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CENTRAL AND EAST EUROPEAN DIVERSIFICATION UNDER NEW GAS MARKET CONDITIONS

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Central and East European Diversification under New Gas Market Conditions*

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Highlights

- Central and Eastern Europe (CEE) has few chances to benefit from a changed gas market.
- CEE states are dependent on gas, gas imports, Russian gas and transit to differing degrees.
- Powerful economic arguments help explain limited progress with diversification.
- Transit-avoidance pipelines could increase security of supply for CEE gas consumers.
- Non-Russian gas could be more expensive and may also involve (other) security risks.

Abstract

The Russo–Ukrainian gas crisis of January 2009 encouraged Central and Eastern Europe (CEE) to diversify away from Russian gas supplies and new gas market conditions have afforded some opportunities for doing so. This paper assesses these achievements, as well as factors preventing CEE countries from benefiting therefrom. The paper addresses four main areas of CEE diversification: (1) gas demand, (2) domestic gas production, (3) transit, as well as (4) gas supply and physical infrastructure for source diversification. There is great variation in the degree of dependence on gas, gas imports, Russian gas and transit countries, across the CEE states. Some progress has been made in diversifying, but the degree of progress and the patterns vary significantly from country to country. Due to long-term gas import commitments and the lack of available import capacity, CEE countries can take only limited advantage of changed gas market conditions. But some countries have genuinely benefited from ongoing developments. Transit-avoidance pipelines can also increase security of supply for CEE consumers by providing the opportunity to arbitrage across gas transit corridors. Despite many criticisms, the EU has taken steps that may help mitigate Russian influence.

JEL: L71, L95, O13, P28, Q4.

Keywords: Central and Eastern Europe; Russian gas; Dependence; Diversification; Security of supply

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1. Introduction

The Russo–Ukrainian "gas war" of January 2009 caused irreversible damage to the reliability of Russian gas supplies. Concomitantly, a new gas market situation – as evidenced by gas oversupply, the emerging role of market-based gas pricing and the possibility of buying gas more cheaply than provided by the oil product-linked contracts – began to unfold in Continental Europe. This situation has brought new opportunities to Russia's Central and East European (CEE) gas buyers and challenges to Russia's Gazprom.

Although different regions have been variously affected, even within Europe, the global gas market picture has changed significantly (Stern and Rogers, 2011). Since the end of 2008, a "two price" or "hybrid price" market – where historical oil (product)-linked and emerging market (hub-based) pricing coexist – has been evident in Continental Europe (Stern and Rogers, 2011, 2013). The role of pricing hubs has started to grow. In 2009, due to both gas oversupply and relatively high oil (product) prices, hub-based gas prices were witnessed well below oil product-indexed prices in long-term supply contracts (LTSC). Until the end of 2013, the gap was narrowing. But in 2014, it first widened and then narrowed again. Due to falling oil prices (starting in June 2014), market gas prices might exceed oil product-linked gas prices in Europe in 2015 (Korchemkin, 2014).

In each year between 2009 and 2014, except for 2010, gas consumption fell in Europe. As Stern argues, Europe appears to have entered a "dark age of gas" rather than a "golden age" (House of Lords, 2012). After the Fukushima nuclear disaster and the subsequent decisions on nuclear power plants, at present, apart from the weather conditions, European gas demand has been driven by economic problems, relatively high gas prices (compared to low coal, electricity and carbon prices), strong growth in subsidised renewables and gains in energy efficiency (IEA, 2012b, 2013a).[1]

Country codes: AL – Albania; AT – Austria; BG – Bulgaria; BY – Belarus; CZ – Czech Republic; DE – Germany; EE – Estonia; FI – Finland; GR – Greece; HR – Croatia; BA – Bosnia and Herzegovina; HU – Hungary; IT – Italy; KV – Kosovo; LT – Lithuania; LV – Latvia; MD – Moldova; ME – Montenegro; NO – Norway; PL – Poland; QA – Qatar; RS – Serbia; RU – Russia; SI – Slovenia; SK – Slovakia; TR – Turkey; UA – Ukraine.

High oil product-linked contract prices have clearly been curbing gas demand. Gas-fired power generating plants are at risk in Europe, as well as in the CEE region. Finally, since 2010, Gazprom has granted various concessions regarding its LTSCs. Reflecting lower European gas demand and Gazprom's prices compared to those of competitors, Gazprom Export, a wholly owned subsidiary of Gazprom, saw its gas exports to non-FSU[2] Europe fall in 2009, 2010, 2012 and 2014 (see Table S1 in the Supplementary material).[3] Finally, in 2013, Gazprom Export's gas exports exceeded the 2008 level for one year (a coincident record high that was unsustainable), mainly due to increased West European imports. Regardless of the cold winter and price discounts (also including rebates, i.e. retroactive payments) from Gazprom, Russia has benefited from the decline in European gas supplies from Norway (presumably still a temporary phenomenon) and the UK (a general trend) and the complicated situation in Algeria and Libya (Natural Gas Europe, 2013b), as well as from high LNG prices, also reflected in falling European LNG imports (see footnote 1).

But even in 2012, Russia remained the EU's principal external source of pipeline supply, ahead of Norway (which is also a minor LNG exporter to the EU), even though Norway's gas exports temporarily displaced Russia's.[4] Algeria ranks as the third-largest supplier to the EU, shipping both via pipeline and LNG. In fourth place, Qatar is Europe's leading LNG provider.

61% of the gas in Europe was sold at hub prices in 2014 (Anadolu Agency, 2015). Gazprom and Algeria's Sonatrach refuse to accept changes in price formulation. While the share of spot gas indexation in the export portfolio of Norway's Statoil has substantially increased, it has hardly changed in Gazprom's contracts, despite price reviews and the introduction of some hub pricing (Gazprom, 2013f; Reuters, 2013a). Gazprom concentrates on other price adjustment mechanisms, including the reduction of the base price (a constant in the gas price formula) and the payment of rebates. Stern

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[1] The US shale gas revolution increased European gas supply (e.g. by European imports of LNG cargoes that were originally destined for the US), but has reduced European gas demand (i.e. more coal has been exported to Europe from the US) (see Konoplyanik, 2012; GIIGNL, 2013, 2014; Natural Gas Europe, 2012a). Europe's LNG imports declined each year between 2012 and 2014.

[2] FSU – former Soviet Union.

[3] The gas interruption during the Russo–Ukrainian gas crisis in January 2009 also played a role in the sharp decline in 2009.

[4] According to Eurostat (2015a), IEA (2013b) and Eurogas (2013). Due to methodological differences, BP (2014) data show that Norway overtook Russia as the main supplier to the EU in 2012.

and Rogers (2013) argue that Gazprom wants to retain traditional oil product-indexed LTSCs because they provide the highest prices.[5] However, as Stern and Rogers (2011) note, the position of some smaller markets, especially in South-East Europe, is different from that in other parts of Continental Europe, because they are still burning significant quantities of oil products in stationary sectors and have retained greater switchable capacity from gas to oil products.

Dependence on Russian gas sources and Western CIS[6] transit states (including Belarus, Ukraine and Moldova) is a crucial issue in CEE and drives an important part of the economic, social and political discussion. Clearly understanding how Russian gas import dependence is evolving is thus essential for the development of adequate policy measures.

