ENERGY SECURITY IN CENTRAL AND EASTERN EUROPE: TOWARDS A COMMON APPROACH

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Executive Summary

Energy security is of high importance to the EU, Russia and European transit states like Slovakia or Ukraine. Central and Eastern Europe has several options to diversify imports away from Gazprom: diversification of suppliers, increase in LNG imports, shift to a more short-term contracting (all undermining Gazprom’s dominant position), and extraction of ‘unconventional’ natural gas namely shale gas.

Drastic changes in production, transit and supply routes of natural gas to Europe open new possibilities and challenges for energy security. Recent developments include: new European gas market model; implementation of the EU 3rd Energy package; competition between already established gas transit routes and the new supply routes. Central and Eastern European countries could benefit from these new developments only in case of deeper cooperation between CEE gas transiters under conditions of new European gas regulation.

To prepare for a new era of short-term pricing Central and Eastern Europe should solve two main challenges. First, it has to define the funding mechanism of the new infrastructure. If Visegrad countries and Ukraine want to trade gas across borders and keep transporting most of the Russian gas to Europe, they need to invest into networks. But shorter contracts of liberalized market with a multitude of competitors make returns on investment quite difficult.

Second, the CEE countries have to develop spot markets to efficiently trade gas. Currently these markets are underdeveloped and can be easily manipulated, especially when the number of suppliers is limited.

Visegrad and Ukrainian governments should coordinate their national energy policies and name EU’s energy targets for the next decades. The CEE region supply security will be enhanced from the interconnection with the Ukrainian GTS and access of European gas traders to Ukrainian underground gas storage facilities. Establishment of the gas trading at the Eastern border of the EU on the basis of Ukrainian and V4 gas storage capacities under the 3rd Energy Package could further improve the energy security in the region.

To solve the gas diversification problem the CEE countries should incite national companies to coordinate large infrastructural projects (LNG terminals, interconnectors) and lobby together for EU funding. They could create a regional market along the European Gas Target Model prescribing liquid regional hubs and interconnectors and move towards harmonization of national market regulation. Better interconnection of pipelines will also benefit the unconventional gas production.
Contents
Introduction ............................................................................................................................................... 4
1. Bypassing gas pipelines projects of Russian Gazprom: do they really enhance European energy security? ................................................................................................................................. 5
2. Current EU policy of supplies diversification: What are the chances to dilute Gazprom’s market power? ........................................................................................................................................ 11
3. Non-conventional gas sources: a panacea for European energy security? ..................................... 18
4. Cooperation of gas transiting countries in Central, Eastern and South Europe: impact of reverse gas flows and better interconnection on EU energy security ........................................ 23
Conclusions and recommendations .................................................................................................. 30
Annexes ............................................................................................................................................... 31
Introduction

The issue of energy security is of high importance to the EU, Russia and European transit states like Slovakia or Ukraine. Recent developments of European gas market showed a number of new possibilities and challenges for energy security that evolved from drastic changes in production, transit and supply routes of natural gas to Europe: new European gas market model built on the principles of diversification, security of supply, interconnectivity and liberalization; implementation of the EU 3rd Energy package related to gradual shift from long-term oil-linked gas supply contracts and development of alternative gas supply sources and routes; competition between already established gas transit routes and the new supply routes.

Russian gas transit diversification means new additions to an already existing network which decreases the risks of the whole system. With new gas routes being built Russia will be able to supply significantly more gas at its marginal variable costs to an extended number of European consumers. In this respect the question is not only whether Europe will need Russian gas on diversified routes but also whether Europe will need more Russian gas altogether.

For Europe, Gazprom is a key gas trading partner. It supplies one third of EU’s net imports and one quarter of its consumption. Central and Eastern Europe has several options to diversify imports away from Gazprom: diversification of suppliers, increase in LNG imports, and shift to a more short-term contracting. Each option has its risks and benefits but all undermine Gazprom’s dominant position.

Another option can be extraction of ‘unconventional’ natural gas namely shale gas. During the last decade, the United States experienced the Shale gas revolution. According to various predictions, Central and Eastern Europe should possess similar abundance of unconventional gas. However, for various reasons, Europe shouldn’t expect a similar revolution in energy sector, at least not at such an abrupt pace.

We believe that Central and Eastern European countries to benefit from these new developments should reach deeper cooperation between CEE gas transiters under conditions of new European gas regulation.

The present report analyzes energy security issues in Central and Eastern Europe: Russia’s new pipelines Nord Stream and South Stream; supplies diversification in Central and Eastern Europe; non-conventional gas sources; and the “transiters union”. It reviews the European gas sector, market trends and policy developments. It provides recommendations to the governments of the Visegrad Group (Czech Republic, Hungary, Poland, and Slovakia) and of Ukraine on increasing energy security and on mutual cooperation.

The report is organized as follows. The first section contains a general overview of bypassing gas supply projects. The second section examines sources of gas supply diversification, and the third one surveys the non-conventional gas sources. The fourth section studies the possibilities of organizing a “transiters union”. All data in the report are based on information as of July 2013, if not indicated otherwise.
1. Bypassing gas pipelines projects of Russian Gazprom: do they really enhance European energy security?

By András György Deák

Changes in importers' energy security

From the traditional point of view, new Russian export pipelines increase the EU consumers' energy security.

First, they diversify transit routes and strengthen the commitment of Gazprom towards the European market. It is an obvious signal that Russia is ready and perhaps keen to increase its supplies to Europe.

Second, Gazprom is the biggest initiator of pipeline construction east of the Rhine. These are huge investments even on the EU on-shore territory that would not happen without the Russian diversification strategy. The new construction creates a significant flexibility in terms of capacity, introducing a higher level of network security and higher levels of West-East reverse flows. The two Streams (Nord and South), if built, would free up large, already existing pipeline capacities for countries like Hungary to import Italian LNG or the Czech and Slovak system to offer reverse flow options. If we look at the conventional and EU benchmarks for energy security, these outcomes are beneficial both in terms of the N-1 rule\(^1\), single market creation and in terms of import diversification.

Third, European consumers get this transit diversification basically for free. Unlike many other energy security and interconnectivity projects on the territory of the EU, these new transit pipelines and their EU on-shore sections presuppose neither EU taxpayers' nor national consumers' money. Understandably, national regulators can admit some of the costs justified but predominantly these investments have been made on a corporate own risk basis.

Fourth, EU and national regulators still have a free hand to set the conditions for pipeline utilization, including TPAs, interconnection points and reverse flow options on their territory. In some cases like OPAL, these provide a partially competitive framework for capacity allocation, neutralizing much of the potential damage to competitiveness and security for consumers. In this respect partial Gazprom ownership does not mean unlimited access to capacities or instrument to maintain its market dominance.

Changes in Trans-European energy relations

These investments barely provide better Trans-European energy relations if we consider only political implications. The realization of transit diversification according to its current radical plans is obviously a failure of Trans-European transit management and trust-building. Post-Soviet transit states, primarily Ukraine and Moldova, are likely to be losing leverage in European energy issues and will have to maintain their relations with Russia from a more difficult position. An institutionalized Trans-European transit framework could have softened some of these harsh implications. However, such framework never existed. The continent's energy landscape consists of two major relational sets:

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\(^1\) The N-1 rule examines a country's/region's supply situation provided its biggest import capacity was stopped.
Relations between the European importers and Gazprom based on supply contracts with delivery points at the national or, more typically, at the EU Eastern border. In this sphere corporate relations and the EU liberalization and regulatory policies play a dominant role. Transit as such does not have a distinguished significance and is only one aspect of the Commission's regulatory activity.

Relations between Post-Soviet transit countries and Russia or Gazprom, where transit and supply considerations are presented in a strong economic and political context. Transit issues are strongly connected with supply arrangements.

It is obvious that an institutionalized transit regime, which by default shall consist of minimum three parties, does not really exist in this case. Transit has been a bilateral matter, primarily between the different Post-Soviet states, and European actors had hardly anything to do with it. Political and energy policy interests have emerged only since the mid-2000s, in parallel with the “transit conflicts”, while Western companies have never showed any readiness to deal with Post-Soviet transit up to the present. The European-Ukrainian (Belarussian) side of the triangle is extremely weak both in legal and policy terms. Not surprisingly, the playlist of the transit scene today is composed of a determined Moscow, a desperate Kyiv and a restrained Brussels. Since the parties do not sit at a single table, it is worth looking at their separate strategies one by one.

