

Report on LNG projects in Russia

October, 2016

Prior to 4th Annual Congress and Exhibition

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About the research

I sincerely thank all the research participants. Your comments, knowledge and expertise, certainly, play the important role in the development of the Russian LNG industry.

I hope that the results of the study will help you to efficiently evaluate the industry risks and opportunities, as well provide you with a set of tools for your company's obtaining the competitive edge in the context of a dynamic market.

I also wanted to inform you that further discussion of the industry's key issues will take place during the LNG Congress Russia 2017. The event has become a landmark event of the LNG industry, gathering the top managers of all Russian projects, both existing and perspective.

Yours faithfully,



Inessa Shahnazarova, Congress Producer

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Methodology

The methodology of this study was underpinned by the combination of qualitative and quantitative methods. It included a survey carried out with the help of a questionnaire and in-depth interviews with industry experts. It helped to gather the most recent and often publicly unavailable information from those who largely shape the future of Russia's LNG industry.

*A total of **153 respondents** – LNG project managers and leading experts, main contractors, technology and equipment developers and suppliers, consultants and researchers – took part in the study.*

Among the companies that participated in the study

- Gazprom proyektirovaniye
- Sakhalin Energy
- Saipem S.p.A
- Novatek
- Rosneft
- Gazprom VNIIGAZ3
- Kriomash-BZKM
- Institute for Energy and Finance
- BASF
- Technip
- CLNG-Gorskaya
- EUROTUBE GmbH

? What are the key challenges affecting your business in LNG industry?

This question didn't have any predefined answers. The participants had to identify three problems, the elimination of which would promote their business development. As, in general, the study participants are the representatives of two groups – the industrial companies' representatives (oil and gas producers and project operators), and service providing companies' representatives (engineering companies, design institutes and equipment producers, service providers and technology suppliers), the respondents' opinions may be distributed, based on that factor.

The key challenges facing **service providers** in the field of LNG can be united in the following sections:

Business closed nature: lack of access to the projects for the independent service providers, focus of Russian customers on the foreign developers and suppliers as well as lack of interest in domestic equipment, predefined «nomination» of separate companies as contractors on some services;

Finance: high net value of LNG equipment and potential customers' lack of financial sources, the customers' requirement in providing the substantial technical information at the preliminary stage without payments;

Technologies: new opportunities for import substitution, however, lack of experience LNG facilities design and construction as compared to the foreign companies, LNG tanker equipment selection criteria do not stipulate for the breakthrough technologies, adherence to dogmas and old technologies.





Analysis of the survey and in-depth interviews

The key challenges facing the **producing enterprises** in the field of LNG can be logically combined in the following groups:

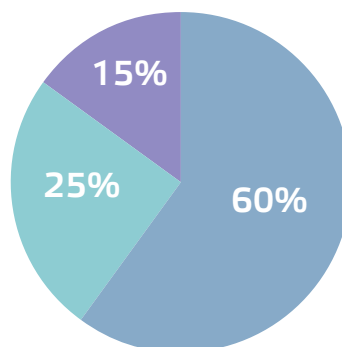
Finance: expensive materials and LNG equipment, insufficient project funding, high prices on LNG transportation due to the deposit's remoteness, high capital costs, budgeting, finance attraction difficulties, low level of the required investments, fixed price on gas regardless the remoteness from the pipe, high cost of project funding at low LNG price;

Market: export restrictions and absence of export permits, lack of customer's infrastructure, fuel consumers' unavailability to convert into LNG, poorly developed internal market, demotivation of the regional authorities in using LNG due to its final cost in regasified state, competition with non-efficient projects, field owners unwilling to process the associated petroleum gas, basic energy sources oversupply in the global market;

Personnel: narrow circle of specialists in the field, low competence of domestic participants in the design, equipment production and facilities construction processes, unqualified local EPC-contractors.

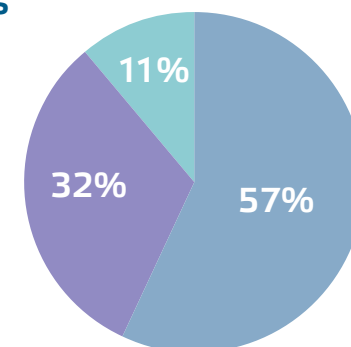
The key challenges facing service providers

- Business closed nature (60%)
- Finance (25%)
- Technologies (15%)



The key challenges facing the producing enterprises

- Finance (32%)
- Market (57%)
- Personnel (11%)



