

BLUE FUEL

Gazprom Export Global Newsletter

July 2016/ Vol. 9/ Issue 3

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To Our Readers Natural Gas in the Era of Technology

Some blame the natural gas industry for its conservative mentality, arguing that in the 21st century mankind cannot rely on fossil fuels and thousand of kilometers long steel pipelines. Critics say that there are much more innovative and flexible energy sources and mechanisms of energy trade available today.

Clearly such an approach is inappropriate by its very nature. Natural gas is one of the most technologically-advanced energy sources. The use of natural gas in the chemical industry and in transportation are booming; new applications for the “blue fuel” are continuously being identified. Gazprom Group is a part of this trend. Being a world-recognized leader in the export of pipeline gas and a mature and experienced LNG trader we are looking to become a champion in other innovative areas of the global gas industry.

As of July 2016 the company operates a network of 67 CNG and LNG filling stations in Germany, the Czech Republic and Poland. LNG stations in Warsaw and Olsztyn were the first facilities in Europe to fill city buses with environmentally friendly liquefied gas.

This year, the 10th NGV Rally Blue Corridor 2016, organized by Gazprom Export and Uniper, focused on the use of LNG in marine bunkering – another very promising sphere for LNG use in Europe. Gazprom Germania is progressing with the implementation of a LNG-bunkering project in the Port of Rostock – the first project of its kind in the Southern Baltic Sea.

Gazprom also develops small-scale LNG (ssLNG) production capacities in Russia. Russia’s new ssLNG plants will provide energy sources for off-the-grid locations and fuel for LNG-driven transport.

In addition, Gazprom Group works on the design of a floating marine-bunkering facility.

Europe has clearly realized the potential of natural gas for transportation needs. Audi expands its model-range of CNG driven Audi g-tron, Iveco has developed a gas engine that breaks the 400 hp barrier and allows travel for 1,500 km on a single tank. Companies all over the EU receive grants to invest into gas filling road infrastructure within the frameworks of TEN-T policy. The number of LNG-fueled vessels in Europe is expected to more than double in the next two years.

Another innovative sector is helium trade. This gas, mostly known for its use in party balloons, has a wide range of applications in many industries from aviation to medical technology. So far, helium is produced in Russia only in the Orenburg region and Gazprom Export is the sole helium exporter from Russia. With the commissioning of a gas processing plant in the Amur region, Gazprom will increase its helium sales by 60 million cubic meters per year becoming one of the world-leaders in this segment.

We have never denied that the world’s energy sector would change in the future. The development of technology does not stop. But we see how the gas industry evolves following this technological progress. The establishment of our NGV, ssLNG, helium activities dates back only to the late 2000s but they have already grown into self-sustained businesses. The future is happening now and natural gas is retaining its positions in a post-industrial world, for the economic and environmental benefits of our planet.

Betting on Bunkering: Cutting Emissions from Maritime Transport

By Elena Burmistrova, Director General, Gazprom Export



Elena Burmistrova

Fluctuating commodity prices, technological progress, changing consumer behaviour and environmental concerns – all these aspects are pushing mankind to reassess the problem of transportation fuel supply. The mentality of having a “low cost, technologically simple” fuel choice has been losing ground and has given way to a more prudent approach, with factors such as effectiveness and ecological sustainability prevailing.

However, the transition to greener mobility is moving ahead at a disappointingly slow pace.

Forecasts point to an increase in global emissions if the right steps are not taken today, specifically in road, aviation and maritime transport. Shipping emissions alone are responsible for 2.5% of global greenhouse gas (GHG) emissions and currently amount to 1000 million tonnes of CO₂ per year, and risk increasing dramatically by 2050. This is not compatible with the European Union’s emission reduction targets.

From an industry perspective, it is evident that various sectors of the economy will need to change their “business as usual” attitude to integrate more low carbon and emission reduction solutions into their business decisions. While higher costs are generally associated with the transition to a low carbon economy, there are ways to pursue this path in a sustainable, affordable and efficient manner. For us at Gazprom Export, that path is very clear and it begins with using natural gas in transport.

From the energy sources available to us today, natural gas is in a privileged position to help the transport sector embrace a more carbon-conscious approach and take emission reduction measures. Compressed natural gas (CNG) is already widely used in transportation in Asia, the Americas, and Europe mostly for passenger cars and light-duty vehicles. Liquefied natural gas (LNG), for its part, is an effective and competitive technology for heavy-duty transport.

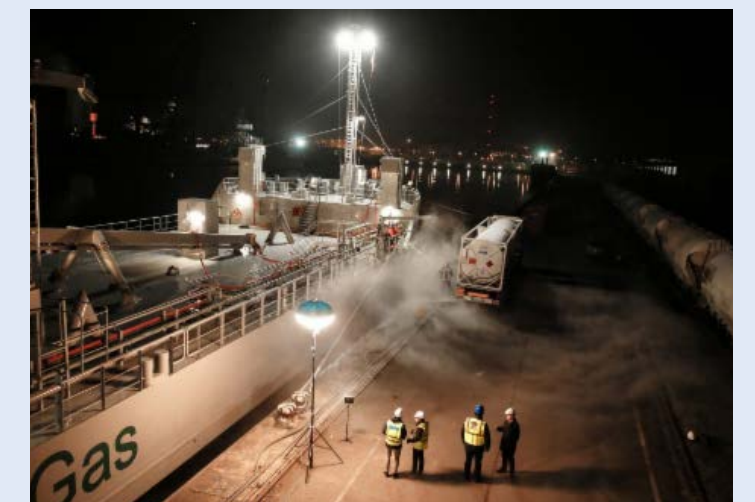
LNG is also the most promising solution to tackle shipping emissions, being an attractive alternative for ship-owners that are subject to ever-stricter emission rules. The use of LNG could result in a 20% decrease in GHG emissions compared to heavy fuel oil and a significantly higher reduction of other pollutants. Let us not forget fuel costs, which become significantly lower when LNG is chosen instead of marine gas oil.

Today, global energy suppliers such as Gazprom Export are in a position to offer access to LNG through cost-efficient infrastructure of bunker tanks in ports, bunker ships and barges, as well as filling stations docked at ports. There is a strong commercial and environmental rationale to introduce more LNG bunkering capabilities across European ports.

It is important that this new technology receives the support it deserves – from policy-makers, market players and citizens who are concerned about the state of European seas and the global climate. The Baltic and North Seas as well as the English Channel are now role models for the implementation of the International Maritime Organization’s most ambitious shipping emission rules. Undoubtedly, other parts of the world will follow to create a level playing field globally.