**Russian considerations**

Both the Kremlin and the Gazprom are frustrated by the Post-Soviet transit issues. Nevertheless, it would be misleading to describe their policies only as retaliatory. Geographical and technical aspects still play an important role in the decision making. Even if Ukraine inherited a quasi monopoly over Russian export routes in 1991, this was an unsustainable situation in the long run. Even the late Soviet industry planning projected a shift of export routes to the North. It is very telling that the Russia-Belarus-Poland-Germany pipeline was named Yamal-Europe as early as in 1993, even if the Peninsula was opened up for industrial production only two decades later. The Yamal-Berlin distance compared to the Urengoy-Kiev-Berlin route is much shorter, giving an approximately 800 km potential advantage to Northern export routes (see Figure 1). The same is true for a part of the Turkish exports, for which the Ukrainian land-route always posed a significant by-pass. It is right to say that both the shift of Russian production to the North and the broadening geographic scope of Gazprom's exports favored the construction of new pipelines. In this geographic context the label “transit diversification” is a bit misleading; the quest for new routes was to some extent natural and reasonable.
In order to quantify these geographic factors, it is worth separating the Gazprom's export destination countries to Northern and Southern area, according to their shortest distance from producing fields. This separation is highly arbitrary (Austria or Switzerland are approximately equally far on both routes) and still independent from economic and political considerations. The Northern area, which is basically planned to be supplied by pipelines built after 1991, has slightly bigger volumes. Nevertheless, the old routes can still count on a significant amount of transit, especially because the expected increase of demand is still significant in these regions.

Understandably, South Stream is a different case: its construction cannot be justified by geographic arguments. On the contrary, geography is highly unfavorable, while construction costs are enormous due to the big investment needs both in Russian on-shore and Black-sea off-shore territories. What is more, as it is shown on Figure 2, there is no European call for such a huge new pipeline, if other routes remain functional.

It is obvious that the two Streams do not fall into the same category of by-passing. The Northern corridor was a must for Gazprom, both because of geography and expected increases in exports. The only reasonable question was, whether it is worth avoiding Belarus and Poland via a
more costly Baltic-sea route. The South Stream would have been a reasonable Ukraine by-pass only if both large imports from Central Asia and a simultaneous huge gas demand call from Europe were present, an increasingly unlikely scenario since 2008. The only non-political argument in favor of South Stream remains Gazprom’s fears from an unmanageable Ukrainian situation when modernization of Ukrainian GTS becomes unfeasible, Ukraine goes bankrupt or the government in Kyiv collides with Moscow and causes further cut-offs or exorbitant cost increases for this route. However, even in any of these cases, the further development of Yamal or Nord Stream pipelines to Italian, Hungarian markets would be a reasonable alternative to the four-line South Stream.

European considerations

The European Union, its member countries and companies do not have an “energy transit policy” as such. Policy distinctions among different pipeline projects are only slightly indicative of political preferences. In this regard Brussels does not have the legal authority to qualify projects according to their “broader” implications in the European area. It can examine only implications to market competitiveness at the EU or regional level and take regulatory measures to limit the consequences.

In this regard the two Streams have highly different regulatory contexts. Nord Stream brought additional pipeline capacity into an already competitive region with relatively dense networks. Russian shipments arrive directly to Germany, where Dutch, Norwegian, different LNG supplies are heavily present. From this angle the Commission could show some flexibility regarding the regulatory matters. Most of these markets are accessible for supplies other than Russian and Gazprom will have to compete with these. The only bottleneck towards the Czech Republic and related markets was the OPAL-South capacity, where TPA was strictly regulated by the Commission (Decision C (2009) 4694).

South Stream will pose a more complex regulatory challenge. Gazprom has almost exclusive market dominance in South-Eastern Europe, but competitive supply may arrive via the Fourth Corridor as soon as the end of the decade. Azeri supplies can be present around the Turkish border, constituting a chance for a more competitive regional market. Furthermore, TPA restrictions were already issued for Nabucco right at the Bulgarian section (Decision D (2009) 2299), setting a relatively high benchmark for other pipelines.

An additional element is Serbia as an extra EU gap on the route. TPA and reverse flow options make real sense only if Serbia also accepts these arrangements. As this is unlikely for the time being, Gazprom and its partners have good chances to contract the full capacity. Nevertheless, the Commission can easily refer both to the Serbian commitments in the Energy Community or press this issue further during the integration process. Independently from the upcoming arrangement between Srbijagaz and Gazprom regarding South Stream, there will be a good chance for revision and provision of some sort of TPA for the South Stream Serbian section in the future. Thus it is more likely that the Commission will insist on a strict TPA-regime for South Stream right from its Bulgarian landing, which is just another argument against its full construction.

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Apart from these domestic regulatory measures, the transit issue is also represented in the EU-Ukraine relations. The content of the EU-Ukraine energy dialogue does not differ too much from other, similar relations: it aims to provide a lower benchmark of acquis in order to improve investment climate and reliability in the sector; it tries to help in setting up policy frameworks to increase energy efficiency and reduce import dependence; provides some small-scale but still pivotal funding for a limited number of strategic projects, including the modernization of the GTS (primarily the transit component, proposed by the Naftogaz). This set of policies is not unique in terms of their content but in terms of its relevance: Ukraine has potentially all the necessary prerequisites to significantly reduce gas import dependence and save a large amount of funds. IEA in its Ukraine study hinted that if all possible measures are implemented, Ukraine can potentially stop Russian gas imports\(^5\).

In this context a new quality of domestic transit regulation is important in two major respects. First, one of the advantages that Ukraine can provide for upstream investors is its huge and dense gas pipe network in the proximity of domestic and European consumers. Clarity about free and undiscriminated access to the system is vital for any producer. Second, reliable regulation is the only way to raise foreign corporate interest in the network. In a situation when much of the domestic network, both storage and pipelines, remains idle, Kyiv could increase the network’s utilization by Western companies only if it provides some clarity about its usage. Western companies came into the CEE energy sectors only when their EU accession seemed to be on track and the implementation of the acquis was guaranteed.

**Ukrainian considerations**

The Ukrainian sectoral situation has deteriorated sharply during the last five years. Transit volumes have been decreasing, import prices have gone up drastically, while large sections of the network are already beyond their expected lifetime. The situation and the context of Ukrainian transit in the Ukrainian-Russian relations have changed fundamentally. First, Kyiv has no real transit leverage anymore. It spends almost 7-8% of its GDP on gas imports every year, a barely sustainable situation in the long run. Transit volumes and revenues have been falling due to the new pipelines and the economic stagnation in Europe.

This is a comfortable situation for Gazprom since it has achieved its minimum strategic goals and put the contractual regime concerning both supply and transit on a long-term basement. Time works for Moscow.

Second, Ukraine will have to invest gradually increasing funds into the system in the foreseeable future. Major transit pipelines, mostly built in the early 1980s, are in a relatively good shape if compared to sections not related to transit and most of the low-pressure distribution lines. Modernization of the former may become financially profitable, while investing into the latter will likely be an unprofitable must very soon.

Chances to reverse transit trends are slim. By-passing pipelines are constructed according to Gazprom’s plans, partially are in its property and are heavily entrenched contractually. Both Blue Stream and Yamal operate at their maximum capacity and Nord Stream is likely to reach its optimum as Bovanenko field increases its production. In the current trend Ukrainian transit option does not seem to be particularly favorable for Gazprom. For Ukrainian GTS, which has no ship-or-

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pay clause in its transit contract with Gazprom, the likely role will be to deliver the residual volumes to Southern Europe and provide peak-time service. Nevertheless, even this smaller piece of transit has been challenged by Gazprom's plans to build South Stream.

Ukraine has one of the biggest gas pipeline networks of the continent, now heavily underutilized. But the basic question is whether the Ukrainian transit volumes have reached the bottom. And whether non-action is a reasonable option. It assumes a painful accommodation process to a high import gas price environment with no short-term benefits and potentially a further scale-back of transit if other alternative systems will be built. Gazprom's entering the network is not necessarily a solution for the problem. There is a high level of political risk to remain around utilization even if Ukrainian GTS is sold out. Kyiv cannot calculate its strategic decisions with fixed benefits while Ukrainian costs in any scenario have become much higher.

Paradoxically, presence of large spare pipeline capacities in Ukraine constitutes a major supply security input into EU-Russia gas relations. Understandably, this means financial losses for the TSOs. It is always difficult to find a reasonable balance between a higher level of spare capacities, increased reliability in terms of supply security and the financial burden of maintaining an empty network. In this respect some of the supply security costs are paid by transiters, primarily by Ukraine, that has no ship-or-pay clause in its contract with the Gazprom (unlike Slovakia). It is reasonable to say that Ukraine – if those idle pipeline capacities remain operational – provides a huge input into European supply security even if against its will. Ukraine still provides a meaningful supply security service both for producers and consumers. But how much does supply security cost, who shall pay for it and at what forum this issue can be raised? All these questions remain today unanswered.
2. Current EU policy of supplies diversification: What are the chances to dilute Gazprom’s market power?