The main objectives of this paper are to (1) assess the degree of CEE dependence on Russian gas and the Western CIS transit countries, and (2) gain an insight of what has been done to reduce dependency in CEE since the Russo–Ukrainian gas crisis of January 2009. I assess whether any CEE countries have benefited from the opportunities emerging from the new gas market situation and, if not, what factors have prevented them from doing so.

Unlike other studies (such as Ćwiek-Karpowicz and Kałan, 2013; Giamouridis and Paleoyannis, 2011; Kaderják, 2011; Kosse, 2013; Le Coq and Paltseva, 2009, 2012; Noël, 2008; Świątkowska, 2011), this paper provides an analysis of the dependence and diversification of all 14 gas importing CEE countries (see Fig. A1 in the Appendix)[7] on Russian gas and the Western CIS transit countries from a comparative perspective using a broad range of relevant evaluation criteria. The aim in this analysis is to avoid simplifications. Complex indices such as that developed by Le Coq and Paltseva (2009) and applied, for example, by Cohen et al. (2011) and the European Commission (2014), have their place. But complex indices are often fraught with complications and

[5] However, as witnessed, there is no guarantee that oil product-indexed gas prices will always be higher.
[6] CIS (Commonwealth of Independent States) denotes the non-Baltic (non-EU) former Soviet Union (or post-Soviet) states.
[7] All of them are either EU Members or Energy Community Contracting Parties. Albania, Montenegro and Kosovo do not import gas at all. They have no import capacity and no gas is used in Montenegro and Kosovo. While no gas infrastructure exists in Montenegro, both the gas pipeline between Macedonia and Kosovo and the transmission pipeline system in Kosovo were destroyed. Albania's industrial sector consumes domestically produced gas (Energy Community Secretariat, 2013).

frequently rely on important over-simplifications (these complications are discussed in detail in Section 3.1).

Thus the key goal herein is to develop a more sophisticated, well-documented and more reliable image of the current state of affairs under the new gas market situation, and thus to gain a better understanding of what factors truly define CEE dependence and diversification.

The paper is structured as follows. Section 2 discusses the methodology and applied data. Section 3 presents and discusses empirical results. First, an introductory assessment of CEE dependence on Russian gas imports is given, revealing problems with measurement (Section 3.1). Then, CEE diversification is addressed through gas demand (Section 3.2), gas production (Section 3.3), transit diversification (Section 3.4) and source diversification (Section 3.5). Conclusions and policy implications are drawn in Section 4.

2. Methodology and data

CEE achievements can only be understood in the context of relatively complex definitions of the concept of "(inter)dependence/independence", "security of supply" and "diversification". Geopolitical issues are not considered in this paper.

Definitions of security of supply are primarily based on "availability" and "prices" (Löschel et al., 2010). Given limited purchasing power, price is a very important factor for CEE consumers. Import dependence/security risks include risks related to source, transit and facility dependence/security[8] (Stern, 2002). According to Stern (2002), the two major dimensions of these risks are: (1) the operational security of gas markets

[8] The latter represents the risks that come from the destruction of a facility. Technical risk is one of several supply security risks (technical, political, regulatory, economic and environmental) also mentioned by the IEA (2004).

versus strategic security;[9] and (2) short-term supply availability versus long-term adequacy of supply and the infrastructure for delivering this supply to markets. In contrast, Kaderják (2011) distinguishes between three time horizons: (1) short-term security of supply (import disruptions that are resolved within two weeks), (2) medium-term security of supply (adequacy of the transportation and storage infrastructure to deal with the trend and seasonality of consumption) and (3) long-term security of supply (risks in regulation and market design; import source diversity).[10]

Diversification is seen as a key to enhancing security of supply. But, as Stern argues, it alone does not inevitably lead to supply security (Rausch, 2012). This means security of supply is more than diversity but, as Stirling (2010) describes, diversity is also more than security of supply.

Possible domestic diversification options include (1) reduced gas consumption, (2) increased gas production and (3) sectoral diversification[11] on the basis of fuels/energy produced domestically. External diversification consists of (1) gas import source diversification, (2) transit/route diversification and (3) sectoral diversification based on imported fuels.[12]

There is, however, no one optimal CEE diversification choice (or mix). There are only different sets of choices, not to mention the very large variation in the idiosyncratic economic and political considerations each country faces based on availability and price (and real and perceived risks), with uncertain and different rewards both in the short and long term.

A combination of several types of domestic and external diversification options may represent the most desirable solution for individual CEE countries. To illustrate the degree of complexity of CEE choices and, in order to illustrate the difficulty of deriving a

[9] Operational security refers to the daily and seasonal stresses and strains of extreme weather and other operational problems. Strategic security includes catastrophic failure of major supply sources and facilities (Stern, 2002).
[10] Long-term security of supply includes systematic vulnerabilities to hard-to-quantify disruptive events beyond the investment cycle.
[11] Sectoral diversification, also called fuel mix, fuel type or energy-source diversification, supports efforts to move away from gas in the energy balance.
[12] I interpret the definitions introduced by Balmaceda (2008, 2013) somewhat differently, as transit diversification is also incorporated into external diversification options and sectoral diversification can be divided into two parts.

hierarchy of dependence and diversification from any single number, I provide a flow chart of different potential CEE diversification options (Fig. 1).

