



ОНД НАЦИОНАЛЬНОЙ ЭНЕРГЕТИЧЕСКОЙ БЕЗОПАСНОСТИ

# NORD STREAM 2 AND UKRAINE: COSTS SHOULD DECIDE

ANALYTIC REPORT



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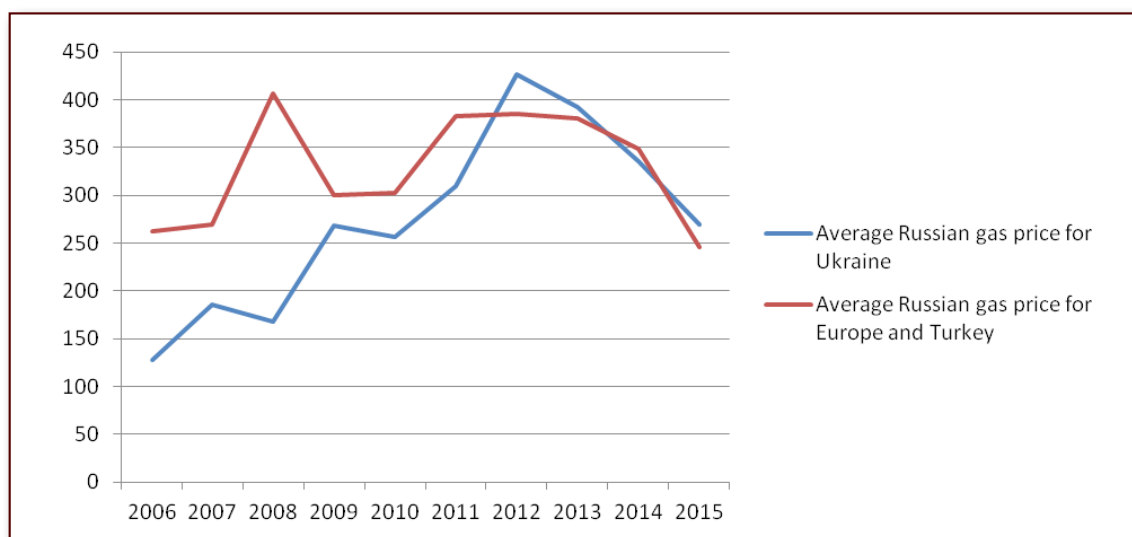


## INTRODUCTION

There has been much discussion about how Russia – Europe's biggest gas supplier – can continue to supply gas to Europe over the coming decades in the most secure and cost efficient way. Gazprom and its European partners have decided that building two additional pipelines through the Baltic Sea (Nord Stream 2) is the best commercial solution to secure future gas supplies for the EU, where gas production continues to decline and demand is expected to grow. Ukraine and its supporters may disagree, because the transit country could face a reduction in its revenues from transportation services and may require additional funding from international financial institutions to support the current government. However, in the end the market will decide: the supplier and the consumers have to find the best transportation options to fulfil their trade agreements between each other.

Ukraine has been the major corridor for Russian natural gas supplies to Europe since the Soviet period. Until the late 1990s, transit through Soviet-era pipelines in Ukraine accounted for over 90% of Russian gas deliveries to Europe, and even in 2011, about 70% transited through Ukraine. According to NESF calculations based on data from Gazprom, Naftogaz, BOTAS, Eustream, Gaz-System, FGSZ and Bulgartransgaz, volumes of Russian gas transported to European countries in 2011 accounted for 88,8 bcm, net of 12,3 bcm that went via Ukraine to Turkey. While total Russian gas exports to Europe were 124 bcm in 2011 out of 150 bcm exported to Europe and Turkey according to Gazprom's report.

### Average Russian gas price for Ukraine and Europe & Turkey, USD/1,000 scm



Source: Gazprom reports, Ukrainian State Customs Committee

November 2016



It was this situation of almost total dependence on Ukrainian transit in Russian gas deliveries to Europe in 1990s and the first decade of the new millennium that led to regular disputes as Ukraine tried to convert its transit power into gas price privileges and other non-market advantages in gas supplies coming from Russia. Some of those disputes were small scale, but others grew into full-scale disputes, such as the 2006 or 2009 crises with disruption of transit flow via Ukraine to European customers. Before 2006, Ukraine paid for Russian gas USD 50-80 per 1000 cu m, much cheaper than European buyers. From 2006 to 2011, Ukraine obtained gas from Russia at final prices that were USD 70-130 lower per 1000 cu m.

In 2009 after three weeks of transit violation, which was unprecedented in 50-years of Russian gas supply to Europe, the first common long-term contracts for supply and transit between Russian Gazprom and Naftogaz of Ukraine were signed. Firm agreements with precise provisions on mutual obligations, price formulas for gas supply and transit fee and a dispute resolution procedure in international arbitration made it possible to maintain Russian gas supplies to Europe via Ukraine even in difficult times. However, both contracts are due to expire on January 1, 2020, which could put Russian gas flow via this country at a high level of political risk. Thus, the security of the European gas market requires an alternative transportation option to be in place by the time that the contract expires.

If the only way to fulfil their obligations under valid long-term sales and purchase agreements between Gazprom and its European partners is to use Ukrainian pipelines post 2019, it will provide Kiev with great power over the EU's energy stability and security and make gas supply even more politically motivated than it is now.

On the other hand, having other options does not mean that Ukraine will cease to be a gas transit country after 2019: it will compete with other transportation options in terms of commercial attractiveness, technical safety and overall security for supplier and customer.



## SUMMARY

- For many years, the transit route via Ukraine had a monopoly and still has for some European countries. Meanwhile Russia has more options for transporting natural gas to its customers in the EU. Thereby the supply reliability for the EU has been strengthened.
- Gas transit via Ukraine increasingly carries commercial risks for both supplier and customer, in particular because of the age of the pipelines and lack of investment to restore and modernize them.
- Key pipelines in Ukraine are reaching the end of their service life and there is so far not enough investment to modernize them. To maintain transit at the current rate of 60 bcm per year it would be necessary to renovate 2,000 km to 2,500 km of pipelines and 20 compressor stations. Such modernization could cost some USD 10 billion to USD 12 billion under NESF estimations based on publicly available information on the cost established for reconstruction of the first part of the Urengoy-Pomary-Uzhgorod pipeline.
- Accumulated substantial technical issues of the Ukraine infrastructure and lack of progress to solve them over decades make it impossible for both Russia as the shipper and the EU as the off-taker to rely on this infrastructure as the major gas transit route over the long term.
- The Ukrainian government's actions do not seem to be aimed at maintaining long-term, sustainable relations with Gazprom – the sole possible buyer of its transit services – and it failed to attract the necessary investments under political support of the European Commission since 2009, when a corresponding agreement was signed.
- The actual transit fee for Gazprom was EUR 2.26 for 1,000 scm per 100 km, or EUR 28 from the Russian border to the border of the EU countries via Ukraine. While last year Gazprom paid 19% less for gas transport via the Baltic Sea route (EUR 1.86 for 1,000 scm per 100 km, or EUR 22.7 from border to border) than for transit via Ukraine and thus saved EUR 207 million. Full capacity utilization of the Nord Stream, now artificially restricted by the European Commission, would have extended the gap by a further EUR 6-7 per route.
- Contrary to the valid transit contract, Ukraine decided to introduce another tariff system, which would increase the fee by 50% to EUR 42 from the Russian border to Slovakia for example. There is effectively no other viable alternative for gas transportation from Russia to the North Western Europe but Nord Stream and Nord Stream 2, as the Yamal Europe Pipeline is already running at full capacity and the Yamal Europe extension project was rejected by Polish government several years ago<sup>1</sup>.
- Even now full capacity utilization would make the Nord Stream route competitive with Ukrainian transit to deliver gas to the main South Eastern Europe gas hub in Baumgarten (Austria). Both cost EUR 33-34 per route. However, we estimate that with the new Ukrainian tariff policy Nord Stream 2 would be 50% cheaper than Ukraine's GTS.