By Pavol Szalai

For Europe, Gazprom is a key gas trading partner. It supplies one third of EU’s net imports and one quarter of its gas consumption\(^6\). In Central and Eastern Europe, Gazprom is dominant. Its share in Visegrad’s gas imports ranges from 66% in the Czech Republic to 93% in Slovakia; it was Ukraine’s sole supplier until 2012\(^7\). Its share in the region’s gas consumption is vital: from 49% in Hungary to 60% in Ukraine to 80% in the Czech Republic.

Table 1. Gas consumption and imports in 2012

<table>
<thead>
<tr>
<th>Country</th>
<th>Gas consumption (bcm)</th>
<th>Gas imports from Russia (bcm)</th>
<th>Share of gas imports from Russia in gas consumption (%)</th>
<th>Share of gas imports from Russia in total gas pipeline imports (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>8.2</td>
<td>6.6</td>
<td>80</td>
<td>66</td>
</tr>
<tr>
<td>Hungary</td>
<td>9.7</td>
<td>4.8</td>
<td>49</td>
<td>81</td>
</tr>
<tr>
<td>Poland</td>
<td>16.6</td>
<td>9.0</td>
<td>54</td>
<td>83</td>
</tr>
<tr>
<td>Slovakia</td>
<td>6.0</td>
<td>3.8</td>
<td>63</td>
<td>93</td>
</tr>
<tr>
<td>Ukraine</td>
<td>49.6</td>
<td>29.8</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>


On the background of the increasingly liberalized and interconnected EU market, Central and Eastern Europe has several opportunities to diversify imports away from Gazprom. Some of them will take a long time to show any effect, some have been effective already, and all carry opportunities and risks:

- **The Southern Corridor bringing Caspian gas to Europe from 2019.** In June 2013, the Shah Deniz Consortium finally chose the Trans Adriatic Pipeline (TAP) over Nabucco to bring its gas to Europe. Nabucco may be dead and the Caspian gas will not flow to Central Europe in the short term. But the pipeline may be resuscitated in a different form in the future and eventually reach Central Europe. The downside is the distant long-term horizon with uncertain results.

- **The LNG terminals on Poland’s Baltic coast, Croatia’s Adriatic coast, and Ukraine’s Black Sea coast.** The market of liquefied natural gas transported by sea vessels supplies a quarter of Europe’s imports. The terminals should provide an alternative to Russian supplies as soon as 2017, increase the leverage for price negotiations with Gazprom as well as gas market liquidity. This viable option comes with several economic risks to be addressed.

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\(^7\) Since November 2012, Ukraine’s Naftogaz has been purchasing gas from RWE and importing it via Poland and Hungary.
Gazprom’s trading model turned obsolete by recent regulatory interventions and market-induced forces. As long-term contracts become increasingly disconnected from the current gas trading in Europe, a new window of opportunity opens for Gazprom’s clients: market-based gas prices. But before Central and Eastern Europe benefits from the increased market liquidity, it has to mitigate the threats related to short-term trading.

The three mentioned opportunities represent specific and interconnected trends in the European gas trading: diversification of pipeline supplies, increase in LNG imports, and shift to a more short-term contracting. They all undermine Gazprom’s dominant position, but also lead to a more liquid and competitive market, on which economics triumphs over politics. Europe and Gazprom’s relations are adjusting, new global economic challenges emerge; the Visegrad countries and Ukraine should prepare for tomorrow’s gas market.

**Nabucco and TAP: the economics and politics of pipelines**

Since its inception, Nabucco has been the symbol of EU’s efforts to diversify gas imports. The decade-old pipeline project was supposed to bring Caspian gas to the Central European Gas Hub in Baumgarten, Austria. Following the 2006 and 2009 gas crises involving Russia, Nabucco became EU’s frontrunner. Especially for the Visegrad countries it offered an alternative to the dependence on Russian gas. Its story is now over, at least for the next decade. Last June, the Shah Deniz Consortium that taps into the Caspian gas did not choose Nabucco West for its future gas supplies to Europe. Instead it selected its less-known and smaller brother, the TAP. EU’s Southern Corridor, which opens the fourth supply route to Europe (next to routes from Russia, Norway, and Algeria), will be built. Yet, it will lead not to Baumgarten but to Italy.

The June decision implies that EU will have, for the first time, access to imports from the Caspian basin. The second stage of the Shah Deniz field in Azerbaijan should produce at least 16 bcm/a from 2018. The gas will be transported by the existing pipelines from Azerbaijan to Turkey which intends to consume 6 bcm/a. The remaining 10 bcm will flow further west: through the Trans Anatolian Pipeline (TANAP) to the Turkey-Greece border and through TAP to the Italian cost. BP and Statoil are the key players here: owning together 51% of the Shah Deniz Consortium, they are set to become shareholders of TANAP and TAP. Azerbaijan’s SOCAR plays a major role, too, as a member of both Shah Deniz and TANAP.

**Table 2. Southern Corridor**

<table>
<thead>
<tr>
<th></th>
<th>Trans Anatolian Pipeline</th>
<th>Trans Adriatic Pipeline</th>
<th>Nabucco West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length, initial capacity</td>
<td>1700 km, 16 bcm</td>
<td>870 km, 10 bcm</td>
<td>1329 km, 10 bcm</td>
</tr>
<tr>
<td>Construction start</td>
<td>2014</td>
<td>2015</td>
<td>2015</td>
</tr>
<tr>
<td>First gas deliveries</td>
<td>2019</td>
<td>2019</td>
<td>2019</td>
</tr>
<tr>
<td>Leading shareholder</td>
<td>SOCAR (Azerbaijan)</td>
<td>BP (UK)</td>
<td>OMV (Austria)</td>
</tr>
</tbody>
</table>

**Source:** official web sites of the companies.

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8 Shareholder structures as of July 2013: Shah Deniz Consortium – BP (25.5%), Statoil (25.5%), SOCAR (10%), Total (10%), LukAgip (10%), NIOC (10%), TPAO (9%); Trans Anatolian Pipeline – SOCAR (80%), BOTAS & TPAO (20%); Trans Adriatic Pipeline – Axpo (42.5%), Statoil (42.5%), E.ON (15%).
The primary reasons behind the Consortium’s decision were economic. TAP is a shorter and cheaper way to bring its gas to Europe. Although Nabucco’s shareholders led by OMV scaled down its length to 1329 km and its capacity to 10 bcm/a, renaming it “Nabucco West”, it did not suffice. TAP is 459 km shorter and costs at least USD 500 m less. Moreover, a week before the Consortium’s decision, it became clear that Azerbaijan’s state company SOCAR would buy a majority share in the Greek gas grid, DESFA. Control over DESFA allows TAP’s further extensions to Greece’s Balkan neighbors, including Bulgaria, initially a Nabucco West transit country. The rejection of Nabucco may be attributed to one more economic factor: the South Stream. The gigantic pipeline partially covers Nabucco’s route and clients. Gazprom started building the 2446 km long pipeline in December 2012.

However, there may be some politics behind Nabucco’s failure. Azerbaijan is in conflict with Russia’s ally, Armenia, over Nagorno-Karabakh, and choosing TAP may have angered Moscow less than choosing Nabucco. TAP challenges primarily Algerian supplies since ENI’s huge contract with Algeria (19.5 bcm/year) expires in 2019. So TAP is likely to enter a different competitive environment and does not challenge Russia’s positions that much. Politics played role also in the EU: Nabucco, an EU project, was a black sheep for EU’s members. Most remarkably, Rome coupled with Moscow to launch South Stream. Visegrad itself was hesitant. Prague promoted Nabucco during its 2009 EU Presidency but later focused on more tangible diversification options. Warsaw, too far to care, invested into the diversification through LNG. Bratislava, cautious about its revenues from Russian gas transit, preferred talking to acting. And Budapest, a partner to both Nabucco and South Stream, eventually preferred the latter.

With Visegrad’s contribution or without, TAP prevailed over Nabucco. Yet, the new situation still brings opportunities for Visegrad. First, TAP may eventually bring the Caspian gas to its doorstep. Given TAP’s initial capacity (10 bcm/a, i.e. 2% of EU’s consumption), its immediate importance is of course marginal. But TAP’s capacity is scalable to 20 bcm. If demand for the gas is sufficient in Central Europe, it can flow through Bulgaria and Romania to Hungary via interconnectors under

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9 The estimated costs of Nabucco and TAP have not been made public. Various sources see them in the range of USD 8 – 15 bn for Nabucco and USD 2 – 7.5 bn for TAP. See for example Reuters: “Russian gas pipeline could doom Europe’s Nabucco plan”, 28 May 2013, http://www.reuters.com/article/2013/05/28/eu-gas-idUSL6N0E41JX20130528.
construction or projected. Second, with a degree of exaggeration it can be concluded that TANAP is the “new Nabucco”: it copies Nabucco’s original route via Turkey. Once the currently unavailable gas comes into game (non-Azeri reserves in the Caspian and the newly discovered reserves in the east Mediterranean and the Black Seas), the infrastructure will be partially ready. Yet, this is a distant and uncertain perspective. In order to increase their energy security, Visegrad and Ukraine may want to look beyond pipelines.