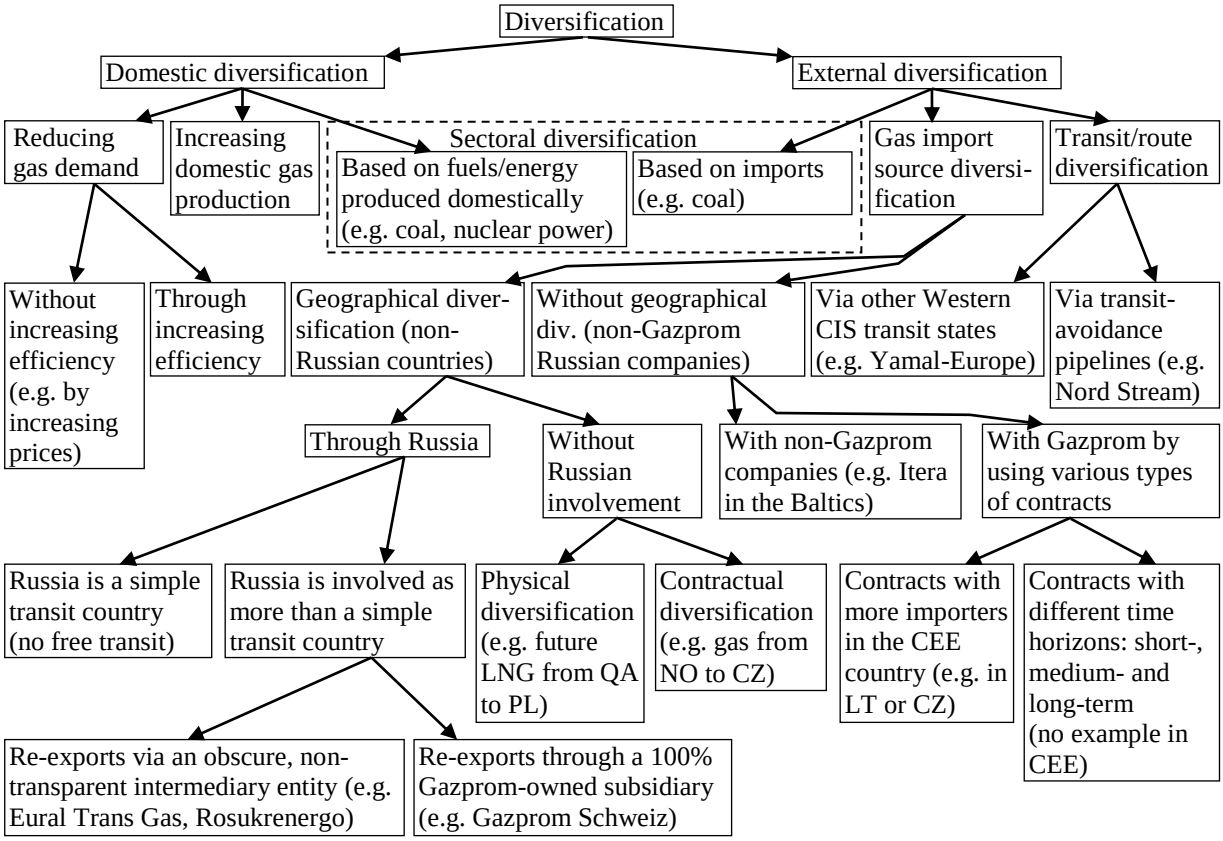

Fig. 1. A CEE diversification scheme for Russian gas imports.
Source: Own compilation, partly based on Balmaceda (2008, 2013) and Stern (2002).

Gas source diversification may refer not only to other countries/regions (geographical diversification) but also to other companies with or without geographical diversification. Purchasing gas from a non-Russian supplier can occur either through physical or contractual diversification. Contractual diversification is a type of geographical diversification whereby, compared to physical diversification, under normal (i.e. non-emergency) conditions, Russian-origin gas is typically delivered, although physical delivery from the non-Russian gas exporting country is also possible.[13]

[13] If Russian gas is not physically available, for example during a Russo–Ukrainian gas crisis, the contracted volumes will be delivered from other gas sources. "Contractual diversification" is used similarly to Stern (2002), but differently from Balmaceda (2008, 2013). According to Balmaceda (2008,

This highlights that Russian gas plays an even greater role in CEE. Buying gas from other Russian suppliers is not possible because Gazprom holds an almost exclusive right to export pipeline gas from Russia.[14] CEE consumers are also unable to buy gas directly from Central Asia transited through Russia because no free transit is provided. Thus in order to purchase Central Asian gas, transit diversification (avoiding Russia) is necessary.[15] For a period, until the end of 2008, a special diversification method was used by certain CEE countries, i.e. buying gas from Central Asia through intermediary companies at a cheaper price (such as through the controversial Russo–Ukrainian Rosukrenergo into Slovakia, Poland, Hungary and Romania).[16]

In order to reduce risks associated with Russo–Ukrainian disputes, Russia has been diversifying its transit routes to Europe via undersea pipelines bypassing Ukraine.

Among external diversification options, source diversification is of a higher order than mere route diversification.[17] And among source diversification choices, geographical diversification without Russian involvement, either physical or contractual diversification, is preferable.

The vision or goal of energy independence arises from time to time in certain CEE countries. I argue that two definitions, a hard and a soft one, are used in CEE. While the hard definition refers to "independence from energy imports" or "self-sufficiency", the soft definition refers to import source diversity, in order to reduce reliance on unstable and unfriendly nations (Branko, 2012; Stelzer, 2009).[18] As Cohen et al. (2011: 4860)

2013), contractual diversification refers to a variety of contractual relationships, either in terms of companies or type of contracts (short-term, long-term, etc.) without geographical diversification.

[14] Also, see Itera's role in the Baltic States in Note (a) below Table A1 in the Appendix. Gazprom's almost exclusive right to export liquefied natural gas (LNG) was partially revoked in December 2013.

[15] Gazprom Schweiz AG (formerly ZMB Schweiz AG), wholly owned by the Gazprom Group, re-exports Central Asian gas to CEE (including Serbia and Macedonia in 2012; Serbia, Macedonia, Romania and Croatia in 2013; Macedonia, Romania, Croatia and Hungary in 2014, see Gazprom Schweiz, 2013; Gazprom Germania, 2013, 2014, 2015). Gazprom Export noted that since 2014, Gazprom Schweiz had not been exporting gas to Serbia (Gazprom Export Communications Team, personal communication, 30 and 31 July 2015). (See footnote 28.) Naturally, it is impossible to separate molecules originating in Central Asia and Russia from each other.

[16] This gas was transited through Russia. And Russians played different roles in, and took advantage in different obscure ways of, these transactions.

[17] However, due to the EU's third-party access rules, route diversification may provide infrastructure for source diversification.

[18] For example, approved in June 2012, Lithuania's National Energy Independence Strategy (2012) implies the soft definition because the initiative also includes import source diversification (i.e. LNG supplies and an interconnection with Poland in the gas sector). In contrast, the Romanian explanation refers to the hard definition (see Section 3.3).

outline, "policy makers often equate the attainment of energy security with [the hard definition of] energy independence". But, as Bazilian et al. (2013) conclude, this aim can promote suboptimal policy choices.

Dependence of the consumer on the supplier is not a unilateral phenomenon, but rather a mutual one (i.e. interdependence). Except for some LNG exports, Gazprom is locked into the European and post-Soviet markets, and depends on the export revenues. However, this is an asymmetric form of interdependence between Russia and Europe because Russia can, in principle, stop deliveries and manage a period of time without export revenues. And a consumer nation often has limited possibilities for the short term (Sutela, 2012: 110). But except for the incident with Estonia in 1993, an unsuccessful one-day gas cut to change Estonia's citizenship policies, Russia has never engaged in a direct "gas war" in non-CIS Europe (Grigas, 2012).

This paper concentrates mainly on long-term security of supply (along security of supply dimensions) as well as domestic gas demand and production, transit diversification and source diversification (among diversification options).[19]

In order to assess the role of Russian imports, I analyse:

(1) Import, consumption and production data (sources: Gazprom, BP, IEA, Eurostat, national energy regulators, other national statistics and gas importing companies);

(2) Contractual information (sources: Gazprom, national energy regulators, gas importing companies and various media sources);

(3) Infrastructure data (sources: TSOs,[20] gas importing companies, national energy regulators, ministries and other indicated sources).

To complete these three strands of analysis, I have undertaken extensive personal communications and data collection.

An individual country's dependence on gas is measured by the role of gas in primary energy consumption and the change in its gas demand. CEE dependence on gas imports is characterised by current and future domestic gas production.

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[19] Though I emphasize its importance, the impact of underground gas storage facilities is not analysed herein (see, however, Fig. 3 and Fig. A1.1 in the Appendix).
[20] TSO – transmission system operator.

I provide information on when each LTSC with Gazprom expires, whether CEE countries have signed new contracts with Gazprom under the new circumstances, and for how many years.

Further, I collect data on the number of pipelines, and from how many different directions, a particular country receives gas. Infrastructure developments are characterised by how much progress has been made with the long-standing, unresolved issues of (1) gas interconnections, (2) LNG/CNG[21] import terminals and (3) high-profile projects of the Southern Corridor[22] since the Russo–Ukrainian gas crisis of January 2009. I also consider whether state-run projects play a dominant role in CEE projects built or under construction and whether these projects have received any EU funding.