At Gazprom Export, we have made great efforts to demonstrate the potential of natural gas in transport over the past decade. During our annual Blue Corridor Rally, vehicles have safely and reliably travelled thousands of kilometres through Europe powered by natural gas, allowing us to share our experience and expertise in the field. This year the Rally followed a route around the Baltic Sea and focused on the bunkering of marine vessels with LNG.

Europe can achieve its climate and business objectives if we create the right market incentives and have the courage to invest in technologies that can change the way we live and run our businesses in the future. On this energy transition journey, I truly believe in the power of natural gas as a common-sense fuel alternative.



Blue Corridor 2016 Rally Successfully Finishes in St. Petersburg

Having covered about four thousand kilometers around the Baltic Sea, participants of the 10th NGV rally “Blue Corridor-2016. The Amber Road”, organized by Gazprom Export and Uniper, crossed the finish line in St. Petersburg on 10 June 2016. Here, in the Northern Capital of Russia the rally had started with a festive ceremony on 26 May 2016.

The principal goal of previous Blue Corridor rallies was raising awareness about the advantages of using natural gas as a fuel for road transport. This year the focus of the event had been shifted to the marine sector and the promotion of LNG for bunkering, which is especially relevant in light of tightening emission standards for sea vessels. That is why this year the rally travelled through important port cities of Russia, Estonia, Poland, Germany, Denmark and Sweden – around the whole Baltic Sea.

A first round-table event was held in Estonia's capital Tallinn, gathering

about 50 representatives of the energy and maritime industry, officials and experts. Estonia pays close attention to development of alternative types of fuels for transport. Importantly, the national strategy foresees the building of LNG infrastructure in all ports, which belong to the EU transport system TEN-T. A high-speed passenger LNG-ferry, which will cruise between Tallinn and Helsinki, is also being constructed.

Having left the Estonian capital, the rally drove west along the Baltic shore. Crossing Latvia and Lithuania, Blue Corridor participants arrived in the Polish port city of Gdansk, where they took part in the next round-table event. For Poland, embracing significant European transport corridors, the possibilities to use cleaner, cheaper and safer fuel, namely natural gas, is of utmost importance, underlined Eugene Pronin, head of petrochemical products exports at Gazprom Export. It is in the Polish cities of Warsaw and Olsztyn where Gazprom Germania, a subsidiary

of Gazprom Export, in cooperation with local companies implements its projects of introducing municipal LNG-buses, the first ever in Europe.

After finishing the Polish stage of the rally, the NGV crews crossed the border with Germany and arrived at the hanseatic city of Rostock, home to one of the main Baltic Sea ports. Here, the key event of Blue Corridor-2016 was held. On 2 June 2016 the Energy Dialogue gathered around 120 representatives from marine shipping companies and port authorities, shipbuilders and manufacturers of natural gas equipment as well as industry experts, politicians and journalists. As conference participants stressed, the development of LNG bunkering infrastructure at sea ports will stimulate the process of marine vessels transitioning to natural gas, which will lead to a significant reduction of harmful emissions. Michael Kraack, CEO of Marine Service GmbH, underlined the bright financial prospects for the development of LNG as bunkering fuel during the next 10-15 years. The Port of Rostock, one of the largest transport hubs on the Baltic Sea, may play an important role in the promotion of LNG.

The next event of Blue Corridor 2016 took place in Denmark. The capital of the Kingdom, Copenhagen, hosted the participants of the Blue Corridor NGV Rally several times in the past. This year's round-table ignited great interest among industry representatives and attracted more than 90 participants from

55 companies in five countries. Environmental responsibility is a key priority of Denmark's energy policy. The country is one of the world leaders in renewable energy use. In this regard, one of the key topics discussed at the round table was the expansion of natural gas use through a combination of natural gas and biogas. The chief vice-president of Energynet.dk, Torben Brabo, opined that by 2040-2050 the biggest share of natural gas consumed in Denmark will fall on the transportation sector.

The final round-table of the Blue Corridor-2016 NGV Rally was hosted in Stockholm. Representatives of LNG suppliers, industry associations and consulting agencies specializing on introducing standards for LNG bunkering took part in the discussions. Participants stressed the importance of introducing single standards and certification rules for LNG bunkering to stimulate the industry's development.

Between 26 May and 10 June, the Blue Corridor-2016 NGV Rally crews drove more than 3800 km along the roads of the Baltic region. A milestone of this rally was the trip from Stockholm to Turku which rally participants made on the Viking Grace ferry which uses LNG for its propulsion system. It demonstrated that LNG as marine fuel is not a remote future, but is truly here and now. The efficiency of LNG use on marine vessels is proven, and its use will undoubtedly gain further momentum in the future.

For more information and videos of the Rally please visit www.bluecorridor.org.



Blue Corridor: A Glorious Past and Promising Future

By Eugene Pronin, Gazprom Export, Head of Division, Blue Corridor NGV Rally Coordinator



Eugene Pronin

As inter-fuel competition stiffens and technological progress speeds up, the promotion of natural gas becomes a vital tool for the gas industry to secure its advantage over its rivals. Natural gas already has a strong foothold in heat and power generation, air conditioning, chemical or steel industry. A promising sector for the coming years is transportation. The Blue Corridor NGV Rally has become a key project to demonstrate the commitment of gas and automotive companies to contribute to cleaner mobility.

Born as a national project in Russia in 2008, the Rally has matured into a big international industry event. The story began in 2008 as a short road journey from St. Petersburg to Moscow. Since then, the Rally has visited 22 countries and 110 cities, driving more than 40,000 kilometers – the length of the equator. The modest travelled distance of the first trip evolved into impressive 6,800 kilometers of the “Eiffel Tour” St. Petersburg – Paris rally in 2015.

But it is not only the mileage travelled we are proud of. Of greater importance is the fact that we managed to organize more

than 70 round table events that gathered hundreds of participants: from scientists to corporate executives, from regulatory agencies to private drivers, from media to politicians.

Another success is the progress of the European NGV industry. Since 2008, the number of NGVs in Europe has grown almost twofold from 0.99 million cars to 1.9 million. I am confident that the Blue Corridor project also contributed to this spectacular growth.

This year we expanded our agenda by complementing our showcase for the use of gas in on-road transport with the topic of bunkering marine and inland water ships with LNG. The Blue Corridor Rally 2016 has proven that European businesses and countries have huge interest in LNG use for water vessels. This sector is still in its infancy in Europe. But it has excellent prospects - we forecast 25 bcm of additional demand for natural gas in maritime transport by 2025. The Blue Corridor Rally has shown the right path to future success.

Operating a wide-spread network of natural gas filling stations Gazprom Group has already been an established player on the European NGV market. With LNG-bunkering projects we think about the future, towards cleaner seas and brighter skies.