1 <http://www.naturalgaseurope.com/gazprom-europol-yamal-pipeline-two>



# Chapter I. UKRAINIAN PIPELINE SYSTEM – SOVIET UNION’S HERITAGE COMES TO AN END

## 1.1 Transit via Ukraine – natural decline

Ukraine inherited the largest transit gas pipeline system in the world after the Soviet Union ceased to exist.

Ukraine’s gas transmission system has 10 entry points for Russian gas (including two from the territory of Belarus). The officially proclaimed entry capacity is 288 bcm per year, and the exit capacity at 5 points on the EU border is 142 bcm annually<sup>2</sup>. The Ukrainian GTS had also supplied more than 100 bcma for Ukraine’s own needs before it became an independent state. Also up to 30 bcm per year crossed Ukraine from Russia to Russia, delivering gas to Southern Russian regions.

Map of the Ukrainian gas transmission system



Source: Ukrtransgaz

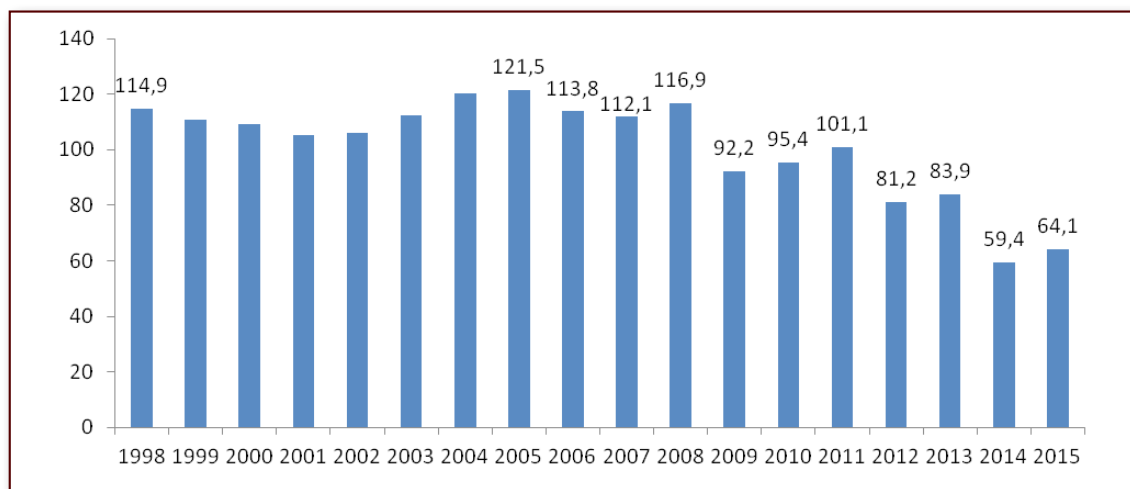
- 2 Uzgorod-Velke Kapusany IP (Slovak border) with technical capacity 92 bcma (Eustream data 73,4 bcma), Beregovo IP (Hungarian Border) - 13,5 bcma (FGSZ data 20,5 bcma), Drozdovichi IP (Polish Border) – 5 bcma (Gaz-System data 4,7 bcma of firm capacity), Tekovo-Mediesul Aurit IP (Romanian border) – 4,5 bcma (Transgaz data 12,6 bcma), Orlovka-Isaccea IP (Romanian border) – 26,8 bcma (Transgaz data 23,5 bcma).





For example, in 1998 more than 140 bcm was in transit via the Ukrainian pipeline system, and 114 bcm went to Europe and Turkey. Seven years later in 2005 transit to Europe and Turkey climbed to its historic maximum – 121.5 bcm, while transportation to Russia and Moldova fell to 14 bcm. Over the past 10 years, gas transportation through Ukraine to Europe and Turkey has dropped by almost 60 bcm – to 64 bcm last year, and Russia-Russia transit has been eliminated.

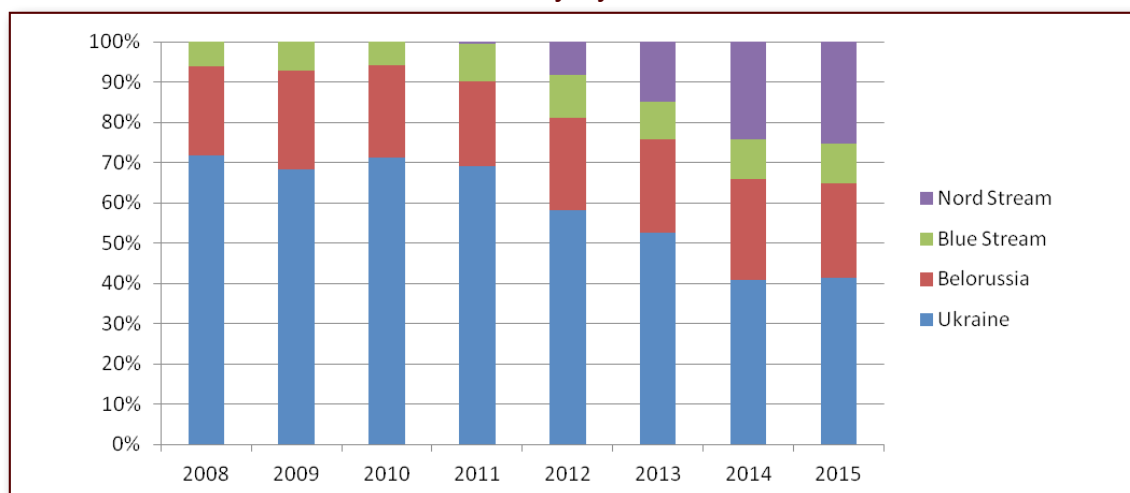
Transit of Russian gas via Ukraine to Europe and Turkey, bcm



Source: Naftogaz of Ukraine

The situation changed significantly after the launch of the offshore Nord Stream gas pipeline and the connecting onshore infrastructure in Germany and the Czech Republic. This reduced the dependence of these countries on Russian gas transit via Ukraine. Moreover, it became clear during 2014 that the demand for natural gas in Slovakia could be fully satisfied without Ukraine transit by routing supplies through the northern route, the OPAL gas pipeline and the Lanzhot-Olbernhau gas pipeline in Slovakia, the Czech Republic and Germany in reverse mode. In 2015 that trend continued.

