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Diversity of gas supplies as a key precondition for an effective V4 gas market

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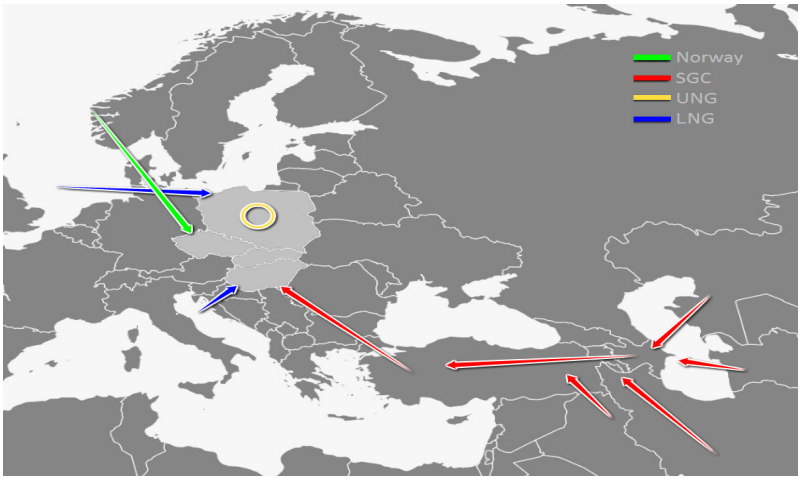
Introduction

In 2013, the Polish Centre for Eastern Studies (OSW) issued a paper by Sergio Ascari, *The Gas Target Model for the Visegrad 4 region*.[1] The paper outlined a conceptual analysis of the plausibility of an integrated natural gas market in the V4 region. In it, Ascari concluded that integrating smaller markets would be beneficial providing the final market fulfills the following basic criteria of liquidity:

1. Size of at least 20 bcmy
2. Three different sources of gas
3. Low wholesale market concentration (HHI 2,000 or less)

This study intends to provide a detailed overview of the diversification options that could, in the medium term, boost the number of independent sources of gas supplied to the V4 border. We evaluate the pipeline (PNG) options of Norway and the Southern Gas Corridor (SGC), unconventional resources (UNG), and liquefied natural gas (LNG) that will be supplied to the V4 as early as 2015.

Illustration 1. Diversification options



Source: Free vector maps.com; editing: szoter.com.

[1] S. Ascari, *The gas target model for the Visegrad 4 region – conceptual analyses*, Warsaw: Ośrodek Studiów Wschodnich, 2013. Available online: http://www.osw.waw.pl/sites/default/files/raport_04_the-gas-target-model_net.pdf (accessed on December 8, 2014).

Since liberalized markets are, in general, more attractive for new suppliers than heavily regulated ones, we start with a brief overview of the current situation on the V4 natural gas markets in order to track the individual market paths of development towards liberalization and competitive trading. We use this line of reasoning to outline the difficulties in getting new sources of supplies to the market(s).

Conceptual framework

The conceptual framework used in our analysis is a modified version of the "4A" energy security dimensions drawn up by Kruyt et al.:[2]

- Availability (physical availability of resources)
- Accessibility (geopolitical aspects associated with accessing resources)
- Affordability (economic costs of energy)
- Acceptability (social and often environmental stewardship aspects of energy)

For the purposes of the study, and given the issue, we have modified these dimensions in the two following ways: 1. We combine the availability and accessibility of natural gas into one dimension as both are often determined and shaped by policies of the gas exporting countries; 2. Instead of social/environmental acceptability we analyze the risks related to sourcing from and transiting through the countries considered in the analysis. We base this decision on the fact that natural gas can be considered an ordinary fuel and, with the exception of the unconventionals, does not raise significant societal or environmental concerns. By contrast, in the V4 region, the public mostly associates natural gas with supply disruptions and political manipulation. We therefore base the acceptability of new sources on the risk of supply disruption they represent.

[2] B. Kruyt, D. P. van Vuuren, H. J. M. de Vriesand, H. Groenenberg, "Indicators for energy security," *Energy Policy*, Vol. 37, No. 6, 2009, p. 2166–81.

Theoretical assumptions

In keeping with Adelman[3], Yergin[4], Noël[5], De Jong and van der Linde[6], and Nordhaus[7], we argue that, in terms of the policies pursued by actors, the very basis of international energy transactions is trade, i.e. mutually beneficial exchange that can be expressed in money terms. However, the business strategies of those who operate in a network industry such as the natural gas trade may differ from strategies pursued in network-free markets.[8] In Černoch et al.,[9] we used this line of reasoning to provide an alternative to the currently prevailing geopolitical explanations of Russian foreign energy policy vis-à-vis central and eastern Europe (CEE). We argue that the current nature of the regional gas market (limited interconnection, limited sources of supply, netback pricing system, inflexible long-term take-or-pay contracts, and destination clauses) is

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3 M. A. Adelman, *The real oil problem*, Boston: MIT, 2004. Available online: http://web.mit.edu/ceepr/www/publications/reprints/Reprint_171_WC.pdf (accessed on January 4, 2015).

4 D. Yergin, "Ensuring Energy security," *Foreign Affairs*, Vol. 85, No. 2, 2006. Available online: http://www.foreignaffairs.com/articles/61510/daniel-yergin/ensuring-energy-security (accessed on January 4, 2015).

5 P. Noël, "Beyond dependence: How to deal with russian gas," European Council on Foreign Relations, 2007. Available online: http://www.ecfr.eu/page/-/ECFR-09-BEYOND_DEPENDENCE-HOW_TO_DEAL_WITH_RUSSIAN_GAS.pdf (accessed on January 4, 2015).

6 J. De Jong, C. van der Linde, "EU energy policy in a supply-constrained world," *Swedish Institute for European Policy Issues*, 2008. Available online: www.sieps.se/sites/default/files/432-200811epa.pdf (accessed on January 4, 2015).

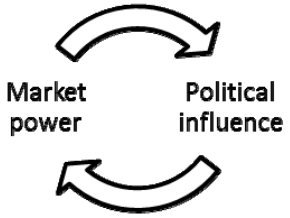
7 W. D. Nordhaus, *The Economics of an integrated world oil market*, Venice: Keynote Address International Energy Workshop, 2009. Available online: www.econ.yale.edu/~nordhaus/homepage/documents/iew_052909.pdf (accessed on January 4, 2015).
W. D. Nordhaus, "Who's afraid of a big bad oil shock?" Brookings Papers on Economic Activity 2, 2007. Available online: www.econ.yale.edu/~nordhaus/homepage/10922-Nordhaus.pdf (accessed on January 4, 2015).

8 J. B. Cardell et al., "Market power and strategic interaction in electricity network," *Resource and Energy Economics*, Vol. 19, No. 1–2, 1997. Available online: http://www.sciencedirect.com/science/article/pii/S0928765597000067 (accessed on January 4, 2015).
K. Atkins et al., "Locational market power in network constrained markets," *Journal of Economic Behavior & Organization*, Vol. 70, No. 1–2, 2009. Available online: http://www.sciencedirect.com/science/article/pii/S0167268108002199 (accessed on January 4, 2015).
F. Holz, *Modeling the European natural gas market – static and dynamic perspectives of an oligopolistic market*, Berlin: Technische Universität Berlin, 2009. Available online: http://opus4.kobv.de/opus4-tuberlin/files/2044/holz_franziska.pdf (accessed on January 4, 2015).

9 F. Černoch et al., *The future of natural gas security in the V4 countries: A scenario analysis and the EU dimension,* Brno: International Institute of Political Science, 2011.

a consequence of the two formative decades of the regional natural gas industry, and that this is now helping Russia achieve the highest possible margins. Conveniently enough, the dominant market position that has emerged from this background also enables Russia to exert the greatest amount of political influence on the affected countries.[10] Hence, contrary to the geopolitical explanations, we argue that Russian foreign energy policy towards the region is consistent with profit-seeking behavior. At the core of Russian business activities lies the need to maintain the current market setting – and in order to maintain it, the Russians will not hesitate to use the political power stemming from it. We therefore see the nature of this policy as a vicious circle of market power leading to mutually reinforcing high margins and political influence.

Illustration 2. Russian gas export strategy



Source: Authors

Therefore, we see diversification of sources as a key tool for consumers to mitigate this strategy. Source diversification targets both pillars at the same time: it reduces Russia's market power as well as its political influence, contributing both to the accessibility and the affordability of energy supplies.

[10] Ibid.

Current situation on V4 markets

The natural gas markets of the V4 countries share a very similar history, which still affects their current problems. In his article, Ascari emphasizes that the main characteristics of the V4 countries' gas markets are that the national gas markets have been relatively slow to open up, gas supplies (routes and sources) are insufficiently diversified, and there is limited interconnection in the V4 region.[11] The aim of this chapter is to identify possible changes in these characteristics during the period 2012–2014.

Opening up the market

Table 1. Opening up the market – natural gas markets in V4 countries

Key indicators (2012)	Czech Republic	Hungary	Poland	Slovakia
Number of entities bringing natural gas into country	25	20	40	8
Number of main gas entities	1	4	1	3
Market share of the largest entity bringing in natural gas	82.3%	32.91%	96.9%	61.8%
Number of retailers selling natural gas to final customers	59	30	120	22
Number of main natural gas retailers	11	6	1	2
Switching rates for gas (domestic)	12.03%	1.5%	0.8%	11.56%
Regulated prices for households	No	Yes	Yes	Yes
Regulated prices for non-households	No	Yes	Yes	Yes for SMEs
HHI[12] in gas supply market	3,358	1,494.26	N/A	N/A
HHI in gas retail market	1,632	1,245.89	9,073	N/A
Gas market value (€bn)[13]	2.505	2.327	3.658	1.135

Source: European Commission[14]

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11 S. Ascari, *The gas target model for the Visegrad 4 region – conceptual analyses*, Warsaw: Ośrodek Studiów Wschodnich, 2013. Available online: http://www.osw.waw.pl/sites/default/files/raport_04_the-gas-target-model_net.pdf (accessed on December 8, 2014).

12 The Herfindahl Index, also known as the Herfindahl-Hirschman Index (HHI), measures the market concentration of an industry's 50 largest firms in order to determine if the industry is competitive or nearing monopoly.

13 Market value is an estimation of the size of the retail gas markets. It is calculated using data on gas consumption in the household and non-household sectors (average bands) and annual average retail prices.

14 "Joint communication to the European Council, the European Parliament, the Council, the European Economic and Social Committee and the Committee of the

The Czech Republic

The Czech market is mature in spite of the relatively small share gas has in the country's primary energy sources. There is minor domestic production and Czech consumption was 8.4 bcm in 2013, an increase compared to 8.2 bcm in 2012.[15]

Of the V4 countries, the Czech market is also the most open and advanced in terms of competitiveness and organization. On September 3, 2009 NET4GAS was legally unbundled from RWE Transgas, a gas importer and supplier. At the beginning of 2013, ERO issued a certification decision concerning NET4GAS, which opted for the status of Independent Transmission Operator (ITO). Gas distribution companies are legally unbundled from the transmission system operator (TSO), gas trading companies and gas storage operators.

The lower market concentration compared to other V4 countries is also a consequence of access to cheaper gas from and through Germany. In 2012, 25 entities imported gas into the Czech Republic[16] and a bi-directional transmission between the Czech virtual trading point and Slovakia was enabled. Competition in the retail supply market is increasing. In 2012, there were 59 active gas suppliers in the retail market, ten more than in 2011. In 2013, there were 62 active traders supplying gas to customers. Since the retail gas market is now saturated, 2013 did not see such a significant increase in the number of traders compared with 2012 as had been the case in preceding years.[17]

The Czech Republic has the lowest wholesale market concentration of the V4.[18] Lately retail competition has also been developing quickly and the switching rate of smaller customers dramatically increased between 2011 and 2012 to over 12 per cent. Switching rates were the second highest in the EU, while the ease of switching scored fourth highest. Supplier switching

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Region. Progress towards completing the Internal Energy Market," COM(2014)634 final, European Commission, October 13, 2014. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication.pdf (accessed on December 7, 2014).

15 "BP statistical review of world energy – June 2014," BP, June, 2014. Available online: http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-natural-gas-section.pdf (accessed on December 7, 2014).

16 The largest entities importing gas were RWE Transgas, WINGAS GmbH & Co. KG, and VNG Energie.

17 "Joint communication to the European Council, the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region. Progress towards completing the Internal Energy Market," COM(2014)634 final, European Commission, October 13, 2014. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication.pdf (accessed on December 7, 2014).

18 Ibid.

between 2012 and 2013 decreased to 10.4 per cent. It seems that the boom in switching is over in the Czech Republic.[19]

Gas prices are generally determined by long-term contracts but a growing number of suppliers offer prices reflecting spot market prices. Gas prices for industrial consumers decreased between 2008 and 2012 as network and tax related components of natural gas prices for industry decreased. The retail gas market is assessed as being below the EU average in 2012 and ranks nineteenth EU-wide in 2012.[20]

Hungary

Hungary has a very mature gas market and because of its limited coal resources has the highest reliance on natural gas for its primary energy requirement (approximately 30 per cent). Consumption is evenly distributed between industry, power generation and the residential sector. Therefore, it is also very sensitive to security of supply as well as gas price issues. In 2013 consumption was 8.6 bcm, which is less than in 2012 (10.2 bcm).[21] This decrease was primary due to problems related to the economic crises. Domestic gas production was 1.95 bcm per year and it covers approximately 20 per cent of demand. Hungarian imports natural gas (8.17 bcm in 2013) from both an easterly and a westerly direction. In 2012, import from the west (4.6 bcm) exceeded import from the east (3.57 bcm).[22]

Hungary was an early case of ownership unbundling, when in 2006 MOL[23], the national oil and gas company, sold its gas supply interests and related Russian supply contracts to Germany's E.ON. The gas TSO is FGSZ

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19 "Národní zpráva Energetického regulačního úřadu o elektroenergetice a plynárenství v České republice za rok 2013," Energetický regulační úřad, July, 2014. Available online: http://www.eru.cz/documents/10540/462958/NZ_ER%C3%9A_2013/b013810e-36e4-49d9-91aa-c1185af992e0 (accessed on December 7, 2014).

20 "Joint communication to the European Council, the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region. Progress towards completing the Internal Energy Market," COM(2014)634 final, European Commission, October 13, 2014. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication.pdf (accessed on December 7, 2014).

21 "BP statistical review of world energy – June 2014," BP, June, 2014. Available online: http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-natural-gas-section.pdf (accessed on December 7, 2014).

22 "Report on the activities of the Hungarian Energy and Public Utility Regulatory Authority in 2013," Hungarian Energy and Public Utility Regulatory Authority, May, 2014. Available online: http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NATIONAL_REPORTS/National%20Reporting%202013/NR_En/C13_NR_Hungary-EN.pdf (accessed on December 7, 2014).

23 Magyar Olajés Gázipari Nyrt, MOL Hungarian Oil and Gas Plc.

Zrt., a listed gas company owned by MOL and certified as an ITO. In 2013, both the former E.ON affiliate gas storage facility and the former public utility wholesale gas trader became affiliates of MVM Magyar Villamos Művek Zrt., i.e. they were transferred to public ownership. The latter has a special role in terms of price regulation and security of supply, and possesses a long-term contract for Russian import sources.

The political and regulatory debates of 2012 and 2013 continued to focus on the price moratorium, on special utility sector taxes and, from December 2012, on price cuts for household consumers. The Minister of National Development approved a price adjustment equal to annual inflation at the beginning of 2012. Nevertheless, the price rise in gas imports created a mismatch between regulated retail prices and the wholesale import price. The energy sector is subject to an energy tax, a differentiated profit tax and a crisis tax. The crisis tax was levied on energy companies' taxable revenue (generation and supply) and was due to end in 2013. However, the government then imposed a new tax on infrastructure, dictated by the length of transmission and distribution lines and pipelines. In 2013, regulated prices for household consumers in the gas and electricity sector were cut by 20 per cent and further decreases were announced for 2014.[24]

Concentration in the gas wholesale market has been decreasing for a couple of years primarily due to diversified imports and their increased share of the reduced domestic demand. In 2013, MVM further increased its presence on the wholesale market, in particular in imports previously dominated by E.ON, GDF and MOL. The gas exchange market, CEEGEX, owned by MVM, became operational in early 2013.[25]

In 2012, 3.66 bcm of natural gas was purchased under regulated prices, 88 per cent of which was sold to household consumers. Almost all households remain under the regulated prices regime. The retail market is relatively concentrated, with six companies covering almost the entire retail market. The switching rate for household consumers was 1.5 per cent, down from 10.4 per cent in 2011. The high figure for 2010–2011 was probably due to the liquidation of EMFESZ, a supply company with considerable retail books. Data for 2012 is much more typical for the market. Industrial consumers on

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[24] "Joint communication to the European Council, the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region. Progress towards completing the Internal Energy Market," COM(2014)634 final, European Commission, October 13, 2014. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication.pdf (accessed on December 7, 2014).

[25] "Report on the activities of the Hungarian Energy and Public Utility Regulatory Authority in 2013," Hungarian Energy and Public Utility Regulatory Authority, May, 2014. Available online: http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NATIONAL_REPORTS/National%20Reporting%202013/NR_En/C13_NR_Hungary-EN.pdf (accessed on December 7, 2014).

the wholesale markets switch more frequently (ratios for consumers equipped with metering devices above 20 m^3/h vary from between 18.2 per cent and 31.5 per cent). Non-household prices are only regulated for consumers with gas meters below 20 m^3/h.[26]

The retail gas market ranks lowest in the EU (with a score of 65.9 points compared to the EU average of 74.1 in 2012) and 28th among 31 domestic service markets. It has also seen a 4.9 point decrease in its score since 2012 (highest in the EU). The market scores lowest in the EU in terms of overall consumer satisfaction, and 2nd lowest on comparability of offers, while the incidence of problems is the highest in the EU.[27]

Poland

Natural gas has played a relatively minor role and per capita consumption is the lowest in the V4 and among the lowest in Europe, which is a consequence of the predominance of cheap local coal in the country's energy industry. However, Poland is still the largest gas consumer of all the V4 countries. In 2013, consumption amounted to 16.7 bcm. Poland's own production was 4.2 bcm and the remaining demand was covered by imports, 9.6 bcm of which were purchased in Russia while 1.8 bcm came mainly from Germany. Poland is among the least advanced EU member states in terms of market liberalization. This is especially because of slow diversification and the slow opening up of the market.[28]

The TSO is Gaz-System which was certified as an ownership unbundled TSO in the course of 2014. The rules on certification of independent system operators were only adopted in 2013. In the same year gas was distributed by 40 system operators, including one incumbent system operator subject to legal unbundling.