The Benefits of Natural Gas in Maritime Transport



Jan Tellkamp

The 10th Blue Corridor Rally successfully circumvented the Baltic Sea to showcase the benefits of natural gas in the transport sector. Blue Fuel spoke to Jan Tellkamp, Naval Architect, Business Development Leader Europe small-scale LNG and LNG bunkering at DNV GL, about the benefits of natural gas in maritime transport, the focus of Blue Corridor – 2016.

What are the main types of fuel for sea vessels nowadays?

Today the bulk of sea vessels use such typical distillates such as Marine Diesel Oil or Marine Gas Oil, as well as Heavy Fuel Oils. Liquefied natural gas (LNG) has only just started to establish itself as a fuel in the maritime sector.

Could you describe the current situation with LNG-vessels in Europe?

More and more vessels running on LNG are entering into service. According to the order book, Europe is the main area of operation for vessels under construction and entering service soon, with Norway being a leader in regard to LNG-driven vessels already in service. It is important to note that LNG is suitable not only for sea vessels. River barges for operation on the Rhine River, passenger vessel for Lake Constance and hopper barges for port operations are also being constructed.

What are the prospects of LNG as a fuel for bunkering in light of toughening environmental requirements?

LNG-driven vessels have notable environmental advantages in comparison to ships running on traditional fuels. LNG engines do not emit sulphur oxides (SOx) at all, emit 99% less particulate matters, up to 25% less carbon dioxide (CO₂) and – depending on the technology – up to 85% less nitrogen oxides (NOx).

Given that more and more stringent emission limits are being introduced, the market has already appreciated the advantages of LNG and there is significant demand for this type of fuel. The prospects for further growth also seem to be very good.

Installation of scrubbers on ships running on conventional fuels allows them to meet new emission requirements. What do you think about the commercial attractiveness of LNG-vessels in comparison to other options?

LNG is a less complex process technology than so called scrubbers, a technology for cleaning exhaust gases. The

combination of a scrubber and a catalyst or a scrubber and particle filters for seagoing ships' engines is very difficult due to the temperatures in the exhaust: the temperature range scrubbers work in are different from those catalysts or particle filters are working in. In contrast, LNG is an all-encompassing solution for all engine sizes used in shipping.

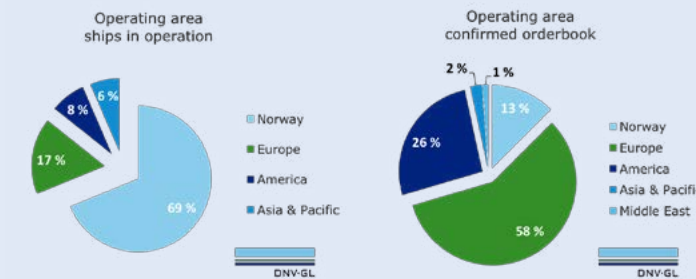
What's your view on LNG infrastructure in the North and Baltic Seas?

The infrastructure is following demand. The European and in particular German approach to foster demand, as the supply will follow, is very reasonable. It makes sense to establish supply contracts for big demand volumes – either single large ships with regular schedules or whole fleets – and develop the infrastructure accordingly.

In order to develop the value chain it is essential to understand the market needs. Factors such as reliability and regularity of service may be crucial for consumers to accept changing to another fuel.

It is also important to understand the impact of boil-off management along the value chain and all its implications on temperature, pressure and fuel quality. LNG is stored either as a boiling liquid, or under pressure. The former is the same as boiling water in a cooking pot, the latter is the same as overheating water in a pressure cooker. If the LNG is stored and transported as boiling liquid, the generated vapor (which is gaseous methane) needs to be treated in order to be not released to the atmosphere. LNG is a blend of different components like methane, butane and others, of which the lighter components dissolve first, thus changing the composition of the LNG if no measures are taken. However, LNG transported in atmospheric tanks will stay at a temperature near to its boiling point.

If LNG is stored and transported in pressure tanks, it will heat up over time and increase the pressure until a point, where the safety valve opens up. This pressure determines the duration in



Continues on page 10



which the LNG can stay in the tank. The LNG may overheat over time and this high temperature needs to be considered along the supply chain.

Which types of vessels are most suitable for using LNG and why?

All ships are suitable for using LNG, if “switching” is not understood as retrofitting but developing new designs for using LNG.

Nowadays the majority of LNG-driven vessels worldwide are car and passenger ferries – there are about 26 vessels in operation and 16 on order. Ferries are followed by platform supply vessels (ships specially designed to supply offshore oil and gas platforms) with 18 vessels in operation and seven on order. There are also some LNG-fueled gas carriers, container ships, tugs, patrol and other vessels. If you look at the order book it becomes evident, that vessels of all types have been ordered with gas engines.

Are there any regulatory obstacles to the use of LNG as a bunkering fuel?

The inconsistent application of existing regulations in different ports is more of an

obstacle than regulation itself. In addition, there is also a lack of standardization for equipment like couplings as the industry would like to avoid the use of adapters for LNG bunkering.

I would like to point out six main factors which are essential for developing LNG bunkering in ports. These are LNG availability, reliable and safe logistical concepts, legal certainty, and a favorable investment climate and taxation regime. Also necessary competences and skills as well as public acceptance are of primary importance to develop the use of LNG for bunkering.

We are proud to say that DNV GL was one of the key drivers in developing SOLAS (International Convention for the Safety of Life at Sea) regulations for gas fueled ships, ISO Technical Specifications for LNG bunker installations, Rules for Classification of Ships and Recommended Practice for developing LNG bunkering installations. We are ensuring that a technical framework is in place for the maritime industry and bunkering.



Gazprom Export to Sell LNG to Europe from Pskov Small-scale LNG Plant



In May 2016, the North-West Russian city of Pskov saw the festive opening of a small-scale LNG (ssLNG) plant. The plant’s capacity is 3 tonnes of LNG per hour - up to 23,000 tonnes of LNG annually. The facility is also equipped with a CNG filling station. The owner and operator of the plant is Cryogas Pskov, a member of Gazprombank Group.

In the course of the festive opening, representatives of Gazprom Export and Eesti Gaas signed a Memorandum of Understanding to cooperate in supplying Estonia with LNG produced at the plant. In particular, LNG from the facility is to be used as bunkering fuel for marine vessels.

In addition, Gazprom Export plans to supply products from the plant to other European markets, to serve autonomous gasification and road transport fueling.

“Commissioning of a new state-of-the-art plant will allow using an environmentally-friendly energy source more actively — both domestically and Europe-wide,” Director General of Gazprom Export Elena Burmistrova said. “It is important that the plant’s products will be used in such a promising sector of the European market as ship bunkering.”

Gazprom Export continues its work on the expansion of the presence on ssLNG markets in Europe. At the moment the company delivers ssLNG to Poland, the Czech Republic, Estonia and Germany.



