Prospect for Development of The Russian LNG Market

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Abstract

Last few years at the world gas market has shown interest to liquefied gas. Perfecting technologies are resulting in reduced cost of production and transportation of LNG. Liquefied natural gas is becoming a real competitor for pipeline gas. LNG demand is growing as offshore production development and the distance from places of production to markets is increasing. Many analysts talk about a new page in the development of gas industry. Russia has so far been aside of the global trend. Russia has traditionally puts on the export of pipelines gas and therefore LNG has been a gimmick for Russia for a long time. All of this confirms is serious technological backwardness. Russia is the largest exporter of natural gas, but still does not have its own facilities in the region of liquefaction. This greatly limits its role in the world gas market which for Russia to date has been exhausted Europe and the FSU. The prospects of Russian Liquefied Natural Gas development are entirely dependent on "Gazprom" - the main supplier of raw materials. The market liquefied natural gas (LNG) is a fairly new concept for Russian energy. Some experts are hesitant to even talk about the market - it is too poorly developed indeed. However the demand for liquefied fuel is growing from year to year both in Russia and in the world. But right now we are witnessing attempts to catch up with the global trend. Producers have announced several large LNG projects. But how the plans comply with a real opportunity? Article will allows investigate this delicate subject and understand what future awaits the production and export of the Russian liquefied gas in the nearest years.

1 Introduction: Geopolitical situation.

Until recently the rapid development of LNG industry was virtually without the participation of the Russia - the biggest gas power has the most powerful «blue fuel» resources in the world. As far the Soviet Union never developed a capability in the alternative method of delivery—transporting liquefied natural gas (LNG) by road tankers and sea vessels (10), as LNG technology developed especially were no alternative ways to the gas export and import. Due to historical factors and the geographical location exports of Russian gas has traditionally provided main gas pipelines (Figure 1).

In 2006,Gazprom exported gas to 32 countries within and beyond the FSU, to and continues reinforcing its positions on conventional international markets. In 2006 the Company sold 161.5 bcm of gas to European countries along with 101 bcm to the CIS and Baltic States. All of this gas was exported by the dominant Russian gas company Gazprom, via its export subsidiaries, principally Gazprom export. Russia is the largest single supplier of gas to Europe, providing around 25 percent of European gas demand. Gazprom’s hard-earned and longstanding reputation as a reliable supplier to Europe (5).

Another reason impedimental the development of LNG-production in Russia is the basic commercial principles of Gazprom’s, according to which the gas supply of the company should not compete among themselves.
Over the time, however, attitude of Gazprom toward the LNG production has changed. The geographical position of Russia and Ukraine endowed their sections of the pipeline with strategic value because the Central Asian gas could pass to its recipients anywhere only through Russia and the Russian gas could reach its European customers for the most part through Ukraine. Ninety seven percent of Russian gas sold in Europe in the 1990s transited through Ukraine (14) and it was technically impossible to cut off gas supply to Ukraine without cutting the gas supply to Europe (10) In 2006, security of European gas supply became a very topical subject following the cuts in Russian supplies to Ukraine in the first days of the year which had the consequence of restricting the availability of supplies to some European countries. Gazprom cut off the gas flow to Ukraine for the first time in February 1993. Since 1993, Ukraine continued to receive gas but failed to pay for it. Towards the end of 2007, Ukraine’s unpaid bill for delivered gas exceeded $1.3 billion dollars (2). Gazprom’s fortunes were highly vulnerable to political and economic changes in the EU and Ukraine because of the concentration of sales in the former and heavy dependence on pipeline transportation through the latter. LNG production presented manifold solutions to these challenges. Although Europe was to continue to dominate company’s export sales, LNG would in the future equip Gazprom with greater latitude of choice in the geography of markets, ease the dependency on transit through the territory of third countries, diversify sources of revenue, and enable greater participation in lucrative spot trading. In the case of other future targets, such as China, Japan, and South Korea, both LNG and pipeline-transported natural gas were viable, each with its own advantages (10)

International transit problems regarding energy supply are of special concern to Russia. Russia has diversified its hydrocarbon export route to minimize commercial and transit risks. In this context the question “ship or pipe?” appears to be rhetorical.
2 LNG market structure

The Russian Continental Shelf is one of the world’s richest untapped hydrocarbon resources mostly containing gas. Recoverable reserves are estimated to be at 24 trillion cubic meters (tcm) of world consumption. The Ministry of Natural Resources has already announced plans to put up 32 blocks in the Barents, Pechora and Okhotsk seas for auction by 2010. So far these resources have not been put into production due to abundant and more easily recovered continental resources, a lack of infrastructure and proper technological experience. The geographic location of these assets leaves little room for speculation on how gas should be delivered to the market (13).