In legislative terms, the Polish gas sector has yet to complete its liberalization process. Market conditions have improved. Progress so far includes implementation of the European Network Codes with the introduction of the virtual trading point, pilot projects with bundled capacities, capacity auctioning platform, market-based balancing, establishment of a gas exchange, etc. However, although these measures have improved Polish

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26 "Joint communication to the European Council, the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region. Progress towards completing the Internal Energy Market," COM(2014)634 final, European Commission, October 13, 2014. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication.pdf (accessed on December 7, 2014).

27 Ibid.

28 "BP statistical review of world energy – June 2014," BP, June, 2014. Available online: http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-natural-gas-section.pdf (accessed on December 7, 2014).

chances of developing a competitive wholesale gas market, they have proven insufficient so far in boosting competition on the market and changing the current market structure.

The Polish wholesale market has not been very attractive so far, not only because of its price regulatory status and its almost monopolistic structure, but also because of the composition of demand. The domestic market is monopolized by PGNiG which, in practice, controls 100 per cent of imported gas and accounts for over 95 per cent of domestic production. PGNiG is also the sole operator of the underground gas storage system.

Since 2013 the gas exchange obligation has provided grounds for competition in the Polish gas market, but PGNiG failed to trade the mandatory 30 per cent share on the exchange as there were too few buyers.[29] The prices available under bilateral agreements were temporarily lower than prices offered on the exchange and the overall demand for gas was insufficient to drive sales up. However, in 2014, the situation changed – the volume of gas traded on the gas exchange is now increasing.

Gas prices for households and industry were still regulated in 2012 (99.5 per cent of households were supplied with gas under regulated prices). Poland's referral to the Court of Justice on regulated gas prices for non-household customers has resulted in Poland deciding to introduce changes in the way prices are determined for non-household customers. Prices for households and small commercial consumers are expected to be deregulated at a later stage. In this context, the Energy Regulatory Office published a *Roadmap of Natural Gas Prices Liberalization* in February 2013. This did not translate into the deregulation of gas prices to non-household customers and derogations are still decided by the President of ERO. This is subject to a court case which is now pending before the Court of Justice.[30]

A high level of concentration on the Polish gas market, mainly because of the dominant position of PGNiG, is still impacting on the structure of the retail market and the pace of change in the market. In 2013, PGNiG SA had about 94.42 per cent of natural gas sales, while the remaining 5.58 per cent belonged to other trading companies active on the market. In 2012, PGNiG SA's share in the sale of natural gas was 95.22 per cent, while the share of other companies amounted to 4.78 per cent, which is proof of slow changes occurring on the retail gas market. In 2013, the scale of supplier switching recorded on the retail market was similar to that in 2012, when

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29 "Joint communication to the European Council, the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region. Progress towards completing the Internal Energy Market," COM(2014)634 final, European Commission, October 13, 2014. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication.pdf (accessed on December 7, 2014).

30 Ibid.

219 gas consumers switched supplier and the total number since monitoring began was 429.[31]

Slovakia

Slovakia is the smallest V4 country in terms of population and gas market size. It has a very mature market with a high gasification level (second in Europe after the Netherlands). Domestic consumption is growing (5.4 bcm in 2013 and 4.9 bcm in 2012), but it produces little gas itself (0.15 bcm in 2013). All the remaining gas is imported from Russia (approximately 5.3 bcm in 2013).[32]

In terms of unbundling, Eustream is the only gas transmission system operator in Slovakia and it was certified as an independent transmission system operator (ITO) in 2013. SPP-distribúcia is the only operator of the gas distribution system and was legally unbundled from SPP in 2006.

Concentration of the gas wholesale market remained very high in 2012. SPP has almost 70 per cent of the gas supply and it has a long-term contract with Gazprom to import gas. The contractual price SPP has to pay to Gazprom has been re-negotiated and was reduced in 2014 in order to better reflect the lower prices on spot markets. Other gas traders purchased gas from various, mostly foreign, gas suppliers at the power exchange or from Slovak suppliers operating as gas traders. Since 2013 it has become more common for smaller suppliers to purchase natural gas from larger suppliers. Larger suppliers can deal with excess gas problems arising when consumers switch gas supplier.

Retail market concentration is high. In 2013, SPP, the traditional gas supplier had the most significant share in the market supplying gas to final gas consumers with a 63.2 per cent share, followed by RWE Gas Slovensko with an 18.7 per cent market share and ELGAS with a 4.0 per cent market share. A further 23 gas traders had 14.1 per cent of the total gas consumed by final gas consumers. Prices for households remained regulated.[33]

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31 "National report," The President of the Energy Regulatory Office of Poland, July 2014. Available online: http://www.ure.gov.pl/en/about-us/reports/67,Reports.html (accessed on December 7, 2014).

32 "BP statistical review of world energy – June 2014," BP, June, 2014. Available online: http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-natural-gas-section.pdf (accessed on December 7, 2014).

33 "Joint communication to the European Council, the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region. Progress towards completing the Internal Energy Market," COM(2014)634 final, European Commission, October 13, 2014. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication.pdf (accessed on December 7, 2014).

The process of household gas liberalization began in 2010 with an assessment of the impact of related regulatory measures. The position of new suppliers in the gas market was substantially more difficult in 2013 than it had been in previous years, when households tended to switch suppliers.

The number of household consumers who switched gas supplier in 2012 was over 131,000 (9.25 per cent of all households), six times the number of those switching in 2011. In 2013 the situation changed. For the first time the open gas market recorded a decrease in the numbers changing gas supplier, with a total of 6.31 per cent switching in 2013, which amounted to a decrease of 2.86 per cent compared with 2012. There was no significant transfer of households in 2013 from a traditional supplier to competing suppliers, as there had been in previous years. This was because there was no great difference between suppliers' offers and because when switching to a more competitive supplier, households had signed up for a number of years in order to obtain greater discounts.[34]

Cross-border interconnection

Czech Republic

Natural gas is imported into the Czech Republic via the northern branch of the "Brotherhood" pipeline that enters the country from Slovakia and quickly splits into two further lines, both leading to the German border.

Gas can be imported into the Czech Republic via three border points. The first is Lanžhot, used mainly for the transit of Russian gas to the Czech Republic. It can also be used for gas purchased on the hub at Austrian Baumgarten an der March (Central European Gas Hub/CEGH). The Czech Republic is not connected to the CEGH directly and so purchased gas is sent through the Slovak gas network Eustream, and from there through Lanžhot to the Czech Republic.[35]

The second point is Hora Sv. Kateřiny with the two border points of Olbernau and Sayda. Gas, which flows into the Czech Republic from this point, includes Russian, Norwegian (in the form of substituted – swapped – Russian gas), as well as gas from Germany and Poland.

The third border station is Waidhaus, which is mainly used for transferring Russian gas from the Czech transit network to Germany. It connects the

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34 "National report 2013 submitted as of 30 June 2014," Regulatory Office for Network Industries Slovakia, June 30, 2014. Available online http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NATIONAL_REPORTS/National%20Reporting%202013/NR_En/C13_NR_Slovakia-EN.pdf (accessed on December 7, 2014).

35 T. Vlček, F. Černoch, *The energy sector and energy policy of the Czech Republic*, Brno: MUNIPRESS, 2013, pp. 112–4.

Czech network with European pipelines using the MEGAL pipeline. Also this station can also be used for gas purchased on the spot market.[36]

In January 2013, the Gazelle pipeline was opened. Gazelle is an extension of the Nord Stream branch running through the Czech Republic (30 bcmy). This pipeline provides a connection between the Opal gas pipeline, used to transport Russian gas from Nord Stream via eastern Germany to the south, and the Megal gas pipeline which transports gas through the southern regions of Germany to France. This pipeline was originally planned as a continuation of the proposed Nabucco pipeline, which lost out in the contest to carry Azeri gas to Europe.[37] Developing this pipeline will provide good synergy between European interconnectivity and Gazprom transit diversification but the implications for the region's gas market competiveness are highly controversial given the enhanced role of Russian gas in the region.

New cross boarder issues are greatly affected by Regulation (EU) No. 347/2013 of the European Parliament and of the Council on guidelines for trans-European energy infrastructure (TEN-E). The regulation defines a list of projects of common interest (PCI).[38] The first option includes three Czech gas pipeline projects nominated by the Czech TSO, NET4GAS, Oberkappel (the ONI pipeline)[39], BACI (Bidirectional Austrian-Czech Interconnection) and STORK II.[40] [41]

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36 Ibid.

37 "Gazelle natural gas pipeline, Czech Republic," Hydrocarbons – Technology, 2010. Available online: http://www.hydrocarbons-technology.com/projects/gazelle-pipeline/ (accessed on December 7, 2014).

38 Projects of common interest are designed to diversify gas routes and sources and to enhance the security of gas supplies in EU member states in the medium term (2017–2020). In particular, they seek to develop new cross-border gas pipelines that will help to reduce country dependence on a single gas source. The list of PCIs is to be updated every two years.

39 "National report 2013 submitted as of 30 June 2014," Regulatory Office for Network Industries Slovakia, June 30, 2014. Available online http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NATIONAL_REPORTS/National%20Reporting%202013/NR_En/C13_NR_Slovakia-EN.pdf (accessed on December 7, 2014).

40 "Joint communication to the European Council, the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region. Progress towards completing the Internal Energy Market," COM(2014)634 final, European Commission, October 13, 2014. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication.pdf (accessed on December 7, 2014).

41 The Czech-Polish interconnector (STORK) project created a direct connection between the transmission systems of the Czech Republic and Poland and launched gas transmission between the systems at 0.5 bcm. STORK was completed in 2011 with 10km of pipeline in the Czech Republic and 22km and a border transfer station in Poland.

Table 2. Czech gas pipeline projects

Oberkappel	This project aims to connect the southern branch of the Czech trans transmission system with the Austrian WAG pipeline terminating at Oberkappel. Oberkappel is also the interconnecting point between the German and Austrian transmission systems. The aim of this project is also to connect the Czech gas system with Austrian storage facilities (7Fields and Haidach).
BACI	BACI aims to connect Lanžhot with Baumgarten. This interconnector will also connect the Czech and Austrian gas systems, and will be a continuation of the planned Moravia gas pipeline, through which Austria will gain easier access to gas storage facilities in the Czech Republic. On the other side, shippers from the Czech Republic will have easier access to storage facilities at the Austrian and the CEGH Central European Gas Hub at Baumgarten. The partner in the project is the Austrian TSO Gas, Connect Austria. The anticipated length of pipeline in the Czech Republic is about 12 km and the total length of the pipeline will be about 60 km. This pipeline is also important for the Polish gas market, as it will link it with the Baumgarten hub.
STORKII	This project is designed to build another interconnection between Czech and Polish transmission systems. The aim is to enhance cross-border capacity between the two countries and enhance security of supply. Gas could also be transported from the Polish LNG terminal at Świnoujście via this pipeline. STORK II is planned to open in 2019 with a capacity of 7.5 bcm and it will be part of the planned North-South Corridor.

Hungary

Natural gas is primarily imported into Hungary via Beregdaróc (Ukrainian border) in the east, while gas from other sources reaches Hungary via Mosonmagyaróvár on the Austrian border.

The Hungary–Ukraine interconnector has 2 uni-directional pipelines (21.9 bcmy in; 8.8 bcmy out) and it is currently the biggest reverse flow capacity into Ukraine from the EU. The Hungary–Serbia interconnector with a capacity of 4.8 bcmy is the transit pipeline for Russian Gas to Serbia (and onwards to Bosnia and Herzegovina).[42]

The Austrian-Hungarian pipeline (HAG, 4.5 bcmy) is a uni-directional interconnector allowing the flow of Western European spot priced natural gas into the CEE region. Creating reverse flow capability requires development on both sides and it is a PCI project.

In recent years, the primary issue in cross-border cooperation has been the development of an interconnection with Slovakia as a vital part of the planned North–South Interconnection. The interconnection with Slovakia (more detail in the chapter on Slovakia) has almost been developed.

[42] There are plans to build an interconnector with Slovenia with a capacity of 0.5–1.2 bcmy. This is a PCI projects.

Hungary has planned other interconnectors with Romania and Croatia especially, given MOL's export aims. In 2010, pipelines to Romania and Croatia were built in Hungary. These pipelines are also part of the North–South Gas Corridor. The Hungary–Croatia interconnector is uni-directional with virtual backhaul (6.5 bcmy).[43] A smaller reverse flow would be possible here (with no need for investment) if there was a TOS–TSO commercial pressure management agreement. A full capacity reverse flow would require an increase in pressure and a compressor station. The Hungary–Romania interconnector is also uni-directional with virtual reverse flow (1.8 bcmy).[44] Since December 2013 there has been limited physical reverse flow and further development (construction of a compressor station) is required to make this interconnector capable of bidirectional transport.[45]

There is frequent discussion of developing interconnectors given Hungary's role in south-east Europe. If disruption to flows from Ukraine were to occur then supplies to Hungary and connecting countries would depend on the availability of flows from the West, through the Hungary–Austria Gas (HAG) pipeline from Austria. If flows into Austria were also affected as a result of disruption to all Russian gas flows, it would be crucial for it to be possible to send proportionate amounts of gas across the interconnector into Hungary.

Poland

The Polish market still has limited access to supplies from countries other than Russia (through either Belarus or Ukraine) but in recent years progress has been made (especially concerning the connection with the Czech Republic and with Germany). The main gas flow is via the Yamal Pipeline (32 bcmy) with a single physical entry point in Kondratki (30.58 bcmy) and three physical exit points: Mallnow, Lwówek and Włocławek (27.9 bcmy).[46]

Since 2014 it has been possible to reverse the flow in the Yamal pipeline at Mallnow. The opening of the Mallnow interconnection for reverse flow is a positive outcome of agreements that brought the Polish section of the Yamal pipeline under Polish TSO (GAZ-SYSTEM) control and access rules that comply with EU legislation. Although this has allowed the sale of virtual reverse flow capacity, it is not regarded as a sound basis for a competitive

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43 The construction of the interconnector was co-financed by the EU as part of the European Energy Economic Recovery Plan. Investment totalled 395 million euros.

44 The EU contributed 50 per cent of the pipeline's aggregate cost of some 68 million euros from European Energy Economic Recovery Program funding.

45 This is a PCI project.

46 Expanding the entry points of the Yamal pipeline at Lwówek and Wloclawek is a PCI project.

trading, due to potential interruption, but it is seen as a useful integration of other supplies. Polish and German governments and regulators and the TSOs concerned have already agreed to ensure that some of the reverse flow capacity will become firm, as required by the EU security of supply regulation. In other words, part of the current virtual reverse flow capacity would be turned into physical reverse flow by adding compression, notably on the German side.[47]

The Polish interconnectors with Belarus are via Tietierowka (0.23 bcmy) and Wysokoje (5.47 bcmy). The first interconnector with Ukraine is via Drozdowicze (4.37 bcmy) and, in November 2012, Polish Gaz-System started providing gas transmission services to Ukraine via the Hermanowice exit point (1.46 bcmy). In seeking to become the region's gas trading and transit hub, Poland is attempting to expand gas transport links with Ukraine as well. In December 2014, Gaz-System and its Ukrainian counterpart Ukrtransgaz signed an agreement to investigate the possibility of expanding their capacity to transport gas. The agreement holds that the companies will conduct a feasibility study on whether to expand their gas pipeline systems.[48]

The current priority of Polish state-owned Gaz-System is to improve the internal grid with more than 1,000 km of new pipelines and to develop effective cross-border cooperation with neighboring countries (the Czech Republic, Slovakia and Germany). The Polish–German interconnectors are via Kamminke (0.13 bcmy), Gubin (0.017 bcmy) and especially Lasów (bi-directional flow, 1.5 bcmy). There is now also another plan to increase the capacity of the interconnector at Lasów from 1.5 up to 3 bcmy, which should be fully functioning in 2021.[49] This boost to cross boarding transport capacity is also important for the future development of the Polish LNG terminal.

The Polish transmission system connects up with the Czech Republic at Branice (local interconnection, 1.40 mcmy), and since 2011 in Cieszyn (0.58 bcmy). Further boosts to this cross-border transmission capacity have been announced.[50] There is still no effective interconnection between Poland and Slovakia. Little progress has been made in this case over the last few years due

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47 S. Ascari, *The gas target model for the Visegrad 4 region – conceptual analyses*, Warsaw: Ośrodek Studiów Wschodnich, 2013. Available online: http://www.osw.waw.pl/sites/default/files/raport_04_the-gas-target-model_net.pdf (accessed on December 8, 2014).

48 "Poland and Ukraine to look at expanding gas transport links," *Reuters*, December 17, 2014. Available online: http://www.reuters.com/article/2014/12/17/poland-ukraine-gas-idUSL6N0U13W120141217 (accessed on December 7, 2014).

49 "Baltic energy market interconnection plan GRIP," ENTSOG, May 14, 2014. Available online: http://www.entsog.eu/public/uploads/files/publications/GRIPs/2014/GRIP_002_140514_BEMIP_2014-2023_annex_low.pdf (accessed on December 7, 2014).

50 The planned STORKII interconnector was discussed in the previous chapter.

to problems with routing. According to the PCI there are also preparatory studies and engineering works for the Poland–Slovakia gas interconnection. This interconnector is planned to be in operation in 2017–2018.

There are also plans for an interconnection between Poland and Lithuania. As Ascari states "this is also a project of major EU interest as it would eliminate the isolation of the Baltic Republics, and potentially also of Finland, with 2017 as a tentative commissioning target."[51] However, the newly opened LNG terminal in Lithuania (in December 2014 with capacity of 4 bcmy)[52] and the limited market size (less than 10 bcmy including Finland) have meant that there is still discussion on the economic rationale of this project. It is expected that the Polish Gaz-System will not link up with the Baltic region before 2019.

Slovakia

For many years, Slovakia strictly followed a transit role with no bigger plans to build interconnectors with other neighboring countries. The situation changed after the crisis in 2009 and it has been announced that new interconnectors will be built with Hungary, Poland and most recently, with Ukraine.