Small-scale LNG from Russia for a Greener Future of Europe

By Igor Maynitskiy, Gazprom Export, Head of LNG Export Division



Igor Maynitskiy

Initially designed as an energy solution primarily for off-grid locations, the use of small-scale Liquefied Natural Gas (ssLNG) now gains momentum in other spheres. The adoption of

new stringent European environmental standards and the introduction of emission control areas in the Baltic and North Seas as well as in the English Channel make the use of LNG a preferred solution for transportation. Thanks to its environmentally friendly nature, LNG can be used not only in road transport, but also in marine and river bunkering sector.

Gazprom Export is the only company that has the right to export natural gas from Russia. We exported about 22,000 tonnes of ssLNG to Europe last year.

We at Gazprom Export have high hopes for the development of the ssLNG sector. Geographically, we are focusing primarily on the European market. The rationale behind our commitment to the European market is the following. Firstly, the infrastructure for ssLNG already exists in Europe. Secondly, stricter legislation on shipping emissions in the Baltic and North Sea zones will help stimulate the development of ssLNG here. So far, we have been exporting ssLNG to Poland, the Czech Republic, and the Baltic countries. But we are also intent on wider geographic diversification.

Gazprom also closely monitors the development of the ssLNG market in China and in addition to the infrastructure

for natural gas supply studies the opportunity of building ssLNG plants in the Far East. We are also looking at Southeast Asia and the Mediterranean markets.

Currently Gazprom Group operates a well-structured portfolio of ssLNG plants and plans to expand it further. There are now four export-oriented ssLNG plants in Russia: one in the Kaliningrad region, two near St. Petersburg (Peterhof and Kingisepp) and one in Pskov, the latter was put into operation in May 2016. The total capacity of these plants is 68,000 t/yr.

Gazprom-affiliated Gazprombank has invested in a major mid-scale LNG project in the city of Vysotsk, Leningrad region. The planned overall capacity of the plant is 660,000 t/yr which could be expanded to 1.3 MTPA. The plant is due to be commissioned in the middle of 2018. Gazprom plans to build other LNG plants in the Leningrad region. The Baltic LNG with planned capacity of 10 MTPA is a large-scale LNG project but will also provide an opportunity for ssLNG production. We've also been analyzing an opportunity of building a 0.5 MTPA ssLNG plant on the shores of the Black Sea.

We have confidence that Gazprom stands firmly on the path of becoming one of the leading players on the European ssLNG market. And by doing so, we fully commit to a greener future of Europe.

CNG in the Czech Republic: A Look behind the Growth

By Alexander Kozlov, Financial specialist, Vemex s.r.o.

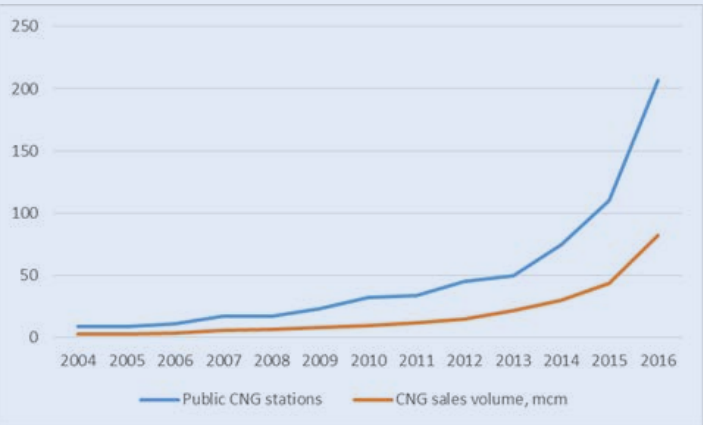


Alexander Kozlov

The CNG market in the Czech Republic has been growing continuously. Drivers enjoy the benefits of CNG in transport, while the positive impact on the environment is undeniable. Meanwhile, the industry celebrates an increasing number of filling stations and sales volumes (see Table 1).

However, despite the positive momentum there are questions looming over the industry as investment costs, expected retail price, cost and margin dynamics, and the profitability of investments, their period of return come under increased scrutiny. The values of these differ by company, their scale, costs and pricing politics. A special issue here is a discount rate that reflects the cost structure.

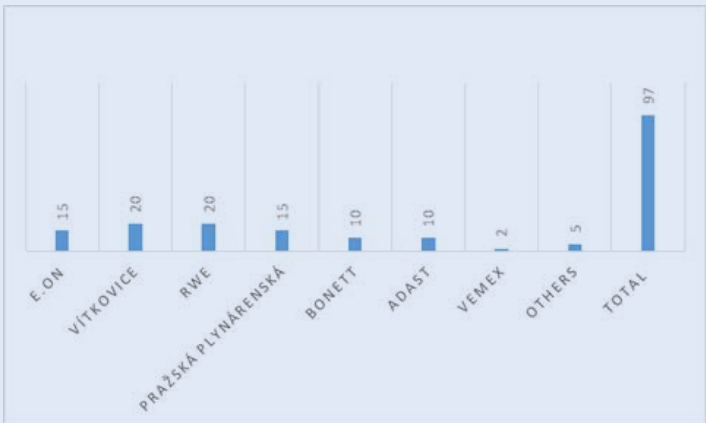
Table 1. CNG infrastructure growth in the Czech Republic



According to current forecasts, a further 97 filling stations will be built in 2016 (see Table 2). To remain at the average level of 23,000kg CNG sold per station, a 90% growth in overall CNG consumption would be needed in 2016 compared to 2015.

Is the figure realistic? We should keep in mind that expected state support (under the "low- and zero emission cars" regional programme) comprises public transport only. What is more, in such cases it is local consumption that can often be satisfied by the transport company itself by building in-house filling station. Although this increases overall CNG sales, it would only be the transport company that benefits.

Table 2. Filling stations growth: outlook for 2016



Another issue is the higher purchase price of CNG-fueled vehicles compared to petrol and diesel ones. For instance, a petrol-fueled Fiat Ducato is by some 5,000 Euro cheaper than its gas-fueled edition. This may be another direction that the support for the CNG market could take – promoting the purchase of new CNG vehicles. The above mentioned gas-fueled Ducato, once purchased, could create additional demand for approximately 400kg CNG per month. This is important especially in light of the fuel cost decreasing in 2015 against 2014.

The CNG market as a whole approaches the theoretical "perfect competition" model, even if single stations could act as monopolists in their locations. In the long term, this model can lead to a fall in prices down to average cost levels. The speed of such a fall might vary between highway stations and remote locations.

