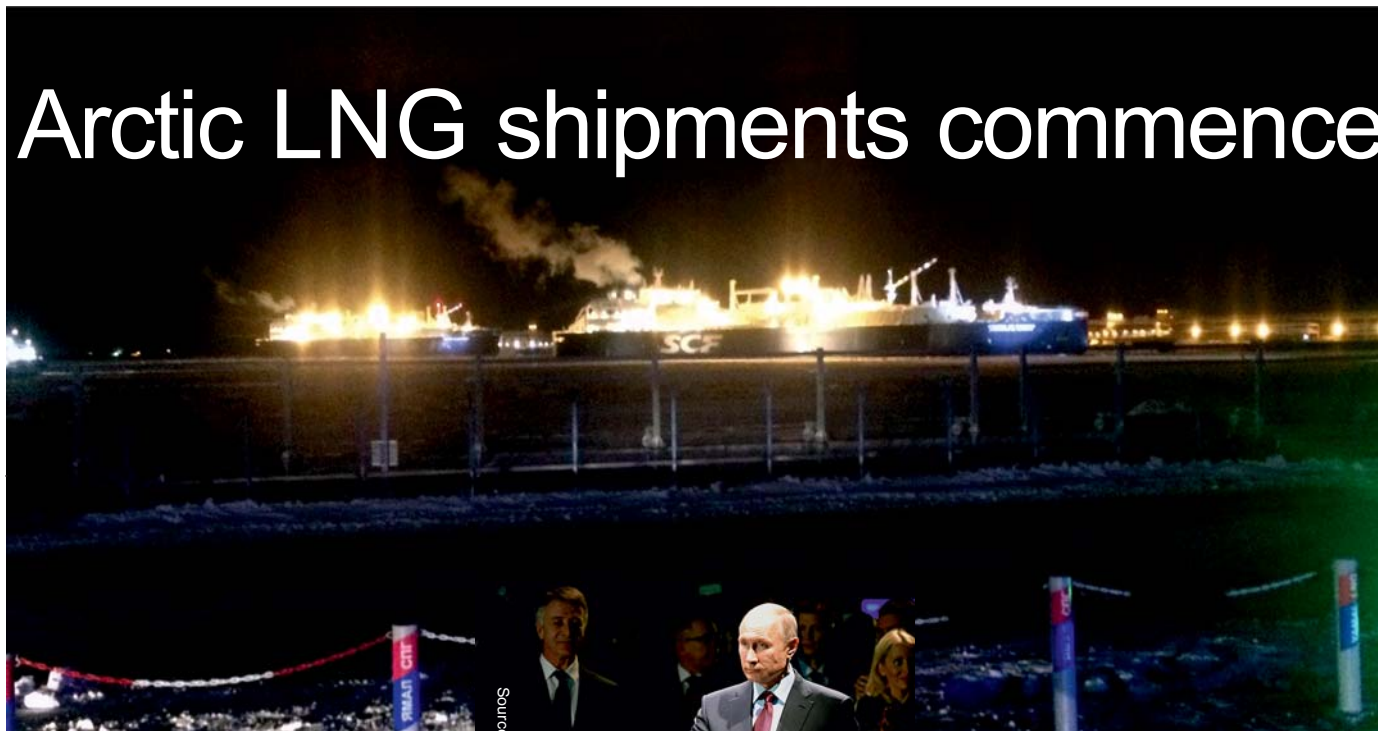


Arctic LNG shipments commence



December 8th, 2017 was an important date for the long-term development of liquefied natural gas (LNG) shipments from the Arctic to the market. The LNG plant on the Yamal Peninsula above the Arctic Circle was officially inaugurated and the start of LNG cargo loading was celebrated.