Natural gas from the Russia Federation is transported via Ukraine (Veľké Kapušany station, 96.5 bcmy) and there are two major exit points for western-bound gas at Lanžhot (on the border with the Czech Republic, 40.5 bcmy) and Baumgarten (on the border with Austria, 47.4 bcmy). There is also an interconnector at Budnice on the Ukrainian border.[53]

The physical reversal of flows is possible at the interconnection points on the Czech and Austrian borders. Reversal could be implemented within two hours at Lanžhot, with the capacity to supply 12.5 bcmy of gas from the Czech network. Flows at the Baumgarten interconnection were reversed in October 2010, making it possible to supply Slovakia with 5.9 bcmy of gas from Austria.[54]

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51 S. Ascari, *The gas target model for the Visegrad 4 region – conceptual analyses*, Warsaw: Ośrodek Studiów Wschodnich, 2013. Available online: http://www.osw.waw.pl/sites/default/files/raport_04_the-gas-target-model_net.pdf (accessed on December 8, 2014).

52 "Baltic states´ gas supply independence – a few more years to wait," *Natural Gas Europe*, November 3, 2014. Available online: http://www.naturalgaseurope.com/baltic-states-gas-supply-independence (accessed on December 7, 2014).

53 "Transmission system," Eustream, Available online: http://www.eustream.sk/en_transmission-system/en_transmission-system (accessed on December 7, 2014).

54 "Energy policies of IEA countries 2012 – review, The Slovak Republic," IEA, 2012. Available online http://www.iea.org/publications/freepublications/publication/Slovak2012_free.pdf (accessed on December 7, 2014).

In spring 2013, construction began on the Slovak section of the gas supply pipeline connecting the gas systems of Slovakia and Hungary. The Slovak–Hungarian gas supply pipeline is of strategic importance for the Slovak Republic. This pipeline will be part of the future North–South Corridor and link LNG terminals in Poland and Slovakia. The gas supply interconnection between Slovakia and Hungary will link high-pressure transmission systems between Veľké Zlievce on the Slovak side and the Hungarian village of Vecsés on the outskirts of Budapest. The two-way gas supply pipeline will have a capacity of 4.38 bcm and will be 110.7 km long.[55] Eustream finished constructing the Slovak section of the gas supply pipeline in March 2014. Commercial operation is scheduled to begin on January 1, 2015. There are delays on the Hungarian side. Official sources refer to technical reasons and the transformation of the ownership structure of Magyar Gáz Tranzit Zrt.[56]

As discussed in the previous chapter, problems remain with the development of Slovak–Polish interconnector. Plans for reverse flows of natural gas from Slovakia to Ukraine found their way onto the agenda in 2014 in the context of the Russian–Ukrainian crisis. The debate was further boosted following assessment of the results of the Open Season procedure in which Eustream, a Slovak gas transmission operator, accepted binding bids for gas shipments via the Vojany–Uzhgorod pipeline in Ukraine's direction.[57] The pipeline, with a current capacity of 27 mcmd (nearly 10 bcmy), was officially launched in early September 2014 to supply natural gas to Ukraine from the EU via Slovakia.

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55 "National report 2013 submitted as of 30 June 2014," Regulatory Office for Network Industries Slovakia, June 30, 2014. Available online http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NATIONAL_REPORTS/National%20Reporting%202013/NR_En/C13_NR_Slovakia-EN.pdf (accessed on December 7, 2014).

56 Magyar Gáz Tranzit Zrt. (MGT Zrt., majority indirectly publicly owned) also holds a license for natural gas transport. This license means it can build a Slovakian-Hungarian cross-border natural gas interconnector. The company will be eligible to obtain a license to operate the transmission system – also suitable for operating a pipeline – once it has obtained the specification on the unbundling of activities. The specification procedure is still to be approved by the EU Committee. On April 29, 2013, MGT applied to the EU Committee for exemption from the requirement for complete ownership unbundling. The Committee approved the application, but required MGT to make significant additions.

57 "European gas suppliers keen on supplying Ukraine via Slovakia: Naftogaz," *Platts*, July 3, 2014. Available online: www.platts.com/latest-news/natural-gas/moscow/european-gas-suppliers-keen-on-supplying-ukraine-26826635 (accessed on December 7, 2014).

Availability and accessibility

Norway

Norway is the third largest gas exporter in the world after Russia and Qatar. Petroleum activities have been crucial for Norway's economic growth, and for financing the Norwegian welfare state. In 2012, the petroleum sector represented more than 23 per cent of the country's total value creation. The state's income from petroleum activities is transferred to a separate fund, the Government Pension Fund – Global. The main consumer of Norwegian gas is the European market.

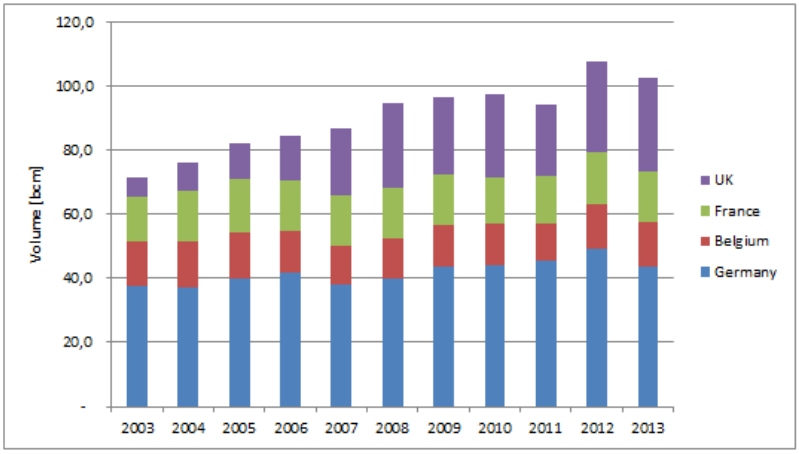
Exportable quantity

Norway's production stood at 112.4 bcm in 2013 (compared to 114.7 bcm in 2012). All Norway's supplies are sourced directly from domestic production on the Norwegian Continental Shelf (NCS). According to estimates from the Norwegian Petroleum Directorate, Norway's largest gas field, Troll, produced 28.3 bcm in 2013, which accounted for 27 per cent of Norway's total gas production that year. Three other major producing fields in 2013 were Ormen Lange (21.5 bcm), Asgard (9.62 bcm), and Kvitebjorn (6.7 bcm). These four fields produced over 60 per cent of Norway's total dry gas in 2013.

Gas exports in 2013 totaled 107 bcm (representing 96 per cent of its production). Of this, 103 bcm was transported via pipelines and 4 bcm as LNG from the Snøhvit facility. In addition, about 1.5 bcm was delivered for domestic consumption. Some of the gas produced is reinjected to improve recovery of oil fields: last year this accounted for about 30 bcm. Gas sales are expected to reach a level of between 105 and 130 bcm in 2020 and between 80 and 120 bcm in 2025. Norwegian gas production is forecast to reach a plateau and possibly decline by the end of this decade. This could be reversed if more reserves are discovered, particularly in the Barents Sea where exploration is still at an early stage. But gas exports – whether by pipeline or LNG – from the far north are likely to be more costly.

Norwegian gas covers about 20 per cent of European gas consumption. Most of the exports go to Germany, the UK, Belgium and France, where Norwegian gas accounts for between 20 and 40 per cent of total gas consumption.

Chart 1. Norwegian gas export 2003-2013



Source: Gassco[58]

All licensees on the Norwegian continental shelf are responsible for selling their own gas. The Norwegian company Statoil sells oil and gas owned by the state, along with its own petroleum. Overall, Statoil sells about 80 per cent of all Norwegian gas. Upstream companies on the Norwegian Continental Shelf sell gas to buyers in e.g. Germany, France, the UK, Belgium, the Netherlands, Italy, Spain and Denmark. The Snøhvit facility primarily delivers LNG to countries in Europe and Asia.[59] The Norwegian Continental Shelf (NCS) has until recently been dominated by traditional producers such as Statoil, Shell, ExxonMobil, ConocoPhillips, Total and ENI. Recently new generations of producers have entered the NCS. These include European utilities moving upstream such as Centrica Energy, RWE, E.ON, Bayerngas and DONG and newly established or small scale upstream companies such as Noreco and Core Energy.

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58 "Decline in gas deliveries," Gassco, January 10, 2014. Available online: http://www.gassco.no/en/media/news-archive/Decline-in-gas-deliveries/ (accessed on December 7, 2014).

59 "Facts 2014, the norwegian petroleum sector," Ministry of Petroleum and Energy Norway, August 22, 2014. Available online: http://www.regjeringen.no/en/dep/oed/documents-and-publications/Reports/2014/Facts-2014--All-you-need-to-know-about-Norwegian-petroleum-activities.html?id=757846 (accessed on December 7, 2014).

The future trend in Norwegian production depends on the discovery of new fields. The general consensus is that production will peak in the early 2020s, and by 2030, total production will decline below even today's values.

Export transmission capacity

Norway's natural gas reaches the EU mainly via its extensive export pipeline infrastructure, while a small fraction is exported as LNG. Major investments in transport solutions are characteristic of gas production. The Norwegian pipeline system currently has a transport capacity of about 120 bcmy.[60] There are four receiving terminals for Norwegian gas on the continent; two in Germany, one in Belgium and one in France. In addition, there are two receiving terminals in the UK. The Norwegian gas transport system includes a network of pipelines with a total length of more than 8,000 km. Treaties have been drawn up that govern rights and obligations between Norway and countries with landing points for gas from the Norwegian shelf.

Table 3. Norwegian natural gas exports in 2013 by delivery point

Country	Delivery point	Gas exports (%)
Germany	Europipe 2 Terminal	18.5%
Germany	Europipe 1 Terminal	16.8%
United Kingdom	Easington	15.7%
France	Dunkerque	14.4%
Belgium	Zeebrugge	13.2%
United Kingdom	Other terminals	11.5%
Germany	Norsea Gas Terminal	5.5%
LNG	-	4.0%
Denmark	Nybro	0.4%

Source: Ministry of Petroleum and Energy Norway[61]

[60] Ibid.
[61] Ibid.

Illustration 3. Norwegian Gas Pipelines

Source: Statoil[62]

Liberalization of the gas market has led to the emergence of two important players in Norway: Gassled and Gassco. Gassled provides transportation services with third party access on a non-discriminatory basis to producers on the NCS. To transport gas to the market, a producer needs to book capacity in the Gassled system and hence become a shipper. Most shippers are also producers, but recently a few non producers (traders) have entered the market. Gassled operates an Entry-Exit system. For each area there are designated entry and exit points where the gas is delivered to Gassled and

62 "A reliable gas supplier," Statoil, 2009. Available online: http://www.statoil.com/en/OurOperations/pipelines/Downloads/Natural_gas_pdf.pdf (accessed on December 7, 2014).

redelivered from Gassled. The entry points are typically the field connection points to the pipelines and the exit points are typically the landing terminals such as Kårstø in Norway and the receiving terminals in the UK and on the Continent.[63]

Gassco is the Independent System Operator (ISO) and is 100 per cent state-owned and funded by the shippers. Gassco is the operator for the integrated system for transporting gas from the NCS to the, landing points such as Emden in Germany, Easington in the UK and Zeebrugge in Belgium.[64]

Export policy

The Norwegian petroleum sector is now characterized by a high level of state involvement and an overall sense of optimism. Development is driven by years of high oil and gas prices, good exploration results and a stable regulatory environment. According to *the White Paper on Petroleum Activities* (2011), the main challenges involved in Norway's petroleum policy are improved recovery from fields, development of discoveries, and confirmation of new discoveries. This document also deals with the future of the Norwegian gas supply to the EU. In this context, the Norwegian government wishes to be one of the key suppliers to European countries. In particular, the government draws attention to its image as a "stable and predictable energy supplier in the EU." Norwegian gas will help meet the European gas demand, and "will be an attractive and valued energy source for many decades to come."[65] This means there will be a basis for profitable exploration, development and production of the gas resources on the Norwegian Continental Shelf.

In its export strategy, the government also stresses the connection between growing gas consumption and EU environmental targets. There is also acknowledgement of the special role played by gas-fired power plants in balancing the electricity grid. The core of the Norwegian export strategy therefore comprises a growing need for more and cleaner energy in Europe and Norway's image as a "stable and predictable energy supplier."[66]

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63 "Annual report 2013," Gassco, March 27, 2014. Available online: http://www.gassco.no/Global/Media/Gassco%20engelsk%20a%CC%8Arsrapport%202013-GODKJENT_LOW.pdf (accessed on December 7, 2014).

64 Ibid.

65 "An industry for the future – Norway's petroleum activities," Ministry of Petroleum and Energy, June 24, 2011. Available online: https://www.regjeringen.no/globalassets/upload/oed/petroleumsmeldingen_2011/oversettelse/2011-06_white-paper-on-petro-activities.pdf (accessed on December 7, 2014).

66 The Polish company PGNiG has eleven exploration licenses and a share in one field in production in Norway (Skarv Field). In 2014, PGNiG production in Norway was about 0.4 bcm. "PGNiG Upstream International A.S.," Available online: http://www.norway.pgnig.pl/norway/ (accessed on December 7, 2014).

A potential increase in exports of Norwegian gas to the EU has been discussed in connection with the Ukrainian–Russian conflict. This option is also strongly preferred by the European Commission but has its limitations. Growing production and regulatory stability make Norway the preferred gas supplier to the EU, suggesting it could once again overtake Russia. This indeed happened in 2012[67] but it did not last long. In 2013, after renegotiations of contracts resulting in a price reduction, Gazprom returned to the leading position, replacing part of the supply of liquefied natural gas on the EU market. At the same time, the sale of Norwegian gas decreased by 5 per cent, due to technical problems in the production of gas from the largest field, Troll.[68]

There is also a visible game change in EU–Norway energy relations. On September 25, at the *In-depth Energy Partnership with Norway* Energy Conference, Commissioner Günther Oettinger tried to secure increased gas supplies from Norway to Europe. This was a qualitative change in the bargaining position between the parties. As Lidia Puka states in her paper, before the Russian–Ukrainian conflict, Norway had to fight to maintain its market (as the EU receives 98 per cent of the country's gas exports). Now it is Norway that is approached and asked to produce and sell more.[69]

In the short term, Norway could probably increase gas supplies to Europe to make up for the amount lost if Russia were to cut off flows through Ukraine. In March 2014, Norwegian pipeline operator Gassco announced it could provide up to 130 mcmd (45 bcmy) of extra gas for a short time, which was slightly more than Russia was then pumping to Europe via pipelines that pass through Ukraine.[70] "The (Norwegian gas) production system is more or less tailor-made for the markets it serves. There is some flexibility, but there are some very strong limitations," said Brian Bjordal, head of Gassco. "It [the extra capacity] would be in the 120 to 130 mcm per day range," he said, but added that Gassco could keep up these flows for only a day or two.[71]

The most important factor in the Norwegian export strategy is the price. In the next five years, the Norwegians will try to maximize the profits via

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67 Norwegian gas exported to the EU was 107.6 bcm in 2014.

68 "The paradox of a stable supplier: Norway in the European Union's gas strategy," *PISM Bulletin No. 122*, October 13, 2014. Available online: http://www.pism.pl/files/?id_plik=18395 (accessed on December 7, 2014).

69 Ibid.

70 At the beginning of March 2014, Norwegian gas export to Europe, including Britain, was approx. 335 mcm per day. In 2013, Norwegian exports to Europe averaged approx. 270 mcm per day and Russian exports to Europe averaged approx. 442 mcm per day.

71 "Norway could provide little help if Russia cuts flows to Ukraine," *Reuters*, March 12, 2014. Available online: http://uk.reuters.com/article/2014/03/12/ukraine-crisis-gas-norway-idUKL6N0M93T520140312 (accessed on December 7, 2014).

increased exports. These profits are to be invested in exploratory drilling in the Barents Sea, which is where the core of the Norwegian production will move after 2030.[72] Norway can therefore be expected to gradually increase its production as long as prices are sufficiently high. On the other hand it cannot be expected to enter any price wars for higher market share as such a policy would decrease the profit per unit sold.

This is consistent with the current slow expansion of Norwegian exports to Eastern Europe where prices are higher. New contracts with Eastern European states include:

1. Statoil – Litgas (21 August 2014)

Statoil and Litgas signed a five-year agreement (2015-2019) to supply 540 million cubic meters of gas annually to Lithuania's new LNG terminal in Klaipeda.[73]

2. Statoil – Naftogas (3 October 2014)

Statoil and Naftogas announced the signing of a contract for the supply of gas to Ukraine through Slovakia (the terms of which have not been revealed but the press speculated on a volume of between 2 and 6 bcmy).[74]

A hot issue is also the future transport of gas from the Barents Sea. In 2011, Norway's foreign minister, Jonas Gahr Støre, presented plans for a future gas pipeline from the Barents Sea. According to these plans, the new pipeline could be 1,000 kilometers long and connect the current pipeline system in the North Sea to facilities in the Barents Sea.[75] But according to a report published in summer 2014, existing discoveries are not sufficient to justify investment in new gas infrastructure. Planned exploration activity up to 2017 is expected to double the resource base in the Norwegian Barents Sea, the development of which could provide substantial value from a socioeconomic perspective.[76] It seems likely that the gas from Barents will be transported as LNG.

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72 "The paradox of a stable supplier: Norway in the European Union's gas strategy," *PISM Bulletin No. 122*, October 13, 2014. Available online: http://www.pism.pl/files/?id_plik=18395 (accessed on December 7, 2014).

73 "Statoil to supply gas to Lithuania in five-year deal," *The Wall Street Journal*, August 21, 2014. Available online: http://www.wsj.com/articles/statoil-to-supply-gas-to-lithuania-in-five-year-deal-1408637833 (accessed on December 7, 2014).

74 In this case, the transit fees will be interesting because of the netback price of the gas: "Norway's Statoil sells gas to Ukraine's Naftogaz," *Reuters*, October 3, 2014. Available online: http://uk.reuters.com/article/2014/10/03/ukraine-crisis-statoil-idUSL6N0RY2UC20141003 (accessed on December 7, 2014).

75 "Norway considers pipeline for Barents gas to Europe," *Barents Observer*, August 25, 2011. Available online: http://barentsobserver.com/en/additional-menu/norway-considers-pipeline-barents-gas-europe (accessed on December 7, 2014).