**LNG terminals: a connection to the global gas markets**

It is already a cliché to say that along with the American shale gas revolution the liquefied natural gas (LNG) is a game changer of the global gas markets. The liquid gas cooled to -162 °C takes up six hundred times less volume which allows for transport by sea vessels. The LNG carriers turned the old-style gas trading upside down: gas pipelines are suddenly unnecessary for gas transport. The new-style gas trading needs, however, a special and expensive infrastructure: LNG terminals for loading the sea vessels and regasification terminals for delivery.

The LNG trade has been growing rapidly in the recent years and it will continue to outpace the growth of the pipeline trade in the next 20 years\(^\text{10}\). The global LNG export capacity climbed up to 379 bcm/a in mid-2012, with Qatar currently holding the largest share at over 100 bcm/a. The LNG market supplied one quarter of Europe’s net imports in 2011 and can supply more if American shale gas boom transforms into American LNG export boom in the late 2010s. Russia, the pipeline giant, is a dwarf on the global liquefied gas market (5%) and oriented mainly on diversification of exports towards Asia. Hence, talking “LNG” in Central and Eastern Europe means talking “supplier and route diversification”.

In the future, at least two regasification terminals should be able to supply the market: Swinoujscie on Poland’s coast and Adria on the Croatian island of Krk. Both are part of the North-South corridor relaying the Baltic and Adriatic Seas via the Visegrad countries and both will be co-funded by the European Union. If built, the two terminals will create a real alternative: their initial cumulated capacity (15 bcm/a) could almost alone supply Poland’s yearly gas consumption. Thanks to inter-state gas connectors, the LNG ports should reinforce diversification of supplies, provide leverage for negotiations with Gazprom for its regional clients, and finally increase liquidity (and competition) on spot markets.

**Table 3. Major regasification terminals in Central and Eastern Europe**

<table>
<thead>
<tr>
<th>Name, location</th>
<th>Manager of the project</th>
<th>Capacity (bcm/year)</th>
<th>Status</th>
<th>Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swinoujscie, Poland</td>
<td>Polskie LNG (a subsidiary of the state-owned Gaz-System)</td>
<td>5 (extendable to 7.5)</td>
<td>Under construction</td>
<td>2015</td>
</tr>
<tr>
<td>Klaipeda, Lithuania</td>
<td>Klaipedos Nafta (state-owned)</td>
<td>2 (extendable to 4)</td>
<td>Under construction</td>
<td>2015</td>
</tr>
<tr>
<td>Adria, Croatia</td>
<td>Adria LNG (E.ON, OMV, Total, Geoplin; Croatian firms to enter)</td>
<td>10 (extendable to 15)</td>
<td>Projected</td>
<td>2017</td>
</tr>
<tr>
<td>Ukraine LNG Terminal</td>
<td>LNG Terminal</td>
<td>5 (extendable to 10)</td>
<td>Concept</td>
<td>2016</td>
</tr>
</tbody>
</table>

Source: official websites of the companies.

The opportunities come with risks. The first is the cost of LNG ports, uneasy to bear for the cash-stripped Central European energy companies. Swinoujscie, whose cost flickers around EUR 500 m, has secured funding from European Bank for Reconstruction and Development, European Investment Bank, EU, and from the Polish transit company, Gaz-System, itself. But the

\(^{10}\) IEA: *World Energy Outlook 2012.*
price for such gigantic infrastructural projects can swell, especially due to construction delays. And Swinoujscie’s construction has already been delayed due to the Polish builders stretched by the Euro 2012 soccer cup. Moreover, should LNG imports partially replace pipeline gas, Visegrad countries and Ukraine have to look for a new role for their transit companies.

Another risk is inherent to the nature of the LNG trade. Like the pipeline trade, it is dominated by long-term contracts linked to oil prices with take-or-pay clauses (obligation to import a specific volume regardless of demand). Indeed, the contract concluded by the Polish state-owned gas company PGNiG with Qatar Gas covers a ten-year period, uses oil-price indexation, and imposes gas intake (1.4 bcm/a) with little regard to demand. True, this type of contract secures supplies to Poland vis-a-vis the more attractive Asian LNG market. But it is this kind of inflexible contract that currently allows Gazprom to push PGNiG against the wall. Although Swinoujscie has two thirds of capacity reserved for spot-traded gas (short-term contracts with market prices), PGNiG may find itself tied to another heavyweight supplier. This may be a tradeoff considering the competition on the demand side of the global LNG market. Indeed, one last risky feature is the LNG market’s dominance by Asia’s demand (70 % against Europe’s 21 % in 2012) and wholesale prices (in Japan they are 50 – 70 % higher than in Europe). Exporting LNG to Asia is simply more profitable.\textsuperscript{11}

The Baltic port’s planned capacity is impressive. But it points to the third risk: an insufficient demand. If demand is too low, the investment on the LNG projects may not be commercially viable. The same goes for new distribution infrastructure in Southeastern Europe that is desirable for Adria LNG. European Union’s gas demand is to increase mildly by 2035 (by 0.6% per year on average), the outlook in EU’s eastern states being above the EU average, yet still moderate\textsuperscript{12}. In Central Europe specifically, gas has too many competitors. Nuclear energy’s share in the Czech, Hungarian, Ukrainian, and Slovak electricity mix is above 30% and all of Visegrad and Ukraine plan for new reactors in the next 20 years. Should they not be realized, Germany shows that in the short-term nuclear power can be replaced by cheap coal to complement the weather-dependent renewables.

**European market in transformation: a threat to Gazprom’s grip**

The backbone of European and Asian energy supply security has been for decades the Groningen Concept. Developed in Western Europe in the 1960s, it justified the need for high investments in the gas production and transport. In order to fund them, contracts used to involve a long-term commitment (15, 20, or 30 years), take-or-pay clauses (obliging customer to pay for around 80% of the contracted gas regardless of demand), and gas prices linked to oil prices (making it competitive against other fuels). The supplier bore the price risk, the customer bore the volume risk. The customer, a national gas monopoly, could pass on the price increase to the final consumer. National market shares were secured by destination clauses\textsuperscript{13}.


In continental Europe, the Groningen Concept has been eroded in the past 15 years. EU legislation cracked the national gas monopolies through separation of production and sale from transit, opened the market to newcomers through third-party access to pipelines, and enforced these provisions through antitrust probes. In 2009, market forces kicked in: due to the American shale gas boom, LNG was redirected to Europe. The LNG traded at European hubs has been cheaper than the oil-indexed gas contracted on the long term. As crisis reduced demand\textsuperscript{14}, the national incumbents dumped the extra gas to spot markets, thereby increasing their liquidity even more. The result: today, one third to one half of gas in Europe is supplied on a spot market terms.\textsuperscript{15} Competition increased and final customers can switch suppliers; they are no longer obliged to accept gas price hikes because of increased oil price.

However, Gazprom, Europe’s largest gas supplier, refused to scrap the old model and abandon monopolistic practices. True, its key European customers making huge losses pushed it to some concessions. Gazprom has agreed to include spot-based pricing in contracts since 2009 and reduced prices by up to 15\% (including for Poland) since 2012. Yet, the share of spot-indexed gas does not exceed 8\% and gas prices actually followed the drop of oil prices\textsuperscript{16}. The problem is all the more exacerbated in Central and Eastern European countries. Their infrastructure is East-West oriented and allows for little diversification. Their negotiation power being limited, their prices remain higher than those in Western Europe. When Europe’s second supplier, Statoil, made important concessions on the Groningen Concept (up to 70\% spot-price indexing\textsuperscript{17}), their effect was limited to Western Europe. Perhaps with the exception of Hungary, East Europeans still live in the 1990s.

\textbf{Table 4. Gas prices in selected countries in early 2012}

<table>
<thead>
<tr>
<th>Country</th>
<th>Average gas price (USD per thousand cubic meters)</th>
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</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>503</td>
</tr>
<tr>
<td>Hungary</td>
<td>391</td>
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<tr>
<td>Poland</td>
<td>526</td>
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<td>Slovakia</td>
<td>429</td>
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<tr>
<td>France</td>
<td>394</td>
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<td>Germany</td>
<td>379</td>
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<tr>
<td>United Kingdom</td>
<td>313</td>
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<tr>
<td>Ukraine</td>
<td>416</td>
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</table>


\textsuperscript{14} Demand for gas in the EU fell by 10\% from 2010 to 2011 and by 4\% from 2011 to 2012 (IEA: World Energy Outlook 2012).

\textsuperscript{15} Reuters: “Most of Europe’s gas supplies still linked to oil prices”, 22 February 2013, http://www.reuters.com/article/2013/02/22/energy-gas-europe-idUSL6N0BL8HO20130222.