The role of transit through the Western CIS and CEE is assessed by considering which Western CIS transit countries a country depends on and how Russian-led undersea bypass pipelines (transit diversification) affect transit countries. For this, knowledge of Gazprom's long-term transit contracts for existing CEE pipelines is essential. Because of the EU's Third Energy Package, existing and planned gas pipelines are also addressed. Physical reverse flow possibilities through/from the CEE states to Ukraine are also noted.

Benefits from the new gas market situation are considered by analysing whether CEE customers have received price discounts from Gazprom (and who has instituted arbitration proceedings with the Gazprom Group), and who has managed to buy gas at lower prices from non-Russian suppliers than from Russia, thus diversifying away from Gazprom and reducing their degree of dependence. But more expensive diversification results are also addressed. Gas prices paid to Gazprom in Europe are also compared.

[21] CNG – compressed natural gas.
[22] The Southern Corridor aims at the transmission of gas from the Caspian Basin, Central Asia, the Middle East and the East Mediterranean Basin to the EU (European Commission, 2012b).

3. Results and discussion

3.1. An introductory assessment of CEE dependence on Russian gas imports: Revealing problems with measurement

There are problems with the use of and reliance on complex indices of CEE dependence and diversification. In order to illustrate these problems, Table 1 provides data from different statistical sources regarding the share of Russian gas in the total gas imports of each CEE country (the different methodologies used for calculating "dependence" reference values are described in the caption to Table 1).[23] The following analysis of these data is sufficient to reveal the difficulties in interpreting dependence (and diversification) from such simplistic indices:

- The simplest case is when a CEE country imports gas exclusively from Russia, such as in the cases of Macedonia, Bosnia and Herzegovina, Bulgaria and Latvia. The data, however, provide no hint to the fact that they have different options for buying gas from non-Russian suppliers under normal or emergency conditions.[24]
- Russian dependence was broken in the Baltics at the end of December 2014, when Lithuania received its first commercial cargo shipment of LNG. In early December 2014, for the first time, Estonia imported gas from Lithuania. The weak link in the chain is Latvia, where Latvijas Gāze will keep its gas monopoly until 2017

[23] Several problems can arise with complex indices. For one, it is frequently difficult to include all relevant factors and simplifications are often made. For example, the simplifying assumption that supplies from outside Europe are more insecure than those from European sources is widely accepted but should be questioned empirically (Dickel et al., 2014). But even simple statistical exercises, such as comparing data regarding Russian gas with country-level gas import data, as well as gas and energy consumption, is still methodologically complicated (see Tables S3–S46 in the Supplementary material). For one, different sources apply different standards to measure gas volume (see e.g. IEA, 2011b: 304). Second, and more importantly, regarding Russian gas, different statistical sources – e.g. (1) Gazprom Export's gas exports, (2) gas sales by the Gazprom Group, (3) the IEA and Eurostat's Russian gas import data, (4) the gas export data of Russian customs statistics, (5) BP's gas trade movements and (5) data from certain national energy regulators and other national statistics – provide different types of data. Even when two sources supposedly use the same definitions (such as the IEA and Eurostat for import and export data), differences remain.

[24] Bosnia and Herzegovina have access to Hungary via Serbia. Bosnia's BH-Gas has a framework agreement with Germany's E.ON to supply gas in an emergency. Physical reverse flow is possible to Bulgaria from Greece. Latvia can buy non-Russian gas from the Lithuanian LNG terminal.

Table 1
Comparison of Russian gas in CEE gas imports, based on different source statistics (2008–2014).
Source: BP (2009, 2010, 2011, 2012, 2013, 2014, 2015); IEA (2012c, 2013b, 2014); Eurostat (2015a, 2015c); GE: Gazprom (2011, 2012, 2013a, 2014a, 2015a); GG: Gazprom (2013c, 2014b, 2015b).

		2008			2009			2010			2011			2012			2013			2014		
		RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%
Macedonia	BP				0.08	0.08	100.0	0.08	0.08	100.0	0.09	0.09	100.0									
	IEA	0.121	0.121	100.0	0.080	0.080	100.0	0.118	0.118	100.0	0.137	0.137	100.0	0.142	0.142	100.0	0.160	0.160	100.0			
	Eurostat	0.121	0.121	100.0	0.080	0.080	100.0	0.118	0.118	100.0	0.137	0.137	100.0	0.142	0.142	100.0	0.160	0.160	100.0			
	GE	0.12			0.079			0.12			0.13			0.08			0.05			0.05		
	GG	0.1			0.1			0.1			0.1			0.1			0.0[a]			0.1		
Bosnia & H.	BP				0.22	0.22	100.0	0.21	0.21	100.0	0.24	0.24	100.0									
	IEA	0.410	0.410	100.0	0.234	0.234	100.0	0.245	0.245	100.0	0.279	0.279	100.0	0.257	0.257	100.0	0.190	0.190	100.0			
	Eurostat																					
	GE	0.31			0.22			0.25			0.28			0.26			0.19			0.16		
	GG	0.3			0.2			0.2			0.3			0.3			0.2			0.2		
Bulgaria	BP	3.10	3.10	100.0	2.64	2.64	100.0	2.16	2.16	100.0	2.55	2.55	100.0									
	IEA	3.432	3.432	100.0	2.604	2.604	100.0	2.608	2.608	100.0	2.764	2.764	100.0	2.485	2.485	100.0	2.708	2.708	100.0			
	Eurostat	3.432	3.432	100.0	2.604	2.604	100.0	2.608	2.608	100.0	2.764	2.764	100.0	2.485	2.485	100.0	2.698	2.698	100.0			
	GE	3.48			2.64			2.65			2.81			2.53			2.80			2.79		
	GG	2.9			2.2			2.3			2.5			2.5			2.9			2.8		
Latvia	BP				1.19	1.19	100.0	0.66	0.66	100.0	1.50	1.50	100.0									
	IEA	1.368	1.368	100.0	1.743	1.743	100.0	1.125	1.125	100.0	1.755	1.755	100.0	1.716	1.716	100.0	1.734	1.734	100.0			
	Eurostat	1.368	1.368	100.0	1.743	1.743	100.0	1.125	1.125	100.0	1.755	1.755	100.0	1.716	1.716	100.0	1.698	1.698	100.0			
	GE	0.7			1.14			0.74			1.18			1.12			1.13			0.96		
	GG	0.7			1.1			0.7			1.2			1.1			1.1			1.0		
Estonia	BP				0.71	0.71	100.0	0.36	0.36	100.0	0.63	0.63	100.0									
	IEA	0.946	0.946	100.0	0.642	0.642	100.0	0.689	0.689	100.0	0.627	0.627	100.0	0.670	0.670	100.0	0.678	0.678	100.0			
	Eurostat	0.946	0.946	100.0	0.642	0.642	100.0	0.689	0.689	100.0	0.627	0.627	100.0	0.670	0.670	100.0	0.678	0.678	100.0			
	GE	0.6			0.77			0.44			0.66			0.64			0.73			0.42		
	GG	0.6			0.8			0.4			0.7			0.6			0.7			0.4		
Lithuania	BP	3.09	3.09	100.0	2.77	2.77	100.0	2.63	2.63	100.0	2.89	2.89	100.0									
	IEA	3.125	3.125	100.0	2.737	2.737	100.0	3.106	3.106	100.0	3.407	3.407	100.0	3.320	3.320	100.0	2.707	2.707	100.0			
	Eurostat	3.071	3.071	100.0	2.690	2.690	100.0	3.053	3.053	100.0	3.349	3.349	100.0	3.263	3.263	100.0	2.661	2.661	100.0			
	GE	3.1			2.74			3.11			3.41			3.32			2.70			2.54		
	GG	2.8			2.5			2.8			3.2			3.1			2.7			2.5		