Unlike oil markets, which were well integrated and increasingly global, gas markets were much more disparate and local. In the extreme the image of a market for gas was simply misleading because delivery completely depended on the pipeline infrastructure. Gas was sold, therefore, only where the pipelines ended. The emergence of the technology to liquefy natural gas, thereby making it transportable by ship, transformed gas markets. Long-term supply contracts remained crucial for LNG projects (10).

In the past, nearly all LNG trade has been realized through long term Sale and Purchase Agreements (SPAs) with little flexibility in terms of volume or price. However, the number of short term contracts, though still small, is growing rapidly (Figure 2).

![Figure 2 Volumes and the contractual structure of global LNG. Source: JAI-Energy](image)

The reason for this rigidity lies in the nature of LNG projects. They are very long term and costly: development and construction require capital investment of several billion dollars with a payback period of some 10-20 years. Banks that provide such big and long term investment generally do not want to be exposed to spot market risks. They require certainty on the outcome which is attained through watertight contractual linkage between upstream and financially sound buyers downstream. Thus, in order for an LNG project to be financed substantial sales contracts need to be agreed upfront (13).

As a result of varying conditions of long term SPAs, LNG prices show little consistency even within one country not to mention different regions.
Historically, the main regions for LNG trade are the Atlantic Basin, the Pacific Basin and Europe each with its own LNG pricing structure. LNG trade evolved differently in the Atlantic and Pacific basins, and this continues to affect import volume, pricing systems, and contract terms. In the Pacific Basin, Europe and the U.S. accounts for completely different shares in total gas consumption (Figure 3) and therefore prices in these three regions are benchmarked to different competing fuels. Importing countries in the Pacific Basin are almost totally dependent on LNG while countries in the Atlantic Basin use domestic supplies and pipeline imports as well as LNG to meet natural gas demand.

In the 1980s and early 1990s, indigenous natural gas supplies were abundant for most countries in the Atlantic Basin, and pipeline gas readily available. It was difficult for LNG to compete and, as a result, LNG imports into the Atlantic basin grew very slowly. LNG still makes up a small portion of the natural gas market in the United States and Europe, and competes with domestic supplies and pipeline imports.

![Figure 3. Natural gas consumption by region (actual and forecast).](source.png)

Source: Deloitte, Wood Mackenzie, Cedigaz, Total.

In contrast, the LNG importers in the Pacific Basin – Japan, South Korea, and Taiwan – have little or no domestic gas production and no pipeline sources for natural gas imports. Because current LNG importers in the Pacific Basin did not have access to domestic or piped imported gas, LNG imports into the region increased rapidly in the 1980s and early 1990s as these countries sought alternatives to oil. Security of supply was a more important consideration in the Pacific Basin than price (4).

Today’s classic long-term SPA represents a combination of a take-or-pay agreement coupled with an oil-linked pricing clause. The buyer is usually obliged to take a minimum of 90% of his annual contract quantity. The easiest method of getting the gas to market is in liquid form. However, billions of dollars of investments are required to put these assets on stream. The approach of project finance is primarily used to raise the funds necessary for projects of such a scale. Gazprom has already reported extensive plans to exploit this method for multiple upstream and downstream projects.