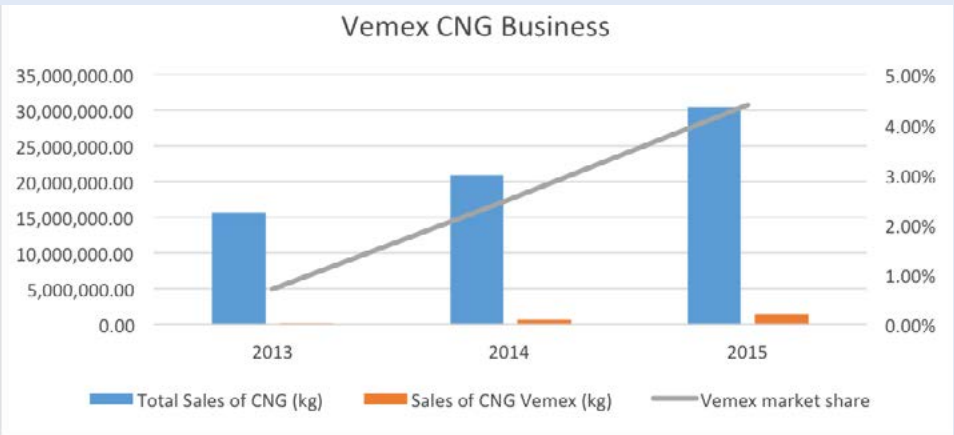
The current situation, represented by higher growth in station numbers than in demand is most probably a temporary state, resulting from industry players willingness to cope with infrastructure risks in advance, but betting on the success of this type of fuel in the country in the long-term.

To further promote the success of the CNG market alongside their infrastructure development, suppliers of CNG may want to look at options to also enhance demand by supporting CNG vehicle fleet expansions, for example.

Vemex: three years of steady success

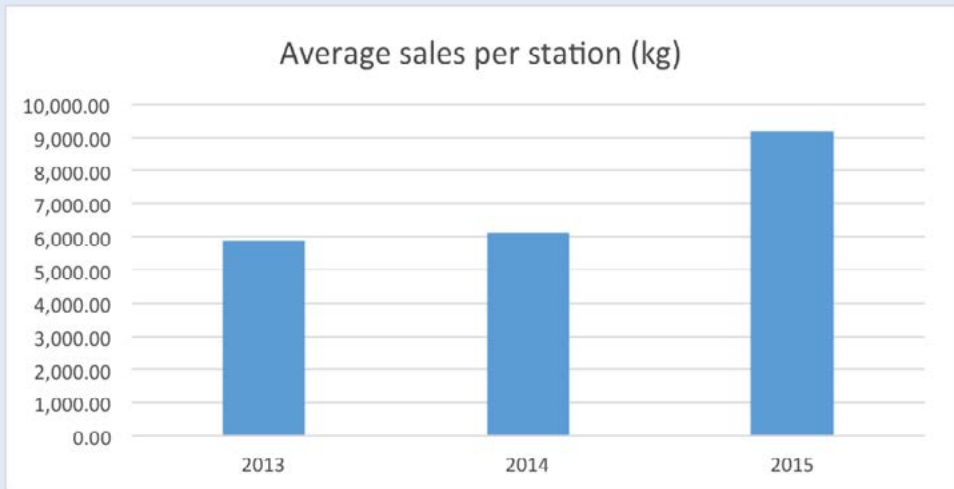
March 2016 marked 10 years since the Czech government and gas companies agreed to support using natural gas in transport. Let's look at the figures to see how Vemex has done since.

Vemex entered the CNG market in the second half of 2013 by starting a joint project with Lukoil (today the partner is MOL). By the end of 2013, the company was already operating four CNG stations, and the number continued to grow to 11 in the following years.



Vemex' share of the CNG market has grown more than sixfold over three years, from 0.7% to 4.4% in 2015.

The sales volume grew much quicker than the market itself.



Average CNG sales at a single station grew from 2013 to 2015 from 6,000 to 9,000 kg CNG, and continue to grow in 2016. On 12 July 2016, Vemex put its latest natural gas filling station into operation. The station is located in Mohelnice-Třebovská in the Olomouc Region of the Czech Republic.

This station is already the sixth unit commissioned in cooperation with MOL Group and Gascontrol.

Vemex currently operates a network of 15 natural gas filling stations all across the Czech Republic.



The opening of VEMEX-operated CNG station in Mohelnice-Třebovská

Czech Gas Union: CNG is unbeatable

In late November last year, the number of CNG stations in the Czech Republic had reached 100. In the first six months of 2016, a further 20 stations were opened, and the number continues to grow. The slow growth of the fuel price in 2016 is beneficial for those who sell CNG and invest into it. The users can easily find new stations via their smartphones, and new fueling technology is also there: a new easy CNG fueling process was introduced in Pilsen and České Budějovice – among the first ever of such kind in Europe.

While petrol prices increased to 30 Kč/l and diesel up to 28,50 Kč/l in the last months, drivers can still enjoy CNG prices of 17-18 Kč/m³ (equivalent to one litre of petrol). „When CNG is compared to the recent moderate price growth that we witness for petrochemical fuels, the fuel costs of CNG can already be substantially lower than 1 Kč/km,“ said Jiří Šimek, Deputy head of the Czech Gas Union.

The Czech Republic also boasts the two biggest CNG stations in Central Europe, located in Brno and Ostrava. „Compared to other central and eastern European countries we have the best dynamics of CNG development. And the growth will

continue. By the end of 2020 we expect to have 200 fuelling stations in the Czech Republic. This growth also expands the leasing potential for CNG vehicles. Although just 3% of Czech companies now enjoy leasing of non-traditionally fueled vehicles, a further 8% have plans to employ these. CNG consumption has grown every year, and reached 43,6 mcm in 2015, with average year-on-year growth reaching over 40% in the last three years. On the alternative fuels market, CNG is unbeatable thanks to its environmental, economical and safety benefits,“ commented Jan Ruml, Executive Director of the Czech Gas Union.

Every month between 400 and 500 new CNG vehicles are registered in the country, with the overall fleet currently comprising over 14,000 vehicles. This is 30 times more than 10 years ago.

New CNG vehicles in the Czech Republic in 2015:

- 1,19% of all passenger cars;
- 2.86% of all light duty trucks
- 26% of all buses

Gazprom and Audi Invest in Alternative Motor Fuels

On 14 April 2016, Gazprom Germania and Audi AG announced that they were to cooperate on natural gas mobility. The same day Gazprom Germania opened a new CNG filling station in Ingolstadt, the site of Audi's Group headquarters, from which to supply natural gas vehicles with environmentally friendly CNG.

"With this new filling station, we are further expanding our network of natural gas filling stations in Germany, and, for the first time, making an important contribution to more environmentally friendly mobility in Ingolstadt," said Timo Vehrs, Director of Business Development at Gazprom Germania. Gazprom Germania operates 49 natural gas filling stations in Germany.

