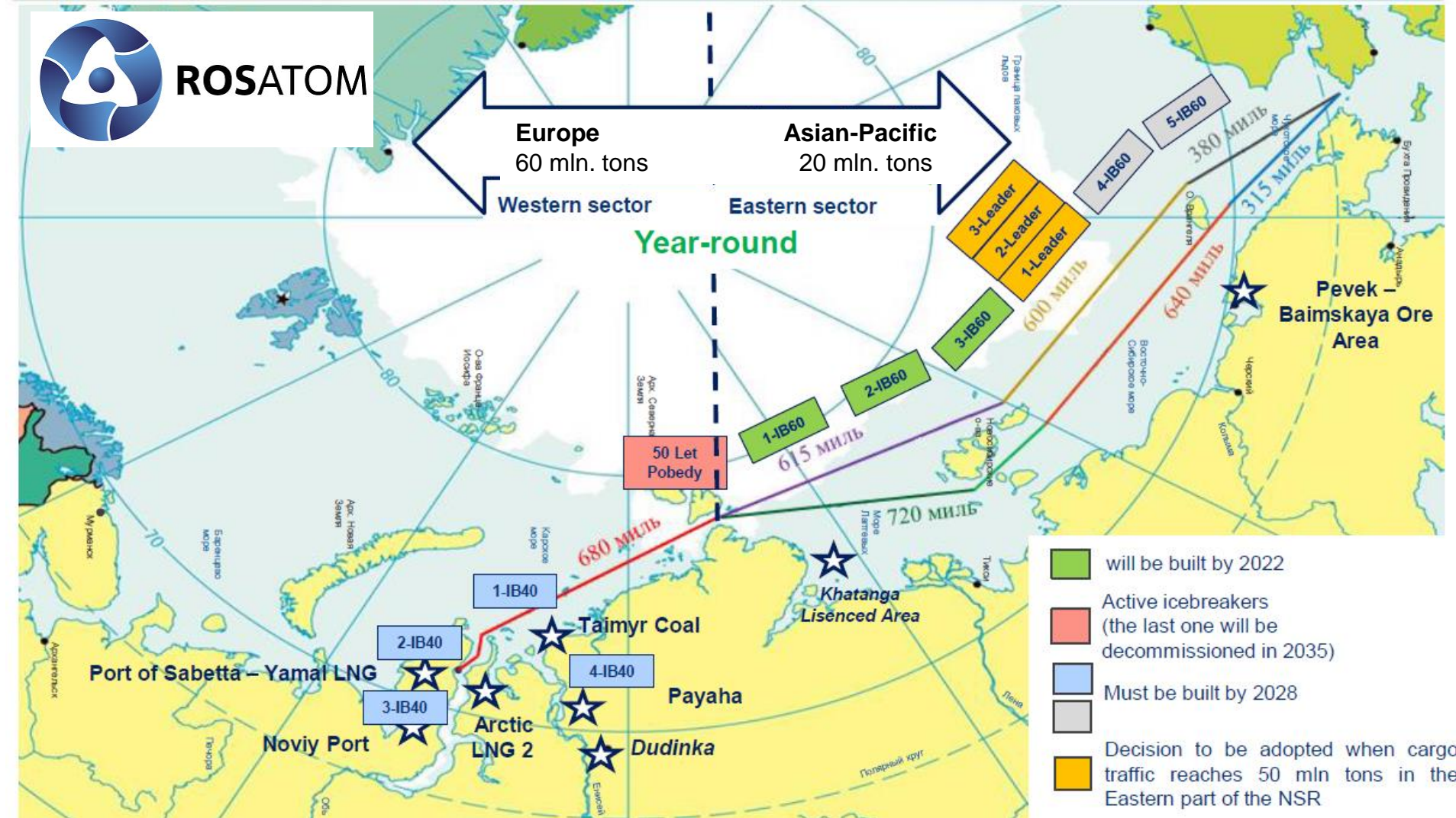
planned

stated

Number of active linear ice breakers at the beginning of the year								6	6	8	9	11	14	15	14	14	14	12	12	13	13	14	14	14		
Including active and under construction as of March 2020								6	6	8	9	10	10	11	10	10	9	7	7	7	7	7	7	7		
decision on construction																	1	1	1	1	1	1	1	1		
planned																				1	1	2	2	2		
stated												1	4	4	4	4	4	4	4	4	4	4	4	4		
Fuel	Status	Owner	Ice class	Type (project)	Vessel	Год постройки	Shipyard	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035		
Nuclear	Operating	Atomflot	Icebreaker8	Taymyr (19580)	Vaygach	1990	Wärtsilä																			
					Taymyr	1989																				
	Under construction		Icebreaker9	Rossia (10521)	Yamal	1992	Baltic Shipyard																			
					50Y of the Victory	2007																				
				Arctic (22220)	Arctic	2020 V																				
					Sibir	2021 VIII																				
					Ural	2022 XII																				
					IB60-4	2024 XII																				
					IB60-5	2026 XII																				