(continued on next page)

Table *(continued)*

		2008			2009			2010			2011			2012			2013			2014		
		RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%
Serbia	BP	2.15	2.15	100.0	1.55	1.55	100.0	1.91	1.91	100.0	1.25	1.80	69.4									
	IEA	2.177	2.201	98.9	1.565	1.584	98.8	1.766	1.968	89.7	1.478	1.747	84.6	0.976	1.790	54.5	1.890	1.940	97.4			
	Eurostat	2.177	2.201	98.9	1.565	1.584	98.8	1.766	1.968	89.7	1.478	1.747	84.6	0.976	1.790	54.5	1.158	1.887	61.4			
	GE	2.16			1.49			1.76			1.39			0.74			1.14			1.36		
	GG	2.2			1.7			2.1			2.1			1.9			2.0			1.5		
Slovakia	BP	5.60	5.60	100.0	5.40	5.40	100.0	5.47	5.47	100.0	5.33	5.33	100.0	3.8	4.1	92.7	5.3	5.3	100.0	4.3	4.3	100.0
	IEA	6.266	6.266	100.0	5.834	5.878	99.3	6.098	6.098	100.0	5.907	5.907	100.0	4.801	4.801	100.0	5.509	5.579	98.7			
	Eurostat	6.266	6.266	100.0	5.834	5.878	99.3	6.098	6.098	100.0	5.907	5.907	100.0	4.801	4.801	100.0	5.509	5.579	98.7			
	GE	6.15			5.43			5.77			5.89			4.19			5.42			4.39		
	GG	6.2			5.4			5.8			5.9			4.3			5.5			4.4		
Romania	BP	3.50	4.50	77.8	2.05	2.05	100.0	2.15	2.15	100.0	2.56	2.56	100.0									
	IEA	4.321	4.432	97.5	1.979	2.006	98.7	2.230	2.279	97.8	2.659	3.092	86.0	2.469	2.884	85.6	1.327	1.448	91.6			
	Eurostat	4.321	4.432	97.5	1.979	2.006	98.7	2.230	2.279	97.8	2.659	3.092	86.0	2.469	2.884	85.6	1.341	1.463	91.7			
	GE	3.58			2.04			2.27			2.82			2.17			1.19			0.33		
	GG	4.2			2.5			2.6			3.2			2.5			1.4			0.5		
Hungary	BP	8.90	11.50	77.4	7.20	8.10	88.9	6.47	7.47	86.6	5.66	6.70	84.5	4.8	5.9	81.4	5.9	5.9	100.0	5.2	5.2	100.0
	IEA	8.855	11.403	77.7	7.964	9.635	82.7	6.771	9.637	70.3	5.218	8.019	65.1	3.576	8.173	43.8	8.176	8.176	100.0			
	Eurostat	8.855	11.403	77.7	7.964	9.635	82.7	9.070	9.637	94.1	7.951	8.019	99.2	8.010	8.173	98.0	7.767	8.176	95.0			
	GE	8.90			7.6			6.93			6.26			5.29			5.97			5.33		
	GG	8.9			7.6			6.9			6.3			5.3			6.0			5.4		
Czech Rep.	BP	6.60	8.61	76.7	6.40	9.40	68.1	8.44	11.54	73.1	6.88	12.03	57.2	6.6	10.0	66.0	7.2	11.0	65.5	4.7	7.3	64.4
	IEA	7.500	9.573	78.3	6.683	9.683	69.0	7.453	8.510	87.6	9.041	9.321	97.0	7.468	7.471	100.0	8.475	8.479	100.0			
	Eurostat	6.620	8.693	76.2	5.670	8.670	65.4	7.453	8.510	87.6	9.041	9.321	97.0	7.468	7.471	100.0	8.464	8.468	100.0			
	GE	7.61			6.44			8.57			7.59			7.28			7.32			4.76		
	GG	7.9			7.0			9.0			8.2			8.3			7.9			0.8		
Poland	BP	7.20	9.80	73.5	7.15	9.15	78.1	9.08	10.15	89.5	9.28	10.83	85.7	9.0	10.9	82.6	9.6	11.4	84.2	8.9	10.6	84.0
	IEA	7.783	11.202	69.5	8.166	9.954	82.0	9.756	10.895	89.5	10.076	11.790	85.5	9.774	12.248	79.8	9.621	12.473	77.1			
	Eurostat	7.783	11.202	69.5	8.166	9.954	82.0	0.003	10.895	0.0	0.003	11.790	0.0	0.005	12.248	0.0	0.006	12.473	0.0			
	GE	7.92			9.02			9.93			10.25			9.94			9.79			9.10		
	GG	7.9			9.0			11.8			10.3			13.1			12.9			9.1		

(continued on next page)

Table *(continued)*

		2008			2009			2010			2011			2012			2013			2014		
		RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%	RU	∑	%
Slovenia	BP				0.51	0.89	57.3	0.50	0.88	56.8	0.48	0.73	65.8									
	IEA	0.509	1.076	47.3	0.494	1.019	48.5	0.495	1.053	47.0	0.434	0.904	48.0	0.365	0.870	42.0	0.356	0.847	42.0			
	Eurostat	0.509	1.076	47.3	0.494	1.019	48.5	0.495	1.053	47.0	0.434	0.904	48.0	0.365	0.870	42.0	0.490	0.847	57.9			
	GE	0.59			0.51			0.52			0.53			0.50			0.53			0.43		
	GG	0.6			0.5			0.5			0.5			0.5			0.5			0.4		
Croatia	BP	1.06	1.29	82.2	1.07	1.20	89.2	1.03	1.17	88.0	–	0.62	0.0									
	IEA	1.083	1.227	88.3	1.000	1.044	95.8	1.046	1.070	97.8	–	0.876	0.0	–	1.358	0.0	–	1.269	0.0			
	Eurostat	1.083	1.227	88.3	1.000	1.044	95.8	1.046	1.070	97.8	–	0.876	0.0	–	1.358	0.0	–	1.270	0.0			
	GE	1.05			1.067			1.11			–			–			–			–		
	GG	1.2			1.1			1.1			–			–			0.2			0.6		

BP: Flows are on a contractual basis and may not correspond to physical gas flows in all cases.
IEA, Eurostat: The IEA's definitions are the same as those of Eurostat in terms of import and export data. The IEA reports the ultimate origin of gas, i.e. the country in which gas was produced. Swap deals and spot purchases are taken into account as well. But only imports destined for use in the importing country are considered, and only exports of domestically produced gas are reported as exports (Mieke Reece, IEA, personal communication, 8 October 2013).
GE (Gazprom Export): This gas belongs to Gazprom's gas balance and is supplied by Gazprom Export under LTSCs.
GG (Gazprom Group): These volumes include both exports from Russia and sales of gas purchased by the Gazprom Group outside Russia. Intra-group sales are not taken into account.
Note: 2013 data from the IEA are estimates. Russian sources apply different standards for measuring gas volume than BP, the IEA and Eurostat. In this table, the original numbers are used (no conversions have been made).