Russian gas exports to Europe (exc. Baltic States and Finland) and Turkey by route, %



Source: Naftogaz of Ukraine, Eustream, Gazprom, ENTSO-G

Nevertheless, more than 40% (64 bcm out of 159 bcm in 2015) of Russian gas is still exported via Ukraine's gas transportation system. Some parts of Europe still rely on gas transit via Ukraine for up to 100% of their supplies of Russian gas.

### Entry and exit in the Ukrainian gas transit system in 2015, bcm



Source: NESF based on Ukrtransgaz, Eustream, Gaz System and FGSZ data

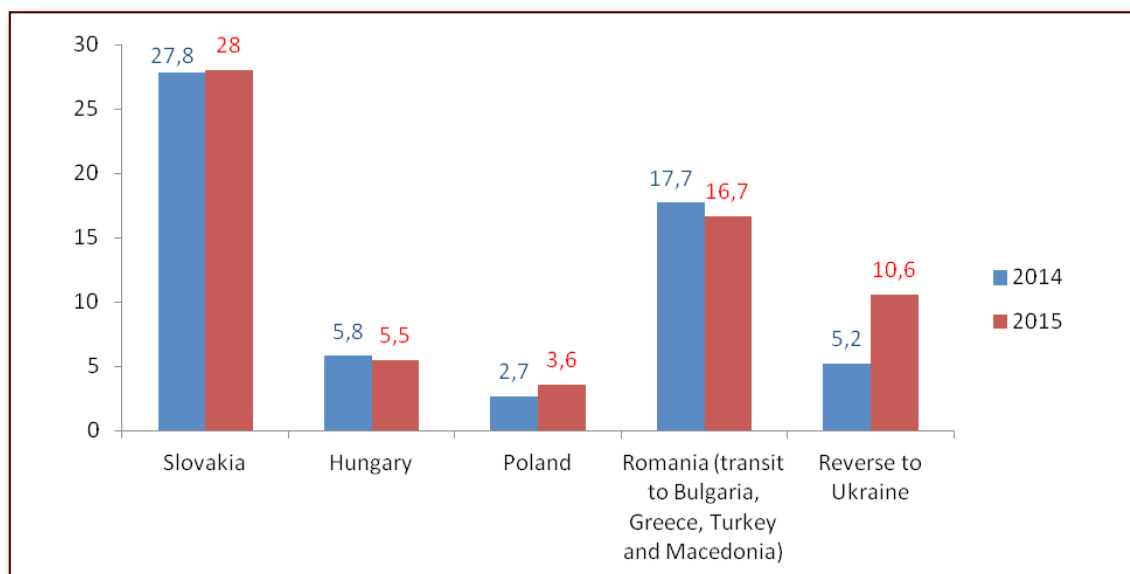
Bulgaria is the most dependent on Ukrainian transit of Russian gas. In 2015, more than 90% of the country's total gas consumption came via Ukraine, for Hungary it was 81%, and Greece about 62%. The average dependency of the Baumgarten hub countries (Austria, Italy, Croatia and Slovenia) plus Slovakia and Hungary we estimate at 35% in 2015, net of volumes of reverse flow back to Ukraine. Poland received about 23% of its gas via Ukraine. All these countries are vulnerable to any disruption to this gas transit. However, some of them are developing energy security projects to decrease this vulnerability. It is worth mentioning that before the launch of Nord Stream the dependency of Baumgarten countries plus Czech Republic and Germany on the Ukrainian route was much higher. For example, in 2011 the Czech market was supplied from the East for 70% of its needs, Slovakia for 100%, Baumgarten hub countries excluding Italy 80% and with Italy 40%.

The main destination for Russian gas flowing across Ukraine to the EU is the Austrian hub at Baumgarten. Last year 28 bcm (44%) were transmitted to Slovakia and from there on to Austria. Some 5.5 bcm were delivered to Hungary and further on to Serbia, and Poland received 3.6 bcm via Ukraine. Another 10.6 bcm returned to Ukraine mainly from Slovakia through short-term trades. Therefore, the real transit for Central Europe and Baumgarten was only 37 bcm in 2015.





## Delivery of Russian gas transmitted via Ukraine in 2014-2015, bcm



Source: Ukrtransgaz, FGSZ, Eustream, Gaz System

On the one hand, there is significant dependency of some EU countries (Bulgaria, Greece, Hungary, Austria, Slovakia, Italy, Slovenia and Croatia) on the Ukrainian transit. On the other, Gazprom depends on having reliable supply routes to fulfil its contracts to supply gas to the delivery points that are deep in the EU or even to supply non-EU countries like Turkey and Serbia after crossing 1-2 EU member states.

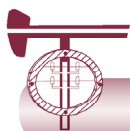
Based on 2015 figures 40% of Gazprom's export obligations were met through Ukrainian transit. About USD 15 billion of export revenues (40% of total Russian gas exports by value to Europe and Turkey at USD 37 billion) last year were provided via this route. One day's violation may cost up to USD 40 million in loss of revenue (based on this winter's price) together with an additional fee for failing to meet delivery obligations.

European customers would suffer from limitations of physical supply flow and skyrocketing spot prices, which are now used as the price indication for most of the LTC's for Norwegian gas - the main source of gas supply in North-Western Europe<sup>3</sup>.

For 25 years, Kiev has done little to build a reputation as a reliable, long-term and attractive transit partner. Last year's initiative by Ukrainian officials to impose state sanctions on Russian transit flow to Europe was only one of the examples of negative policy putting the supply of European customers at high risk<sup>4</sup>. New routes of supply – Yamal-Europe to Poland and Germany and Blue Stream to Turkey are utilized at rates of more than 90% on average, Nord Stream-1 – 70% for 4<sup>th</sup> year of year of operation (if there was no restriction from the European Commission on Gazprom's use of the OPAL gas pipeline, the figure could be even higher) and proved their efficiency commercially and in terms of energy security.

3 Any gas supply disruption will lead to gas shortage in whole European market more integrated during last years, thus effecting gas trading hubs pushing spot prices up across the EU

4 <http://www.theatlantic.com/business/archive/2014/08/ukraine-considers-gas-transit-sanctions-against-russia/375786/>



Gazprom varied from to USD 1 billion in 2013 and to 0,4 billion in 2014 due to the advance payments made to the Ukraine counterparts (USD 5,3 billion paid in 2012). In the first half-year 2015 Naftogaz received over USD 910 million, which roughly corresponds to the level of 2014. Annual transit revenue of Ukraine increased in 2015 to USD 2 billion.

Some politicians in Europe argue that these transit revenues should be maintained in the future to support Ukraine financially in a difficult economic situation. The political backing in this issue is clear, but what about technical side?

## 1.2 Ukraine GTS - too old to live

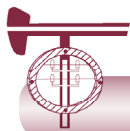
Most of the Ukrainian gas transportation system was built in the Soviet period, and key pipelines are reaching the end of their service life. There are three main export gas pipelines that are used to deliver Russian gas to Europe (not taking into account supplies to Turkey, Bulgaria and Greece) – Soyuz, Urengoy-Pomary-Uzhgorod and Progress; their designed capacity is 83bcm/year. Soyuz is the oldest and longest route of the three; it was built almost 40 years ago and requires urgent overhaul. In fact, it has not been used for gas transit over the past few years. The service life of the 33-year-old Urengoy-Pomary-Uzhgorod pipeline is also about to finish. The Progress pipeline is capable of operating for another three to six years without significant investments. These two gas pipelines are utilized at 50% so far, which makes it possible to operate them without serious incidents. However, by 2020 the service life of all Ukraine's major transit gas pipelines will have finished, which means a higher risk of failures and ruptures, unless there is a certain amount of investment in the total modernization and reconstruction of the pipelines and compressor stations.