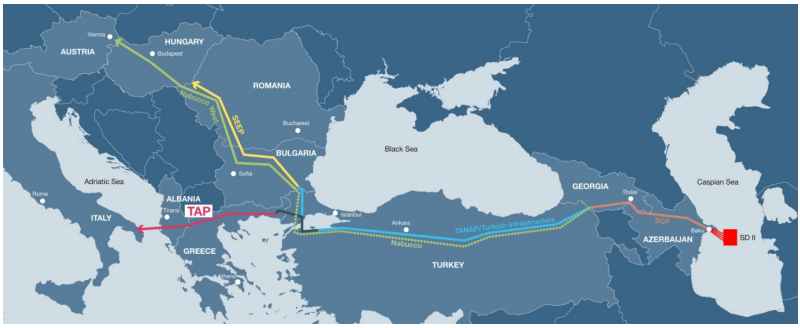
76 "Barents sea gas infrastructure," Gassco, June 10, 2014. Available online: http://www.gassco.no/Documents/099808.pdf (accessed on December 7, 2014).

Southern Gas Corridor

The diversification of gas supplies to the Visegrad countries has become one of the most serious concerns of central European governments, mainly after the two gas crises in 2006 and 2009. The European Union has also supported diversification of resources and routes, using new suppliers from the Caspian region and the Middle East. The Southern Gas Corridor (SGC) has been included among projects of common interest for the EU. Behind these efforts stand rational reasons including economic profit, declining dependence on Russian supplies and security reasons. The Southern Corridor has become the "Holy grail" of diversification of gas supplies to Europe.

The most ambitious project was Nabucco that was to supply more than 30 bcm of gas per year and which became synonymous with the Southern Gas Corridor. Developments in 2012 and 2013 meant that this project failed along with its reduced Nabucco-West alternative. Instead, the Trans-Anatolian Gas Pipeline (TANAP) and Trans-Adriatic Pipeline (TAP) projects will supply gas to Greece, part of the Balkans and Italy. In this section we evaluate the current situation regarding "southern" gas (transit and export policies; political and security obstacles) as a possible source of diversification for the V4 gas market. The other aim is to analyze the consequences of choosing the TAP pipeline and possible connection to the pipeline and between the Visegrad four countries.

Illustration 4. Southern Gas Corridor possibilities in 2013



Source: euroasianews.com[77]

[77] "Southern gas corridor export routes," Available online: http://euroasianews.com/wp-content/uploads/Southern-Gas-Corridor_export_routes_.jpg (accessed on December 8, 2014).

Exportable quantities and export policies

The Southern Gas Corridor has become the EU's energy flagship project thanks to political, diplomatic and partly financial support. High-level European officials started promoting this project in Europe and in key third countries such as Turkey, Azerbaijan and Turkmenistan.[78] Nevertheless, the only confirmed supplier for the Southern Gas Corridor remains Azerbaijan and it would be capable of providing 10 bcm of gas per year at best in the initial phase. Therefore, the idea of the Southern Corridor has been linked with other suppliers, mainly from the Caspian area and the Middle East, where countries like Iran and Turkmenistan have huge gas reserves and there are other potential suppliers such as Kazakhstan, Uzbekistan and Iraq. These countries were most often mentioned in plans by European Union institutions. The EU has signed Memoranda of understanding with Kazakhstan in 2006, with Turkmenistan in 2008, with Iraq in 2010 and finally with Uzbekistan in 2011.[79]

Azerbaijan

Azerbaijan has become the key player for supplying gas from the Caspian to Europe, by enabling production at the Shah Deniz gas field, which, in practice, started the entire process of bringing Caspian gas to Europe. The agreement with Turkey shows that Azerbaijan can play a very active role. The TANAP and TAP projects will initially deliver 16 bcm of gas per year to Georgia, Turkey, Greece, Bulgaria, Albania and Italy. The first gas exports are planned for 2018, with supplies to the European Union in 2019. According to the president of SOCAR, Rovnag Abdullayev, "the total export capacity [of Azerbaijan] will be 40-50 billion cubic meters of gas annually by 2025, most of this gas will go to the European markets."[80] The country is important not only because of its gas reserves and essential role in building the new infrastructure, but also because of its geostrategic position. The supply of gas from Kazakhstan and Turkmenistan directly to European markets is almost impossible without the agreement and active participation of Azerbaijan. It is Azerbaijan who is the main constructor of the new gas export route and who will control the greater part of the infrastructure being built, and not the EU

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78 A. Livanios, "The conundrum of the Southern gas corridor: What are the risks for Europe and Azerbaijan? The viewpoint of an insider," *Natural Gas Europe*, April 2013. Available online: http://www.naturalgaseurope.com/pdfs/IFRI_actuelleslivanios17413.pdf (accessed on December 8, 2014).

79 Ibid.

80 "Azerbaijan can participate in transit projects through pipeline TANAP – expert," *News.Az*, January 13, 2014. Available online: http://www.news.az/articles/economy/85700 (accessed on December 8, 2014).

as had originally been planned by the European Commission.[81] Moreover, the country has a strong role to play in offering Turkmenistan, and also other countries, the opportunity to participate in the Southern Corridor.

Azerbaijan has been a net exporter of gas since 2007, with the majority of exports flowing to Turkey, through the South Caucasus Pipeline, with an initial capacity of 8.8 bcm per year which will be increased to 25 bcm. The remainder is supplied mainly to Russia and Iran. Proven reserves are 0.9 trillion cubic meters[82], 0.5 per cent of the world's total. Although the production of gas is slightly increasing, it is still just 16.2 bcm per year with consumption of 8.6 bcm per year. It is expected that there will be growth in production as well as consumption in the next decade. "Despite its fundamental contribution to the development of the corridor, Azerbaijan cannot be considered a major player on the world's gas scene. In the short to mid-term, the only resources actually available to flow westward are the 10 bcm from Shah Deniz II."[83] The price of gas supplies from Azerbaijan will continue to be uncertain in the future since developing Caspian off-shore production is costly.

Turkmenistan

Central Asia's landlocked location would force Kazakhstan, Turkmenistan and Uzbekistan to export their gas to Europe[84] via Iran and Russia. The construction of the pipeline across the Caspian Sea would ease this situation. The unsettled legal status of the Caspian Sea means that export would be conditional on consent from Iran and Russia, which strongly oppose the Trans Caspian Pipeline option.[85] Russia and China are also very interested in buying Turkmen gas, and these countries could provide investment to the Turkmen gas sector as well as the economy. Moreover, relations between Turkmenistan and Azerbaijan are not easy because of their claims in the Caspian Sea, so interconnecting these two counties could be problematic. Other problems relate to underdeveloped infrastructure, the willingness of

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81 A. Jarosiewicz, "The lunch of the modified Southern gas corridor," September 24, 2014. Available online: http://www.osw.waw.pl/en/publikacje/analyses/2014-09-24/launch-modified-southern-gas-corridor (accessed on December 8, 2014).

82 The data dealing with reserves, production, consumption and export of gas used in part about the Southern Gas Corridor are used from BP Statistical Review of World Energy, 2014.

83 N. Sartori, "The European Commission's policy towards the Southern gas corridor: Between national interests and economic fundamentals," *IAI working papers,* January 2012. Available online: http://www.iai.it/pdf/DocIAI/iaiwp1201.pdf (accessed on December 8, 2014).

84 If there is interest.

85 Ibid.

the Turkmen government to supply gas only on the Turkmen border and commitments toward China. Turkmen exports to China will increase to 60-65 bcm per year in 2020. Despite this commitment, Turkmenistan has repeatedly declared an interest in supplying gas to European markets.

The country has potential to become the most important supplier for the Southern Corridor as it is the fourth largest gas reserve country in the world and the sixth biggest exporter of gas. As the *BP Statistical Review of World Energy* highlighted, Turkmenistan's proven reserves are 17.5 tcm, which represents a 9.4 per cent share of world reserves. In 2013 production was 62.3 bcm and should increase in the short term. Optimistic scenarios would see overall export reach 90 bcm per year in 2020. Consumption was 22.3 bcm. The EU institutions have considered Turkmenistan as the second supplier for the Southern Corridor after Azerbaijan. The European Commission has taken several steps to integrate Turkmenistan into its plans relating to the Southern Corridor. "Turkmenistan offers up to 40 bcm per year of gas to be fed into the Southern Corridor. The Turkmen leadership is interested in selling larger volumes on the European market and identifying a collective buyer for these quantities."[86]

Additionally, Turkey and Azerbaijan played a more active role in involving Turkmenistan in the Southern Corridor in 2014. "The Turkmen and Turkey presidents in Ankara declared that Turkey will deliver Turkmen gas to European markets. Turkmenistan would be exporting gas in the future, westwards to Azerbaijan via a subsea Caspian pipeline for further transmission to Turkey."[87] In 2014, during a visit by the new Turkish president to Turkmenistan, Turkmen and Turkish gas companies signed a framework agreement for Turkmenistan to supply its gas to the Trans-Anatolian gas pipeline.[88] One could say that this agreement is the first step in delivering Turkmen gas to Europe. Nevertheless, many issues remain unresolved.

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86 "Azerbaijan and the Southern gas corridor to Europe: Implications for U.S. and European energy security," Jamestown foundation, Conference report, September 13, 2013. Available online: http://www.jamestown.org/uploads/media/Conference_Report-Azerbaijan_and_the_Southern_Gas_Corridor_-_FINAL_web_version.pdf (accessed on December 8, 2014).

87 J.C.K. Daly, "Turkmenistan looks to Europe," *Silk road reporters,* July 14, 2014. Available online: http://www.silkroadreporters.com/2014/07/14/turkmenistan-looks-europe/ (accessed on December 8, 2014).

88 M. Gurt, "Turkmenistan inks deal with Turkey to supply gas to TANAP pipeline," *Reuters,* November 7, 2014. Available online: http://www.reuters.com/article/2014/11/07/turkmenistan-turkey-tanap-idUSL6N0SX2QK20141107 (accessed on December 8, 2014).

Kazakhstan

The position of Kazakhstan is similar to Turkmenistan in several respects. Currently, the only ways of getting gas from Kazakhstan to Europe is via the Caspian Sea or Russia. However, relations between the EU and Kazakhstan are good and from this point of view Kazakhstan is not a problematic partner. Kazakhstan is not actively involved in plans to develop the Trans Caspian pipeline, unlike Turkmenistan. One explanation lies in its underdeveloped domestic infrastructure. The country continues to depend on gas imports to meet domestic demand, and its gas reserves in the west and population centers in the north, east, and south are not connected.[89]

The existing gas pipeline network mainly transports gas from Kazakhstan to Russia. "Kazakhstan's outlets are traditional and do not significantly influence the global commodity markets of natural gas. Kazakhstan exports natural gas mainly to Russia (51.4 per cent), Ukraine (48.3 per cent) and Germany (0.2 per cent)."[90] Kazakhstan's proven reserves are 1.5 tcm, a 0.8 per cent share, while production is 18.5 bcm and consumption is 11.4 bcm per year. One can expect production to increase in the future, but there is also strong interest from China and Russia to buy it.

Iran

Iran could be another important player in relation to the Southern Corridor because it has waste gas reserves. The EU prioritized a plan to import natural gas from Iran as relations with Tehran thawed while those with top gas supplier Russia chilled due to the Ukraine crisis.[91] Since Iran is a direct neighbor of Turkey, it does not face the geographical obstacles affecting Turkmenistan or Kazakhstan. Nonetheless, the country is still under international sanctions. Political tensions between the EU and Iran over the country's nuclear program have prevented Tehran from becoming a gas supplier to the EU, or

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89 "Kazakhstan," EIA, October 28, 2013. Available online: http://www.eia.gov/countries/analysisbriefs/Kazakhstan/kazakhstan.pdf (accessed on December 8, 2014).

90 Energy Charter Secretariat, "Investment climate and market structure review in the energy sector of Kazakhstan," 2013. Available online: http://www.encharter.org/fileadmin/user_upload/Publications/Kazakhstan_ICMS_2013_ENG.pdf (accessed on December 8, 2014).

91 D. Hudson, "Iran gas exports to Europe would take at least 5 years – experts," *Reuters*, October 29, 2014. Available online: http://www.reuters.com/article/2014/10/29/europe-gas-iran-idUSL5N0SO4PZ20141029 (accessed on December 8, 2014).

even a transit option for Central Asian gas heading westward.[92] Iran has made it clear that it opposes the Trans-Caspian Pipeline, which would transport gas from Turkmenistan to the Southern Gas Corridor.[93] Despite western sanctions against the Iranian energy sector, it has been successful in seeking out new gas customers such as Oman, Pakistan or neighboring Iraq.

Since the EU imposed sanctions against Russia, Iran has been mentioned more often as a potential gas supplier to European markets. It has proven natural gas reserves of 33.8 tcm, with 18.2 per cent of world reserves. Production was 166.6 bcm in 2013 and consumption level is 162.2 bcm per year. It is necessary to highlight that Iranian production has increased dramatically from 82.7 bcm per year in 2003 and 132.4 bcm in 2008. Iranian officials have stated that gas production will increase rapidly in the next few years and that it is ready to deliver to Gulf States, Asian markets and Europe as well. The increase in production has come almost exclusively from South Pars located in the Persian Gulf. Therefore a pipeline from there to Europe is highly unlikely. Moreover, the country is facing other problems as well. "Any increase in production was directly absorbed by the domestic market. There is also a heated debate in Tehran whether, in the first place, natural gas should be exported at all. In practice, the domestic use of natural gas was de facto prioritized over exports."[94] As Grabe[95] has highlighted, according to Iranian representatives, the diversification of gas supplies to Europe would take the form of increased natural gas exports from Iran to the European market, with a daily volume of anywhere between 4 and 50 million cubic meters. However, these Iranian declarations are often seen as political statements. Iran would take at least five years to start exporting natural gas to the European Union once sanctions were removed.[96] The most economic route for Iranian supplies

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92 N. Sartori, "The European Commission's policy towards the Southern gas corridor: Between national interests and economic fundamentals," *IAI working papers,* January 2012. Available online: http://www.iai.it/pdf/DocIAI/iaiwp1201.pdf (accessed on December 8, 2014).

93 "Azerbaijan and the Southern gas corridor to Europe: Implications for U.S. and European energy security," Jamestown foundation, Conference report, September 13, 2013. Available online: http://www.jamestown.org/uploads/media/Conference_Report-Azerbaijan_and_the_Southern_Gas_Corridor_-_FINAL_web_version.pdf (accessed on December 8, 2014).

94 D. Jalilvand, "The puzzle of Iranian natural gas," July 18, 2014. Available online: http://energlobe.eu/economy/the-puzzle-of-iranian-natural-gas (accessed on December 8, 2014).

95 N. Grabe, "Iran plans to increase gas exports to Europe," *Liberty Voice,* May 18, 2014. Available online: http://guardianlv.com/2014/05/iran-plans-to-increase-gas-exports-to-europe/ (accessed on December 8, 2014).

96 D. Hudson, "Iran gas exports to Europe would take at least 5 years – experts," *Reuters*, October 29, 2014. Available online: http://www.reuters.com/article/2014/10/29/europe-gas-iran-idUSL5N0SO4PZ20141029 (accessed on December 8, 2014).

would be through Turkey, thanks to its geographic position and infrastructure with Europe – the TANAP pipeline. Iran delivered 8.4 bcm of gas to Turkey in 2012. Among other problems with infrastructure, the pipeline has become a target for Kurdish groups fighting for independence.

Iraq

Another option for the Southern Corridor is supplies from Iraq. However, Iraq will probably not be able to produce a significant amount of gas in the short term. Despite having proven reserves of 3.6 tcm and 1.8 per cent of the world's proven reserves, Iraqi production was only 0.6 bcm in 2013. Most of the proven gas reserves are located in the south of the country. The volatile security situation in Iraq restricts the country's ability to increase its gas production. In addition to security problems, there are two parallel strategies for developing Iraq's oil and gas potential – one is favored by the federal government of Iraq and the other by the Regional Government.[97] Wars, sanctions, civil unrest, terrorist attacks, and aging infrastructure suffering from a lack of maintenance mean that most of the pipeline network is either non-operational or operates well below nameplate capacity.[98] Instability in Syria, the complicated situation in Iraq, Kurdish attempts to gain independence, and tensions in relations between Turkey and the Kurds make limited opportunities for progress. All these factors mean that there is little mention of Iraq being one of the suppliers to Europe.

Tensions between the Kurdish regional government and the central government in Bagdad further complicate the situation. However, this also provides an opportunity for Turkey in particular. Turkish companies and the Kurdish regional government have concluded several agreements to bring gas from northern Iraq to Turkey and possibly also Europe. Creating stronger ties with Kurdistan makes sense for Turkey from an energy security perspective because Kurdistan has ample supplies of oil and gas and is more secure than the rest of Iraq. Back in 2012 an International Energy Agency report stated that Kurdistan could potentially export 20 bcm of gas annually, although experts agree that this number is probably unrealistic.[99] These plans now seem more probable, as the Genel Energy consortium announced that it had reached agreement with the Ministry of Natural Resources of the Kurdistan

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97 L.J. Al-Khatteeb, "Natural gas in the Republic of Iraq," Belfer Center, November 18, 2013. Available online: http://belfercenter.ksg.harvard.edu/publication/23639/natural_gas_in_the_republic_of_iraq.html (accessed on December 8, 2014).

98 Ibid.

99 N. Borroz, "Turkey`s energy strategy: Kurdistan over Iraq," *Natural Gas Europe*, November 11, 2014. Available online: http://www.naturalgaseurope.com/turkey-energy-strategy-kurdistan-iraq (accessed on December 8, 2014).

Regional Government in November 2014. It is expected that the first natural gas production will be available for export in the first half of 2018.[100]

Uzbekistan

Uzbekistan is another Central Asian country which is seen as a potential gas supplier for diversification. Nevertheless, geography also matters in this case. Bringing gas to Europe requires not only new infrastructure such as the Trans Caspian Pipeline, but also agreement with Turkmenistan or Kazakhstan, since the country has no access to the Caspian Sea. Another issue is that gas production has continually decreased since 2008. The production of natural gas was 55.2 bcm in 2013 with consumption at 45.2 bcm per year. Uzbekistan's proven reserves are 1.1 tcm.