(see Table 7). Latvia also benefits from cheaper Russian gas,[25] which, besides regulations and infrastructural constraints, discourages imports from the Lithuanian LNG terminal. Changes in Estonia and Lithuania should be reflected in the 2014 and 2015 data.[26]

- Serbian national statistics for 2014 show Serbia only imported gas from Russia, while for two years, 2012 and 2013, a significantly reduced role for Russian imports is suggested. For previous years, all statistics include only minor or small non-Russian imports.[27] For 2012 and 2013, however, a new intermediary (Russian–Serbian Trading Corporation a.d.) made up about half of Gazprom Group's gas sales to Serbia. This is mirrored in the statistics for 2012 and 2013 as (1) significant differences between the figures for Gazprom Export (the lower numbers) and Gazprom Group (the higher ones),[28] and (2) the appearance of significant non-Russian imports. For 2013, Eurostat and Serbian national statistics show significant imports from Kazakhstan in addition to Russian imports.[29] But as indicated above, no direct access is provided to Central Asian gas. Thus Kazakh imports should relate to purchases from the Gazprom Group. For 2012, Eurostat and IEA report significant imports from Hungary in addition to Russian imports. Serbian national statistics categorise these non-Russian imports as imports from other sources/under other agreements rather than via the Russian LTSC.[30] These numbers may also relate to purchases from the Gazprom Group because purchases from the Gazprom Group roughly correspond to

[25] European Commission (2015) compares import prices for the first quarter of 2015.
[26] Monthly Eurostat statistics for 2014 and 2015 provide partial assistance because monthly and yearly statistics use different methodologies. Monthly statistics report imports from the country of last consignment and not the country of ultimate origin, as yearly statistics do. Lithuania's imports from Norway are reflected in monthly statistics, but Estonia's imports from Lithuania are not. Meanwhile, according to the monthly statistics, Latvia imported gas from Lithuania both at the end of 2014 and in 2015 (Eurostat, 2015b).
[27] Eurostat and IEA show minor or small Hungarian imports for 2008–2011, and also minor Kazakh imports for 2011, in addition to Russian imports. Serbian national statistics also include minor or small non-Russian imports before 2008, but the country of origin (here Hungary) is only determined for 2010 and 2011.
[28] Gazprom Export noted that, for some time, gas supplies to Serbia had been carried out by Gazprom Export and other companies of Gazprom Group which had sourced gas from its international portfolio. Starting from 2014, Gazprom Export is the sole gas exporter to Serbia (Gazprom Export Communications Team, personal communication, 30 and 31 July 2015).
[29] Eurostat calls it Russian, while Serbian national statistics categorise it as imports via the Russian LTSC. In contrast, only having estimates for 2013, IEA reports only minor Hungarian imports in addition to Russian ones.
[30] The earlier Serbian national statistics showed smaller "other imports", including minor volumes of Hungarian imports in 2012.

Serbia's total imports. Therefore, because of the Gazprom Group's activities, Russia had to have similarly large role in 2013 and, likely, 2012 than in 2014.

- The January 2009 gas crisis forced Slovakia to begin diversification and consider security of supply measures. Contracts with western suppliers and import capacity from countries other than Ukraine were pursued. According to the data, however, Slovakia has remained almost 100% (IEA and Eurostat) or totally (BP) reliant on Russian gas supplies. The IEA and Eurostat place the remainder in the non-specified category.[31] Gas from non-Russian gas suppliers could come from the directions of Austria and the Czech Republic. From July 2015 onwards, however, gas can, in principle, be bought via the Hungarian–Slovakian gas interconnector. The drop in Russian gas supplies in the autumn of 2014 prompted the Slovak gas incumbent SPP to renew its contractual relation with Germany's E.ON.
- For Romania, the various data sources suggest high dependence on Russian gas. But Romania is able to buy gas from and through Hungary using the Hungarian–Romanian interconnector completed in 2009, recorded in the statistics as Hungarian imports. The role of Austrian imports is close to zero.
- Since 2013, the data sources almost exclusively indicate Russian imports for Hungary. But Hungary is also importing gas from non-Russian suppliers from the West. There are likewise considerable differences between Eurostat and IEA data for 2010–2012. For these years, at the IEA, Hungary has high import figures included in the non-specified category because the Hungarian administration told the IEA it did not know the origin of imported gas from the West (Mieke Reece, IEA, personal communication, 9 October 2013). For the first time in 2011, and then in 2012 (but not in 2013 and 2014), Hungary imported more gas through the western than the eastern entry point. Due to increased interest, the capacity of the western entry point has been expanded. However, not only hub-traded gas arrives from the western direction. With its major LTSC (see Table A1 in the Appendix), Gazprom sells gas both from the eastern and western directions, the latter via Ukraine, Slovakia and Austria (see Fig. 8). Until early 2010, import statistics included Germany and France. These meant contractual diversification from the direction of Austria via the LTSCs with E.ON and GDF Suez,

[31] 2013 data from the IEA are estimates, making it difficult to compare data.

respectively. The contract with GDF Suez expired, while the one with E.ON was finally terminated because it had become a burden on the Hungarian party.

- IEA and Eurostat data suggest the share of Russian gas imports to the Czech Republic had become almost exclusive by 2012, with virtually no Norwegian imports in 2012 and 2013. Meanwhile, BP and Czech national sources suggest a much smaller share of Russian supplies. But while BP indicates significant Norwegian gas and no other supplies besides Russian gas, Czech national sources explain the transactions as follows: disappearing Norwegian imports are compensated by soaring German and other EU imports, i.e. by cheaper traded gas (MPO, 2012; OTE, 2013), and the bulk of gas supplies from Norway are sold outside the Czech Republic (ERU, 2011; MPO, 2014). Another challenge is the difference between Gazprom Export's gas exports to, and much lower gas sales by the Gazprom Group in, the Czech Republic in 2014. The reason is that for commercial reasons, Gazprom Group exploits a broad trading scheme that involves gas sales on the Czech market to companies from other jurisdictions. Gas physically delivered to the Czech Republic is being sold there to one company from another country. However, gas is recorded as sold not to the Czech Republic but to the country from which the customer originates (Gazprom Export Communications Team, personal communication, 20 July 2015). Another important change is that more Russian gas is delivered to the Czech Republic via Germany than via Slovakia (Free Poland Info, 2013) (see Fig. 8).
- For Poland, Eurostat has reported virtually no Russian imports since 2010. But Russian imports were moved into the non-specified category. The IEA, on the other hand, included these volumes in their data as Russian imports. Again, this is a situation when relying one source can mislead the cross-country comparison of dependence on Russian gas. The fact is that, despite various projects, Gazprom Export plays an increased role in gas supplies in Poland thanks to the elimination of Rosukrenergo. But capacity expansion on the German border, a new interconnector with the Czech Republic and virtual reverse flow services on the Yamal-Europe gas pipeline, carrying Russian gas to Poland and Germany (and onwards) via Belarus, help reduce imports from Gazprom Export. Import diversification is reflected as German (since 1993) and Czech imports (since 2012) in the IEA and Eurostat

statistics, while BP counts it as other European imports[32] and with smaller volumes. These flows will be further supplemented by expensive LNG in 2016 (see Section 3.5.1).