Given the regional problem, European Commission decided to apply a regional approach. After earlier attempts of involvement in negotiations with mixed results, it launched a full-scale antitrust investigation against Gazprom in September 2012. DG Competition suspects Gazprom of abuse of dominant position (Article 102 of the Treaty on the Functioning of the EU) on the upstream gas markets in Central and Eastern Europe. The Commission suspects Gazprom of three practices hindering competition and supply security. First, it may have applied destination clauses, banning resale of gas across Europe. Second, it may have prevented the diversification of supply by blocking new pipelines and LNG terminals as well as third-party access to transport infrastructure partially owned by Gazprom. And, finally, it may have imposed unfair prices on its customers by linking the price of gas to oil prices.18

Although the company and Russian government reacted furiously, DG Competition’s chances to break Gazprom’s grip are high. Kremlin’s attempts to block the investigation by a Federal Decree as well as any political pressure from EU capitals will have little impact on the same DG that sanctioned Microsoft. If Gazprom does not agree on a settlement, it is heading towards a prohibition decision with fines estimated at EUR 10.6 bn.19 An appeal before the EU Court of Justice would have a marginal effect on DG Competition’s case. Indeed, according to one competition law expert, it may be “the landmark antitrust case of this decade, as Microsoft was of the last decade”20. It can last for up to four years, but once over, it is likely to transform the whole European gas market and push Gazprom’s strategy towards a market-oriented model.

The European gas trade heads towards a new era of short-term pricing. Central and Eastern Europe should prepare for it. Two main challenges are ahead. First, how will the new infrastructure be funded on the short-term pricing market? Investments into networks are necessary, if Visegrad and Ukraine want to trade gas and transport most of the Russian gas to Europe. They are even mandatory on the free market where competitors have to be provided access to gas transport and storage. If the current Gazprom contract duration (10 – 15 years) is insufficient compared to pipeline amortization periods, shorter contracts will cause even more problems. Returns on investment on a liberalized market with a multitude of competitors will be possible, but difficult.

Second, how can gas be efficiently traded on immature spot markets? Compared to the U.S. Henry Hub, Europe’s gas hubs (national trading points) are generally much smaller and less liquid. In addition, most of the short-term traded gas is actually supplied by the same companies than the long-term traded gas. And spot markets are even less developed in Central Europe. The Visegrad’s share in EU’s gas consumption was only 9% in 2012. And the closest trading point, the Central European Trading Hub in Baumgarten, Austria, serves mostly for gas transit. Such a market can be easily manipulated, especially when the number of suppliers is limited. High demand can cause a steep price hike, for example, during the cold periods.

3. Non-conventional gas sources: a panacea for European energy security?

By Helena Schulzova

During the last decade, the United States experienced a perfect storm in its energy sector, something that is now widely known as the Shale gas revolution. According to various predictions, Europe, and especially its Central and Eastern part, should possess similar abundance of ‘unconventional’ natural gas that could now be yielded thanks to the new technology behind the shale gas boom in the United States. However, there is probably no similar revolution ahead of Europe, at least not at such an abrupt pace.

Soaring fossil fuels prices and very uneven position of exporting and importing countries led to long-term investment into several technologies that around 2006 triggered shale gas revolution and completely changed the outlook of global energy market. First of all, drilling techniques were significantly improved and now allow for horizontal drilling. Imaging technologies have also improved tremendously and now enable detailed imaging of potential source rock and help find ‘sweet spots’ with the most gas. Most importantly, unconventional gas that was long beyond the reach of drilling can now be extracted thanks to a technology known as hydraulic fracturing. Whereas conventional gas flows on its own when tapped, unconventional gas has to be extracted by cracking the rock in which it is contained. This is mostly done with a mixture of water, sand and chemicals that are injected under pressure into the source rock, which cracks and allows the gas to flow and to be collected. Crucially, the introduction of LNG as a common and financially viable way of transporting natural gas makes it possible for the U.S. to start exporting natural gas.

The U.S. in the coming years is expected to produce so much gas from shale that it can export it.\(^{21}\) Only a few years ago the U.S. was facing the danger of insufficient domestic production of gas and a need to rely on imports. Now projected reserves should cover domestic consumption for decades to come\(^{22}\); in 2011, the U.S. production of unconventional gas was over 7 trillion cubic feet which was approximately 34% of the overall gas production.

The abundance of unconventional gas resulted into such a decrease of gas prices that drilling is now focused on wells that yield not only gas but also oil. Cheap natural gas is beneficial to all energy intensive industries as well as petrochemical industry that uses gas not only as a source of energy but also as an input. Cheap shale gas does push down consumption of coal in the U.S., and it postponed any plans for new nuclear power plants.


\(^{22}\) The latest estimate by EIA is 316 trillion cubic feet [http://www.eia.gov/naturalgas/crudeoilreserves(235,916),(765,933)]
Cheap domestic gas is now increasingly used for heating and electricity production and most probably will soon have a significant share in transportation as well. Gas share in electricity generation has been growing by 3% annually and has reached 25% in 2011.  

**European unconventional gas**

According to geological surveys and various projections, the deposits of unconventional gas in Europe can or may be almost as potent as those in the United States (see Figure A in Annexes). Poland and Ukraine especially should have large deposits of various forms of unconventional gas such as coal bed methane (CBM) contained in coal deposits and tight gas locked in rock with low porosity and permeability. However, reserves of unconventional gas are very hard to predict without proper testing done by drilling of hundreds of test wells to find sweet spots with the most gas. This was possible in the U.S. where many small and mid-sized companies took a considerable risk and drilled thousands of wells. In Europe, the players are very different and almost all current unconventional gas test drilling has been done in some form of joint venture with large international oil companies that are able not only to bring knowledge and experience to Europe, but also move it to more promising basins anywhere in the world when testing results are unsatisfactory.

What happened in the U.S., therefore, may not be easily replicable in Europe, at least not at a similar pace. First of all, Europe lacks some crucial preconditions: the infrastructure, liberalized gas market and transportation networks accessible to whoever pays. Transportation networks and storage facilities in Europe are for the most part held by few supplier companies including Gazprom

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23 EIA AEO2013 Early Release Overview [http://www.eia.gov/forecasts/aeo/er/early_elecgen.cfm](http://www.eia.gov/forecasts/aeo/er/early_elecgen.cfm)
and are not freely accessible to outside supplies. Infrastructure also means the number of physically available drilling wells and skilled professionals able to do the testing and run the wells.

Besides that, European geology seems to be especially challenging for unconventional gas drilling and might need significantly different techniques than the ones used in the U.S.: shale gas in Europe is located deeper (which influences pressure of drilling, flow rates as well as increased underground temperatures); plays are smaller and more fractured; and clay content in Europe is higher which makes fracturing more difficult. Another important factor is high population density in Europe and land ownership rights. In the U.S., the landowner also owns mineral resources underneath his or her property; in Europe, the mineral resources are mostly state-owned. Thus, local inhabitants in the U.S. often favor drilling since they share the profits whereas in Europe, any mining and drilling activities usually cause great disapproval by locals. High density may be equally problematic since productive drilling requires many test wells and thus an extensive territory. In densely inhabited territories test wells sometimes cannot be placed on ideal spots because of human settlements.

Hydraulic fracturing – a dangerous method?

Hydraulic fracturing technology was banned in some states of the U.S. and in various European countries including France and the Czech Republic. Germany is not allowing test drilling even though it doesn’t have an actual moratorium. First of all, hydraulic fracturing requires large amounts of water mixed with sand and various chemicals. There is some danger that this contaminated water may compromise underground waters. Few accidents happened in the U.S., though large International Oil Companies (IOCs) that are drilling in Europe are generally less prone to such incidents than small and mid-sized companies that pioneered the technology in the U.S. Nevertheless, the water used for fracking has to be handled cautiously and cleaned.

In addition, there is a suspicion that the technique may cause minor earthquakes: due to earth tremors test drilling was withheld near Blackpool, UK in 2011. However, conventional mining as well can trigger quakes and according to research of Durham University, the risk of earthquakes caused by hydraulic fracturing is minor and can be further reduced by using advanced 3-D seismic imaging.

Another problematic issue may be methane gas leakages during production of unconventional gas, since methane is an even more potent GHG than CO₂. Small amounts of methane are also leaked during conventional production but the estimates for hydraulic fracturing vary widely. Recent study by MIT of 4000 wells in the U.S. suggests that the amount of methane released by hydraulic fracturing is relatively low and is further reduced by the use of two techniques – gas flaring and green completion. In case the percentage of methane leaked during fracturing is significantly over 2%, it may put into jeopardy the reputation of unconventional gas as a relatively clean ‘transitional’ fossil fuel.