Uzbek gas exports are aimed at its "traditional" markets, including Kazakhstan, Tajikistan and Kyrgyzstan. In this case, gas is also used as a political weapon when tensions arise with neighborhood states. It is also clear that the country is more oriented towards countries like China, Pakistan and India than European markets. Uzbekistan is involved in the construction of the pipeline which will link China with Central Asia. In 2015 Uzbekistan will increase its natural gas exports to China up to 10 billion cubic meters compared with six billion in 2013.[101]

Export transmission capacity

All potential suppliers to the Southern Gas Corridor, with the exception of Azerbaijan, require investment to build additional infrastructure to bring gas to Turkey. There are added complications such as the issue of the legal status of the Caspian Sea, serious security concerns and international sanctions. Some of these countries could start building interconnections with Turkey, which might open up other possibilities for European countries and the V4 gas market. The TAP pipeline would deliver 10 bcm of gas to the EU from 2019 and capacity could be doubled. Similarly, the capacity of the TANAP pipeline will be more than 30 bcm per year by 2026. The most important factor for the Southern Corridor is Azerbaijan and Turkey playing an active role in order to increase these volumes and find new suppliers. Turkmenistan and Iraq, or rather the Kurdish regional government, are the

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100 "Natural gas from Iraq to Turkey possible: Genel Energy," *Anadolu agency*, November 14, 2014. Available online: http://www.aa.com.tr/en/economy/420526--natural-gas-from-iraq-to-turkey-possible-genel-energy (accessed on December 8, 2014).

101 "Uzbekistan to increase natural gas export to China," *The times of Central Asia*, May 19, 2014. Available online: http://www.timesca.com/news/9877-uzbekistan-to-increase-natural-gas-export-to-china (accessed on December 8, 2014).

most likely suppliers given that they have already signed framework or final agreements. These countries have also declared their willingness to deliver gas to European markets. All these plans depend on financial, legal, political as well as security issues; nonetheless, it looks as if the year 2014 brings first steps in this process.

There are hopes that Southern Gas Corridor supplies may increase at a later stage through other potential sources that are not currently available for various reasons.[102] From this point of view, by 2026 infrastructure enabling 31bcm should be in place to deliver gas to the European Union border. The table below shows available capacity for European markets in 2020, based on specific or framework agreements as well as on the expected available capacity. Nevertheless, the amount of gas available for Europe depends on other, rival, projects like the Turkmenistan–Afghanistan–Pakistan–India (TAPI) one.

Table 4. Export capacity for European markets

Country	Production (bcm)	Consumption (bcm)	Proven reserves (bcm)	Share of world's reserves	Export capacity available for the EU in 2020
Azerbaijan	16.2	8.6	9,000	0.5%	8–10 bcm
Turkmenistan	62.3	22.3	175,000	9.4%	0–20 bcm
Kazakhstan	18.5	11.4	15,000	0.8%	0 bcm
Iran	166.6	162.2	338,000	18.2%	0 bcm
Iraq	0.6	-	36,000	1.9%	0–5 bcm
Uzbekistan	55.2	45.2	11,000	0.6%	0 bcm

Source: Authors

Transit to the European border

The decision to create the Trans Anatolian pipeline (TANAP) has completely changed the rationale behind the Southern Gas Corridor. Now it is not the EU, European countries or European companies but other players that have started to play the most important role. After years of negotiation, Azerbaijan and Turkey agreed the legal and commercial terms for gas transit from Azerbaijan to Europe via Turkey and separately for Azerbaijani gas supplies

[102] S. Ascari, *The gas target model for the Visegrad 4 region – conceptual analyses*, Warsaw: Ośrodek Studiów Wschodnich, 2013. Available online: http://www.osw.waw.pl/sites/default/files/raport_04_the-gas-target-model_net.pdf (accessed on December 8, 2014).

to Turkey.[103] This pipeline would also be used for supplies from other suppliers. "The volumes flowing through TANAP will increase from 16 billion cubic meters annually, planned for 2020, to 23 bcm by 2023 and 31 bcm by 2026. There is also discussion about more ambitious capacities beyond 31 bcm."[104] In the medium term, expected development is rather limited: only 10 bcm per year of Azerbaijani production is allocated to Europe.

Even with the ready infrastructure, there remains the basic issue of whether there will be enough gas for TANAP as well as European markets. One possibility would be to expand the existing South-Caucasus pipeline[105] (SCP) from Azerbaijan, via Georgia to Turkey, with an initial capacity of almost 9 bcm per year, which would increase to 21 bcm (some sources have even mentioned 23 bcm) per year in 2019. The SCP would receive additional supplies through the Trans-Caspian Gas Pipeline (TCP). This project is still very much at the planning stage but some estimate it would deliver around 30[106] bcm of gas from Turkmenistan to Azerbaijan (and possibly also in reverse direction). The Trans-Caspian Gas Pipeline project, providing for the construction of a 300-kilometre gas pipeline across the Caspian Sea to the shores of Azerbaijan, is considered optimal for the delivery of Turkmen energy resources to the European market.[107] These two projects are EU projects of common interest. The advantage is that they can be realized without direct investment by European countries or the European Union, although the question of financing is still unresolved. As a whole, the TANAP, SCP and TCP pipelines would connect Turkmenistan, Azerbaijan, Georgia and Turkey with European countries. As mentioned in the previous section, the pipeline from Kurdish Iraq to Turkey will be built by 2020, with possible interconnection with TANAP at a later stage.

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103 A. Livanios, "The conundrum of the Southern gas corridor: What are the risks for Europe and Azerbaijan? The viewpoint of an insider," *Natural Gas Europe*, April 2013. Available online: http://www.naturalgaseurope.com/pdfs/IFRI_actuelleslivanios17413.pdf (accessed on December 8, 2014).

104 "Azerbaijan and the Southern gas corridor to Europe: Implications for U.S. and European energy security," Jamestown foundation, Conference report, September 13, 2013. Available online: http://www.jamestown.org/uploads/media/Conference_Report-Azerbaijan_and_the_Southern_Gas_Corridor_-_FINAL_web_version.pdf (accessed on December 8, 2014).

105 Known also as the Baku – Tbilisi – Erzurum (BTE) pipeline.

106 The capacity has not been officially confirmed, different sources suggest between 10 and 50 bcm per year.

107 Ibid.

Table 5. SGC feeding and transit lines

Pipeline	Countries	Capacity	Status
Trans Caspian pipeline (TCP)	Turkmenistan –Azerbaijan	30 bcm (possible)	Framework agreement
South Caucasus pipeline expansion	Azerbaijan – Georgia –Turkey	16 bcm (2018) 21 bcm (2021)	Under construction
Trans Anatolian pipeline (TANAP)	Turkey – Greece	16bcm (2020) 23bcm (2023) 31bcm (2026)	Under construction

Source: Authors

Transit to the Visegrad borders

Even if sources for the Southern Corridor are confirmed, the V4 countries still face the basic issue of how to access this source. The capacity of the TAP pipeline is only one third of the amount that Nabucco is to deliver to Europe, which means that the potential volume and contribution to the Visegrad countries will be limited if additional infrastructure is not built. The Trans-Adriatic Pipeline will transfer gas from Turkey via Greece and Albania to the Italian and Swiss markets. Despite the TAP consortium's contrasting rhetoric which highlighted potential supplies for other countries, this has not changed. The two most likely ways of linking "southern gas" with V4 gas market are – 1. Through Bulgaria and Romania or 2. Through western Balkans countries via the Ionian Adriatic Pipeline (IAP).

The first option would be to get gas from the Turkish border to central Europe via Bulgaria and Romania. Another project of common interest is the Southern Gas Corridor that would bring gas from the Turkish border to Austria via Bulgaria, Romania and Hungary. Following the cancelation of plans for the South Stream pipeline, central European and Balkan countries quickly started to search for ways to connect Turkey with central Europe. The current infrastructure in Bulgaria and Romania is not sufficient to provide interconnection with the TAP pipeline. Existing or soon-to-exist interconnections with neighboring countries are the Greece–Bulgaria interconnector (with a capacity of 6 bcm per year) and the Turkey–Bulgaria interconnector (3 bcm per year). However, connection between Bulgaria and Romania is limited to only 1.5 bcm per year.[108] The Bulgarian national natural gas transmission system has an annual transport capacity of 19 billion cubic meters.

Romania, from this point of view, is in a slightly better position thanks to its Arad–Szeged interconnector with Hungary and capacity of 4.4 bcm

[108] Bulgartranzgas, "Gas infrastructure," Available online: http://www.bulgartransgaz.bg/en/pages/gaz-infra-54.html (accessed on December 8, 2014).

per year. Hungary and Romania have both signed up to investing in the construction of the bi-directional Arad–Szeged pipeline, which will be operational by 2016. It will open up gas transport from the Black Sea region to central and east European markets.[109] Although the national natural gas transmission system has an annual transport capacity of 30 billion cubic meters, it is not yet ready to deliver a larger volume of gas to central Europe from the SGC. On the other hand, Romania is seen as a key country in terms of other means of delivering possibilities how to get Caspian gas to Europe, such as the Azerbaijan–Georgia–Romania Interconnector (AGRI), which would ship Azerbaijani natural gas to Romania via the Black Sea. Capacity would be between 7 and 20 bcm per year and the projected cost is expected to be 4 to 6 billion euros.[110] Another option to link up Romania was the White stream project, which would connect Georgia and Romania by sub-marine pipeline. Since the infrastructure remains underdeveloped, Slovak Eustream company has developed a project called Eastring. It would consist of a pipeline with a capacity of 20 bcm per year connecting Veľké Kapučany with the Bulgarian–Turkish border. Eustream, Bulgartrans and Romanian Transgas would deal with the technical and financial side of the project.[111]

Another option would be the Ionian Adriatic pipelines and the interconnection between Croatia and Hungary. The IAP pipeline would connect Croatia with the Trans Adriatic Pipeline, via Montenegro, and Albania. The IAP could supply the region with around 1.2 bcm in 2020 and this is expected to increase to 5.8–6.8 bcm in 2040.[112] The advantages of this project are that it would directly link up with the TAP pipeline in Albania, which would be the hub country, and it would require relatively low investment. The disadvantages are that it has limited capacity, which would be consumed by the Balkans, and that there are no plans to supply central Europe. The project is still in the preparatory phase. Nevertheless, the interconnection via the network in Croatia and on to the Hungarian border is one of the potential routes. The Hungary–Croatia interconnection has a capacity of approximately 5.5 bcm per year.

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109 G. Petrescu, "Romania will export gas to Hungary before end-of-year," *Natural Gas Europe*, September 3, 2013. Available online: http://www.naturalgaseurope.com/romania-hungary-pipeline-december (accessed on December 8, 2014).

110 "Azerbaijan, Romania and Georgia signed memorandum on gas supplies," *Trend.az*, April 13, 2010. Available online: http://en.trend.az/business/energy/1668912.html (accessed on December 8, 2014).

111 "European gas suppliers keen on supplying Ukraine via Slovakia: Naftogaz," *Platts*, July 3, 2014. Available online: www.platts.com/latest-news/natural-gas/moscow/european-gas-suppliers-keen-on-supplying-ukraine-26826635 (accessed on December 7, 2014).

112 Cowi – IPF Consortium, "FS and ESIA for the Ionian – Adriatic Pipeline (IAP). Feasibility study report," January 2014. Available online: http://www.energy-community.org/pls/portal/docs/3096031.PDF (accessed on December 8, 2014).

Table 6. Projects for delivering gas to central Europe

Pipeline	Countries	Capacity	Status
Trans Adriatic pipeline	Albania, Greece, Italy	10–20 bcm	Permitting
Ionian Adriatic pipeline	Albania, BiH, Croatia, Montenegro	5 bcm	Feasibility studies
White Stream	Azerbaijan, Georgia, Romania, Turkmenistan	17 bcm	Pre-feasibility studies
AGRI	Georgia, Romania	7–20 bcm	Feasibility studies
Greece-Bulgaria interconnection	-	5 bcm	Permitting
Turkey-Bulgaria interconnection	-	3bcm	Pre-feasibility studies
Bulgaria-Romania interconnection	-	1.5 bcm	existing
Romania-Hungary interconnection	-	4.4 bcm	existing

Source: Energy projects in Southeastern Europe[113], August 2014.

Transit policies

The fact that the TAP option was chosen has been justified on the grounds that it is more commercial, being a shorter and cheaper route to reach a bigger market. The Nabucco project (as well as Nabucco-West) failed not only because of economic reasons but also because political factors played an important role – the lack of clear strategic support and possible conflict with Gazprom. "The selection of TAP over Nabucco was not only a commercial, but also a political decision as Russia put Azerbaijan under immense pressure to withdraw from Nabucco in order to allow its competitor South Stream to be built."[114] TAP also serves the Azeri export strategy well: with SOCAR, the Azerbaijan national energy company that is expected to acquire DESFA in Greece, the Azers will have more downstream control over their gas.[115] However, The European Commission has announced an investigation into

[113] "Energy projects in Southeastern Europe," August 2014. Available online: https://intelligence.seenews.com/documents/EnergyProjectsSoutheasternEurope2014.pdf (accessed on December 8, 2014).

[114] "Azerbaijan and the Southern gas corridor to Europe: Implications for U.S. and European energy security," Jamestown foundation, Conference report, September 13, 2013. Available online: http://www.jamestown.org/uploads/media/Conference_Report-Azerbaijan_and_the_Southern_Gas_Corridor_-_FINAL_web_version.pdf (accessed on December 8, 2014).

[115] A. Loskot-Strachota, J. Lasocki, "End of Nabucco – end of Southern gas corridor?" *Energy Post*, June 27, 2013. Available online: http://www.energypost.eu/end-of-nabucco-end-of-southern-gas-corridor/ (accessed on December 8, 2014).

the sale of the DESFA National Natural Gas System Operator to Azerbaijani SOCAR, in order to determine whether the sale conflicts with European legislation on mergers.[116]

One opinion has it that the failure of Nabucco was also linked with the unclear attitude of the V4 countries, and indeed it seems that EU institutions played a more active role than these countries.

> 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 the Russian gas transit, preferred talking to acting. And Budapest, a partner to both Nabucco and South Stream, eventually preferred the latter.[117]

The Southern Gas Corridor could not be used as a third independent source of supplies for the V4 gas market, at least in the short term, which was seen as a strategic mistake. "In light of the Ukraine-crisis and rapidly deteriorating relations with Russia, the unwillingness to act in unison to achieve success in the Nabucco concept that would have delivered gas to particularly vulnerable states was a strategic mistake."[118]

Three Nabucco consortium members – OMV, MOL and Bulgargaz – have also signed up to the Gazprom South Stream pipeline. Bulgaria has been ambivalent in choosing either Nabucco or South Stream. Different Bulgarian governments have sided with one or the other, with the previous centre-right government delaying a decision on South Stream for a long time.[119] Hungary's oil and gas company, MOL, had expressed skepticism on Nabucco. Then, in spring of 2012, Hungary's Prime Minister Viktor Orbán announced that the project was in trouble and MOL re-evaluated its participation. Later, the Hungarian government declared its support for the South Stream pipeline. However, Hungary and Azerbaijan signed the declaration on a strategic

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116 "European Commission blocks DESFA sale to Azerbaijan`s SOCAR," *Tovima*, November 6, 2014. Available online: http://www.tovima.gr/en/article/?aid=648022 (accessed on December 8, 2014).

117 "Central Europe`s energy security after Nabucco," CEPI, November 6, 2013. Available online: http://www.cepolicy.org/publications/central-europes-energy-security-after-nabucco (accessed on December 8, 2014).

118 D. Koranai, N.R. Brown, "Revitalizing the Southern gas corridor to counter the Russian energy great," April 25, 2014. Available online: http://www.huffingtonpost.com/david-koranyi/revitalizing-the-southern-gas_b_5214501.html (accessed on December 8, 2014).

119 "Azerbaijan and the Southern gas corridor to Europe: Implications for U.S. and European energy security," Jamestown foundation, Conference report, September 13, 2013. Available online: http://www.jamestown.org/uploads/media/Conference_Report-Azerbaijan_and_the_Southern_Gas_Corridor_-_FINAL_web_version.pdf (accessed on December 8, 2014).

partnership in 2014. According to Orbán (the prime minister), Azerbaijani gas supplies are of interest to Hungary and Europe generally.[120]

From this perspective, it seems that countries like Azerbaijan and Turkey were making more active progress towards the Southern Gas Corridor and, more importantly, have attempted to find a way of delivering even more gas to the European Union. Azerbaijan has made it clear that it has an open door policy with regard to Turkmenistan exporting its gas to Europe. "Turkmenistan never involves itself in commitments outside its borders and prefers to sell gas on the border. Azerbaijan will probably have to finance construction in conjunction with western companies."[121] However, Russia and Iran strictly oppose the construction of the TCP, stressing that the project cannot be implemented without first resolving the issue of the international legal status of the Caspian Sea. Turkey seemed to assume the role of key negotiator, motivator, and catalyst for the development of the Southern Gas Corridor.[122] Several bilateral and trilateral meetings were held between Turkey, Azerbaijan and Turkmenistan in relation to the energy dialogue and also other topics.

> In July 2013, a framework agreement was signed between the governments of Turkmenistan and Turkey, on co-operation regarding deliveries of Turkmen gas to Turkey and Europe. In April 2014, the President of Turkmenistan, Gurbanguly Berdimuhamedov, met with the head of the State Oil Company of Azerbaijan (SOCAR), and agreed to build transit pipelines which will enable a diversification of gas supplies in both countries.[123]

UNG Poland

For quite some time, Poland has been considered the most likely case for unconventional natural gas production in the EU. Starting in 2009, when the US shale gas revolution began taking greater shape, the eyes of the energy corporations, governments and analysts turned beyond North America in their search for the next "game to be changed" by the unconventionals.

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120 "Azerbaijan and Hungary sign declaration on strategic partnership," *News.az*, November 11, 2014. Available online: http://www.news.az/articles/official/93417 (accessed on December 8, 2014).

121 "Turkmenistan`s Asian pivot: Implications for the European energy dynamic," *Natural Gas Europe*, July 3, 2014. Available online: http://www.naturalgaseurope.com/turkmenistan-european-energy-dynamic-ccee(accessed on December 8, 2014).

122 E. Latypov. "The Southern gas corridor: a struggle between EU co-operation and Chinese dominance," November 6, 2014. Available online: http://www.ceep.be/southern-gas-corridor-eu-co-operation-chinese-dominance/ (accessed on December 8, 2014).