### Main transit gas pipelines in Ukraine

	Route, km	Compressor stations	Projected capacity, bcm/year	Start of operation
Soyuz Pipeline (Novopskov-Uzhgorod)	1,567	12	26	1976
Urengoy-Pomary-Uzhgorod (Ukrainian section)	1,160	9	28.5	1983
Progress Pipeline (Sudzha-Uzhgorod)	1,120	9	28.5	1988

Source: Ukrtransgaz

A high degree of wear of fixed assets of Ukraine's gas transportation system, including the gas transit system, is well documented. Back in 2011, the country's government officially announced the beginning of a comprehensive modernization of its GTS using domestic resources. The programme was estimated at USD 5.3 billion in capital investments within 5 to 7 years. Since then practically no resources have been invested. Ukrtransgaz's investment programme for 2015 stipulates just USD 10 million in investments to maintain the operation of underground gas storages.



All Kiev's attempts to attract investments from foreign sources have only had limited success. Seven years ago, in March 2009 the Ukrainian government together with the European Commission held an international conference on investments to modernize the UGTS. Prime Minister Julia Timoshenko, European Commissioners Andris Piebalgs and Benita Ferrero-Waldner and heads of the EBRD, EIB and WB, signed a joint declaration. European financial institutions expressed their intention to give loans totaling 1.7 billion US dollars for the Ukrainian GTS renovation. ([http://europa.eu/rapid/press-release\\_IP-09-1218\\_en.htm?locale=en](http://europa.eu/rapid/press-release_IP-09-1218_en.htm?locale=en)).

To make a precise calculation of potential capital expenditures in the Ukrainian gas transmission system the detailed inspection of pipelines and compressor stations equipment is needed. Engineering company Mott McDonald under a contract with Naftogaz Ukraine conducted an assessment of the technical condition of the country's gas transit infrastructure. The full results of this sort of study were never published, however Ukrainian media reported that the system needed at that time at least USD 4.8 billion over 7 years in "the repairs of trunk gas pipelines, compressor stations and the installation of new gas metering units, as well as a modern system to manage the gas transportation system (GTS), its reconstruction and modernization"<sup>5</sup>. Moreover, Mott McDonald recommended investing some USD 2.8 billion into priority projects just to keep the system running. Later different Ukrainian officials said that the renovation budget had to be USD 5.3 billion to maintain transit at 60-110 bcm per year. The Ukrainian government and Naftogaz Ukraine declared that the first stage of reconstruction consisting of rebuilding 120 km of Urengoy-Pomary-Uzhgorod would require USD 539 million and started negotiations with EBRD to finance USD 308 million (57%). The cost works out at USD 4.5 million per km of renovated pipeline. However, no investments were made during the last five years.

At the time of the assessment (2009-2010), the UPU pipeline was only 26 years old with an aged deterioration level of about 78%. Now, 33 years have passed since the pipeline was constructed in 1983 and the pipes that need total rehabilitation are at the end of their full service life. If we take that 6-year old estimation of renovation costs and extrapolate it to cover the full length of Urengoy-Pomary-Uzhgorod, then just one pipeline with around 30 bcma capacity will require more than USD 5.8 - 6 billion of investments.

At the end of 2014, EBRD and the Ukrainian government signed an agreement to loan EUR 150 million for the first stage of modernization while its cost increased from the initial USD 540 to 600 million. The Ukraine Parliament ratified it last year, but financing has not started yet.

To conclude, there are different estimations of the volume of investments required for Ukraine's GTS. They vary from USD 5 billion to USD 20 billion depending on the scale of upgrade and restoration of the system's throughput capacity. According to our estimations, to maintain transit of the current 60 bcm per year it would be necessary to renovate 2,000km to 2,500km of pipelines and 20 compressor stations. Such modernization could cost some USD 10 billion to USD 12 billion. On the other hand, just 30 bcma of transit to Central Europe may require some USD 5-6 billion after 2020.

5 <https://www.kyivpost.com/article/content/business/study-48-billion-needed-to-modernize-gas-transit-p-116805.html>



At present, it does not seem possible to find a source of such investments and guarantees of them being paid off. For political reasons Ukraine blocked a project for its GTS modernization based on an international consortium with Russia's participation as a gas supplier, Ukraine as a transit state and Europe as a gas consumer<sup>6</sup>.

Now the Ukrainian authorities are offering to foreign investors up to a 49% stake in the GTS operator to be established on the basis of Ukrtransgaz; the state is supposed to remain the owner of the infrastructure. At the same time, the law limits the range of potential investors to residents of the USA, the EU and the Energy Community – i.e. excluding Gazprom. However, only Gazprom, as a gas supplier to Europe, could guarantee transit and payments for transit services on a long-term basis. In this respect, it seems that the Ukrainian authorities are deliberately blocking a possibility of real investments in its GTS.

### ***1.3 The risk of transit disruptions related to contractual problems***

The stability of transit via Ukraine is also threatened by the fact that the current contract between Gazprom and Naftogaz will expire in four years. Meanwhile, obligations of the Russian company to supply gas to Baumgarten for Austrian, German and Italian companies are in force until at least 2035.

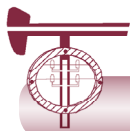
In the meantime the possibility of suspension of transit is not just theoretical but a real danger which Gazprom and its European partners faced during the most severe transit crisis in January 2009 and several transit violations before that (for example in 2006).

For almost 18 years since 1991, Gazprom and Naftogaz every year agreed the conditions for Russian gas supplies to Ukraine. Essentially Russia supplies gas to Ukraine for domestic use and for transit to Russia's European customers. At different times, natural gas was sold to Ukraine for transit payments and with significant discounts compared to the prices of gas exports to neighboring European states.

Russia with European partners tried to establish a risk-sharing management system for the Ukrainian transmission system that could guarantee long-term security of transit and attract necessary investments to support the technical viability of the system and to build new transit pipelines via Ukraine. Russia, Germany and Ukraine signed a high-level Declaration on international consortium to manage and develop the Ukrainian GTS (There is no publicly available text of the declaration). Ultimately, Kiev declined to share its power over transit in order to make the transportation process less politically motivated, more balanced and focused on providing investments.

At the end of 2008 when an agreement on gas supplies to Ukraine was about to expire, the two sides failed to finalize a new accord by December 31. As a result, Gazprom had to

6 <http://www.gasandoil.com/news/russia/936c7cf6841e5a6cdf6fbd2619fe2c8a>



stop gas supplies to Ukraine due to the absence of any contractual basis. However, Gazprom kept pumping the required amounts of natural gas bound to Europe to meet its contractual obligations to its European customers.

However, Naftogaz began to withdraw part of the transit gas, leading to the most serious interruption of gas supplies to Europe in history at the height of winter. The gas flow was restored a month later after the first legally clear contracts on supplies and transit of natural gas through Ukraine were signed. These contracts expire on 31 December 2019.