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24 The ‘Shale Gas Revolution’: Hype and Reality, Paul Stevens, Chatham House, September 2010; Can Unconventional Gas Be a Game Changer in European Gas Markets?, Florence Geny, The Oxford Institute for Energy Studies, December 2010

25 Induced seismicity and hydraulic fracturing for the recovery of hydrocarbons, Richard Davies, Gillian Foulger, Annette Bindley, Peter Styles, Marine and Petroleum Geology vol. 45, August 2013

26 Shale gas production: potential versus actual greenhouse gas emissions, Francis O’Sullivan, Sergey Paltsev, Massachusetts Institute of Technology, November 2012
Central and Eastern Europe – a prospective site

Deposits of unconventional gas are scattered across Europe, but Central and Eastern Europe together with the UK seem to be the region with the best prospects for drilling. Countries in Central and Eastern Europe are more dependent on gas from Russia and accentuate energy security more than the western parts of the continent. Many countries of the region already have domestic coal and gas mining industry. Yet, population in Central and Eastern Europe is now more environmentally conscious and hydraulic fracturing has faced aversion by local communities.

Environmental hazards are cited as the main reason for moratorium on both exploration and production of unconventional gas in the Czech Republic. In 2012, Ministry of the Environment has cast the moratorium for 2 years ending July 2014. Ministry of the Environment is currently examining a possibility of comprehensive legislation on unconventional gas.

Estimated deposits of unconventional gas in the country are very vague and most projections don’t expect production larger than a few percent of the country’s overall consumption. Today, about 98% of Czech natural gas is imported (78% of imports come from Russia, and the rest from Norway), so significant local production would be very favorable for the country’s energy security. Before the moratorium, two licenses were awarded, one to Australian BasGas Energia and one to British Caudrilla. Yet due to the lack of consultations with regional governments and public outcry in affected regions, exploration licenses were quickly withheld in 2012 and the moratorium was cast shortly afterwards.

In a way, situation of Slovakia is similar to that of the Czech Republic. Shale gas and other unconventional haven’t caused wide public debate. Current energy policy draft in Slovakia doesn’t mention possible domestic production of unconventional gas at all. Similarly to the Czech Republic, geological information on deposits of unconventional is rather vague and projections do not expect massive production. British Aurelian Oil & Gas has been exploring for shale in eastern Slovakia though no drilling took place. There are hopes that some shale formation in the south of Poland might overlap with Slovakia.

Hungary has quite a significant level of local production of gas and, therefore, has some advantage before other European countries without any mining or drilling know-how. Hungary also has a high share of natural gas in its energy mix (38% in 2010). Geological surveys even suggested shale gas basin suitable for drilling. MOL, the largest energy producer in the country, formed a joint venture with ExxonMobil to explore possibilities of drilling. However, after some disappointing test drilling ExxonMobil decided to pull out of the country in 2010.

Poland is one of European countries with the most favorable projections for unconventional gas deposits, even though the latest assessments reduced the previous estimates. It also has a quite strong gas production lobby not only because it depends on the Russian gas but also because it needs to scale down its GHG emissions from burning coal, and cheap domestic gas seems to be the best solution. Also, Poland already awarded over 100 licenses for unconventional gas exploration.

28 Energetická bezpečnost ČR a budoucnost energetické politiky EU, Filip Černoch et. al. Mezinárodní Politologický Ústav Masarykovy Univerzity, 2010
29 Návrh energetickej politiky Slovenskej republiky, Ministerstvo hospodárstva Slovenskej republiky, May 2013
30 Central and Eastern European Shale Gas Outlook, KPMG International, 2012
So far the results are inconclusive, some companies even decided to leave Poland, but according to Energy Information Agency, the somewhat disappointing results don’t necessarily mean that drilling in Poland is not commercially feasible. In the U.S., it took hundreds of wells to achieve commercially viable production.

What might hamper unconventional gas in Poland though is a too strict regulatory framework and strong taxation of unconventional production. New Geological and Mining Law came into force in early 2012 but it is still possible that a new law specifically regulating shale gas might be introduced; according to the Mining Law, exploration licenses are now granted through tenders.

**Ukraine** shares with Poland favorable predictions of deposits as well as enthusiasm of the politicians. Test drilling is not as advanced as in Poland; however, on January 24, 2013, Ukraine signed a major contract with Shell that will enable exploration of Yuzivska gas field in eastern Ukraine. The contract with Shell is a 50% joint venture and envisages drilling 15 wells. Chevron, another IOC, is in negotiation with Ukraine for another joint venture in Olesska field in the west of the country. Signing of the deal has been delayed due to disagreement with local communities and far-right Svoboda party. 

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32 Shale gas report – Poland, *Ernst & Young*, 2012
33 Ukraine drops deadline for signing Chevron shale gas deal, Reuters, January 29, 2013
4. Cooperation of gas transiting countries in Central, Eastern and South Europe: impact of reverse gas flows and better interconnection on EU energy security

By Dmytro Naumenko

Recent developments of European gas market showed a number of threats for energy security that evolved from drastic changes in production, transit and supply routes of natural gas to Europe. New European gas market model built on the principles of diversification, security of supply, interconnectivity and liberalization is expected to deliver both new possibilities and challenges for gas transiting countries in Europe. On the one hand, a gradual shift to spot gas markets in Europe will mean fair pricing driven by competition. On another hand, abolishment of long-term pipeline supply contracts will bring high level of uncertainty and price fluctuations for countries that lack diversification of supply sources like the countries in Central and Eastern Europe. This situation will force the CEE region to search for the new sources of supply; craft reverse supply contracts in the framework of the 3rd Energy package, finance investments in new transit and interconnection infrastructure and development of trading hubs for better matching of demand and supply of gas in the region. We believe that the abovementioned challenges are only to be addressed based on deeper cooperation between the main gas transiting countries in the region, including Ukraine.

The importance and associated challenges of East-to-West Gas Corridor for the EU and the CEE region

According to BP, Russian imports to European countries constituted 130 bcm in 2012 or almost 35% from all pipeline supplies. It makes Russia the largest natural gas supplier to Europe (followed by Norway with 107 bcm shipped in 2012). According to the International Energy Agency (IEA), the majority of Russian gas imports to Europe are delivered through two former Soviet countries, Ukraine and Belarus, and four Central European countries known as Visegrad group, namely Slovakia, Czech Republic, Hungary and Poland. These countries host sections of the largest Russian gas transit pipelines to Europe (see Table A in Annexes for full list of the pipelines) with cumulative capacity of 180 bcm/a or about 70% of total commissioned ones at the former Soviet Union border. Amid them Ukraine holds the strategic position with up to 142 bcm/a of transit capacity. The CEE region and Ukraine are also important for European energy security as large holders of underground gas storages (UGS). Together, Ukraine, Hungary, Czech Republic, Slovakia and Poland possess 36 UGS able to storage almost 50 bcm of gas. These storage facilities were built along already established gas transit routes to Europe and are crucial for leveling off daily gas consumption fluctuations, providing additional flexibility and security of supply in case of unexpected shortages. Also, UGS normally serve as a mitigating factor in gas pricing by smoothing seasonal price fluctuations (the peak of demand usually falls to the winter season) in the gas market and can be considered as an important element of spot gas trade (but not the crucial one).

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Figure 5. East-to-West Gas Corridor capacities and dependence of the CEE countries on Russian pipeline supplies (as a share in total pipeline imports)

Source: The International Energy Agency; BP; East European Gas Analysis; The Economist (map)

As Figure 5 depicts, the majority of already built transit gas pipeline capacities to Europe from Russia pass through territories of Ukraine, Belarus and Visegrad countries. As discussed below, such positioning of the pipelines is optimal in terms of delivery distances and costs of transit but also are coupled with certain risks for energy security in Central and Eastern Europe for a number of reasons. The core question is how the EU and the CEE region will be able to cope with these risks?