123 Ibid.

Production outlook

Initial estimates of the Polish shale gas reserves were for 5.3 tcm in 2011 but were later reduced by approximately 20 per cent to 4.1 tcm because of the lower than expected total organic carbon (TOC).[124] The Polish Geological Institute, in cooperation with USGS,[125] assessed the recoverable reserves, taking into account some preliminary exploration work, and produced estimates with conservative figures of 346-768 bcm and optimistic ones of as much as 1.9 tcm. Although the reserves may be substantial, achieving economically sound extraction will take time, especially in an environment with no recent experience of developing an industry of such scale.

Over the past four years, two main arguments have emerged regarding Polish UNG. While the official authorities have stressed the anticipated benefits of potential UNG production, mainly independence from Russian gas imports and reduced coal consumption, analysts and other officials have focused on endeavoring to estimate future Polish UNG production. Interestingly enough, both groups have based their arguments on an analogy with US UNG development. Florence Gény, who authored the first thorough evaluation of UNG development in Europe, compared the key geological characteristics of the US and European shale plays, arguing that the Polish Lublin and Baltic basins are most similar to the US Barnett, Fayetteville, and Marcellus basins. However, she concludes that despite certain structural similarities, European unconventional gas basins tend to be smaller, and tectonically more complex, and the geological units seem to be more compartmentalized. Furthermore, the shale tends to be deeper, hotter, and more pressurized. The quality of the shale is also different, generally having more clay content in Europe. Specific to Poland and Germany is a certain degree of nitrogen contamination of the shale, affecting the quality, and thus the value, of the gas.[126]

Factors that are likely to determine the level of production in the future include technology and operating practices, land access, economic profitability, policies and regulation, and the availability of service industries. It

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124 "World shale gas and shale oil resource assessment," EIA/ARI, 2013. Available online: http://www.eia.gov/analysis/studies/worldshalegas/pdf/chaptersviii_xiii.pdf (accessed on January 4, 2015).

125 "Assessment of shale gas and shale oil resources of the lower Paleozoic Baltic-Podlasie-Lublin basin in Poland," Polish Geological Institute, 2012. Available online: http://www.pgi.gov.pl/pl/dokumenty-in-edycja/doc_view/769-raport-en.html (accessed on January 4, 2015).

126 F. Gény, *Can unconventional gas be a game changer in European gas markets?*, Oxford: OIES, p. 53–4. Available online: http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/NG46-CanUnconventionalGasbeaGameChangerinEuropeanGasMarkets-FlorenceGeny-2010.pdf (accessed on January 4, 2015).

is concluded that Poland is highly unlikely to develop any significant UNG production before 2020 mainly due to its substantial lack of experience in developing an industry of such scale, the unavailability of equipment and an underdeveloped service industry to support the rig operation, an unfriendly regulatory and as-yet-unknown tax regime, and the as-yet-unknown environmental regulations at both national and European levels.

Similar conclusions have been presented by Černoch et al., who look at European Union policies on unconventionals, and, most importantly, provide a network analysis of the key actors involved in Polish UNG development. In this context, it is noteworthy that rather surprising coalitions and confrontations have emerged in the Polish UNG industry stakeholder area – such as PGNiG, the Polish state-owned and government-controlled oil and gas incumbent, pursing strategies that almost contradict those of the Polish government.[127] Yet, there are signs of significant preferential treatment of domestic energy companies in government policies. The international oil companies interviewed by Smyrgala, Černoch et al., often acknowledged that regulatory issues were the greatest threat to the development of shale gas production in Poland. Specifically, public administration and the management of big state companies have been accused of ignorance and indolence, which partly results from their monopolist (or very strong) positions in the system. Interestingly enough, a public administration representative confirmed that there were protectionist practices favoring Polish companies, who gained approximately half of the licenses.[128]

Production policy: regulatory issues

The idea that there may be regulatory instability seems to be further supported by recent developments in the area. In November 2013, Donald Tusk, then Polish prime minister replaced his environmental minister, Marcin Korolec, with Maciej Grabowski, a former deputy finance minister. This move was part of a larger government reshuffle that was probably intended to stop the decline in popularity that the government was facing.[129] However, with regards to shale gas exploration, it may also be seen as the prime minister's reaction to the slowed-

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127 F. Černoch et al., *Unconventional sources of natural gas: development and possible consequences for the Central Eastern European region,* Brno: International Institute of Political Science, 2012.

128 D. Smyrgala, F. Černoch et al., *Shale gas in Poland and in the Czech Republic: Regulation, infrastructure and perspectives of cooperation*, Brno: International Institute of Political Science, 2012. Available online: http://www.ceners.org/energy-research/ceners-2012-shale-gas-poland-czech-republic.pdf (accessed on January 4, 2015).

129 "Polish prime minister replaces top cabinet officials," *The New York Times*, November 20, 2013. Available online: http://www.nytimes.com/2013/11/21/world/europe/poland-cabinet-reshuffle.html?_r=0 (accessed on January 4, 2015).

down exploration pace in 2013, when only 12 new wells were completed, half the number drilled in 2012. The new minister immediately stated that his top priority would be to streamline shale gas exploration, and expressed the hope that the first commercial well would be launched in 2014.[130] On December 19, 2013, a month after taking up office, Grabowski replaced Piotr Wozniak, who was the deputy environment minister in charge of preparing draft shale regulations and overseeing licensing procedures, with Slawomir Brodzinski.

The licensing procedures have faced heavy criticism from the industry for being overly complicated. According to company insiders, the licensing that takes 21 days in Canada, takes more than a year in Poland.

To address these concerns, the Polish authorities worked intensively on new legal provisions. Between 2010 and 2014, several regulatory drafts were introduced. However, each one tended to reject the preceding one instead of building on it. The key issue concerning the new regulatory arrangement proved to be the degree of state involvement in the upstream sector and the tax regime. In this regard, developing exploration has been further hindered by the envisaged obligatory state participation in the form of a national agency called National Energy Minerals Operator (NOKE), which raised significant opposition among industry representatives, particularly since the competencies of NOKE were not made clear.[131][132] Similarly, the industry become preoccupied by the government's declarations regarding the Norwegian tax model that was for a certain period of time considered as the one to follow.[133][134] In the Polish context, this would have increased royalties and the overall burden substantially, since the pre-shale legislation had been created for an upstream sector dominated by publicly owned companies. In such an environment, royalties and taxes are almost an irrelevance since the money is only transferred between state institutions.

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130 "Poland's first commercial shale gas well possible this year," *Reuters*, June 14, 2014. Available online: http://af.reuters.com/article/commoditiesNews/idAFL5N0OY12020140617 (accessed on January 4, 2015).

131 "Prime Minister on shale gas and the European Council," October 16, 2012. Available online: https://www.premier.gov.pl/en/news/news/prime-minister-on-shale-gas-and-the-european-council.html (accessed on January 4, 2015).

132 "Shale gas law 'near completion'," June 13, 2013. Available online: http://www.thenews.pl/1/12/Artykul/138434,Shale-gas-law-near-completion#sthash.VLJwetM3.dpuf (accessed on January 4, 2015).

133 "Poland the second Norway?," *Natural Gas Europe*, June 9, 2010. Available online: http://www.naturalgaseurope.com/poland-the-second-norway (accessed on January 4, 2015). "Shale fail," *The Economist*, November 14, 2014. Available online: http://www.economist.com/blogs/easternapproaches/2014/11/polish-fracking (accessed on January 4, 2015).

134 "Woźniak: shale gas will flow in 2016," Cleantech Poland, 2012. Available online: http://shalegas.cleantechpoland.com/?page=edition&id=2&id_article=6 (accessed on January 4, 2015).

At the same time, the Polish authorities decided to focus on other aspects that could be considered obstacles to exploration. Firstly, in June 2013 the authorities decided to ease the environmental requirements for exploration drilling by amending national laws to allow shale drilling at depths of up to 5,000 meters, without first having assessed the potential environmental impacts. According to the authorities, the amendment to the EIA law limits shale drilling to 1,000m in "sensitive" areas such as Natura 2,000 sites. But as shale gas reserves in Poland are located mostly at a depth of 1,000–4,500m and the "sensitive" areas cover only 23 per cent of Polish territory, the new thresholds de facto exclude most shale gas exploration projects in Poland from the scope of the EIA directive. Naturally, the European Commission began a case against Poland for infringing the Environmental Impact Assessment (EIA) Directive.[135] This is especially interesting given the fact that after realizing that no EU-wide pro-shale coalition was going to emerge, Poland lobbied heavily to prevent the EU from regulating the environmental impact of hydraulic fracturing.

Secondly, in early 2014 the authorities decided to block local opposition movements before they had even emerged. Under a Ministry of Environment proposal that would have formed part of Poland's legal framework for the planned extraction of shale gas, environmental organizations would only be able to participate in the consultation process for decisions on new investments if they had been active in relation to the issue for at least twelve months before the consultation began.[136] This would have effectively prevented any citizen initiative wishing to take part in decisions over the future of its neighborhood from doing so. Later on, the proposal was withdrawn.

Production policy: an assessment

In developing the regulatory framework, Polish legislators seem to be trapped in pursuing too many, often opposing, goals at the same time. Reluctant to give up control over an energy industry that is still considered the nation's "family silver", the Polish authorities have continuously neglected the EU commission's liberalization and market competition

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135 "Poland on road to EU Court over shale gas defiance," *Euractiv*, July 30, 2014. Available online: http://www.euractiv.com/sections/energy/poland-road-eu-court-over-shale-gas-defiance-303798 (accessed on January 4, 2015).

136 "Poland proposes restrictions to shale gas opposition," *Natural Gas Europe*, April 1, 2013. Available online: http://www.naturalgaseurope.com/poland-proposes-restrictions-to-shale-gas-opposition (accessed on January 4, 2015).

measures,[137] underperformed in interconnecting the regional networks,[138] and introduced protectionist practices as far as shale gas concessions licensing is concerned.[139]

Underlying this reluctance is fear of the Russians ultimately taking over the energy sector if the Polish government voluntarily gives up control. Importantly, on the one hand, this sentiment encourages public support, praising the "energy independence" framing of shale gas that is heavily pushed by the government. On the other hand, it allows others to capitalize on the willingness of the government to burden end-users with higher energy prices (stemming from a lack of competition) in order to keep the state in charge of the strategic industries. A perfect example is PGNiG, a company which, in terms of market setting, shares more interests with Gazprom than with the Polish government.[140]

Realizing that strong state involvement and a competitive market are barely compatible, the Polish government narrow-mindedly focused on the Norwegian model that seems to somehow successfully combine these two elements, despite the fact that Poland lacks Norway's credibility. As a result, drafting the regulation has been quite a difficult process, giving the IOCs yet another reason to leave Poland: by November 2014, four oil majors had ceased doing business in Polish UNG: Exxon-Mobil, Marathon Oil, Talisman Energy, and Eni. The companies generally stated that this was because of the unsatisfactory results of exploratory analyses and drills, however, there have also been unofficial leaks about administrative inefficiency.[141]

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137 "Polish gas market," Office of Competition and Consumer Protection, September 10, 2012. Available online: http://uokik.gov.pl/news.php?news_id=3622 (accessed on January 4, 2015).

138 "Why Poland doesn't want a gas interconnection to Germany," *WikiLeaks*, December 7, 2006. Available online: http://www.wikileaks.org/plusd/cables/06WARSAW2525_a.html (accessed on January 4, 2015).

139 D. Smyrgala, F. Černoch et al., *Shale gas in Poland and in the Czech Republic: Regulation, infrastructure and perspectives of cooperation*, Brno: International Institute of Political Science, 2012. Available online: http://www.ceners.org/energy-research/ceners-2012-shale-gas-poland-czech-republic.pdf (accessed on January 4, 2015).

140 For details see F. Černoch et al., *The future of natural gas security in the V4 countries: A scenario analysis and the EU dimension,* Brno: International Institute of Political Science, 2011.

141 "Taking flight: Poland tries to revive its shale gas hopes as Russia tightens its grip," *Alberta Oil Magazine*, November 3, 2014. Available online: http://www.albertaoilmagazine.com/2014/11/poland-shale-gas-canada/ (accessed on January 4, 2015). "North American firms quit shale gas fracking in Poland," *BBC*, May 8, 2013. Available online: http://www.bbc.com/news/business-22459629 (accessed on January 4, 2015). "Chevron emerges as one of the last big oil and gas companies still searching for shale gas In Poland," *International Business Times*, March 31, 2014. Available online: http://www.ibtimes.com/chevron-emerges-one-last-big-oil-gas-companies-still-searching-shale-gas-poland-1565222 (accessed on January 4, 2015).

Despite some good news surfacing in 2014 (for example BNK announced promising results from its Gapowo B-1H well[142]), the key factors limiting the industry's development remain: the shale is deeper and of a different geological composition; there is a lack of infrastructure, technology and personnel, maintenance and other services; and profitability is dependent not only on marginal production costs, but also on market price. That price is largely determined by the Russians, who at the moment enjoy a rather comfortable margin. However, it is hard to imagine them sitting and watching their market share shrinking as UNG gradually develops. In other words, if economically recoverable gas reserves are found, the Russians will most likely adjust the price to make them non-competitive.

To summarize, we fully agree with Gény who states that there will be no significant UNG production in Poland in 2020. According to Rogers, a shale play analogous to the Barnett shale could produce 8 bcmy (about 80 per cent of Polish imports from Russia) if 300 wells were drilled per year during a period of over 10 years.[143] Considering that less than 70 wells have been drilled during the last four years, Polish UNG is extremely unlikely to affect the regional gas market anytime during the next decade.

LNG

Sources of LNG

Before the silent revolution, the world LNG market was defined as a rather rigid venture involving only a few. The technology that enabled the global reach of LNG vehicles was pioneered during Qatar's transformation from a marginal player to the world's largest LNG exporter, which happened in less than a decade. Consequently, a twofold market structure has emerged: 1. Well established regional trade in two consuming basins (the Atlantic and Pacific) with limited price convergence supplied by four source areas (Central America, the Middle East/North Africa, West Africa, and Australasia); and 2. Emerging global trade based on the geographical as well as the economical reach of suppliers such as Qatar. This trade was based on the following model: firstly, the premium markets, such as Japan and South Korea, received their supplies. Secondly, the spare export capacity was distributed within the

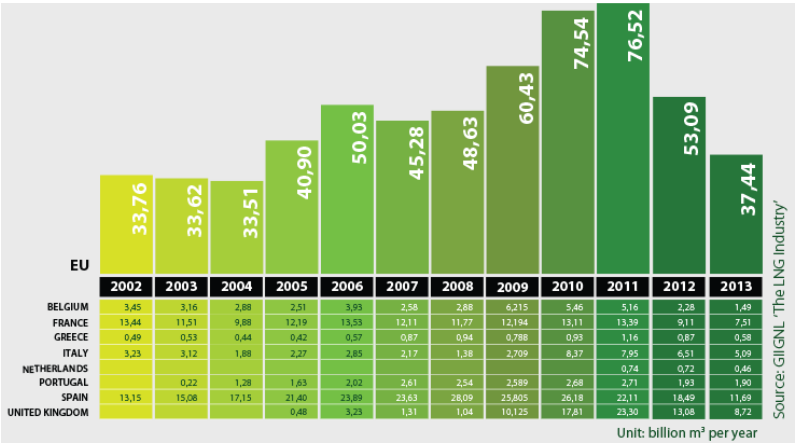
142 "Polish shale still on international radar," *UPI*, December 31, 2014. Available online: http://www.upi.com/Business_News/Energy-Resources/2014/12/31/Polish-shale-still-on-international-radar/7751420022647/?spt=sec&or=bn (accessed on January 4, 2015).

143 H. Rogers, *Polish shale still on international radar*, Oxford: OIES, 2013, p. 5. Available online: http://www.oxfordenergy.org/wpcms/wp-content/uploads/2013/07/UK-Shale-Gas-GPC1.pdf (accessed on January 4, 2015).

Atlantic Basin according to the principle of arbitrage. When storage levels in the US were low, the price at Henry Hub rose and attracted the available LNG deliveries. When storage was high, prices declined and the quantities were re-routed to Europe, where it outcompeted pipeline deliveries up to an amount set by long-term contract flexibility. Europe, therefore, played a balancing role between supply and demand.

The silent revolution put a sudden end to this balancing structure. The US left the picture all of a sudden and considerable amounts of LNG dislocated for the US market had to be marketed well below the expected price elsewhere. In Europe, this led to two years of exceptionally high LNG imports (2010 and 2011), during which the long-term PNG contracts were renegotiated to reflect the new situation on the market. However, the years that followed brought the import level down to below even pre-2005 levels. This decline can be attributed to the following factors: low gas demand due to a weak economy, renewed competitiveness of PNG contracts, growth of renewables, drop in carbon prices and in coal import prices, which together led to a mini-renaissance of coal at the expense of gas.[144]

Chart 2. LNG imports to the EU



Source: Gas Infrastructure Europe[145], 2014

144 "World LNG report – 2014 edition," International Gas Union, 2014, p. 13. Available online: http://igu.org/sites/default/files/node-page-field_file/IGU%20-%20World%20LNG%20Report%20-%202014%20Edition.pdf (accessed on January 4, 2015).

145 "Number of LNG regasification terminals in EU," Gas Infrastructure Europe, 2014. Available online: http://www.gie.eu/KC/generalfigures_lng.html (accessed on January 4, 2015).