The 2009 crisis was the most complicated but not the only case when Kiev tried to leverage its position in gas transit to Europe. Even after the 2009 agreements were signed, there have been further risks of transit suspension, as can be seen from the necessity to hold tripartite talks with the mediation of the European Commission to sign the so-called winter packages that should enable Ukraine both to go through a heating season and honour its natural gas transit obligations.

In 2015, the European Commission for the first time acted as guarantor of the allocation of financial resources to Ukraine to buy gas for the current heating season. The total amount of credits may be as much as USD 1.8 billion. While there may be several reasons for the support granted by the European Commission, it also demonstrates that Brussels is concerned that Ukraine may not implement its transit obligations if it does not have enough fuel to satisfy its own demand.

As a result of trilateral negotiations between Russia, the European Commission and Ukraine, the European Investment Bank and World Bank decided to provide loans of USD 520 million in total. The funds had to be (and were) spent on purchasing 2 bcm of gas from Gazprom to pump into Ukrainian underground gas storages before the 2015/2016 winter season and thus reduce the risk to transit to the EU countries<sup>7</sup>.

Furthermore, EBRD had also given a credit facility worth USD 300 million to Naftogaz under the Ukrainian government's guarantees. This amount was used for gas imports from European traders last winter<sup>8</sup>.

The contracts sealed by Gazprom and Naftogaz provide certain legal guarantees. Both sides are disputing their provisions within the international arbitration framework; however, there is a continuing risk of the Ukrainian authorities making a political decision to take transit gas to satisfy domestic demand.

It is worth mentioning that the Ukrainian authorities have also expressed their intention not to buy Russian natural gas. It could be argued that achieving this objective has, to some extent, been facilitated by the poor economic situation in the country, sharp growth in end-consumer natural gas prices (the government raised internal gas prices for households and municipal utilities), the decline in industrial production and the effective collapse of demand

7 <http://www.eib.org/infocentre/press/releases/all/2015/2015-224-eib-and-world-bank-join-forces-with-new-agreement-to-support-ukraine.htm>

8 <http://www.ebrd.com/work-with-us/projects/psd/naftogaz-gas-purchase-facility.html>



even at a time of decrease in world oil and gas prices. In 2014, natural gas consumption in Ukraine fell to 40bcm (a fall of 29% against 2011). This trend continued in 2015. Ukraine's demand for imports dropped by almost 50% to 33 bcm.

Since November 2015, Ukraine has not imported any volumes of gas under the current contract with Gazprom. Balance on the demand side is reached by purchasing Russian gas from European traders under so-called reverse schemes. Reverse gas volumes in Ukraine in 2015 increased to 10.6 bcm (60%) and in the first quarter 2016, all imported gas came from the traders. However, the average gas price under contract between Gazprom and Naftogaz was USD 15 per 1,000 cubic meters less than the actual average import price of "reversed gas", which cost Ukraine USD 150 million of additional spending for gas imports.

The situation is compounded by a multibillion trial in international commercial arbitration between Gazprom and Naftogaz about gas sales and transit contracts. Gazprom's claims on Naftogaz's failure to pay for part of the gas delivered in 2014 and penalties for not meeting Ukrainian company's obligations known as the "take or pay" clause during recent years exceeds USD 30 billion. Naftogaz accuses Gazprom of establishing an unfair price for gas, of decreasing transit flow through Ukraine, and demands 25 billion USD in the court. Naftogaz CEO Andrey Kobolev recently announced that the Ukrainian side will upgrade its claims to USD 50 billion<sup>9</sup>.

The instability in the country carries inherent risks, to the extent that there have even been threats of attacks by armed radicals in Ukraine. Supreme Rada deputy Dmytro Yarosh, a leader of the Right Sector political movement, publicly urged the blowing up of transit gas pipelines to prevent Russia from receiving gas export revenues<sup>10</sup>.

## 1.4 Ukrainian transit fee rally

On December 29, 2015 the National Energy Regulation Commission in Ukraine (NERC) decided unilaterally - and contrary to the valid transit contract between Gazprom and Naftogaz - to establish a new tariff system for gas transit<sup>11</sup>. Tariffs are to be set on the basis of entry/exit. Normative loss of transmitted gas, reflecting the fuel gas needs of the system, is added to the fee.

For example, the cost of transit by the Urengoy-Pomary-Uzhgorod or Progress pipelines from the Sudzha interconnection point on the Russian border to Uzhgorod exit point on the Slovak border is USD 35.27 per 1,000 scm plus 2.69% (26.9 cubic meters of gas for transportation). The current price for Ukraine is about USD 170 per 1,000 scm, fuel gas will cost another USD 4.6.

9 <https://www.kyivpost.com/article/content/ukraine-politics/total-amount-of-claims-by-ukraines-naftogaz-and-russias-gazprom-at-stockholm-arbitration-estimated-at-about-50-billion-kobolev-412390.html>

10 <http://www.ibtimes.co.uk/ukraine-neo-fascist-leader-dmitry-yarosh-vows-destroy-russias-gas-pipelines-stop-world-war-1440620>

11 <http://www.nerc.gov.ua/?id=18343>





Moreover, Kiev introduced 20% VAT for transit services, which did not exist before and was not foreseen in the transit contract. Thus, the new transportation fee comes close to USD48 or EUR42 per 1,000 scm, i.e. a 50% increase on last year's fee via Ukraine.

In addition, the Antitrust Committee of Ukraine ruled in early 2016 that Gazprom acted as a monopoly buyer of transit services from Naftogaz Ukraine (however, there were no other real or potential clients to buy transit services in Ukraine) and has to pay a USD 3 billion penalty. The trial on this issue is currently ongoing in the Ukrainian courts and has the potential to escalate to the international level.

It's worth mentioning that Gazprom follows a wait and see strategy in the cases of introducing new tariffs and the antitrust penalty and continues to fulfill its obligations under the current transit contract, paying for gas transportation according to the existing formula.

But the alternative tariff system and the penalty claim for sure increase the risk to transit of gas via Ukraine, because Kiev at any time may say that Gazprom pays less for the transit service or has to transfer money for the Antitrust fine. As a result, Ukraine may undertake measures against Gazprom's assets in the country and the main asset, which is easily available for prosecution, is gas flowing to Europe.

Considering political relations between Kiev and Moscow and the numerous disputes about the transit contract (Ukrainian authorities many times declared their intention to raise transit prices), there is a serious risk that current transit agreement may be violated at any time and will not be prolonged on mutually acceptable terms, which could lead to another transit crisis and problems with gas supplies to Russia's European consumers after its expiry.