				Leader (10510)	IB120-1	2027 XII	FESRC																			
	Decision on construction				IB120-2	2030 XII																				
	Planned				IB120-3	2032 XII																				
Diesel	Operating	Rosmorport	Icebreaker8	Yermak (R-1039)	Adm. Makarov	1975	Wärtsilä																			
	Under construction			(22600)	V. Chernomyrdin	2020		Adm. Shipyards																		
Dual-fuel (diesel and LNG)	Stated	NOVATEK	Icebreaker8	(Aker ARC 123?)	LNG IB40-1	2022?	FESRC																			
					LNG IB40-2	2023?																				
					LNG IB40-3	2023?																				
					LNG IB40-4	2023?																				

ARRANGEMENT OF GROUP OF LINEAR NUCLEAR ICEBREAKER9'S

Target arrangement of Arctic icebreaker fleet by 2025-2030



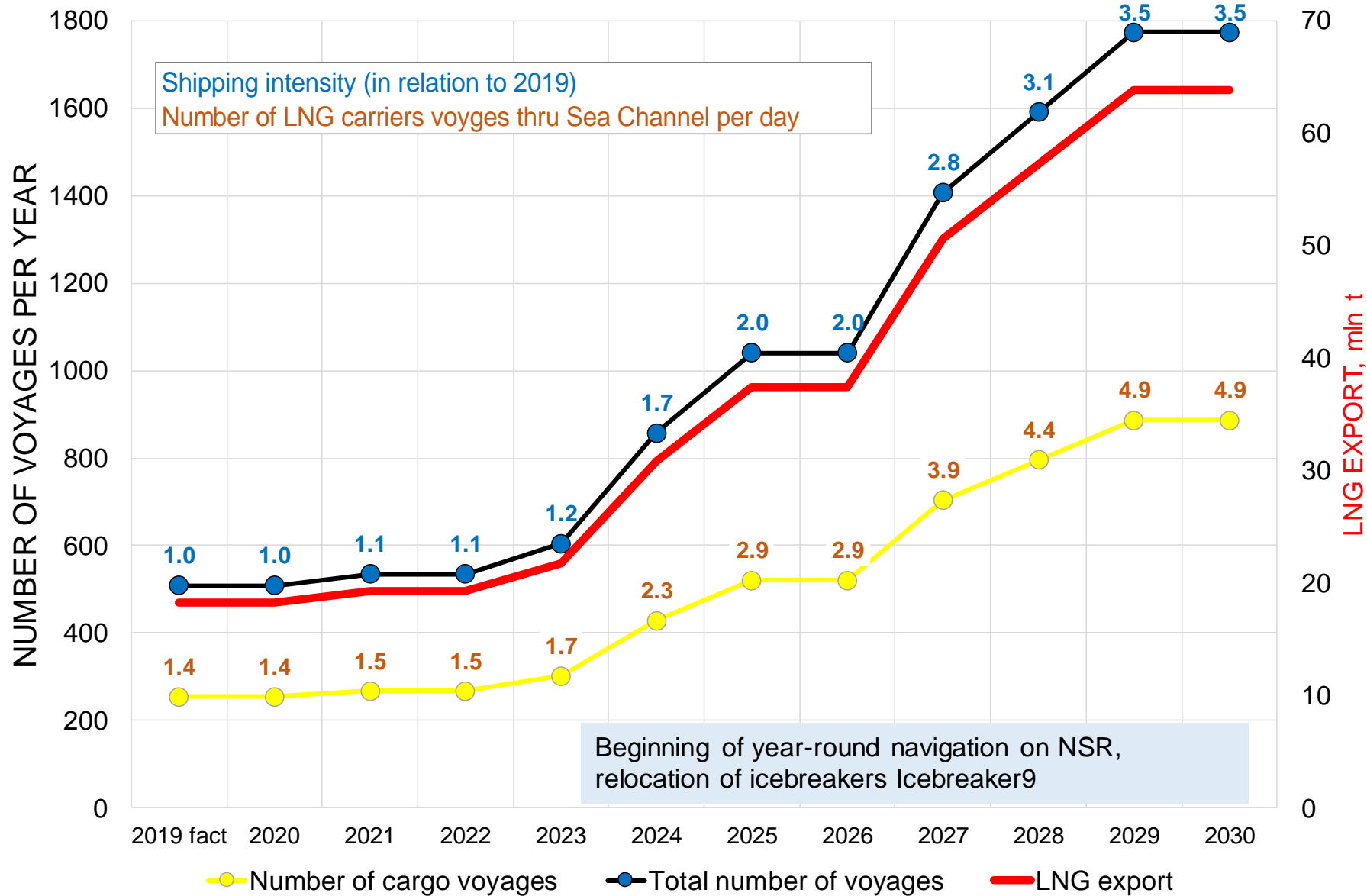
"In order to export LNG and crude oil through the Obskaya Bay, an LNG icebreaker project with a capacity of 40 MW is being developed in the interests of FSUE Atomflot. In total, it is planned to create **four** such vessels intended for operation **in pairs**, which will ensure the necessary width of the navigation channel in ice."