Meanwhile, the demand pull from Asia and South America seemed to help the supply-demand nexus to regain balance after several years of LNG glut. Overall, 331 bcm was delivered in LNG form in 2013, a negligible year-on-year change from 330 bcm in 2012. Increased production from several important exporters, notably Qatar, Malaysia, Australia and Yemen, plus the addition of two new production trains in Algeria and Angola, was offset by production declines in Nigeria and Egypt. The higher output from Qatar and Malaysia was possibly related to less planned maintenance in 2013. At the same time, Australia benefitted from a full year of production from Pluto LNG and Yemen had fewer attacks on its pipeline infrastructure. However, the new LNG trains in Algeria and Angola did not contribute significant new volumes. Overall, production in Algeria remained at 2012 levels while in Angola the plant had delays starting up. Unplanned outages, in particular in Nigeria, and a continued decline in production, most markedly in Egypt, weighed on supply, keeping overall volumes flat year on year. We estimate that industry production – on a delivered basis – represented 87 per cent of nameplate capacity in 2013.[146]

However, the 2013–2014 supply additions are only the first wave of the final phase of the current investment cycle. Currently, around 83 bcmy of export capacity is under construction or in commissioning in Australia, and a 9.7 bcmy terminal is soon to start operation in Papua New Guinea.[147]

Last year demand was mainly driven by South Asia and Latin America. In South Asia, China and South Korea accounted for most of the year-on-year growth, supplemented by LNG newcomers such as Singapore, Malaysia, and Thailand. In Latin America, Brazil and Mexico demonstrated the strongest annual demand growth. Next year, four new LNG importers are expected to enter the market: Jordan, Egypt, Lithuania, and of course Poland.[148]

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146 "Global trade summary for 2013, LNG supply hiatus in full effect," BG Group, 2014. Available online: http://www.bg-group.com/assets/files/cms/A3319_BG_LNG_flyer_v6.pdf (accessed on January 4, 2015).

147 Ibid.

148 Ibid.

Table 7. LNG capacity additions (bcmy)

	Liquefaction capacity		Regasification capacity		LNG Delivered (at 5% growth p.a.)[149]
Year	Existing[150]	New	Existing	New	
2013	389.4	10.7	904.4	44.6	331.0
2014	400.1	22.0	949.0	45.1	347.6
2015	422.1	54.3	994.1	48.7	364.9
2016	476.4	41.9	1042.2	2.8	383.2
2017	518.3	25.8	1045.0	NA	402.3
2018	544.1	9.7	1045.0+	NA	422.4
2019	553.8	7.6	1045.0+	NA	443.6
Total	**-**	**175.1**	**-**	**141.2**	**-**

Source: International Gas Union, 2014[151]

Apart from growth in capacities and deliveries, the market is undergoing a significant qualitative change as well. Before 2004, less than 5 per cent of LNG was traded on the basis of long-term contracts. Hence, it was available, but only under rigid conditions and strong commitments. Since 2004 and especially since 2010, flexible trading has emerged as yet another game changer in the global gas industry: in 2013, as much as 33 per cent of LNG was traded under flexible arrangements. The International Gas Union attributes this growth to the following factors:

- The growth in LNG contracts with destination flexibility, chiefly from the Atlantic Basin and Qatar (allowing LNG to be re-exported according to the arbitrage principle).
- The increase in the number of exporters and importers, which has amplified the complexity of the trade and introduced new permutations and linkages between buyers and sellers.
- The lack of domestic production or pipeline imports in Japan, Korea and Taiwan which means that they need to resort to the spot market to cope with any sudden changes in demand.
- The surge in global regasification capacity.
- The availability of volumes from destination-flexible producers facilitated diversion to high-demand markets.

149 Based on the BG Group's projections (BG Group 2014).

150 Excluding capacity that is likely be decommissioned by the end of this decade in Algeria, UAE, and Egypt: the worst case scenario expects shutdown of all UAE and Egyptian exports and of aging terminals in Algeria, resulting in 37.5 bcmy decrease in global liquefaction capacity.

151 For more detailed information including geographical distribution and ownership structure see International Gas Union 2014.

- The continued disparity between prices in different basins which has made arbitrage an important and lucrative monetization strategy.
- The large growth in the LNG fleet which has allowed the industry to sustain the long-haul parts of the non-long-term market (chiefly the trade from the Atlantic to the Pacific).
- The decline in competitiveness of LNG relative to coal (chiefly in Europe) and shale gas (North America) that has freed up volumes to be re-directed elsewhere.
- The large increase in demand in Asia and in emerging markets (Southeast Asia and South America).

To summarize, in the LNG industry we can observe a combination of long term and short term trends overall accelerating the emergence of the global natural gas market. Every year, there are more actors involved in the trade, more countries and more companies bandwagon on the LNG business, making the market more robust and resilient. The profound growth of a flexible market in both absolute and relative numbers makes LNG more accessible and increases liquidity at receiving terminals. A reduction in the use of destination clauses is also very important, introducing LNG re-export possibilities that lead to higher liquidity and deeper price convergence. Following the first wave in which the US and the full-scale development of Australian exports enter the picture, flexible trading is again expected to rise. However, continuously growing demand with several new premium markets entering the same picture mean it is unlikely that the global spot price or average contract price will decline significantly. Similarly, with capital cost per liquefaction unit nearly twice as high as in the previous round of the LNG investment cycle,[152] the high marginal costs of LNG exports via the new infrastructure will keep LNG prices above the average import price paid by European traders for the foreseeable future.

Import terminals

Poland

At the time of writing, the LNG terminal in Poland is approaching the final stages of construction, and is expected to begin operating in the first half of 2015. The project was initiated by PGNiG in 2007, with Gaz System taking over after Poland adopted EU unbundling rules in 2008. In 2010, Polskie LNG

[152] Liquefaction terminal average CAPEX increased by nearly 100 per cent from 2000–2006 to 2007–2013 due to higher material costs, labor competition, and mitigation costs for project delays. International Gas Union 2014.

was created by Gaz System to construct, own, and operate the terminal. At the time of writing the regasification capacity is planned to be 5 bcmy, with possible expansion to 7.5 bcmy.

The terminal will be run under a regulated TPA regime. The contract signed in 2010 between Polskie LNG and PGNiG allocates 65 per cent of initial capacity to PGNiG. The remaining 1.75 bcmy is available to other traders according to the terminal codes. According to Jan Chadam, chief executive of Gaz-System, preliminary interest in capacity booking exceeded the re-gasification potential of the terminal. If this translates into binding agreements, a decision about building the third container might be made, with additional capacity of 2.5 bcmy coming on stream as early as 2017–2018.[153]

The only existing shipping contract was signed between PGNiG and Qatargas in 2009. The contract encompasses deliveries of 1.6 bcmy for a 20 year period starting from 2015.[154] As the contract features a take-or-pay clause and the terminal will not be ready to receive the first deliveries, the parties agreed to sell the contracted amount elsewhere with PGNiG paying only the price difference instead of penalties stipulated under the take-or-pay clause. The stakes were high, especially for the Polish. Signing the agreement in the atmosphere of the 2009 gas crisis and Nord Stream finishing its permitting phase, they agreed on a rather harsh pricing formula. According to Reuters, the price will be set at 116 per cent of the price of oil plus 50 US cents per MMBtu. At current oil price levels, this would translate into 16.8 USD/MMBtu – an equivalent of 594 USD/tcm and 1.9 USD/MMBtu (68 USD/tcm) more than the Polish paid for Russian gas in 2013.[155]

Croatia

The idea of an LNG terminal in Croatia dates back to the period of elevated energy prices between 2004 and 2008. A single purpose company, Adria LNG, was established by OMV, E.ON Ruhrgas, Total, INA, HEP

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153 "Poland may expand new LNG terminal to equal half its market," Reuters, September 4, 2014. Available online: http://uk.reuters.com/article/2014/09/04/poland-lng-idUKL5N0R30U720140904 (accessed on January 4, 2015).

154 Ibid.

155 The Qatargas – PGNiG pricing formula has a twofold effect: 1. Willingness to pay such prices enables Poland to compete with the premium markets of Japan and South Korea, as the Japanese import price has fluctuated between 15.0 and 18.1 USD/MMBtu (531–640 USD/tcm) over the past four years; 2. Since the end-user gas prices in Poland are already high, the government is likely to get even more involved in the sector, possibly by offering substantial assets – such as power plants or real estate – to convince the Qataris to lower the price. This would of course set Poland on a course diverging from setting up a competitive market as more distortions would be introduced.

and Plinacro in 2007 with the intention of building a terminal with robust regasification capacity of 10–15 bcmy. The driving force behind the project was the expectation of the growing competitiveness of LNG over pipeline natural gas, and increased regional demand. The terminal was expected to serve the markets of Romania, Hungary, Austria, Slovenia, and also Italy.[156]

After 2008, many large investment projects were postponed due to the financial crisis and lack of clarity on the future of gas demand. The Adria LNG project was also affected by this. During the next six years, the project was only revamped in connection with the emerging North–South Gas Corridor and the search for diversification options in central and eastern Europe. However, due to the delicate relations between Croatia and Hungary over natural gas interconnection and over privatization of INA, the project has lain idle.

In 2014 the Ukrainian crisis presented them with a significant incentive to reconsider the Croatian terminal. Ukraine, cut off from Russian gas since June 2014,[157] has managed to purchase gas that was not sold, mainly on the German market due to the mild winter and sluggish economy during the 2012–2013 heating season, and deliver it through the interconnections that were not subject to contracts with Gazprom. The idea of purchasing LNG via a Croatian terminal and Hungarian transit has gained attention amongst policy makers in these countries. However, despite the text of the memorandum of understanding in cooperation with DG Energy being completed by late 2013, it has not been signed yet.

Current relations between the three countries do not suggest any rapid developments. Hungary is clearly drifting away from the European idea of liberalized energy markets and leaning towards robust government-to-government relations with Russia. On September 25, 2014, only three days after Gazprom CEO Alexey Miller's visit to Hungary, and just a day ahead of

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156 "Adria LNG in brief," Adria LNG. Available online: http://www.adria-lng.hr/index_en.php?f=&m=1&s=0 (accessed on January 4, 2015).

157 At the time of writing, an accord was reached between Russia and Ukraine over restoring gas deliveries at the price of 378 USD/tcm, against payment of the first tranche of Ukrainian debt and based on prepayment. However, the relatively mild weather in the first half of November 2014 encouraged the Ukrainians to postpone the payments.
"Russia gas flows still frozen; Ukraine banks on mild weather to hold out," *Reuters*, November 13, 2014. Available online: http://www.reuters.com/article/2014/11/13/us-ukraine-crisis-russia-gas-idUSKCN0IX1S820141113 (accessed on January 4, 2015).
"Russia to resume gas glows to Ukraine after first payment," *Bloomberg*, October 31, 2014. Available online: http://www.bloomberg.com/news/2014-10-31/russia-to-resume-gas-flows-to-ukraine-after-first-payment.html (accessed on January 4, 2015).

the gas supply talks between Russia, the European Union and Ukraine scheduled for September 26, Hungary shut down the reverse flow to Ukraine,[158] effectively cutting off the bulk of its Western-borne supplies. Meanwhile, on Hungary's south western border, the Croatian government is losing interest in closer cooperation with Hungary. This includes a reluctance towards building a physical reverse flow on the Hungary–Croatia interconnector, which would very likely drain gas technically belonging to MOL but pipe-locked in Croatia from the Croatian market. This is not good news for the LNG terminal. The European Commission has criticized the Croatian government for not encouraging investors to deliver the project and for sending contradictory signals.[159]

Despite strong political and financial support from the EU, the outlook for the Croatian LNG terminal remains unclear. The launch scheduled for 2020 is still achievable; however, there are domestic and regional factors that could delay the project significantly or put it on hold.

158 "Hungary stops delivering gas to Ukraine," *Wall Street Journal*, September 26, 2014. Available online: http://online.wsj.com/articles/hungary-stops-delivering-gas-to-ukraine-1411728732 (accessed on January 4, 2015).
"Let's make a deal," *Foreign Policy*, September 26, 2014. Available online: http://www.foreignpolicy.com/articles/2014/09/26/lets_make_a_deal_russia_ukraine_gas_eu_gazprom_oettinger (accessed on January 4, 2015).

159 "Country reports," European Commission, October 13, 2014, p. 36. Available online: http://ec.europa.eu/energy/gas_electricity/doc/2014_iem_communication_annex2.pdf (accessed on January 4, 2015).

Affordability

The affordability of the selected diversification options has been calculated on the basis of retail prices. These prices, in turn, largely reflect the producers' long run marginal supply costs (LRMC), i.e. the combined costs of production and transit to the V4 border. Naturally, lower LRMCs lead to the greater competitiveness of a particular supplier. Under the merit order principle, suppliers with the lowest LRMCs are those who stay in business longest, while marginal suppliers have LRMCs set at around the average price on a particular market. The marginal suppliers only do business during upward price fluctuations as it is only then that their LRMCs are covered. Therefore, the larger the supplier's portfolio and the lower their LRMC, the lower the wholesale price on the market.

The table below shows the LRMCs of existing and potential suppliers to the V4 region. The cost of supply includes production costs (excluding the producing country's royalty), the technical costs of transport, and transport tariffs.

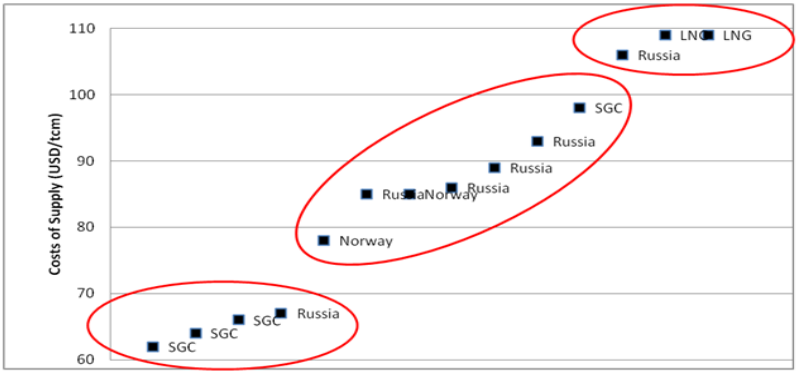
Table 8. Cost of supply

Source/route	Cost of supply (USD/tcm)
SGC Azerbaijan (via Turkey to Hungarian border)	62
SGC Turkmenistan (via TCGP and Turkey to Hungarian border)	64
SGC Iran (from South Pars via Turkey to Hungarian border)	66
Russia (from NPT via Belarus to Polish border)	67
Norway (North Sea to Czech border)	78
Russia (from NPT via Ukraine to Slovak/Hungarian border)	85
Norway (Norwegian Sea to Czech border)	85
Russia (from Yamal via Belarus to Polish border)	86
Russia (from NPT via Nord Stream to Czech border)	89
Russia (from Shtokman via Nord Stream to Czech border)	93
SGC Turkmenistan (via Iran and Turkey to Hungarian border)	98
Russia (from Yamal via Nord Stream to Czech border)	106
LNG Adria	109
LNG Poland	109
SGC Iraq (via Turkey to Hungarian border)	NA
SGC Kazakhstan (via TCGP and Turkey to Hungarian border)	NA
SGC Uzbekistan (via TCGP and Turkey to Hungarian border)	NA
UNG Poland	NA

Sources: OME 2001, Černoch et. al. 2011

When we compare the cost of the selected supply options, we see three clusters emerge. The most competitive supplies include Russian deliveries to Poland (via Belarus), and SGC producers of Azerbaijan (via Georgia), Turkmenistan (via TCGP, Azerbaijan, and Georgia), and Iran. The second cluster includes the rest of the Russian supply with the exception of gas from the Yamal Peninsula via Nord Stream and Germany to the Czech border, the Norwegian supply, and the remaining SGC option of Turkmenistan connected to Turkey via Iran. The least competitive alternatives include Russia (Yamal gas via Nord Stream) and the LNG supply options.

Chart 3. Supply costs clusters



Source: Authors

From the affordability point of view then, there are cost-effective diversification options. Since Yamal, the only route in which Russian gas is competitive against the three most cost-effective SGC supply options, is already fully utilized and its further expansion cannot be assumed, Russia would be largely dependent on routes that also allow Norway and possibly west European hub-borne deliveries to compete. In this regard, the SGC producers are becoming the preferred option as their marginal supply costs are the lowest, and therefore offer more space for maneuver in price negotiation.

Acceptability

The acceptability dimension is derived from the Worldwide Governance Indicators (WGI) by the World Bank. We base our analysis on the assumption that the higher the source, or transit country, scores in the governance assessment, the lower the risk borne by its trading partners.

Methodology

Of the five indicators available we consider two to be of especial importance for the energy business: 1. Political Stability and Absence of Violence, and 2. Rule of Law. The other indicators in the index include Voice and Accountability, Government Effectiveness, Regulatory Quality, and Control of Corruption.

In assessing the risk for considered combinations of source and transit, we proceeded in the following way:

1. For each country involved either in production or transit we calculated five-year mean average scores for the two indicators selected.
2. We created an aggregate risk index (ARI) by calculating the average mean for the two indicators. This index represents the risk associated with a particular country. Since the country scores at original indicators are in fact percentiles, the index can reach values ranging from 0 (the highest risk of all countries) to 100 (the lowest risk of all countries).
3. Source risk was calculated as the weighted average of sources contributing to the supply option. Taking the Norway option and the existing deliveries from Russia as reference points, the source risks are based only on the ARIs of the particular supplying country in each option. Where LNG is concerned, the current six largest LNG suppliers (Australia, Indonesia, Malaysia, Nigeria, Qatar, Trinidad and Tobago) are included together with the US, since the latter is expected to gain a substantial share of the global LNG market after 2018–2019. As for SGC, only producers considered viable by the analysis are included in the assessment (i.e. Azerbaijan, Iraq, and Turkmenistan). Since transport capacities will be very limited at least in the beginning, it is difficult to predict the share of each producer. We therefore base the overall source risk of the SGC option on the mean average of the three producing countries' ARIs.
4. Transit risk is calculated as the weighted average of all countries included in commodity transportation from wellhead to V4 border. The average ARI is therefore weighted by the approximate distances of the pipeline in the respective countries. For LNG transit, no risk was assumed since no report of incidents was found that would suggest otherwise.

5. Finally, we calculated the average risk (AR) for each source-transit option including the existing ones as reference points. The AR is again a mean average of source risk and transit risk.

Results

Overall, we can observe that all diversification options with the exception of sourcing gas from unstable Iraq and international sanctions-hit Iran contribute positively to the diversification risk mitigation strategy. Apart from the two SGC sources mentioned, the crucial source today – Russia – possesses the highest risk of all the options considered. Understandably, the other side of the set is occupied by the stable west European democracies of Norway (source) and Germany (transit), and the "domestic" source option of UNG Poland.