For Russia to embrace fully its role in world energy markets it would need massive amounts of capital to develop its resources. Energy, moreover, was certain to dominate the future of Russia’s international relations. Russian industry had little or no experience with offshore production facilities and operations and no experience with building LNG plants (11). Russian companies have only started to realize the benefits of project financing. The largest project financing to date in Russia is the Sakhalin-II LNG project. After the recent dramatic rise in costs, the main lenders, US ExIm Bank and EBRD, are waiting for major ecological issues to be settled.
The Arctic seas shale

Gazprom’s long-term strategy of future production envisioned also the development of fields on the Yamal Peninsula, fields in the Arctic seas, the Ob and Tazovskyaya bays, East Siberia, and Far East. For the development of the Shtokman field in the Barents Sea, Gazprom sought to form an international consortium, thereby reversing its initial intention to do it alone.

The field, 350 meters underwater, contained 3.8 Tcm of gas with an expected annual production of 23.7 Bcm a year. As Figure 4 shows, the main advantages of the project are favorable geographical location in relation to existing and proposed receiving terminals in consumer markets (Canada, Mexico, eastern coast of the United States), possibility to diverse supplies – simultaneous supplies to Europe and the USA, varying destinations depending on market conditions and expansion of LNG production increases economic effectiveness.

Figure 4. Location the Shtokman field. Source: Gazprom

Delivered to the shore by underwater pipelines, the gas was scheduled to flow into the Nord Stream pipeline in 2013 and, a year later, into the LNG plant to be built nearby. The consortium consisted of Gazprom with 51 percent, the French company Total with 25 percent, and the Norwegian company StatoilHydro with 24 percent (9).

Sakhalin-II LNG project

Sakhalin Energy Investment Company (SEIC) was formed by foreign energy companies in 1994 with the blessing of the Russian government to tap into the previously untouched oil and gas wealth off the coast of Sakhalin Island.

The blessing, verbalized in the first ever production sharing agreement (PSA) between Russia and foreign investors, had been necessary to attract interest to this expensive and complex development project. The PSA enticed the foreigners with privileged terms, including 100% cost recovery. The consortium consisted of Shell, the projects operator, with 55% of the stake, Mitsui with 25%, and Mitsubishi with 20%.
Gazprom’s participation in Sakhalin II had been discussed for years and came closer to realization in July of 2005. The future of the deal faced uncertainty after the viability of the Sakhalin II came under relentless attack from the federal agencies in charge of environmental protection, when in September of 2006 the government withdrew the project’s environmental approval. Gazprom’s subsequent entrance into consortium as a majority stakeholder settled the crisis. In April of 2007, Gazprom gained 50% plus one share stake in Sakhalin Energy, while the other participants reduced their share proportionately: Shell now held 27.5% minus one share, Mitsui 12.5%, and Mitsubishi 10% (12).

Why LNG market is so attractive for Russia? First of all, LNG technology allows to flexible follow up as well market as the political environment. Owners of LNG-projects can change the volumes of output and scope of the deliveries quickly thus to smooth out of the demand seasonal variations (it is impossible when gas pipeline deliveries). This efficiency makes conditions of protection of a deteriorations in relations between transit countries while pipeline projects will be realized only if the long-term arrangements between suppliers, customers and often transit countries provides.

![Figure 5](image)

**Figure 5** LNG production costs become cheaper than pipeline export, ($ USD/tonna). Source: “Expert”,

The other cause for demonstration of interest to the LNG-business to Russian companies is constant retrofit and cheapening of the expensive liquefaction technologies. For example, since mid-1990's to the present day the liquefaction process has depreciated about 40% and by 2010 it will lose another 10% and will cheapen more (Figure 5). CAPEX for construction of LNG plants were $ 2000 dollars per ton capacity in the late 1970's, and now it costs is $ 500 per ton capacity (cut-off date is 31.12. 2002 year). At the same time construction and maintenance of the raw material intensive pipeline systems will go up conversely. Before comparing prospects Russian LNG market with other players, we need to consider domestic and external markets in a bit more detail.

## 3 The Future and Prospects of Russian LNG

### World LNG market overview

The value of liquefied gas to suppliers is the ability to diversify and expand the supply markets. Customers can also diversify supply, choose suppliers and to increase imports respectively.