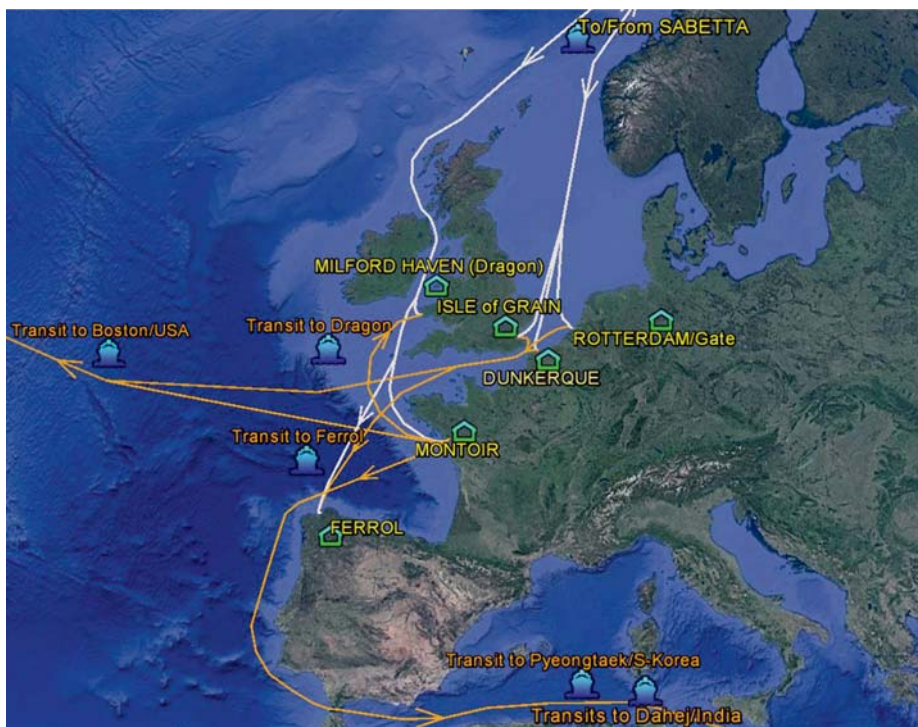
Russia's President Vladimir Putin and other prominent guests watched as the first cargo lot from the Yamal LNG plant was loaded onto the icebreaking LNG carrier *Christophe de Margerie*, owned by the Russian shipping company Sovcomflot, one of the world's leaders specialising in the transportation of crude oil, petroleum products, and liquefied gas.

Challenging area

The joint venture between Russian natural gas producer Novatek (50.1%), France's Total (20%), China's CNPC (20%) and the Silk Road Fund (9.9%) is expected to cost US\$ 27 Billion. Novatek started the building project in 2012. When completed, the project will comprise three production units with a total annual capacity of 16.5 million tons of LNG and up to 1.2 million tons of gas condensate from the resources of the South Tambey Field. Products will be shipped to Europe and Asia. The first LNG train, with an initial capacity of 5.5 million tons a year, is now operational and the other two will be ready in 2018 and 2019 respectively.

Source: www.kremlin.ru

Russia's President Vladimir Putin and other prominent guests watched as the first cargo lot from the Yamal LNG plant was loaded on the icebreaking LNG carrier *Christophe de Margerie*.



The destinations of the first LNG shipments have been traced. The white lines are routes by Arctic LNGCs, the yellow ones show transshipments. So far all cargoes have been sold on the spot market.

Apart from the LNG plant, the project includes Sabetta port with two berths for large tankers and other port facilities for various supplies and a supporting fleet. Worth mentioning are the vast dredging jobs done for the port and the deep navigable fairways in Ob Bay which is very shallow by nature. The new international Sabetta airport serves the community and a 282 MW power plant is expected to become operational in 2018.

The primary export markets for LNG will be both the East and the West. To China and other Asian markets LNG will be shipped via the Northern Sea Route during the summer season. Yamal LNG aims to tap into northwest Siberia's enormous natural gas reserves, accounting for 84% of Russia's total natural gas, and, once fully operational will double Russia's share in the growing global LNG market.

Five completed arctic LNG tankers

Christophe de Margerie, Sovcomflot

Boris Vilkitsky, Dynagas

Fedor Litke, Dynagas

Eduard Toll, Teekay

Vladimir Rusanov, MOL



The LNG tanker Christophe de Margerie is the first in a series of 15 icebreaking LNG carriers ordered for the Yamal LNG project to transport LNG in the challenging ice conditions of the Kara Sea and the Gulf of Ob.

While the Yamal peninsula has huge hydrocarbon reserves, it is an isolated region north of the Arctic Circle, about 2,500 kilometres from Moscow and is covered by ice for most of the year, with temperatures dipping as low as minus 50 degrees Celsius.