"We're excited to have found a partner in Gazprom that supports our efforts around environmentally-friendly drive trains. Given that we've expanded our range of models to include additional CNG vehicles, the filling station's location is ideal for filling up cost-effectively while being kind to the environment. This is an important step towards CO₂-neutral

mobility", said Reiner Mangold, Head of Sustainable Product Development at Audi.

Ingolstadt's Audi launched the Audi A3 Sportback g-tron, its first CNG vehicle, in 2014. The Audi A4 Avant g-tron is scheduled for launch by the end of 2016.

Gazprom Germania and Audi share a future-oriented approach to natural gas mobility in the context of Germany's energy transition. After all, natural gas vehicles emit up to 15% less CO₂ than diesel vehicles and 25% less than petrol vehicles – and up to 95% less nitrogen oxide than diesel cars. Natural gas vehicles make fine dust emissions a thing of the past, and also emit much less noise. Overall, natural gas vehicles make a significant contribution to reducing emissions, particularly in urban areas, where they are often particularly high.

Moreover, natural gas' higher energy content means filling up with natural gas still saves motorists money when compared to the cost of filling up with petrol or diesel – even as petrol and diesel prices fall. And that means that



Opening of Gazprom Germania CNG station in Ingolstadt. From left: Thomas Rieder (Shell), David Graebe (Gazprom Germania), Reiner Mangold (AUDI AG) and Alois Zrenner (Shell)

companies benefit from natural gas' cost benefits as much as they do from its environmental benefits.

Rainer Mangold sees even greater potential: "Synthetic methane derived from wind and solar energy is key to the success of Germany's energy transition. That's why Audi built the world's first industrial power-to-gas facility and offers Audi g-tron customers access to this promising energy via the Audi e-gas fuel card – a systemic addition to electric mobility fuelled by green electricity."

But despite Germany's extensive natural gas filling infrastructure of over 920 filling stations and both Audi's and other manufacturers' expanding range of natural gas vehicles, new natural gas vehicle registrations are declining: According to Germany's Federal Motor Transport Authority, just 6,250 natural gas vehicles were registered last year, compared to 9,126 in 2014.

For Natural Gas to Succeed as a Motor Fuel, the Automotive and Fuel Industries Have to Work Hand in Hand

Blue Fuel interviewed Tobias Block, e-fuels engineer at Audi, to talk about the ongoing development of the premium car manufacturer's range of models fuelled by natural gas.

When it launches in late 2016, the new Audi A4 Avant g-tron will be the most powerful factory-standard natural gas vehicle on the market. What type of potential buyers are you targeting?

With its high-performance engine, the new Audi A4 Avant g-tron embodies our company's competitive DNA. The cost of the fuel it consumes, however, is 50% lower than that of a petrol-based vehicle, which also makes it the most economical natural gas model. Running on sustainable Audi e-gas, the A4 Avant g-tron is actually the most fuel-efficient car on the market. That's why it should attract the interest of any customer in its segment, from old-school fans of natural gas to those just getting to know it.

Following the A3 Sportback, the A4 Avant g-tron is the second Audi model to run on natural gas. How have you advanced the technology in the interim?

Just like the new Audi A4, part of what makes the A4 Avant g-tron compelling is the innovative and highly efficient combustion process used by its 2.0 TFSI ultra engine. The version used in the A4 Avant g-tron is optimized to run on natural gas, which has enabled us to reduce its consumption significantly: Using less than four kilograms of natural gas per 100 kilometres, it now has a range of over 500 kilometres. We have also made great strides with the model's fuel tank system in line with Audi's lightweight design philosophy. The new tank

In recent months, Germany's Federal Ministry of Economics and Technology, the German Association of the Automotive Industry (VDA), and metalworkers union IG Metall signed a joint declaration committing to increasing natural gas' share of the energy mix used to power Germany's road transport tenfold by 2020. Increasing the share of natural gas used to power motor vehicles from its current 0.4% to 4% by 2020 is an ambitious goal that will require the government to take the impact of the transport sector on the environment seriously. It must recognize the indispensable role natural gas must play in the transport sector if Germany's energy transition is to be successful and establish a level playing field for all alternative energies. When the government recognizes this and establishes conditions that do not favour one technology over another, the market will develop at a faster pace.

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is made of carbon fibreglass composite, which makes it 56% lighter than a conventional steel tank.

What do you think of the development of Germany's network of natural gas filling stations?

With more than 900 stations, the network offers sufficient coverage for the current number of vehicles out there. Of course, we would like to see further expansion to help natural gas break through on the mass market and support more corresponding models. For customers, the advantages of using natural gas for transport lie in the much lower costs involved and the greater sustainability it generally affords as a means of getting around.



Tobias Block

For natural gas to succeed as a motor fuel, however, the automotive and fuel industries have to work hand in hand.

If you had to put it in just a few words, how would you describe Audi's natural gas strategy going forward?

Audi will continue to devote considerable resources to pursuing its vision for both g-tron and e-gas while expanding its range of models.

“We agree on everything but pricing”

A conversation with Sergey Komlev and Thierry Bros



Blue Fuel brought together Sergey Komlev, Head of Gazprom Export’s Contract Structuring and Price Formation Directorate, and Thierry Bros, Senior European Gas and LNG Analyst at Société Générale, to discuss the latest developments in the global natural gas market.

Oil indexation – has it come to an end or is the hybrid system going to last?

Sergey Komlev: Pricing formulas in European long-term contracts have undergone serious transformation to become reflective both of oil and gas indexes. Meanwhile in Asia oil indexation in its classic forms still remains the dominant pricing mechanism. Let me remind you that oil-indexation is a form of market pricing, but based not on gas-on-gas competition but gas-on-substitute competition. It is economically justified as long as inter-fuel competition is in place. And in many instances it is a preferable form of pricing owing to the defaults of the real-world gas markets irrespective of how liquid they are.

Thierry Bros: Oil-indexation was invented by the Dutch in 1962. There was no market for gas at this time, and oil-indexation was a way to establish a fair pricing. We are now moving towards a market system, providing a more volatile and short-term signal that is called a hub price. Therefore, I would not say oil indexation is immortal. If markets are

perfect, short-term hub pricing works. But if they are not, an alternative pricing is needed, be it oil or coal. But to me, the real question about pricing is: what is a good price level? How fair is it? These are the issues producers and consumers negotiate on.

SK: A study was conducted in India. Consumers and producers were asked about what they considered a fair price for natural gas. The difference between the answers was \$8 per MBtu!

TB: It’s a big gap! But at the end of the day, price levels are more an issue than the way you price the gas. In Europe, prices are mostly hub based, but oil, coal or electricity indexation is also available if a market actor asks for it.