For some countries LNG purchase is actually no alternative way to meet the demand for gas. For example, Japan receive as liquefied gas more than 85% of the total consumption of gas. LNG is the
only technology that can ensure the supply of gas across oceans: from the Persian Gulf in the U.S. and Japan, from Australia to Japan again. Demands for trans shipments in the near future significantly increase in direct ratio to how to increase regional imbalances between production and consumption of gas (See Table 1).

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Export (bcm)</th>
<th>Consumers</th>
<th>Import (bcm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qatar</td>
<td>31,09</td>
<td>Japan</td>
<td>81,86</td>
</tr>
<tr>
<td>Indonesia</td>
<td>29,57</td>
<td>South Korea</td>
<td>34,14</td>
</tr>
<tr>
<td>Malaysia</td>
<td>28,04</td>
<td>Spain</td>
<td>24,42</td>
</tr>
<tr>
<td>Algeria</td>
<td>24,68</td>
<td>USA</td>
<td>16,56</td>
</tr>
<tr>
<td>Australia</td>
<td>18,03</td>
<td>France</td>
<td>13,88</td>
</tr>
<tr>
<td>Nigeria</td>
<td>17,58</td>
<td>Taiwan</td>
<td>10,2</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>16,25</td>
<td>India</td>
<td>7,99</td>
</tr>
<tr>
<td>Egypt</td>
<td>14,97</td>
<td>Turkey</td>
<td>5,72</td>
</tr>
<tr>
<td>Oman</td>
<td>11,54</td>
<td>Belgium</td>
<td>4,28</td>
</tr>
<tr>
<td>Brunei</td>
<td>9,81</td>
<td>UK</td>
<td>3,56</td>
</tr>
<tr>
<td>Other</td>
<td>9,52</td>
<td>Other</td>
<td>8,47</td>
</tr>
</tbody>
</table>

Table 1: Key players of the LNG market (2007). Source: BP, 2007

At the same time, new producers and consumers are making LNG markets more diverse. In addition to expansions by current LNG exporters, two countries – Egypt and Norway – are poised to become LNG exporting countries, as they are currently constructing their first LNG liquefaction plants. At least seven additional countries – Angola, Bolivia, Equatorial Guinea, Iran, Peru, Venezuela, and Yemen – are in the planning stages for their first LNG liquefaction plants. In addition to expansions by existing importers, three countries – China, India, and the United Kingdom – are poised to become LNG importing countries, as they are currently constructing new regasification terminals. At least seven countries – the Bahamas, Jamaica, Indonesia, Mexico, the Netherlands, New Zealand, and the Philippines – are in the planning stages for their first regasification terminals.

![Figure 6: The dynamics of the LNG-industry development. Sources: IAE, BP, ENI, Expert](image-url)
According to the International Energy Agency, energy companies and their partners by 2010 investing more than 135 billion dollars in the construction of LNG terminals and tankers. Liquefaction and transportation of natural has become the global business only the 1990's. Since then world trade in LNG has annually increased by an average of 2.5% since 2003 - at 7.3% and herein the demand for natural gas has increased only 2% per year (see Figure 6). In 2006 the volume of world LNG trade grew to more than 211 bcm per year (more than 28% of total gas supplies), an increase since the early 1990's more than doubled. By 2015 LNG market will grow even double that would be attributable primarily to the growing demand for natural gas from the U.S., UK and Asia-Pacific region - especially China and South Korea.

**Domestic market review**

The domestic LNG market volume reaches 5-7 bcm annually is incomparably with the natural gas market (459 bcm). A bit players in the market is down to underdevelopment of technologies of natural gas liquefaction and liquid fuels production.

Interesting fact: the first LNG-factory appeared in Russia in 1953, which is under Stalin, but currently are only small-scale gas liquefaction plant at three Gazprom's affiliated undertaking - «Lentransgaz», «Uraltransgaz» and «Samaratransgaz». LNG technology was not widely spread on the Soviet domestic market inasmuch as lack of demand was evidenced. Thereafter both Soviet gas industry and the Russian Gazprom was inappropriate to develop it in the long-term 'pipeline' contracts environment. Russia hardly progressed in the liquefaction gas field farther more a few mini-plants is not commercial interesting for that matter.