Given the forecasts for gas market development in the EU the dependence of Europe on gas supplies will continue to grow in the long run. Projections for future gas demand in Europe are highly uncertain reflecting the possible developments of a number of factors such as the gas use in power generation (depending on price competitiveness of gas relative to other fuels), the impact of European legislation on fossil fuels use (namely, the Large Combustion Plants Directive and Industrial Emissions Directive), and the European carbon reduction policy aimed at energy saving and expansion of renewables. Namely, increasing the energy efficiency of European economies and further expansion of renewables will drive decreasing demand for natural gas in Europe whilst stricter EU regulation for greenhouse gases emissions will demand more gas by power generation and transport sector as a bridge fuel to carbon-free technologies. Based on the IEA\textsuperscript{35} and the European Commission\textsuperscript{36} projections and assuming that the EU will more or less reach the climate policy targets by 2020 we can suggest that the demand for gas in Europe will demonstrate a slightly moderate growth reaching nearly 600 bcm gas consumption by 2030 (about 1% CAGR compared

\textsuperscript{35} World Energy Outlook 2011, The New Policies Scenario and 450 scenario

to 2010\textsuperscript{37}. Thus, the share of natural gas in the primary energy mix should grow from 25\% in 2010 to 28\% by 2030.\textsuperscript{38}

The IEA and CERA projections demonstrate that Europe will face significant need in increasing pipeline gas supplies in the long-term perspective. Given uncertain prospects for indigenous gas production inside the EU (especially in the UK and the Netherlands)\textsuperscript{39} and LNG supplies to European markets\textsuperscript{40} net gas imports to the EU is expected to rise from 302 bcm in 2011 to 525 bcm in 2035, with the share of imports in total consumption jumping from 63\% to 85\%.\textsuperscript{41}

**Figure 6. Gas balance in Europe, in bcm**

![Graph showing gas balance in Europe](image)

*Source: Gazprom*

Therefore, increasing dependency of Europe on gas imports will raise a security issue of long-term gas supplies and dependency on its primary supplier, Russia. After full commissioning of new Russian pipelines projects (Nord and South Streams) it is expected that Russia will be able to cover European long-term demand gap for imports. According to Reuter’s research, Gazprom will keep its share on Europe’s gas market steady at around 30\% by 2023.\textsuperscript{42} But if permanent Russia’s power is more or less acceptable for the old Europe (it will have a diversified gas supply mix even after an increased share of pipeline supplies from Russia), Eastern and Southern parts of Europe will remain locked-in to the existing gas transit infrastructure and highly dependent on Russian gas supplies. More specifically, such status quo means that CEE and SEE countries remain vulnerable in terms of interruptions of supply (the likes of January 2009 gas crisis), separated from alternative EU gas supplies (e.g., gas flows from Norway and North Africa) and major spot trading markets in Western

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\textsuperscript{37} We tend to employ a bit optimistic estimates for gas demand in Europe considering that the natural gas fired power plants will obviously be used as “bridge technology” for the back-up of wider use of renewables in power generation due to the smallest emissions levels and CAPEX. Another driver in gas demand for long term will be the transport sector due to new maritime regulation in the EU and the development of natural gas fuelled vehicles.

\textsuperscript{38} CERA Global Redesign Scenarios, October 2012

\textsuperscript{39} According to CERA Global Redesign and LT Scenarios for 2012, domestic production is expected to decline by 1.7\% per year between 2010 and 2030.

\textsuperscript{40} There is a risk discussed that in the longer run the LNG supplies will leak to Asian markets which already offer higher margins for suppliers.

\textsuperscript{41} The IEA World Energy Outlook 2012, p. 147

\textsuperscript{42} [http://uk.reuters.com/article/2013/07/18/uk-energy-gas-europe-analysis-idUKBRE96H0SE20130718](http://uk.reuters.com/article/2013/07/18/uk-energy-gas-europe-analysis-idUKBRE96H0SE20130718)
Europe that provide additional possibilities for arbitrage pricing to Gazprom (see Chapter 2 for details). To solve these challenges the issues of better interconnection of these regions in North-South and East-West direction are currently discussed, as well as Western Europe’s increasing participation in European spot gas trade that can potentially connect the Central and Eastern Europe to alternative sources of supply and improve their power for re-negotiation of long-term supply contracts (LTSCs) with Gazprom after the common gas market of the EU is created.

Reverse gas flows and new gas interconnectors in CEE and the Southeast Europe

Reverse gas flows or backhauling is transportation of gas in the reverse direction to the main flow of the pipeline. This is usually achieved by swap arrangements rather than by physical movements. Reverse gas flows or backhauling is transportation of gas in the reverse direction to the main flow of the pipeline. This is usually achieved by swap arrangements rather than by physical movements.43 Physical movements of gas in Europe in reverse direction were performed only during the recent gas crisis in 2009 when gas inflow from the Eastern border of the EU was ceased and some amount of gas from UGS in Western Europe was pumped to the East (e.g. Austria to Hungary direction in January 2009).

Today the legal grounds of swap reverse contracts remain uncertain despite the fact that they received high political support in the EU. Namely, it’s still unclear whether it violates the provisions for so-called “delivery points” in LTSCs, especially those signed with Russian Gazprom. According to EU Commissioner for Energy Günther Oettinger, virtual reverse flows are entirely consistent with the rules of the EU and the Energy Community and are considered as one of the ways to optimize the supply and trade of gas within the internal market of the EU (and that of the Energy Community), and can be implemented as swaps between different buyers. The first reverse contracts in the EU had been implemented in Poland on the Yamal Europol pipeline.44

Ukraine potentially can benefit from changing contracting rules in Europe for launching gas reverse from the West direction. In November 2012, Ukraine’s gas monopolist Naftogaz signed an agreement with German gas company RWE creating a legal framework for the possible import of natural gas from Europe – a deal that wouldn't contain binding purchase or supply commitments. After that Ukraine started purchasing gas from RWE via Poland and later, in 2013, had been testing reverse gas supplies from Hungary and Slovakia. Currently the Ukrainian government expects to sign a contract for the supply of 7 bcm/a through Hungary and Slovakia, reducing import from Russia to 18 bcm. Slovakia is believed to be the main reverse gas transporting corridor from the EU to Ukraine.45

Nevertheless, introduction of gas reverse to Ukraine from European gas market has some peculiarities and pose some risks. First, due to legal uncertainties the reverse probably will be carried out only by physical interconnection of Ukrainian gas transmission system with the pipelines of bordering countries. The tests of gas reverse with Slovakia showed that real-time unified rules and data transfer are needed to guarantee the correctness of virtual gas flows and avoid the legal hurdles with the gas owner – Russian Gazprom (the topic of so-called shipper-codes that prove the gas origin). In this case the question of who will invest in new physical interconnectors remains unresolved. Second, the projections for new gas deliveries in the CEE region (mainly, LNG supplies) and gas demand show that it will not probably be significant volumes of spot traded gas there as

43 http://www.gasstrategies.com/industry-glossary
the region is relatively small in European dimension. The situation may be changed only if shale gas will outflow to this market which is also possibly but not very certain today. Third, and more important, there will be no much price difference for traded spot gas and pipeline gas in long-term and for this reason gas reverse may not become commercially viable. Finally, all the above-mentioned options will be available for Ukraine only after integration to common gas market of the EU which also can be a long-lasting and difficult path.

The idea of deeper energy interconnection of Central, Eastern and Southern Europe with North and West has been promoted at the highest level in the EU. The EU Energy Infrastructure priorities for 2020 and beyond among other issues include development of a **North-South Energy interconnection** linking the Baltic Sea, the Adriatic Sea and the Black Sea. With establishment of a High Level Expert Group this project was officially launched on February 3, 2011. On the regional level, the Visegrad countries signed the Memorandum of Understanding in February 2010 when all the countries agreed to support the promotion of the North-South Interconnection and the Nabucco pipeline. The general idea is to connect the region to alternative supply routes (mainly from Western Europe and North Africa) and interconnect the national transmission systems enabling gas flows in bidirectional North-South manner.

**Figure 7. The North-South Gas Corridor (triangle)**

![Diagram of the North-South Gas Corridor](source: Energy security of the V4 countries. How do energy relations change in Europe? - The Kosciuszko Institute 2011)

Figure 7 depicts the projected North-South Gas Corridor as a triangle with LNG terminals on each top and Nabucco pipeline in the middle, with well interconnected systems among the region. Visegrad countries (V4) cooperation regarding North-South Gas Corridor was recently broadened in
the V4+ framework, with indispensable involvement of Croatia and Romania. In terms of intra-national networks, the corridor can be split over the following projects:46

- **Baltic Pipe**: Gas-System (Polish TSO) underwent preparatory works to announce Open Season procedure in 2013. The pipeline would open the possibility for transmission of natural gas from the Norwegian Continental Shelf to Poland and provide access to the global LNG market for Scandinavian countries.
- **Poland – Slovakia interconnector**: a perspective project after 2016. In late 2010, Memorandum of Understanding was signed between national TSOs to shape the project and prepare feasibility study.
- **Czech – Poland interconnector**: the 32 km pipeline was launched in September 2011, further expansion is planned.
- **Czech – Slovakia reverse flow**: the project was completed in mid-2011 enabling physical reverse gas flows from Northwest to East Europe terminating in Slovakia.
- **Hungary – Slovakia interconnector**: the project is expected to be completed by the middle of 2014 with projected capacity of 5 bcm/a.
- **Croatia – Hungary**: commissioned from the end of 2010 in the direction to Croatia.
- **Hungary – Romania**: online from late 2010 in the direction to Romania.