SK: Except that gas prices cannot be indexed to electricity, which is produced from gas – that would be a circular reference. In addition, its calorific value makes it an extremely expensive substitute.

The number of arbitration cases of long-term contracts has dramatically increased in the last few years. How is it impacting the current system? Is it challenging the very existence of this type of contract?

TB: Yes, a lot of Gazprom’s clients went to arbitration recently, but the majority of the disputes were solved through negotiations. Two things should be said on that. First of all, Gazprom never

forced European utilities to sign long-term contracts; buyers were willing to sign those. Secondly, though an initiative to renegotiate contract comes from the utilities their purpose is in getting better terms rather than cancelling existing contract.

SK: The question that should be asked is not “how long is the contract?” but rather “do you prefer stability or cash flow?” If your price is hub-based, you never know how to stimulate your cash flow. The US has shown that a gas market purely based on supply and demand pricing is not able to support long-term contracts.

Can we discuss Thierry Bros’ “price war” theory?

TB: Between 2009 and 2013, gas prices in the EU were pretty high. Oil indexation was leading to high prices. Most analysts also thought it was because Fukushima had pulled LNG out of Europe, leading to higher gas prices. At this time, I was saying that these high prices were good for producers on the short term, but not on the long term, because they gave a green light to new producers eager to invest in new projects. And this is exactly what happened. Gas production is a boom and bust industry. My view is that LNG, which was initially supposed to be delivered in Asia, where prices were higher, will eventually end up in Europe now that Asian prices have decreased. This leaves current producers with two possibilities: keep prices they feel conformable with but lose market share, or lower their prices to keep market share.

SK: You have to remember that Gazprom is not a price maker, but a price taker. We do not set prices for our clients since mutually agreed formulas are doing that job. Within a framework of the existing contracts we do not determine volumes for the reason that nominations come from the buyers. As such, we are not able – or willing – to get rid of competitors. When prices were high, Gazprom was not pursuing any kind of hidden policy to make as much profit policy as possible. The situation has not changed now that the prices are low.



Thierry Bros

TB: What I am saying is that you have the ability to push more or less volume on top of what the buyers nominate and if you push more than the market needs prices are going to go down. Prices are low today because the market is oversupplied: producers

have invested when buyers were cutting consumption, because of both increased energy efficiency and Germany moving from gas to coal.

SK: I cannot buy your oversupply argument; gas stocks are on their five-year averages at the moment. The market in Europe is rather over-contracted leading to oversupply of paper gas on the forward market which in addition to oil is pressurizing gas prices. We are a low cost producer and can stand these prices. Europeans have to decide whether they favor diversification of supplies or low prices. Delivering gas from the US to Europe is a loss making exercise for off-takers of gas from the terminals. If you take all costs including liquefaction into account, you lose more than \$ 2.5 per MMBTU.



Sergey Komlev

TB: We are moving toward an Energy Union but it’s a long path. In the past ten years, Europe has done a lot. For instance, in term of gas prices, Italy is not different from the rest of Europe anymore. Other European markets are further out (Spain, Greece, and Eastern Europe) but the European Commission is trying to find solutions, through “projects of common interest”, which will bring more re-gas in some areas and also more pipes and reversed-flows to create a single market. The set up of energy efficiency targets by the European Commission is another success: Europe is now using less oil and gas, and prices have gone down as a result of the reduced demand.

Of course, there will be price spreads across Europe, as in the US. Creating a single energy market is also a question of security of supply, of allowing gas to flow freely inside Europe and increasing competition between utilities.

SK: Consumption of fossil fuels in Europe was already highly efficient ten years ago. Making additional advantages of these energy savings will be costly.

Talking about the environment, how can gas fight back against coal? Is it a matter of price as well?

SK: I don’t think natural gas could get back to into the grid without a regulatory effort. In Germany, the market is completely distorted. Renewables’ growth is based on subsidies and as a result, electricity prices for end-users are the highest in Europe.

Do you believe that we are moving toward a single European gas market? What would be the consequences for sellers?

SK: Europe is moving toward a common energy market, but it is still a long way away. There are still big differences between Central/Eastern and Southern Europe in terms of prices.

You have four regulatory options: creating an artificial market for emissions is one, but it does not work. A second way is to create a market for capacity. A third and most efficient solution is to promote a coal phase-out: create a regulatory framework that discourages the use of coal, as it was done in the UK. A fourth way is changing the merit order to bring gas back into the base load. Gas powerplants are in the peak or the semi-peak segment of the market, and are therefore underutilized.

TB: Allow me to compare the UK and Germany to the US power generation market, which could be assumed as perfect. In the US, low gas prices have had two impacts: they killed the nuclear renaissance and displaced coal. Today, in the US, gas is the first fuel for power generation. But more regulation supporting renewables should in the future negatively impact both coal and gas. The UK is different from the rest of the EU because it has a carbon price support mechanism, which is now working. By increasing the special tax on carbon dramatically, HM Government increased gas demand for power generation. In Germany the markets are not working. The clean spark spread and

clean dark spread are not in favor of gas. The clean spark spread is sometimes negative versus the clean dark spread for coal generation.

That being said, it seems to me that companies are becoming more afraid of investing in coal and coal-fired power plants. These assets are viewed as very risky ones in a post-COP 21 world. Therefore, at the end of the day, 'let the market work' strategy is maybe a better way of moving away from coal.

Gazprom conducted a successful auction at the end of last year. Is that model applicable to other EU markets?

SK: We are still at the very beginning of this process, but we definitely think that it is possible to sell gas on an auction basis. It turned out that the results were quite promising for Gazprom. Our second auction for the Baltic States was also a very successful one. We managed to sell 75% of all volumes offered at the auction.

TB: In the fast changing EU energy scene you have to address different markets that have different timeframes, different efficiency or risk appetite. That is what Gazprom is doing.

Dambořice Underground Gas Storage Starts Operations

The Dambořice underground gas storage (UGS) was put into service near the town of Hodonin in the South Moravian Region of the Czech Republic on 1 July 2016. The UGS is operated by Moravia Gas Storage, a joint venture between Czech energy company MND Group and Gazprom Export. The active capacity of the storage is 456 mcm, withdrawal capacity is 7.6 mcm per day, while injection capacity is 4.6 mcm per day. Dambořice UGS' capacity represents about 12% of the gas storage market of the Czech Republic.



"This project has all the opportunities to actively contribute to achieving the goal of strengthening interconnections between European markets. The project gained particular importance in view of the implementation of Nord Stream 2 which will provide uninterruptable supplies of additional gas volumes to Europe," said Alexander Medvedev, Deputy Chairman of the Management Committee of Gazprom.