The offtake of LNG in the Russian domestic market is not profitable inasmuch as of the gas pipeline network advanced. Pricing also make against to the domestic LNG market development: processing complexity requires large investments. These reasons plus the relatively low paying of potential customers reduce probability creation of the mature LNG market in Russia within the next ten years.

**External market opportunities**

The LNG price in the world market is $ 850 USD per tonne and twice as much as the domestic market price ($ 200-350 USD per ton). Russia will take 10% of the world LNG market if export is 17-20 million tons per year. In some cases the Russian liquefied methane by reason of the short haul distance has a competitive edges (8).

Exports of liquefied gas is not only prospective but also alternative trend of gas business development for Russia. The Gazprom expansion at the ATR market has began in September 2005 (Table 2). Then Gazprom accomplished of the LNG spot contract supply in the USA, as far back as August 2006 it were in East Asia countries. Total sales of liquefied gas was about 0.85 billion cubic meters:

**USA**

In September 2005, Gazprom’s first liquefied natural gas carrier arrived in the USA. The LNG was delivered based on contracts with British Gas Group and Shell Western B.V. Under the contracts, the LNG had been purchased from British Gas Group and sold to Shell Western B.V. for marketing in the US. In September 2006, Gazprom and British Petroleum (BP) clinch the deal to supply liquefied natural gas to Atlantic Basin countries. In accordance with the Agreement, over 2006 to early 2007 BP will be supplying LNG to Gazprom for marketing in Atlantic Basin countries. BP’s first 135 thousand cubic meters of LNG carrier was loaded in September 2006 at the Point Fortin seaport (Trinidad & Tobago) for delivery to the Cove Point regasification terminal (Maryland, USA).

**Great Britain**

In April 2006, Gazprom shipped its first LNG to the UK-based Isle of Grain terminal. The LNG was purchased from Gaz de France and sold to British Petroleum. The LNG supply volume averaged 140 thousand cubic meters (some 85 million cubic meters of natural gas).
**Japan**

In August 2006, Gazprom supplied its first LNG cargo to Japan. The LNG was purchased from Mitsubishi Corporation that had bought it from Celt (a joint venture between Mitsubishi Corporation and Tokyo Electric Power, Inc.). 145 thousand cubic meters of LNG (some 92 million cubic meters of natural gas) were supplied ex-ship to the Chubu Electric Power-owned Chita terminal.

**South Korea**

In October 2006, Gazprom supplied its first liquefied natural gas cargo to the Republic of Korea. The LNG was purchased from Mitsubishi Corporation that had bought it from Celt. 145 thousand cubic meters of LNG (some 92 million cubic meters of natural gas) were supplied ex-ship to the KOGAS owned Pyeongtaek regasification terminal.

<table>
<thead>
<tr>
<th>Data</th>
<th>Source</th>
<th>Volume</th>
<th>Terminal</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2005</td>
<td>British Gas Group</td>
<td>Around 80 million cubic meters of natural gas</td>
<td>Cove Point (US)</td>
<td>Shell Western BV</td>
</tr>
<tr>
<td>December 2005</td>
<td>Gaz de France (Egypt)</td>
<td>Around 80 million cubic meters of natural gas</td>
<td>Cove Point (US)</td>
<td>Shell Western LNG</td>
</tr>
<tr>
<td>April 2006</td>
<td>Mitsubishi Corporation (Oman)</td>
<td>Around 85 million cubic meters of natural gas</td>
<td>Isle of Grain (UK)</td>
<td>BP</td>
</tr>
<tr>
<td>August 2006</td>
<td>Mitsubishi Corporation (Oman)</td>
<td>Around 92 million cubic meters of natural gas</td>
<td>Chita</td>
<td>Chubu Electric Power</td>
</tr>
<tr>
<td>August 2006</td>
<td>BP (Trinidad &amp; Tobago)</td>
<td>Around 92 million cubic meters of natural gas</td>
<td></td>
<td>Tokyo Electric</td>
</tr>
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<td></td>
<td>Pyeongtaek</td>
</tr>
</tbody>
</table>

**Table 2.** First Russian LNG supplies. Source: Gazprom

*A medium-term contract was signed with BP for 2006-2007, including sale of rights for several tanker shipments from Trinidad & Tobago to the USA*

Since 2008 Gazprom made one off transactions and swap operations (LNG –pipeline gas) with BP and Gaz deFrance and supplied LNG to the USA, Great Britain, South Korea and Japan. In all, Gazprom sold around 1 bcm of LNG.