Table 9. Risk assessment

Source/route	Risk		
	Source	Transit	Average
Norway (North Sea to Czech borders)	97	83	90
Norway (Norwegian Sea to Czech borders)	97	83	90
UNG Poland	76	-	76
LNG Adria	58	63	61
LNG Poland	58	-	58
SGC Kazakhstan (via TCGP and Turkey to Hungarian borders)	40	38	39
SGC Turkmenistan (via TCGP and Turkey to Hungarian borders)	31	38	35
SGC Azerbaijan (via Turkey to Hungarian borders)	28	40	34
SGC Turkmenistan (via Iran and Turkey to Hungarian borders)	31	31	31
Russia (from Shtokman via Nord Stream to Czech borders)	22	33	28
Russia (from NPT via Nord Stream to Czech borders)	22	29	26
Russia (from Yamal via Nord Stream to Czech borders)	22	30	26
Russia (from NPT via Belarus to Polish borders)	22	23	23
Russia (from NPT via Ukraine to Slovak/Hungarian borders)	22	24	23
Russia (from Yamal via Belarus to Polish borders)	22	23	23
SGC Iran (via Turkey to Hungarian borders)	14	26	20
SGC Iraq (via Turkey to Hungarian borders)	4	30	17

Source: calculated from World Bank Worldwide Governance Indicators 2009–2013[160]

[160] "The worldwide governance indicators," World Bank. Available online: http://info.worldbank.org/governance/wgi/index.aspx#home (accessed on January 4, 2015).

A closer look at the following figures, especially the average risk figure, may suggest that, with exception of Norway, all PNG options, including existing ones, represent a comparable amount of risk. Since the average risk seems to correlate with transit risk more than with source risk, it can be assumed that the sources not exposed to risky transit routes demonstrate lower overall average risk.

Chart 4. Source risk

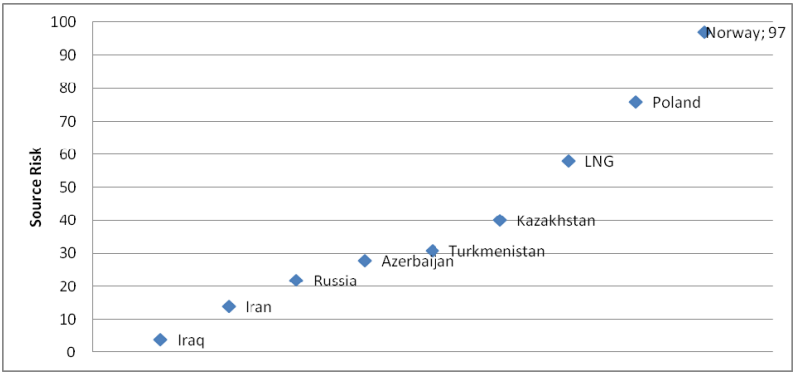


Chart 5. Transit risk

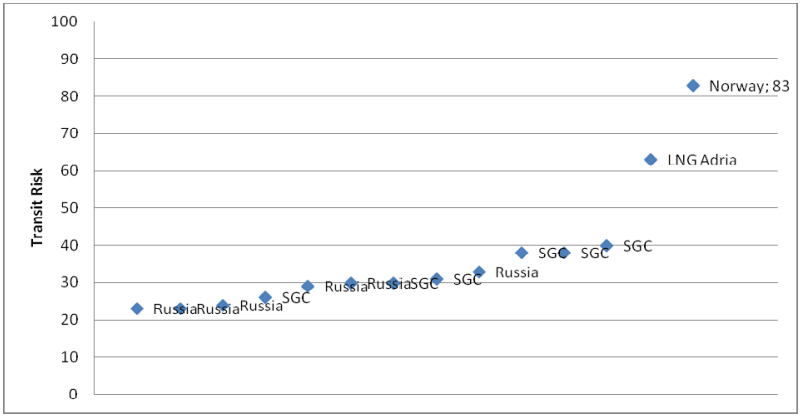
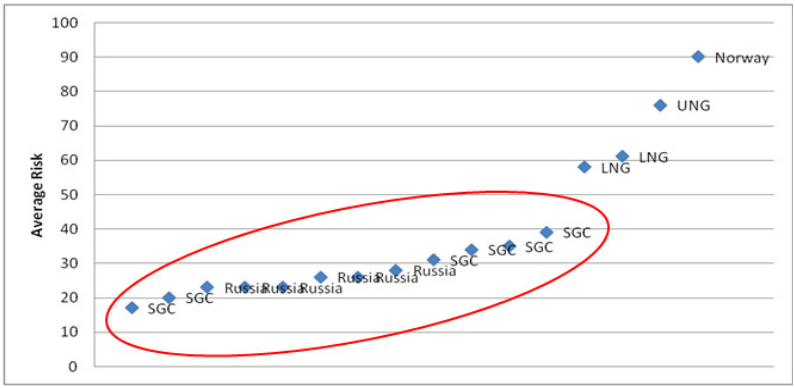


Chart 6. Average risk



From the acceptability point of view, despite the worrisome results of some of the supply alternatives considered, the overall situation is very likely to improve as soon as almost any new option materializes. Moreover, since the core of the diversification endeavors of the V4 countries lies in their reluctance to being subject to the Russian export strategy (see theoretical assumptions), any new supply that would help to reduce Russian market share will be welcomed.

Conclusions

The analysis shows there is substantial potential for further diversification of V4's natural gas supplies. We evaluated three dimensions associated with energy security: availability and accessibility, affordability, and acceptability.

The overall availability and accessibility of natural gas accessible on the V4 border can be considered sufficient for the development of a competitive integrated market. Moreover, compared to the predominant supply costs of existing deliveries, at least two diversification options (Norway and SGC) come in at a lower cost, thereby offering a substantial incentive to reduce import prices. It is also noteworthy that in comparison with the current supply pattern, all the diversification options considered, excluding Iraq and Iran (via SGC), are associated with a lower overall risk (according to the average risk methodology derived from the World Bank's World Governance Indicators).

Therefore, it can be stated that it is possible to diversify supplies in the V4 region and that this does not necessarily have to come at overly high costs. There are producers capable of delivering gas at lower costs than Russia and, more importantly, at prices significantly lower than those Gazprom is currently charging central and eastern Europe, including some V4 countries.[161] The alternative supplies could therefore force Russian gas to become more competitive, effectively relieving some of the price burden currently carried by some CEE countries, including some V4 countries.

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[161] In the first half of 2012, the Russian export price for Poland was 526 USD/tcm. The Czech Republic paid 503 USD/tcm, while the Austrians, who share the same feeding line, paid as little as 397 USD/tcm. Similarly, Serbia and Bosnia and Herzegovina, two neighboring countries supplied by the very same pipeline paid 457 and 515 USD/tcm respectively. Interestingly enough, Gazprom's price for Hungary was 390 USD/tcm in the same period.
"Russia cuts Ukrainian gas supplies," *Business New Europe*, June 16, 2014. Available online: http://www.bne.eu/content/story/russia-cuts-ukrainian-gas-supplies (accessed on January 4, 2015).
The Norwegian contract recently signed by the Ukrainians is said to include the price of 330 USD/tcm, the same price as German RWE charges for its gas sold to Ukraine. Gazprom charges a discount price of 378 USD/tcm.
"Gorshenin Weekly," Gorshenin, September 15, 2014, p. 21. Available online: http://gorshenin.eu/media/uploads/123/31/54170ce067f1b.pdf (accessed on January 4, 2015).

Table 10. Benefits and obstacles

Option	Main benefits	Main obstacle
PNG Norway	Price + Security	Access to hubs where the gas is traded, limited exports.
PNG SGC	Price + Security	Transaction and political costs of contracting gas and building pipelines.
UNG	Price + Security	Geological, technical, and regulatory uncertainties.
LNG	Security	High import price (competition with premium markets)

Source: Authors

During the next decade we will see Norwegian exports increase from the current 107 bcmy to 130 bcmy, an amount to which the Norwegian producers will approximate during the 2020s and at the same time a plateau set by the government. The current situation in the region suggests a growing Norwegian presence: firstly, there is already an existing long-term contract with the Czech Republic, and secondly, new contracts have recently been signed with Ukraine and Lithuania. An important factor is also the involvement of the EU, which in the wake of the current crisis in the Ukraine, appealed to Norway to increase its exports to the European market. Moreover, only a negligible part of Norwegian exports is via LNG. Norway is therefore tied to the European market and cannot reach the premium markets of South Asia and South America. The V4 states can thus reach Norwegian gas either directly via contract or indirectly at a west European hub.

Norwegian export policy is currently very favorable for the diversification endeavors in the CEE. Seeking higher profits to obtain sufficient funds for its Barents Sea exploration activities, Norway seems to be turning its attention more to beyond Germany's eastern border, where the price level is generally higher than in Western Europe. The sweet spot of affordable Norwegian exports will only last until the beginning of the 2030s, when the production center is expected to shift to the Barents Sea area. Related higher production and transit costs are likely to drive prices up for over-the-counter contracts and at west European hubs. In terms of V4 market integration, which is partially driven by affordable supplies from regions other than Russia, this 15+ year window of opportunity should suffice.

In Central Asia, the Mediterranean, and the Middle East, regions that may one day be reached via the Southern Gas Corridor, there is certainly enough gas to diversify V4 as well as the Balkan markets. However, although these reserves may exist, they are difficult to reach. The main reason for this is the geographical fragmentation of both the production and consumer regions. There is no strong political entity that could introduce and support a pipeline project that would be capable of overcoming the

substantial transaction and political costs of negotiating contractual terms and conditions. In other words, despite the tempting prices, consumption in some Balkan countries is too low to attract additional suppliers, further weakening their interest in reaching more distant markets. The combined consumption of Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, and Serbia is just 8.5 bcmy – 12.5 per cent of Italian or 5.8 per cent of Chinese consumption.

The overall size of the V4 market seems significantly bigger than that (the Czech Republic alone consumes 8.5 bcmy); however, all individual markets are bound by long-term contracts and related take-or-pay clause. Since until recently the clause usually only allowed for a 10–15 per cent deviation from the annually contracted quantity, the market share to be captured by new suppliers was limited to only 10–15 per cent of all imports to the V4 region. The 2010 wave of contract renegotiations increased contract flexibility to as much as 30 per cent; however, the actual figures for individual contracts vary and often remain undisclosed. This does not alter the basic premise that in terms of absolute volume, the bigger markets offer bigger sales opportunities, despite being locked into long term contracts. For example, if all the Italian consumption was to be covered by a standard long-term contract with Russia, it could still accommodate all Azerbaijani exports within its level of contract flexibility. Moreover, bigger markets are more attractive to suppliers as transaction costs are reduced and as it is generally more difficult to reduce profits by flooding the market with a commodity and pushing the price down.

On the other hand, supplies from the Turkish near abroad via the SGC may see unrivalled prices due to lower production and comparable transit costs. Surprisingly, all source options considered for deliveries via SGC (with the exception of Iraq and Iran) have lower exposure to source risk and average risk than Russia.

At the moment, the greatest uncertainty is associated with unconventional gas resources in Poland. There is no doubt that gas is available in the Polish shale plays. However, slow exploration, and regulatory and licensing difficulties mean that the size of the reserves and extractable quantities remain and will remain unknown for years to come. It is therefore extremely unlikely that shale gas will become a regionally significant source of supply earlier than the mid-2020s.

It is important to acknowledge that UNG will be developed only if it is competitive in relation to existing supplies. Since, under the current regime, the import price will be set in negotiations between the Russians and the Polish, the Russians can be expected to initiate price reductions to make UNG supplies non-competitive if recoverable reserves are discovered. If developed, UNG will substantially increase the incentive for market integration, providing a competitive alternative to the Russian supplies and reducing the risk associated with them.

There is better news from the global LNG market. Apart from the continually growing number of countries involved in the trade, there has been a significant shift towards flexible trading (9–33 per cent of all deliveries between 2004 and 2013) encouraged by the newly introduced potential of LNG re-export. Together, the flexible market and re-exports make LNG more accessible even for importers unwilling to participate in decade-long contracts. With flexible trading, LNG will be easier to obtain and could be used to balance soaring consumption in unusually cold winters (if cheaper pipeline deliveries were not available) or if there was disruption to other supply sources. The imminent rise of Australia and several new exporters will provide sufficient export capacity to cover growing demand in traditional and new destinations. Moreover, expected exports from the US are likely to boost the flexible market and briefly reduce the LNG spot price until demand among traditional consumers adapts to the new situation. Another strong point of LNG is its relatively low risk performance because of the range of exporters involved in flexible trading (most notably Qatar and recently also Brunei) and the significantly lower risk of transit in comparison with piped natural gas. LNG should therefore be considered as a security-led diversification option and not a direct bargaining chip for price negotiations with the Russians. However, it may prevent Gazprom from excessively capitalizing on the monopoly position, i.e. something that east European states have witnessed regularly.

The future does not look very bright for the receiving terminals. The development of regasification capacities can be rated as underperforming at best. While the delayed start-up in Poland will only result in a modest financial loss resulting from evening out the difference between the contract price and the price at which the supplier will be able to sell the LNG envisaged for Poland, the reluctant pace of development in Croatia raises concerns about the very future of the project. Moreover, the current strained relations between Croatia and Hungary over the oil and gas issues (resulting in limited gas flows between the two countries), and the current Hungarian expressively pro-Russian (foreign) energy policy make it increasingly difficult to consider Hungary as a future partner for marketing the LNG that could one day arrive in Croatia.

With regard to Ascari's three conditions, we conclude that source diversification, considered crucial for the V4 countries' energy security, has nearly been met. With regional interconnection in the CEE gaining momentum and with gradual long-term contracts expiring and being renegotiated with more flexible arrangements, more alternative supplies will be unlocked in the medium term. We expect the first deliveries to materialize from the Middle East and Central Asia towards south-eastern Europe in the next decade. The niche Balkan markets will be the target for arbitrage supplies coming from west European hubs through the V4

countries and will compete with those coming through Turkey. The V4 countries are likely to benefit from this situation twice: in terms of regional price convergence both within the region and with neighboring regions (western Europe and southern Europe), and in terms of higher utilization of their transit assets.

The three sources condition will be in place long before the first Turkey-transited natural gas reaches the V4 border. In 2015, the first LNG deliveries will be unloaded in Poland, adding the third source to the current portfolio.

Technically, however, this condition was fulfilled a few years ago with the increased market liberalization and with the emergence of traders obtaining their supplies at west European gas hubs. The German, Austrian, Dutch, and Belgian hubs are currently great contributors to the supply mix in the Czech Republic, Slovakia, and Hungary. As liquidity at these hubs is constantly growing, it is legitimate to expect them to have an increased role not only in supplying the domestic and adjacent markets, but also in regional trading generally. The competitive nature, anonymity, and loose relations between sellers and buyers at the natural gas exchanges will shape the future of the continental market.

Nonetheless, the other two conditions remain unfulfilled, hindering any substantial progress in market integration. Firstly, the willingness of the V4 governments to adopt liberalization policies varies greatly and in the Hungarian case the liberalization process seems to have been reversed by current political attempts to regain state control over the gas industry. Limited liberalization translates into higher market concentration (especially in the case of Poland), hindering the emergence of a competitive integrated market. Existing levels of market concentration can also be attributed to the actual size of the V4 market. Combined consumption is 39 bcmy, of which 6 bcmy comes from highly competitive indigenous production and 33 bcmy by imports. The contracts are long-term with limited flexibility – until recently only as little as 10–15 per cent, thus leaving only 3–5 bcmy for completive trading. Although the 2010–2012 wave of contract renegotiations raised the flexible share to as much as 30 per cent in some of the existing long-term contracts, for the V4 this would translate into only 10 bcmy, an amount that cannot attract sufficient traders to decrease market concentration below the HHI 2,000 demanded. At the same time, this "actual market size" is well below Ascari's minimum of 20 bcmy.

The competitive market is expected to grow slowly. Another wave of renegotiations is, at least in the foreseeable future, unlikely, which means that traders will need to wait until the existing long-term contracts expire. This will happen in 2015 for Hungary's Russian contract, in 2017 for the Czech Republic's Norwegian contract, in 2022 for Poland's Russian contract, in 2028 for Slovakia's Russian contract, and in 2035 for the Czech Republic's Russian

contract. By the second half of the next decade, therefore, the maximum size of the competitive market will be approximately 25 bcmy, provided that all the meanwhile expired contracts be renegotiated with full flexibility or left unrenewed. From this point of view, the forthcoming renegotiation of Hungary's Russian contract will be an important indicator.

Recommendations

MARKET SETTING AND INTEGRATION

- **Follow and adopt the European Commission's policies on market liberalization and integration.** These policies are aimed at establishing a regulatory framework suitable for the development of a competitive market reaching beyond national borders and attracting more suppliers.
- **Consider deeper market integration with non-V4 neighboring countries** if current V4 governments are unwilling to continue the project. Unilateral integration with hub trading markets such as Germany or Austria may result in additional sources of liquidity (i.e. additional supplies) inside the V4 region, offering competitive pricing to markets whose regulators do not oppose it.
- **Reduce the influence wielded by energy incumbents and interest groups on public policies.** A regulatory framework co-authored by national incumbents will not encourage new suppliers to enter the market or engage in infrastructure development. If state ownership of a large energy company is considered necessary, its top managers should not be appointed as ministers and ministers should not be allowed to hold managerial posts at energy companies for a certain period of time. The golden rule is that state-owned energy companies should adhere to state policies, not create them.

FOREIGN ENERGY POLICY

- **Do not link natural gas contracts with other (energy-related) arrangements with Russia.** However tempting short term benefits such as a gas price discount may seem, the Belarusian and Ukrainian cases speak for themselves. By tying multiple issues into one package, the Belarusian and Ukrainian governments provided the Russians with an opportunity to use their most sensitive lever as the main lever at the time of negotiations, and hence the Russians gained a stronger negotiating position than they would have had if these issues had remained separate. Despite the clear message that in the long run, such packages are always beneficial for Russia at the expense of its counterpart, some CEE governments keep engaging in similar agreements.
- **Support the Turkey–Greece–Albania–Italy corridor despite the fact that it circumvents the CEE markets**. It takes significantly less political

and financial commitment sign up for smaller quantities and fill up the corridor's offshoots than to back a mid/large scale project such as Nabucco West. Moreover, during the 2020s this will probably become the preferential export route for Azerbaijani, Iraqi, Iranian, Cypriot, and Israeli production if they decide to export. For the same reasons, deeper political involvement in Turkey is needed to demonstrate the willingness of the V4 countries to utilize Turkish transport capacity. Otherwise, Turkey is likely to be tempted into establishing preferential deals with Gazprom, jeopardizing the independence of a natural gas hub that is likely to emerge on the Turkish–Greek–Bulgarian border in the next decade or two.

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