"Dambořice UGS will become one of the crucial elements to provide secure supplies of Russian natural gas to our European consumers. The unique location of this gas storage will allow to guarantee reliable gas supplies not only to the Czech Republic, but also to Austria and Germany," underlined Director General of Gazprom Export Elena Burmistrova.

"I'm glad that our partnership with Gazprom and Gazprom Export has allowed us to build a state-of-the art gas storage site in the Czech Republic. The facility is situated in a very good strategic location and offers excellent prospects. Likewise, we value highly that Gazprom will be the most important client of the Dambořice gas storage facility," said Karel Komárek, founder and owner of investment group KKCG, the owner of MND.

Dambořice UGS is built in the reservoirs of a depleted oil field. The implementation of the Dambořice UGS project dates back to 20 March 2013, when a joint venture agreement was signed by Gazprom Export and MND and Moravia Gas Storage was set up to build and exploit the UGS. Construction started in May 2014. 90% of the UGS's capacity was booked by Gazprom Export in an auction.



Russian-German Music Academy Performs in Great Hall at Moscow Conservatory

The Russian premiere of *Tabula Russia* by composer Vladimir Tarnopolsky was performed by the Russian-German Music Academy's orchestra on 9 June 2016 in the Great Hall of the Moscow Conservatory.

Performing new compositions is an important area of the Russian-German Academy's work. Last year the orchestra was responsible for the first performance in Russia of the *Con Brio* overture by German composer Jörg Widmann. This time they played *Tabula Russia*, which Tarnopolsky, a professor at the Moscow Conservatory, wrote in 2015 especially for Maestro Valery Gergiev and the Rotterdam Philharmonic.

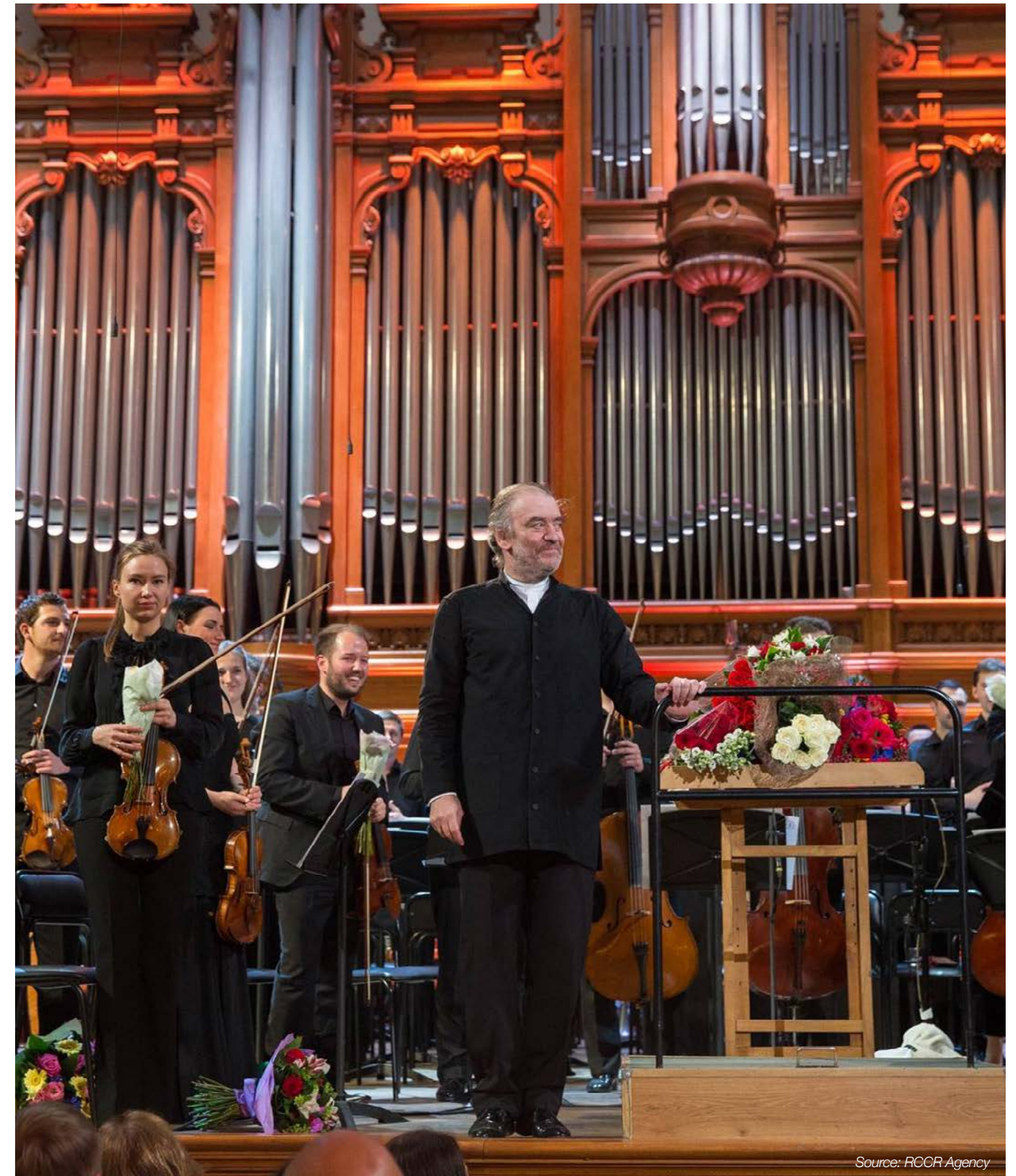
This cooperation, and the performances on prestigious stages, have been made possible thanks to the sponsorship from Gazprom Group.

The motto of the evening was Listen, Understand, Connect. Also on the program was Sergei Prokofiev's Piano Concerto No. 3, performed by young pianist Behzod Abduraimov, as well as one of the late 19th Century's largest orchestral canvases: Richard Strauss's tone poem *Ein Heldenleben* (A Hero's Life), performed by over a hundred musicians.

The ensemble presented this same program in Germany in the Great Hall of the Berlin Konzerthaus on 6 July 2016. Before the concert on 9 June, the orchestra worked for a week at the Mariinsky Theater – the Academy's rehearsal venue.

The Russian-German Music Academy was founded by young Russian and German musicians in 2012-2013, during the Year of Germany in Russia and the Year of Russia in Germany. The project aims to expand cultural exchange between talented young musicians in both countries, who can enrich each other by sharing their experiences.

The Academy's orchestra includes students from leading conservatories and soloists from the top orchestras of both countries – such as the Mariinsky Theater Symphony Orchestra, the Bavarian Radio Symphony Orchestra, the Berlin Philharmonic Orchestra and the Hamburg State Opera Orchestra. As they prepare for each concert program, the young musicians are supervised by experienced instructors from Russia and Germany.



Valery Gergiev and young musicians

Source: RCCR Agency

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