Analysis of the survey and in-depth interviews

Despite the specific problems, the LNG industry raises the problems, common for all market players:

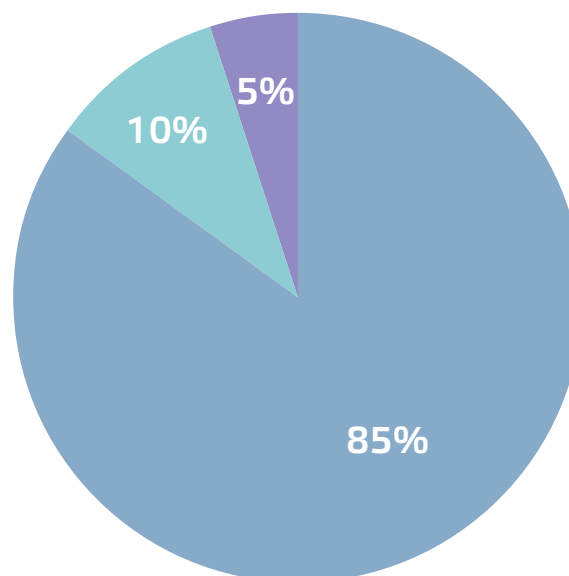
Administrative barriers: bureaucracy and corruption in the authorities, uncertainty in government regulation prospects and lack of forecasts about the LNG potential demand and LNG industry development in Russia, inefficient state regulation of the industry, excessive requirements of the authorities, lack of legal framework documents in HSE and fire safety. Immaturity of the legal framework associated with LNG usage on vehicles, absence of Russian standards and requirements GOST, outdated legal framework on design, monopolism in gas sector, information security;

Finance: tight credits, ambivalence in price regulation, project freeze;

Macroeconomics: unstable economical environment, western sanctions, high macroeconomic risks.

Overall LNG sector problems

- Administrative barriers (85%)
- Finance (10%)
- Macroeconomics (5%)





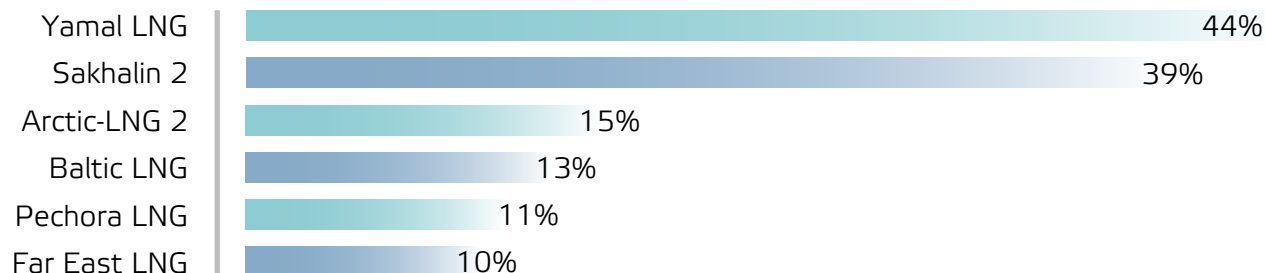
Analysis of the survey and in-depth interviews

? Which of the large-scale LNG projects are most promising, in your opinion?

The respondents had to range the large-scale LNG projects from the list, on the scale from 1 to 6, where 6 – most promising, 1 – least promising.

According to the results of the study, the top list of Russian mega-LNG projects (in descending order of their viability) is:

- **Yamal LNG.** The most advanced, according to the majority of respondents (44%), is considered the project, based on South-Tambey field.
- **Sakhalin 2** (construction of the third train). Sakhalin 2 is a quite prospective LNG project too, in opinion of 39% respondents.
- **Arctic-LNG 2.** Reported by 15% respondents, the most promising large-scale project is Arctic-LNG 2.
- **Baltic LNG.** A bit less promising, according to the survey participants' replies, is Baltic LNG (only 13% have marked it as highly promising).
- **Pechora LNG.** Only 11% of survey participants consider this project progressive.
- **Far East LNG.** 10% of respondents think that Rosneft's project Far East LNG is most up-and-coming.



? Which small-scale LNG projects are the most promising?

The question was open and had no predefined answer options. The respondents were supposed to outline three small-scale projects, of their highest concern.