- Apart from Croatia, Slovenia has been the least dependent on Russian gas supplies and has had the most diversified portfolio of gas importing contracts. But at the end of 2012, Slovenia ceased buying expensive Algerian gas,[33] which resulted in growing dependence on Russian imports in 2013. While IEA data reports the Algerian imports until 2012, Eurostat data suggest Algerian import data were not available, a further problematic situation, if one relies on only one statistical material. However, at Eurostat, total imports should include Algerian imports because if one deducts the other imports (i.e. significant volumes of Austrian and minor amounts of Italian imports) from the total, then, one always gets the same numbers in every respective year as IEA gives for Algerian imports. Austrian imports include traded gas volumes with no information about origin, but physically supposed to be mainly of Russian.
- The most significant results in reducing dependence on Russian gas imports were achieved by Croatia, previously almost exclusively supplied by Russia. Croatia did not extend its LTSC with Russia when it expired at the end of 2010. However, in 2013, gas sales by the Gazprom Group to Croatia were re-initiated. But these are not classified as Russian imports by the IEA and Eurostat. For 2011–2013, Eurostat indicates imports from Italy, Hungary, Kazakhstan, Austria, Slovenia, Germany and France that vary significantly in size each year, reflecting well the different types of contracts, but presumably not adequately reflecting the ultimate origin of the gas.[34]

This analysis illustrates the complications inherent in relying on single indices[35] and the need for more detailed knowledge of gas market conditions and developments in order to understand the level of dependence. This knowledge should also include the contractual relations between CEE gas importing companies and Gazprom.

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[32] Imports from the Czech Republic via the new interconnector were initiated in 2012. Since 2011, for Poland's European gas imports, BP has not broken down the statistics by country.
[33] Gas supplies from Algeria started in 1992.
[34] In the IEA's statistics, imports were assigned to Italy, Hungary, Germany and the non-specified category.
[35] Therefore, if such problems arise with the share of Russian gas in total imports, then, the usage of the ratios of Russian gas in gas and energy consumption also face such problems (see Tables S3–S7 in the Supplementary material).

Based on my collected data (see Table A1 in the Appendix), between 2005 and early 2009 several gas supply contracts were signed or extended with Gazprom for the CEE region.[36] But several LTSCs will expire in the 2010s as well. Since the fiasco in Croatia in 2010, the Russians have concluded LTSCs with some companies in the CEE region despite the new gas market conditions. Bulgaria signed an LTSC in 2012, as did Serbia in 2013. Contracts with Vemex of the Czech Republic, and Dujotekana and Haupas of Lithuania were also extended in 2012.[37] Among these five contracts, the longest (with Bulgargaz) is for ten years, while the shortest (with Haupas) is for an additional two years. No contracts have been signed for 20 or 30-year periods, which prior to 2010 was the practice.

Table 2 clearly illustrates that while the CEE countries generally pay the highest gas prices to Gazprom, significant changes are also evident in price rankings from one year to the next. However, the figures and thus the rankings are a bit misleading and do not adequately illustrate the buyers' bargaining positions (i.e. the package deals and the extent of alternative sources for Russian gas imports) because the delivery points vary from buyer to buyer and the figures are not calculated on a netback basis.[38] Rebates paid by Gazprom presumably distort the rankings as well.

According to my data, based on reports from Gazprom, their customers and on other media sources, at least 16 of the current 20 long-term contract buyers for the CEE countries have received some price discount from Gazprom, either for one year or for the duration of the contract (see Table A1 in the Appendix).[39] Beyond this, take-or-pay

[36] The last LTSCs of the "old gas market situation" were signed in late 2008 (with Slovakia's SPP) and early 2009 (with Latvia's Latvijas Gāze).
[37] Haupas extended its contract from the original expiration date of 2013 to 2015. The Bosnia and Herzegovina's Energoinvest contract is not counted in this list (see Note (l) below Table A1 in the Appendix).
[38] The netback price at the Russian border is determined by subtracting transit costs and customs duties from the price at the delivery point.
[39] Discounts may have been given to one of the remaining four consumers, Macedonia's Makpetrol (see Note (c) below Table A1 in the Appendix). But no information is available about whether the other three of the five Lithuanian importers have received discounts. Presumably they have not. It is only known that in 2012, two of those three Lithuanian LTSCs were extended (they made "additional alterations and amendments", as Rimas Valungevičius of Lithuania's energy regulator reported on 7 January 2014, personal communication). Note that Estonia's Nitrofert contract is not counted among the 20 LTSCs (see Note (a) below Table A1 in the Appendix). In contrast, this figure includes two annually extended

Table 2
Prices for Russian gas in Europe and their rankings.
Source: Own compilation based on the following sources: [a] Stern (2014: 61); [b] Interfax-Ukraina (2013); [c] Izvestia (2013); [d] Vedomosti (2012).

	Prices ($ per thousand cubic metres or mcm)					Price rankings[e]				
	2013[a]	2012[b]	H1 2012[c]	2011[b]	2010[b]	2013[a]	2012[b]	H1 2012[c]	2011[b]	2010[b]
Macedonia	493	558	564.3	462	381	1	1	1	2	1
Greece	469	475	476.7	414	359	2	4	8	7	3
Slovakia	438	428	429	333	371	3	8	13	20	2
Poland	429	433	525.5	420	331	4	7	2	5	8
Bosnia & H.	421	500	515.2	429	339	5	3	3	4	6
Hungary	418	416	390.8	383	350	6	10	17	13	4
France	404	398	393.7	399	306	7	14	16	10	15
Austria	402	394	397.4	387	305	8	15	15	12	16
Czech R.	400	500	503.1	419	326	9	2	4	6	9
Netherlands	400	346	371.4	366	308	10	19	20	17	14
Italy	399	438	440	410	331	11	5	11	8	7
Slovenia	396	400	485.6	377	312	12	13	7	16	12
Bulgaria	394	435	501	356 (391[d])	311	13	6	5	19	13
Romania	387	424	431.8	390 (380[d])	325	14	9	12	11	11
Serbia	386	405	457.3	432	341	15	12	9	3	5
Turkey	382	416	406.7	381	326	16	11	14	14	10
Denmark	382	394	495	480	–	17	16	6	1	–
Switzerland	378	333	442.2	400	296	18	20	10	9	17
Finland	367	373	384.8	358	273	19	17	18	18	18
Germany	366	353	379.3	379	270	20	18	19	15	19
Baltic States				(397[d; f])	(333[d; f])					
Great Britain			313.4	(331[d; g])	(240[d; g])					

H1 – first half.
[e] In descending order (i.e. No. 1 is the most expensive).
[f] Average for the three states (Estonia, Latvia and Lithuania).
[g] There is no accurate price data for Great Britain, thus average spot prices at the British National Balancing Point (NBP) are provided.
Note: A previous compilation made by Vedomosti (2012) argues that these are average prices, including European operations. However, there is no available price data for gas arriving exclusively from the territory of Russia. In this table, the CEE countries are highlighted in grey. In the first column, countries are shown in descending order, ranked based on 2013 gas prices.

(i.e. the minimum purchase commitment) concessions are also evident in CEE. Three CEE consumers decided to search for a solution to price disputes through arbitration, resulting in a settlement agreement (Poland), successful arbitration (Czech Republic) and two pending cases (Lithuania and Poland) (see Table 3).

contracts (Macedonia's Makpetrol and Bosnia and Herzegovina's Energoinvest). See Note (l) below Table A1 in the Appendix.