## Chapter II.

# NORD STREAM-2 AND UKRAINIAN TRANSPORTATION COST ASSUMPTION

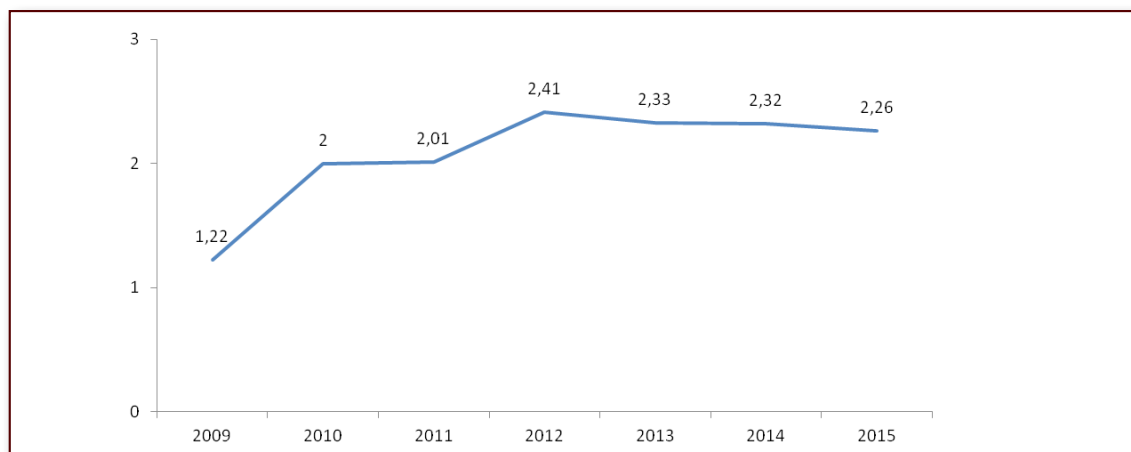
### 2.1 Border to border fee contest

Current transit of Russian gas through Ukraine is regulated by a long-term gas transportation contract concluded in 2009 after the most severe transit violation of gas deliveries to the EU. Before that, Gazprom had to agree with Naftogaz on terms of gas supply to Ukraine and transit conditions on a year-to-year basis. After 2009, the separate gas selling and gas transportation contracts between the parties were signed for eleven years. These contracts are due to expire at the end of 2019.

The gas transmission fee is calculated monthly under a formula from the 11-year gas transit contract between Gazprom and Naftogaz concluded in January 2009. It has two parts: a constant part of 2.04 USD/1,000 scm adjusted every year for the inflation rate in the EU (Eurostat figure) and a variable part based on the Russian gas price for Ukraine under contract between Gazprom and Naftogaz that reflects expenses for fuel gas needed by the transmission system. Gas price volatility has a limited influence. For every USD 10 increase in the gas price 2.4 cents are added to the gas transit rate, which is equivalent to about 30 cents on the cost of gas transit via Ukraine.

The set transportation distance is 1,240 km. The cost of transit in 2015 was EUR 2.26 per 1,000 cubic meters for every 100 km or 28 EUR/1,000 scm for the whole route.

Transit fee for Russian gas in Ukraine, EUR/1,000 scm/100 km



Source: Naftogaz, NESF calculations



It is important to understand Ukraine's competitiveness issues in comparison to what can be offered by the newer Nord Stream and Nord Stream 2 pipelines, which can for example transport gas over 1,220 km without the need for any intermediate compressor stations.

In 2015, the physical gas flow via Nord Stream was almost 39 bcm (70% of projected capacity). The operator's revenue from Gazprom's transportation service fee was EUR 1.07 billion. Gazprom's share in the net profit of Nord Stream AG was EUR185 million, in line with its shareholding. Thus, Gazprom's net payment for transit in 2015 was EUR 885 million, or EUR 1.86 for 1,000 standard cubic meters (scm) per 100 km. From the Russian coast to Germany's Baltic coast the price is EUR 22.7 for 1,000 scm. If the pipeline were to be operated at full capacity, the effective fee would be reduced to EUR 1.32 per 100 km and EUR 16.1 from border to border for 1,000 scm.

Last year Gazprom paid 19% less for gas transport via the Baltic Sea route than for transit via Ukraine and thus saved EUR 207 million. As mentioned, this was in spite of the fact that the EU has set regulatory restrictions on the use of the OPAL gas pipeline in Germany preventing Nord Stream from being used by Gazprom at full capacity utilization. Without such restrictions, annual savings could be doubled.

Moreover when in December 2015 the Ukraine government set the new transportation fee mechanism, the new tariff based on entry/exit would require payment of EUR 42 to transport 1,000 scm from the Russian border to Slovakia (including fee, fuel gas and new taxation), if it were to come into effect – i.e. twice as much as via Nord Stream.

### Comparative costs of shipping Russian gas to the EU via the Baltic Sea and Ukraine

Route	Distance (km)	Total cost (EUR/1,000scm)	Unit Cost (EUR/1,000scm/100km)
Nord Stream 2015	1,220	22.7	1.86
Nord Stream @ 100%	1,220	16.1	1.32
Ukraine 2015	1,240	28.0	2.26
Ukraine new tariff	1,240	42.0	3.39

Source: Gazprom data and NESF

These calculations show why from border to border Nord Stream is much more attractive than the Ukrainian route from a strictly commercial point of view. A further consideration is that the main reason to increase transport capacity in the North is the additional demand for gas imports in North Western Europe, where we see a steady decline of its own gas production. During just the last five years, it has declined by 58 bcm – a figure that exceeds the capacity of two Baltic Sea pipelines. For supply to the growing markets of North West Europe, Ukraine is at an even bigger cost disadvantage, even at 2015 prices.

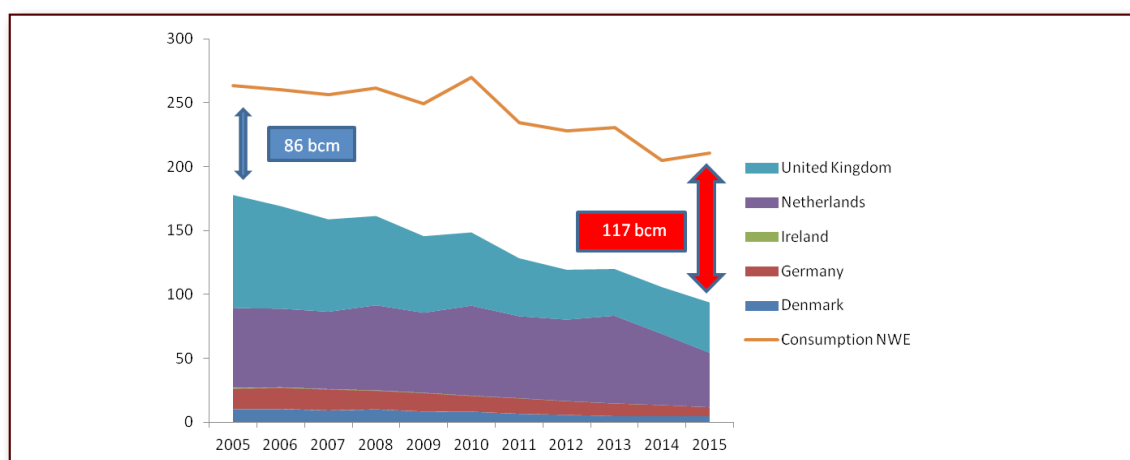
Reaching the border of the EU is the first pass. After that, the gas has to be delivered to the market zones. Nord Stream 2 is aimed at two destinations – North Western Europe including Western Germany, Benelux and Great Britain and South Eastern Europe with the Baumgarten hub distributing gas to Austria, Italy, Slovakia, Hungary, Slovenia and Croatia.