Based on the extensive resources of the Arctic seas shelf (especially The Shtokman field), Gazprom intends to participate in the value chain of production, delivery and export of liquefied gas. Now Gazprom is actively investing in plants to production of liquefied gas.

The expansion of Russian companies in the world LNG market is fraught. First of all is the high competition and secondly the LNG production method. The experience of similar production is insufficient for Russian energy companies. All of this complicate the target of Russian expansion on the world LNG market. Therefore Gazprom has involved of the foreign partners for the Shtokman project realizing are the French Total and Norwegian StatOil Hydro, on the Sakhali-2 project Gazprom cooperates with Shell, Mitsui and Mitsubishi. Consider next a main risk for Russian LNG business development.
**Risks**

The Russian gas industry exposed to large external risks influence, most important of which are the geopolitical situation and world energy markets conjuncture, especially the European, North American and Asian and Pacific.

**Figure 7. Risk for gas industry. Source: ERIRAS**

There are three fundamental factors of it:

- Domestic gas prices equivocating,
- equivocating of export market capacity for Russian gas,
- expenditures connected with transit (**Figure 7**)

The first and most important risk factor in the development of long-term export strategy for Russia is the dynamics of gas prices in the European gas market. This uncertainty is conditioned by difficult to predict dynamics of oil price.

Gas prices forecast the added complication is that proper allowance must be made deregulation of gas market. The Second EU Gas Directive and the work initiated within the Madrid Forum framework are focused on at advancement of an indivisible liberalized the EU and a number of the Eastern European countries gas market organization.

Gas market liberalization creates several risks for the Russian gas industry. The most important risk for LNG market creations is revise the completed contracts terms risk. Falling fundamental changes in the system of long-term contracts, the risk of destruction of prevailing in recent decades investment projects financing facilities shall becoming a reality. In the case of exceptions from the new contracts to steady the market “take or pay” conditions the producers shall lose the possibility of outward investment bid security. Within the medium-und short-term contracts frames, as the United States and Great Britain experience shows, there are no financing arrangements of the major capital projects such as resources development of Yamal Peninsula and the Barents Sea shelf.
The scenario for the Russian LNG market development is darkly. The fact that Russia should choose an effective LNG export and development strategy tolerant to external environment changing is apparently. Many experts believe that the development will receive only export destinations. However, the development of domestic LNG market does not prevent, but by the relying of liquefied gas as a fuel oil only.

4 Conclusions.

The pipeline system is not only the most expensive part of the gas industry, but it is also the main factor to be considered for future industry development plans. Seeing the construction of additional pipelines from West Siberia to Europe would prove to be very poor economically, therefore exports of LNG is very beneficial for Russia.

Russia has vast gas reserves on the continental shelf, which is logical to use to develop LNG projects.

Massive development of the oil and gas potential of the Russian continental shelf is distant because of the lack of own technologies.

Russia expects a very serious competition in the LNG segment with experienced suppliers of liquefied gas. But Russia has a competitive advantage. First of all, there is a shorter transportation routes to major markets from the north-west to U.S. factories and from Sakhalin to the ATR. Secondly, the harsh climate allows reduce the cost of gas liquefaction (in northern regions will be 10-15% lower than, for example, in Qatar). The third is a zero export duty, established in Russia for the supply of LNG.
Bibliography

1. Dmytry Loukashov, Maria Radina, Natalia Pushkina, “Russian gas industry” UBS Investment Research, May 9, 2008
2. Elena Lakshina “Gazovoe peremirie - Kievu dali srok do 1 Noyabrya”, Rosijskaya gazeta – Federal’ny vypusk №4488, October 10, 2007
4. IAE
12. Rawi Abdelal, "Journey to Sakhalin: Royal Dutch/Shell in Russia (A), (B), and (C),” HBS No. 9-704-040 (Boston: Harvard Business School Publishing, 2006