### Table 5. Investments into North-South Gas Corridor projects, EUR m

<table>
<thead>
<tr>
<th>Project</th>
<th>Investments</th>
<th>EU funding</th>
<th>Share of EU funding (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baltic pipe</td>
<td>8.6</td>
<td>4.3</td>
<td>50</td>
</tr>
<tr>
<td>Poland – Slovakia interconnector</td>
<td>0.4</td>
<td>0.2</td>
<td>50</td>
</tr>
<tr>
<td>Czech – Poland interconnector</td>
<td>2.3</td>
<td>2.3</td>
<td>100</td>
</tr>
<tr>
<td>Czech – Slovakia reverse flow</td>
<td>1.9</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hungary – Slovakia interconnector</td>
<td>160.0</td>
<td>30.0</td>
<td>19</td>
</tr>
<tr>
<td>Croatia – Hungary interconnector</td>
<td>395.0</td>
<td>120.8</td>
<td>31</td>
</tr>
<tr>
<td>Hungary – Romania interconnector</td>
<td>68.1</td>
<td>33.0</td>
<td>48</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>636.3</strong></td>
<td><strong>190.6</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

*Source: the national TSO reports; European Commission; own estimates*

Therefore, significant advantage of the Corridor is its scope. This is not a single, huge-scale project with enormous required financing but rather a series of small-scale components (see Table 5) removing identified infrastructural gaps which will deliver deeper inter-connection to the whole region at the lowest possible costs.

### Possible cooperation of CEE countries with Ukraine

Adding the fourth angle to the above mentioned triangle on the Eastern border, namely Ukraine, could increase the number of mutual benefits for the V4 countries and Ukraine in the following manner:

1. **Connection of existing pipelines and planned interconnectors to Western part of**

Ukrainian GTS and inclusion of Ukrainian UGS into North-South gas corridor would automatically reduce the need to build additional interconnecting pipelines in CEE region. Together, such an idea if realized would make the project of North-South interconnectors cheaper (some investments should be made in modernization of Ukrainian GTS) and will provide transit and storage infrastructure for organizing spot gas trade in CEE region. However, such connection would be only possible after Ukraine implements regulatory decisions for capacities allocation rules and third-party access to transiting and storage facilities according to the EU legislation.

(2) Establishment of the gas trading hub on the Eastern border of the EU. Planned deeper interconnection of the CEE gas markets and the associated possibilities for free gas trade flows in both East-West and North-South directions give a chance to set up a large East-European gas trading hub. Such trading platform would become an important step towards the spot-based gas trade in the region comprising new LNG deliveries from North and South directions and new pipelines deliveries from South (South Stream and Nabucco West/TAP). The recently crafted reverse supply contracts may become an important element of this spot trade.

(3) Development of the joint policy for necessary investments in infrastructure and search for the new supply sources. The Visegrad countries will have to find the necessary investments in construction of interconnecting pipelines and LNG terminals while Ukraine needs to attract investments in modernization of existing gas transmission and storage infrastructure. Considered as a united project with clearly defined goals and mutually recognized benefits for each party such an initiative can be a strong supporting factor for attracting the investments from the EU side and international financial organizations.

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47 Current capacity of Ukrainian UGS is about 31 bcm and approximately half of it can be used for securing the gas supplies in the CEE region. Technically, these capacities can be increased to 50 bcm.

48 According to the statements made by the Ukrainian Minister of Energy Eduard Stavytsky in May-June 2013:

49 According to the Energy Charter Secretariat and OJSC “Naftogaz”, Ukraine has to spend about USD 4 bn on modernization of national GTS (including UGS) as about 29 % of gas pipelines and gas compressor units have exceeded their designed service life; more than 60% of pipelines have been in use for 10-33 years.
Conclusions and recommendations

The European gas trade faces a new era of short-term pricing. To prepare for it Central and Eastern Europe should solve two main challenges.

First, they have to decide how the new infrastructure on the short-term pricing market will be funded. If Visegrad countries and Ukraine want to trade gas across borders and keep transporting most of the Russian gas to Europe, they need to invest into networks. Investments become mandatory on the liberalized market where competitors can access gas transport and storage. If currently the duration of a Gazprom contract (10 – 15 years) is insufficient compared to pipeline amortization periods, then shorter contracts will cause even more problems. Returns on investment on a liberalized market with a multitude of competitors will be possible, but difficult.

Second, the CEE countries have to develop spot markets to efficiently trade gas. Compared to the U.S. Henry Hub, Europe’s gas hubs are much smaller, less liquid, and partially supplied by the same companies as the long-term traded gas. Spot markets are even less developed in Central Europe. The Central European Trading Hub in Baumgarten, Austria serves mostly the gas transit. Such markets can be easily manipulated, especially when the number of suppliers is limited.

Therefore, Visegrad and Ukrainian governments should coordinate their national energy policies and name EU’s energy targets for the next decades. They could even form a buyers’ consortium within Visegrad with possible inclusion of Ukraine. The CEE region supply security will be enhanced from the interconnection with the Ukrainian GTS and access of European gas traders to Ukrainian underground gas storage facilities. Establishment of gas trading at the Eastern border of the EU on the basis of Ukrainian and V4 gas storage capacities under the 3rd Energy Package could further improve the energy security in the region.

To solve the gas diversification problem the CEE countries should incite national companies to coordinate large infrastructural projects (LNG terminals, interconnectors) and lobby together for EU funding. They could create a regional market along the European Gas Target Model prescribing liquid regional hubs and interconnectors and move towards harmonization of national market regulation. Better interconnection of pipelines will also benefit the unconventional gas production.

To fight Gazprom’s monopolization of the market, the CEE countries should assist the European Commission in the Gazprom antitrust probe and invite the EC representatives to the negotiations of national incumbents with Gazprom. Countries of the region should support construction of interconnectors in Ukraine and Southeastern Europe and keep exporting EU rules beyond EU’s borders vis-a-vis the Energy Community and Energy Charter.

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50 The idea of a Visegrad consortium potentially including Croatia that would purchase gas internationally was proposed by Urban Rusnak, former Project Leader of External Energy Security at the Slovak Ministry of Foreign Affairs, in an interview conducted by Pavol Szalai on 11 June 2013.
### Table A. Outlet Capacity of Export Pipelines at the FSU Border, bcm/a

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Capacity</th>
<th>Destination of exports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Via Ukraine:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orenburg-Western border (Uzhgorod)</td>
<td>26</td>
<td>Slovakia, Czech Republic, Austria, Germany, France, Switzerland, Slovenia, Italy</td>
</tr>
<tr>
<td>Urengoy-Uzhgorod</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Yamburg-Western border (Uzhgorod)</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Dolina-Uzhgorod - 2 lines</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Komarno-Drozdowichi - 2 lines</td>
<td>5</td>
<td>Poland</td>
</tr>
<tr>
<td>Uzhgorod-Beregovo - 2 lines</td>
<td>13</td>
<td>Hungary, Serbia, Bosnia</td>
</tr>
<tr>
<td>Hust - Satu-Mare</td>
<td>2</td>
<td>Romania</td>
</tr>
<tr>
<td>Ananyev-Tiraspol'-Izmail &amp; Shebelinka-Izmail - 3 lines</td>
<td>26</td>
<td>Romania, Bulgaria, Greece, Turkey, Macedonia</td>
</tr>
<tr>
<td><strong>Total via Ukraine:</strong></td>
<td><strong>142</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Via Belarus:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yamal-Europe (Torzhok-Kondratki-Frankfurt/Oder)</td>
<td>33</td>
<td>Poland, Germany, Netherlands, Belgium, UK</td>
</tr>
<tr>
<td>Kobrin-Brest</td>
<td>5</td>
<td>Poland</td>
</tr>
<tr>
<td><strong>Total via Belarus:</strong></td>
<td><strong>38</strong></td>
<td></td>
</tr>
<tr>
<td>St. Petersburg-Finland - 2 lines</td>
<td>6</td>
<td>Finland</td>
</tr>
<tr>
<td>Blue Stream (design capacity)</td>
<td>16</td>
<td>Turkey (possible to Greece, Macedonia)</td>
</tr>
<tr>
<td>Nord Stream (design capacity)</td>
<td>55</td>
<td>Germany, France, Czech and others</td>
</tr>
<tr>
<td><strong>TOTAL EXISTING EXPORT CAPACITY:</strong></td>
<td><strong>257</strong></td>
<td></td>
</tr>
<tr>
<td><strong>New Projects (Final Investment Decision Stage):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Stream</td>
<td>63</td>
<td>Bulgaria, Serbia, Greece, Italy and others</td>
</tr>
<tr>
<td><strong>Other New Projects:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nord Stream-3 and -4</td>
<td>55</td>
<td>Germany, France, Czech, UK and others</td>
</tr>
<tr>
<td>Yamal-Europe-2</td>
<td>15</td>
<td>Poland, Slovakia, Hungary and others</td>
</tr>
<tr>
<td><strong>Sub-total new capacity:</strong></td>
<td><strong>133</strong></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL PLANNED EXPORT CAPACITY:</strong></td>
<td><strong>390</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Guaranteed contracted exports for 2020-2025</strong></td>
<td><strong>158</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: East European Gas Analysis*
Figure A. Location Shale Gas Prospects in Eastern Europe

Source: Advanced Resources International, Inc., 2011. World Shale Gas