## 2.2 Route to the North Western Europe: no real alternative for Nord Stream 2

North Western European countries form the biggest market zone in the EU consuming roughly half of the total gas demand in the block. In addition, its own supply-demand gap widened over the last decade increasing the share of imported gas from 86 bcm in 2005 to about 117 bcm in 2015 due to a steady decline in gas production in the North Sea and the onshore fields in Germany and Netherlands as well.

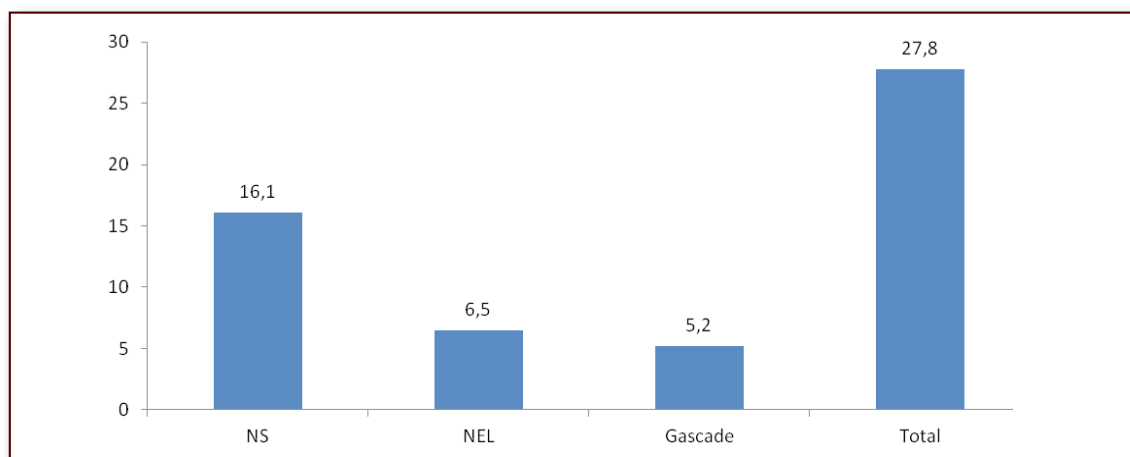
Gas production in the NWE countries and cumulative gas consumption, bcm



Source: Eurostat, NESF calculations

A long-term safe and economically competitive supply route to North West Europe is very important to meet the energy policy objectives of the EU and provide security and affordability to the European market.

Cost of transportation from the Russian border to NW Europe  
(Bunde interconnection point) via Nord Stream at full capacity utilization  
under the current tariff policy, EUR/1,000 scm



Source: Gazprom, NEL Gastransport, Gascade, NESF calculations

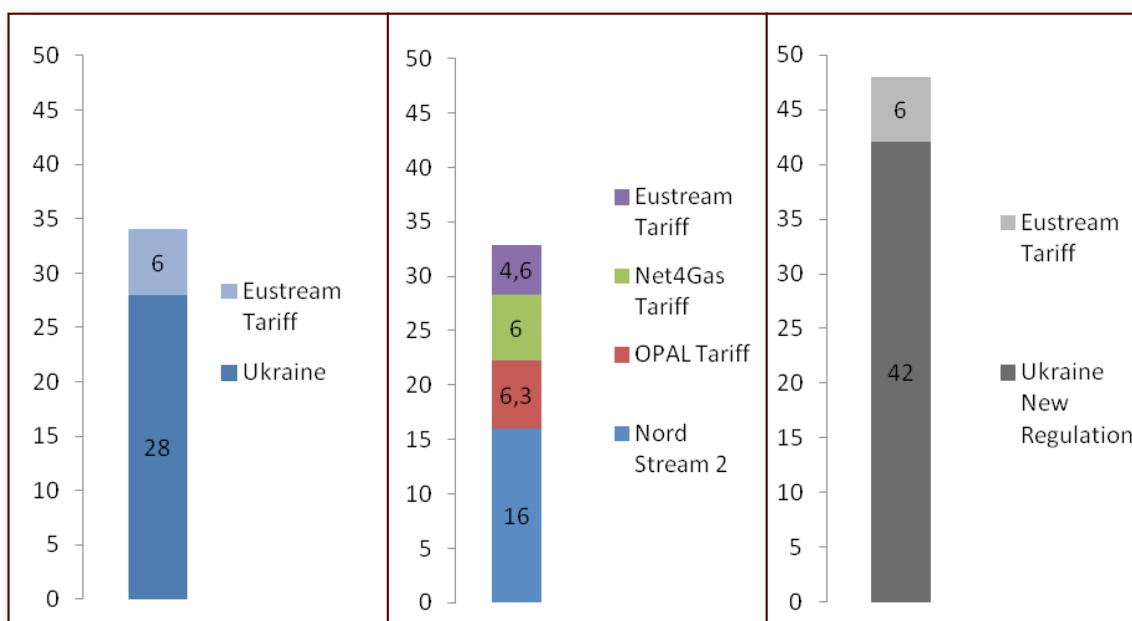


Nord Stream 2 is the shortest, cheapest and least risky way to achieve these goals. The total cost of transporting Russian gas via Nord Stream and onshore pipelines to the Bunde interconnection point on the Netherlands/German border calculated on the base of full utilization of Nord Stream and current tariff policy of Transmission system operators is EUR 27.8 per 1,000 scm. (EUR 16.1 Nord Stream plus EUR 11.7 within the EU). It is cheaper than the current cost of Russian gas transportation to the EU border via Ukraine. Under the current tariffs of TSOs in Slovakia, Czech Republic and Germany the whole route to the NWE via Ukraine could cost about EUR 52, almost double the cost via Nord Stream. Moreover, physical flow via Ukraine would only be possible with new investments to build new transit pipelines in the Czech Republic and Germany. The current gas flow in the Net4Gas system goes from North West to East.

## 2.3 Destination Baumgarten: is the Baltic Sea route competitive with shorter Ukrainian one?

As for Baumgarten, after landing in Greifswald Russian gas from Nord Stream has to travel another 850 km through Germany, the Czech Republic and Slovakia to reach Baumgarten. Based on the current fees of transmission systems operators OPAL Gastransport, Net4Gas and Eustream and full capacity utilization of the Baltic Sea pipelines, gas transportation will cost the shipper about EUR 33 - EUR 16 offshore and EUR 17 onshore. It takes EUR 34 to deliver gas to Baumgarten from the Russian-Ukrainian border under the current tariffs of Naftogaz and Eustream. This is only marginally more expensive than via Nord Stream, but Kiev's new fee for transit would increase the actual transportation cost via Ukraine to Austria to EUR 48 per 1,000 scm.

Russian border – Baumgarten routes' cost of transportation by segment, EUR/1,000 scm



Source: operators' data, NESF calculations

November 2016



Calculation of the estimated cost of transporting natural gas from the Russian border to Baumgarten is based on the current tariffs of transmission system operators. Gas passes through four transit zones – 1,220 km offshore (Nord Stream), 472 km in Germany (OPAL), about 400 km in Czech Republic (Net4Gas) and about 70 km in Slovakia (Eustream).