According to the survey results, of data obtained, the most popular small-scale LNG projects are:

LNG-Gorskaya (70% respondents)

Vysotsk-LNG (56%)

Pskov-LNG (24%)

Top-3 small-scale LNG-projects

Project name	Description	Updates
LNG-Gorskaya	LNG – Gorskaya intends to commission the production complex in late 2018, while in early 2019, LNG sales will be launched.	<i>LNG Gorskaya negotiates with the leading German shipping corporation about arranging the new ferry line Hamburg (Germany) – Saint Petersburg (Russia, Bronk terminal) on new vessels based on LNG.</i>
Vysotsk-LNG	The project implementation will provide 100-120 employment opportunities. The project construction period is 2015-2018. The project investor is Gazprombank (100% «Cryogas», established in 2014).	<i>The South Korean Daelim Industrial has become a technology donor for the project in Vysotsk. To build a facility with capacity of 660 thsd.tons, a joint venture is created, named OMZ-Daelim.</i>
Pskov-LNG	Cryogas project, launched in May 2016. The LNG facility in combined with CNG filling station as of 1 mln m3 per year. The facility has been built for 2 years, its capacity is estimated at 22-23 thsd. tons per year. The investment amount totalled 756,6 mln. RUB.	<i>The annual amount of gas produced at small-scale LNG in Pskov is contracted a year ahead, predominantly to European countries- Estonia and Poland. A smaller share will be delivered to the internal market.</i>



Analysis of the survey and in-depth interviews



What small-scale project operators would you like to hear from in 2017?

To successfully arrange the Congress 2017 and invite truly relevant speakers, the question had no predefined answer options, for the respondents to provide three operators, they would like to hear, within the framework of the event.

Among the operators mentioned by the respondents:

- **Gazprom proyektirovaniye**
- **Gazprom promgaz**
- **Gazprom transgaz Yekaterinburg**
- **Gazprom VNIIGAZ**
- **Gazprom gazenergoset**
- **Gazprom export**
- **Gazprom gazoraspredeleniye**
- **Gazprom gas motor fuel**
- **LNG-Gorskaya**
- **Cryogas**

Analysis of the survey and in-depth interviews

? Please name three Russian companies, developing technologies and producing equipment for LNG projects. Please outline three leading international companies in the technology and equipment market for LNG projects.

To reveal the leaders among Russian and international technology and equipment suppliers for LNG industry, the question did not have any predefined options. The respondents named three Russian and three international companies, which are the leaders in LNG industry.

Among the Russian companies, the majority of respondents named:



CRYOGENMASH



Among the foreign technology and equipment suppliers, the most popular are:

SIEMENS



KVERNER





Analysis of the survey and in-depth interviews

? What is your estimate of Iran LNG project prospects? To what extent are Iran projects relevant for your company?

As is known, Iran plans to recover its scalable projects for LNG production, which were frozen after western sanctions imposed.

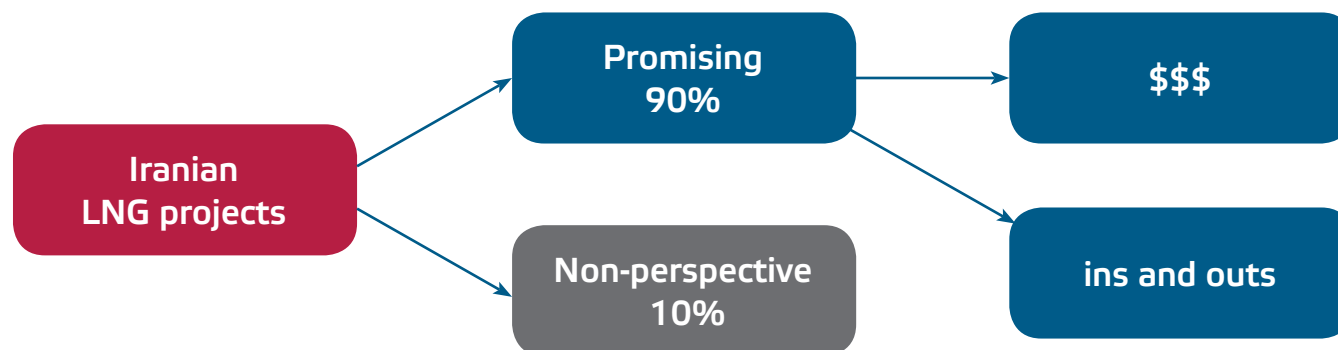
Iran has tried to negotiate with English and Dutch oil and gas company Royal Dutch Shell, Spanish Repsol and French Total for the construction of three LNG facilities, but has received refusal in 2010 in the context of Europe's and USA's pressing.

In late July, Gazprom has applied for participation in Iranian LNG projects.

Currently, NIOC develops project feasibility study, which will further become the basis for tender procedures.