FSUE Krylovsky State Scientific Center, 2018

Icebreaker8's and Yamal are not taken into account; year-round East NSR navigation from 2023

Data sources: Government of Russia, Ministry of trade, Atomflot (November 2019); analysis by Gecon

GROWTH OF SHIPPING IN THE SEA CHANNEL OF THE OB BAY, CONNECTED ONLY WITH LNG EXPORT



Excluding postponement of Arctic LNG 2 to 2024

ASSESSMENT OF ICE-BREAKER AVAILABILITY OF YEAR-ROUND EXPORT OF MINERAL CARGO OF PRODUCTION PROJECTS



Project Groups	Projects and Cargo	Cargo Vessels Ice Class	Icebreaker Tasks												
			Icebreaking in ports, terminals and channels					Linear icebreaking in water areas							
			port operations	terminal operations	maintaining channels in fast ice	escort through channels	Sea channel of the Ob Bay	Kara Sea		Laptev Sea	East Siberian Sea	Chukchi sea			
								south-western	north-eastern						
operating	Novoportovskoye (crude oil)	Arc 7		Vilkitsky Sannikov	Atomflot 2027-29		EiC Atomflot 2027-29								
		Arc 4				Atomflot 2027-29	Atomflot 2027-29	Atomflot 2027-29							
	Yamal LNG (LNG)	Arc 4	Port icebreakers/Ice class tugs	IB_LNG	IB_LNG	IB_LNG	IB_LNG	YRN							
		Arc 7													
	Yamal LNG (gas condensate)	Arc 4			IB_LNG		IB_LNG								
		Arc 7													
	Norilsk (ores)	Arc 7	Dudinka Zavenyagin (RR)		Atomflot 2027-29	Ship leadership during channel renewal									
		Arc 4 Arc 5				Atomflot 2027-29	Atomflot 2027-29								
Pelyatkinskoye (gas condensate)	Arc 7			Ship leadership during channel renewal											
under construction	Arctic LNG 2 (LNG)	Arc 4	Port icebreakers/Ice class tugs			IB_LNG	IB_LNG	IB_LNG	YRN						
		Arc 7													
	Arctic LNG 2 (gas condensate)	Arc 4				IB_LNG		IB_LNG							
		Arc 7													
	Arctic LNG 2 (supply)	Arc 4 Arc 5													
projected	Arctic LNG 1 (construction)	Arc 4 Arc 5	Port icebreakers/Ice class tugs			IB_LNG		IB_LNG							
	Severnaya Zvezda (coal)	Arc 4													
	Sever Bay (crude oil)	Arc 7													