Successful long-term development

Aker Arctic's CEO Reko-Antti Suojanen also braved the polar night and freezing cold to be present for the historical occasion.

"It is a great pleasure to see our long-term development with Yamal LNG come true," he says.

From 2010 onwards, Aker Arctic has supported the development of the project by designing the Arctic LNG carriers, port fleet and related shipping infrastructure for transporting natural gas from Sabetta.

"Finnish engineers have been involved in developing transportation solutions for LNG since the 1970s," Suojanen adds.

"After our invention of the double acting ship principle and the growing interest in LNG transport from the Arctic, the development of an Arctic LNG tanker began in 2004." (Read about the development of Arctic LNG carriers in the September 2017 issue of Arctic Passion News.)

Fifteen independent tankers

The LNG tanker *Christophe de Margerie* is the first in a series of 15 icebreaking LNG carriers ordered for the Yamal LNG project to transport LNG in the challenging ice conditions of the Kara Sea and Gulf of Ob. The vessels will open a new class of YamalMax ships. The 300-metre-long lead ship has a capacity of 172,600 m³, and is managed by a crew of 29. Furthermore, the vessel is capable of sailing independently through ice of up to 2.1 metres thick.

Possessing the Arc7 ice class, the highest amongst existing merchant vessels, *Christophe de Margerie* can sail westward unassisted from Yamal year-round and eastward to the Asia Pacific destinations along the Northern Sea Route for six months during the summer season (from July to December). Previously, the summer navigation window in the eastern region of the Northern Sea Route was limited to only 4 months with icebreaker support.

In August 2017, *Christophe de Margerie* demonstrated her capability when she shipped a load of LNG without icebreaker assistance along the Northern Sea Route (NSR) from Melkøya, in Arctic Norway, to South Korea. The transit shipment along the most demanding NSR part was made in a

days, whereas the whole loaded voyage took less than 18 days.

Since the first loading of LNG from Sabetta in December, there have been hectic activities in the new Arctic port. The first four completed tankers, *Christophe de Margerie*, *Boris Vilkitsky*, *Fedor Litke* and *Eduard Toll* have all visited the Sabetta port frequently to load LNG cargoes. The fifth ship is in the process of final commissioning in Russian waters.

At the inauguration ceremony, Chairman & CEO Leonid Mikhelson of Novatek said that the Yamal LNG plant would start regular deliveries under major long-term contracts in April 2018. According to him, 96% of the LNG produced at the plant has been contracted. Before April and later in the year, spot deliveries to different locations will continue. The destinations of the first LNG shipments have been traced. See details on page 10.

The port of Sabetta is working well and the tankers are loading and discharging their cargoes according to plan. Construction work on the site is continuing to complete the second and third train on schedule while the remaining ten tankers are at various building stages at the Daewoo Shipbuilding & Marine Engineering (DSME) shipyard in South Korea.

Novatek Arctic LNG 2 project status

Novatek has announced plans to further expand its LNG production on the Gydan peninsula. Located on the other side of Ob Bay from their recently operational Yamal project LNG facility at Sabetta, the Gydan peninsula has substantial natural gas reserves to provide for another, larger LNG project. The initial plans are to build gravity-based production facilities for a total of 18 million cubic metres of LNG production.

Three companies have partnered up with Novatek for this project, Linde (Germany), Technip (France) and NipiGas (Russia). Construction is planned to start 2019 with the first production train ready by around 2023. It is notable for the project that the costs are expected to be significantly lower, i.e. about one third of the costs for Yamal LNG. This can be achieved by using

local resources to a larger extent than for the Yamal LNG project, reducing transportation and ground preparation costs.

Novatek has signed an agreement with Linde for the license concerning the natural gas liquefaction technology for the Arctic LNG 2 project. Capitalizing on the competencies gained from the Yamal

LNG-project, the partners have chosen new techniques for the project. The production facility will be gravity based, with the plant sitting on a trio of platforms, which will be held in place on the seabed.

"Three aspects of the new project are important: the location of the facility, thus creating an LNG hub with a common port and cargo fleet; the building and testing of the gravity based structures and the topsides at the Kola yards in Murmansk; and the targeted destination of the trans-shipment port in Kamchatka, closer to major end users," says Roumen Tzvetanov, head of business development for oil and gas at Aker Arctic.