That is why the issue of the Russian party being involved in Iranian LNG projects is quite acute now.

According to the results of the study, *90% respondents highly assess the prospects of Iranian LNG projects, consider them realistic and note that they are absolutely of their business concern.* However, the problems of **financing and works unique features** bother almost half of the respondents concerned.



The overview of large-scale LNG projects

“Sakhalin-2” project – is the only operating plant for large-scale LNG production in Russia. The project operator is Sakhalin Energy (Gazprom, Shell, Mitsui, Mitsubishi). Currently, the plans for project extension due to the third train construction are reviewed. The design documentation for the construction of a third phase will be ready in 2017. Construction of a third train will enable half as much capacity growth — up to 15 million tons.

“Far East LNG”. Rosneft, together with «Sakhalin-1» partners, ExxonMobil, intends to implement the “Far East LNG” project. The priority site for facility location is named by the operators as the Khabarovsk territory. The projected capacity is estimated at 5 mtpa.

“Yamal LNG” – is an integrated project for natural gas production and liquefaction in Sabetta village. Three trains with capacity of 5,5 mtpa each are in the progress of construction, to be launched in 2017, 2018 and 2019. Novatek does not exclude the possibility of extending “Yamal LNG” with an additional train. The prospects for expansion are to be discussed with project partners (Total, CNPC, Silk Road Fund).

“Pechora LNG” – is a large-scale project, stipulating for the development of two fields in the Nenets Autonomous District: Kumzhinsky and Korovinsky, creation of gas and transport infrastructure, construction of LNG plant, gas treatment unit and sea terminal. In December 2015, Rosneft and Alltech Group have completed the establishment of JV RN-Pechora LNG, with Rosneft’s share as of 50,1%. The capacity of the facility is 2,6 mtpa, extensible twofold.

“Baltic LNG” is a project for the construction of the LNG facility in Ust-Luga of the Leningrad region. The projected capacity of the plant is estimated at 10 mtpa, extensible to 15 mtpa. Gazprom and Shell have signed a memorandum of understanding in June 2016. The companies anticipate defining the terms of JV for the LNG facility construction by the end of the year, and the project is to be commissioned in December 2021 – 2022.

“Arctic LNG 2” is a licensor for Salmanovsky (Utrenniy) area, with homonymous field. The field is located in the north of Gydan and is considered the largest on the peninsula. The recoverable reserves are estimated at 235 bcm of gas and almost 9 million tons of liquid hydrocarbons. Novatek intends to accomplish the technology concept of “Arctic LNG-2” in 2016. The construction of trains with capacity of 6 mtpa each are reviewed.





The overview of small-scale LNG projects

“LNG Gorskaya” is a project for construction of FLNG, with the in-house fleet providing both LNG deliveries to Europe, and vessel bunkering in the Gulf of Finland. LNG – Gorskaya intends to commission the production facility in late 2018, and in early 2019 to start LNG sales.

Cryogas has commissioned a small-scale LNG facility in Pskov Region. The facility launch took place on 26 May 2016. The plant capacity amounts to 21 thsd tons/year (3 t/h) of LNG. Gazprombank considers the opportunity for construction of another LNG facility in the Pskov region. The site will be located in v. Tyashma of Pskov area.

Cryogas implements the construction of LNG terminal with capacity of 660 thsd tons of LNG per year in the port of Vysotsk of the Leningrad region. The LNG complex and adherent infrastructure will be commissioned in 2018. In 2014, in the Perm Territory, the Gazprom pilot project for gasification was commissioned - the LNG complex in Kanyusyata (Karagay area), and three LNG reception, storage and regasification units – in Ilyinsky settlement (Ilyinsky area), v. Nerdva (Karagay area) and s. Severniy Kommunar (Sivinsky area). The project initiator is Gazprom gazenergoset. Gazprom also plans to implement the project for autonomous gasification in the Tomsk region, stipulating for the construction of a mini-plant, and LNG reception, storage and regasification units in 4 settlements. Moreover, the similar projects are reviewed for implementation in the Vologda and Kirov Regions.

Gazprom gas motor fuel carries out the project for developing the infrastructure for LNG/CNG production and trade in Tatarstan. To distribute the produced LNG, a wide network of cryogenic filling stations is built, which will enable the vehicles refilling with both LNG and regasified compressed natural gas.

Contacts

The results of this study and other hot issues of the industry will be discussed within the framework of the 4th annual LNG Congress:

“LNG Congress Russia 2017”, 15–17 March, Moscow

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