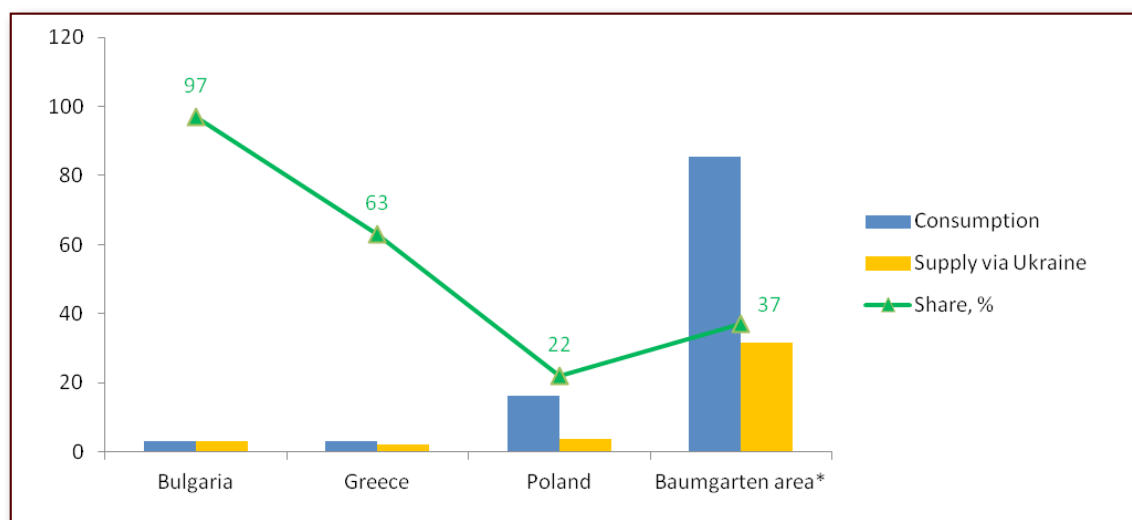
In winter 2014/2015 actual gas flow through the Northern Route reached Baumgarten, although initially the main destination point for the Nord Stream and OPAL transportation route was the Waidhaus interconnection point (in the Bavaria region of Germany). Net4Gas northern branch (between Lanzhot and Olbernhau) originally built for gas transit from the Soviet Union to Eastern Germany now operates in reverse mode and is capable of transmitting up to 67 million scm per day (24 bcm per year). During last year some 11 bcm from Nord Stream were delivered this way.

Some investments in capacity extension may be required, but it would not have a great influence on tariffs, as they are calculated on entry/exit pricing for a standard one-year contract for a given amount.

As already mentioned in Chapter I, Ukraine is the main transit route to deliver Russian gas to Baumgarten, and the Austrian gas hub is the key destination for gas travelling to Europe across Ukraine. This route accounted for around 32 bcm or 54% of all gas flow reaching Europe and Turkey via Ukraine In 2014. Moreover, the Baumgarten area is 37% dependent on Ukrainian gas transit.

According to the current gas transportation pricing system, the tariff for transporting gas from Russia's border to Baumgarten via Ukraine is about EUR 34 per 1,000 scm, just marginally higher than via Nord Stream. Besides there are no transit risks with Nord Stream, and Gazprom as a buyer of transportation services has an interest in the project to transport gas via the Baltic Sea. This adds to the commercial attraction of that gas supply route.

Share of Ukrainian Transit in Supplies to the EU Countries, %



\* Austria, Italy, Hungary, Slovakia, Slovenia and Croatia

Source: Eurostat, Ukrtransgaz, Eustream, Gas System, FGSZ, BEH, NESF Calculations

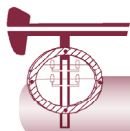




The cost of transporting Russian gas to Baumgarten via Ukraine or Nord Stream may currently be broadly similar, but even the current Ukrainian tariff has a fuel price component. The current natural gas price is the lowest over the past five years, which affects the Ukrainian transit rate. An increase in gas prices will worsen the competitiveness of transit via Ukraine.

Moreover, Ukrainian authorities from time to time declare their intention to increase the transit fee for Russian gas by 50-300%. If the new tariff policy established from January 1, 2016 by Kiev were in force the cost of transporting 1,000 scm to Baumgarten would rise dramatically to EUR 48 or 45% higher than the estimated fee for the Nord Stream 2 route.

In that case, transportation of 30 bcm/year for 30 years via Ukraine would involve additional payments of EUR 13.5 billion, which is much more than the full capex of the Nord Stream 2 project budgeted at EUR 8 billion.



## CONCLUSIONS

At present Gazprom can use different supply routes through which to transport gas to its customers in the EU: Nord Stream, Yamal-Europe or the transit route via Ukraine. Based on the performance of the existing Nord Stream pipeline system there is concern in Ukraine and some Eastern European countries that the planned Nord Stream 2 pipelines will prove to be much more competitive than the traditional transit route through Ukraine's aged gas pipeline system - and threaten revenues from transit fees.

Blocking Nord Stream 2 for the sake of preserving Ukraine's transit business would not be a viable long-term solution, as much of Ukraine's gas system has already reached or will soon reach the end of its operational life and would not be able to continue much longer transporting large volumes of gas to Europe safely and reliably without substantial investment.

So if one compares the Nord Stream and Nord Stream 2 pipelines with transit routes via Ukraine just in terms of the costs of usage – without even considering issues of the reliability and safety of aged pipelines and CO2 emissions and the environmental impact of compressor stations – the result is striking. Commercial logic is not on Ukraine's side. That is not all: Russian gas brought to Europe via Ukraine, Belarus, Nord Stream or Nord Stream 2 will have to compete in the EU's new single energy market with increasing supplies of LNG from further afield, as well as with pipeline gas from other sources. Therefore, if normal rules of competition apply and commercial logic informs the decisions of Europe's energy groups and the EU, there could be big changes in the EU's gas supply routes, and the EU's industry and energy consumers should be able to benefit from competitive supplies of gas for many years to come.

Despite statements from Ukraine's Naftogaz, the competitive disadvantage that Ukraine has when compared with Nord Stream and the planned Nord Stream 2 pipelines is quite stark. Gazprom paid 19% less for transmission of 1,000 scm through Nord Stream than for transportation via Ukraine. Looking to the future, the competitive disadvantage could eventually be even greater: in 2015, Nord Stream operated at 70% of its 55-bcm annual capacity, partly because it was capacity-constrained by the EU Commission's decision to restrict the flow of gas from Nord Stream through Germany to other EU countries via the OPAL connecting pipeline. If Nord Stream or Nord Stream 2 could operate at 100% capacity, the cost of transportation to Gazprom would be 42% cheaper.

Compounding the problem for Ukraine and Gazprom is that total modernization and reconstruction of the pipelines and compressor stations within Ukraine would be essential to avoid increased risks of failures and ruptures, as by 2020 the service life of its major transit gas pipelines will have ended. Ukraine is in a difficult position: if it is to continue to play a major role in gas transit, it would need massive investments. This is the motivation for its planned dramatic increase in transit fees. This would however have the effect of making it even more uncompetitive compared with the Nord Stream and Nord Stream 2 pipelines through the Baltic Sea.

On the other hand, as European gas extraction will continue to decline in the future, a new direct supply route to North West Europe would be of great value for market liquidity and security for customers.