Delay in deciding on the construction of a port fleet and in determining ways to provide ice-breaker support to ships in the Kara Sea will lead to a critical situation

LEGEND

- steady situation
- unstable situation
- critical situation
- uncertainty
- new challenge that needs to be solved
- the decision is expected
- Atomflot 2027-29

critical situation is possible due to decommissioning of icebreakers "Vaigach" and "Taimyr" in the period 2027-2029.
- IB_LNG

possible critical situation due to delay in construction of LNG icebreakers
- YRN

possible unstable situation during transition to year-round navigation
- EiC

extreme ice conditions

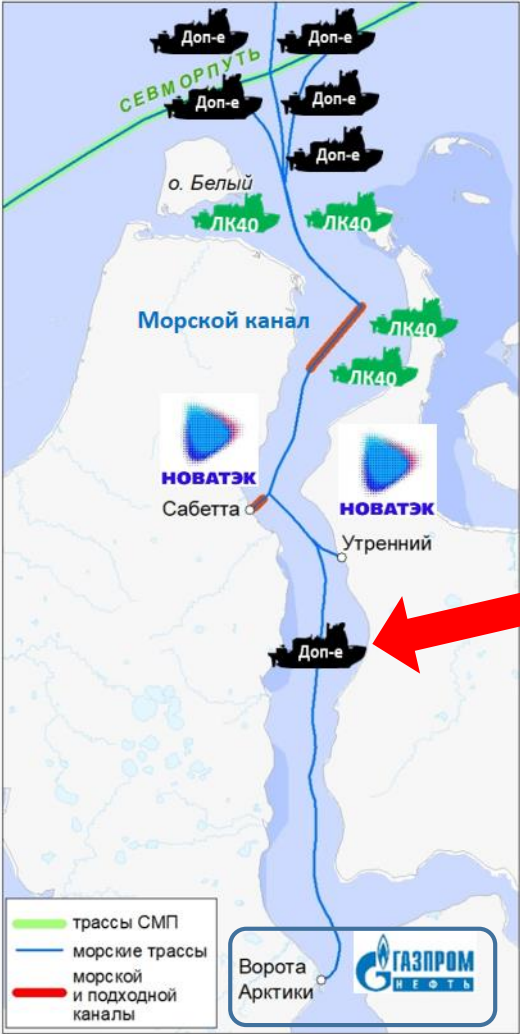
Is prepared by GECON with participation of Administration of the Northern Sea Route with the assistance of practitioners from Atomflot, Sovcomflot, Northern Shipping Company, Yamal LNG, Norilsk Nickel and Gazprom Neft.

ASSESSMENT OF THE NEED FOR LINEAR ICEBREAKERS TO SUPPORT PROJECTS IN THE OB BAY



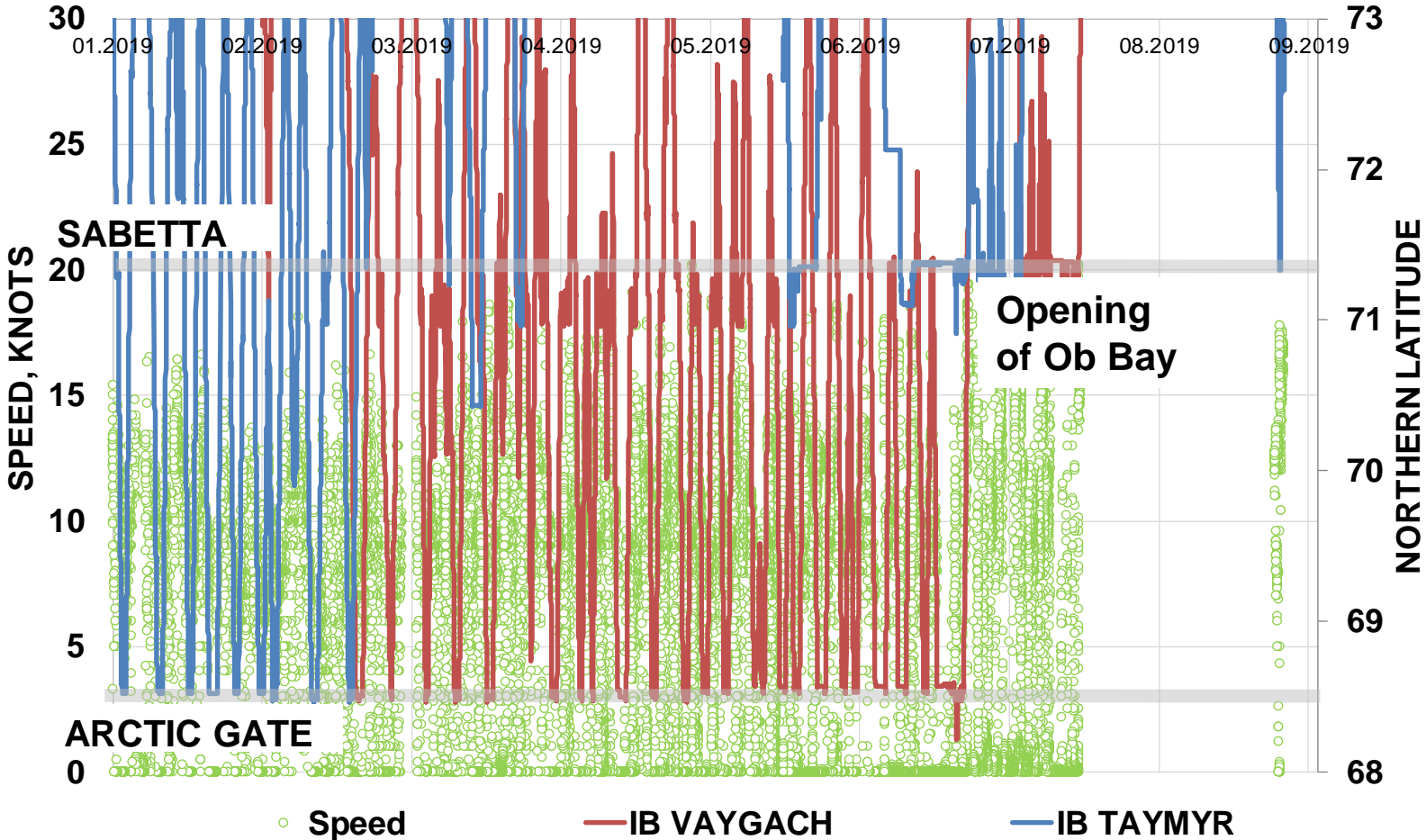
ESTIMATE OF DEMAND FOR 2025

ESTIMATE AS OF JUNE 2019



Expected NOVATEK LNG IB40 Fleet Necessary construction

ALTERNATING OPERATION OF ICEBREAKERS FOR THE CHANNEL LAYING



Gazprom Neft may refuse to charter ice class tankers Arc4 (5); but planning new projects "South Yamal", "Yamburg" (Port Kruglyi/Round) since 2024

Data sources: Ministry of Transport, NOVATEK, Gazprom Neft, Ministry of Natural Resources; analysis by ANSR, CNIIMF and GECON

The obvious solution to the situation is the construction of non-nuclear (diesel/LNG) icebreakers at the expense of mining companies, possibly using a co-financing mechanism, and transferring them to the management of Atomflot.

At a moment Atomflot has experience of operating diesel icebreakers - its own "Ob" and taken to the berbout charter "Varandey," serving the terminal of the same name in the Pechora Sea.



Thank you for attention!

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Do you really have any questions?