Table 3
Discounts vs. arbitration: Arbitrations initiated by CEE players because of price disputes.
Source: Own compilation based on Gazprom (2013d, 2014a).

CEE party	CEE country	RU party	Claim	Date of filing the claim	Award	Date of the award
PGNiG	PL	Gazprom, Gazprom Export	Review of long-term contract prices	Nov. 2011	Agreement	(Nov. 2012)
RWE Supply & Trading CZ (formerly RWE Transgas)	CZ	Gazprom Export	Review of long-term contract prices[a]	Dec. 2010	RWE won (partial)	Jun. 2013
Lithuanian Energy Ministry	LT	Gazprom	A breach of the shareholders' agreement (Lietuvos Dujos), demanding recovery of damages for overpriced gas[b]	Oct. 2012	Pending	
PGNiG	PL	Gazprom, Gazprom Export	Review of long-term contract prices	May 2015	Pending	

[a] This should not be confused with another arbitration process. In October 2012, RWE Transgas won an arbitration procedure concerning the fulfilment of the take-or-pay clause (and not regarding the prices).
[b] This should not be confused with the price discount applied since July 2014. At the end of January 2014, the shareholders of Lietuvos Dujos also decided to initiate arbitration against Gazprom. But no such action has been taken.

However, Gazprom's CEE practices have not been well received in the EU. In September 2012, the European Commission launched an antitrust probe against Gazprom. And in April 2015, it sent a *statement of objections* to Gazprom because of Gazprom's abusive strategy, including (1) territorial restrictions; (2) unfair pricing policies; and (3) package deals in which gas supplies are conditional on achieving unrelated commitments.

3.2. CEE diversification through reduced gas demand

The CEE countries can be divided into three distinct groups based on the role of gas in primary energy consumption (see Fig. 2). In the first group of countries, these ratios are higher than for both the OECD and the OECD European average.[40] The shares of gas in primary energy consumption are below these averages in countries of the second group, while in countries of the third group gas has an extremely small share in the energy balance.[41]

[40] The high figure for Lithuania is a recent phenomenon and is due to the closure of its nuclear power plant at the end of 2009.
[41] Montenegro, Albania and Kosovo are not considered in Figs. 2–5.

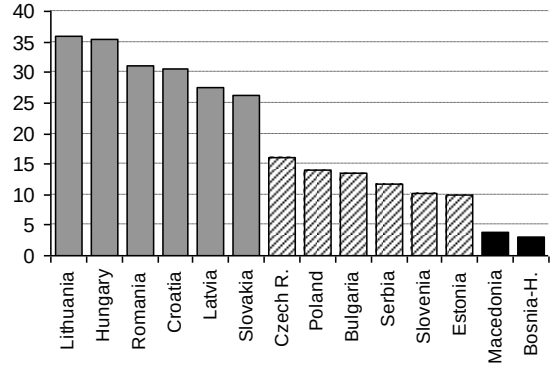

Fig. 2. Share of gas in total primary energy supply in CEE (2013 est., %).
Source: Own compilation based on IEA (n.d.).
Note: The different colours indicate different groups according to the share of gas in total primary energy supply in CEE.

IEA data shows that in the CEE region, Poland, Romania and Hungary are the largest gas consumers (see Fig. 3), with a combined share in total CEE consumption of 58% in 2013 (i.e. 40.1 bcm of the 68.9 bcm gas market).

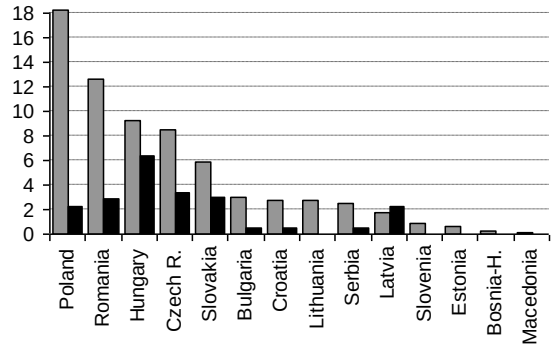

Fig. 3. Gas demand (1st column, annual, 2013 est.) vs. storage capacity (2nd column, end-2013) in CEE (bcm).
Source: Own compilation based on IEA (2014).

With the exceptions of Poland and a negligible gas market, Macedonia, all CEE gas importers consume less gas than in 2008 (see Tables S47 and S48 in the Supplementary material). In most CEE countries, however, gas demand reached its peak before 2008 (IEA, 2008, 2011a, 2012c, 2013b, 2014).

Consequently, and taking into account the mostly negative changes in CEE gas production (see Section 3.3) and certain CEE source diversification results, with a few exceptions, all CEE countries purchased less gas from the Gazprom Group in each successive year between 2009 and 2014 than in 2008 (see Table 1, as well as Tables S1 and S2 in the Supplementary material).[42] Romania has experienced the largest fall in gas imports and Russian gas imports across the CEE region. Although, as seen above, Croatia did not buy gas from Gazprom Export and Gazprom Group in 2011 and 2012, it has gradually increased purchases from Gazprom Group since 2013. At the other extreme is Poland, with its markedly growing gas consumption and increasing purchases from the Gazprom Group. The latter, however, as described above, is strongly related to the elimination of the intermediary company Rosukrenergo. In terms of Russian import volumes, Poland is substantially out of line. Hungary, the Czech Republic and Slovakia are also significant markets of Russian gas, but the rest are small or even negligible.

Table 4
Gas demand scenarios for the CEE region (% change).
Source: Own compilation based on sources indicated in the table.

	OIES by Honoré (2010)	IHS CERA[a] cited by Roberts (2012)	TYNDP (2011)[b]	TYNDP (2013)		Kantor – Booz & Co. (2012)[c]		
	2020/2008	2020/2008	2020/2008	2020/2008	2020/2010	2020/2010		
						Min	Base	Max
Estonia	0.0		+8.4	+8.4				
Latvia	–2.5		–20.3	+6.0	–3.9			
Lithuania	–26.3		–15.0	–19.5	–16.2			
Poland	+26.7		+15.3	+72.7	+68.3	+22.7	+45.3	+51.8
Czech R.	+2.9		+54.3	+44.2	+39.0	+23.0	+38.2	+60.0
Slovakia	+6.7		+15.5	+11.6	+12.5	+16.5	+24.4	+33.5
Hungary	–1.4	–8.3	+23.4	+6.5	+15.9	+5.3	+26.0	+55.6
Romania	+12.9	+16.2	–20.0	–1.9	+8.5	+17.2	+25.2	+37.9
Bulgaria	–7.4	+21.9	–13.0	+34.3 +28.3[f]	+49.7 +43.1[f]	+41.5	+77.5	+110.9
Croatia	–14.3	+58.6	+33.5	+33.5		+34.5	+86.9	+105.2
Slovenia	–34.0	+30.0	+68.2	+43.8	+42.6	+14.3	+35.2	+42.4
Serbia & M.	+2.0	+39.1	+75.5[e]	+75.5[e]				
Bosnia & H.	–32.5	+100.0						
Macedonia	+10.0	+8x	+7x	+3.5x				
Albania	0.0	–[d]						

[a] The information came from a private study conducted by IHS CERA. According to John Roberts, the information dates back to 2010. [b] Final customers. [c] The data for 2010 is also an estimate. [d] 2008: 0.0 bcm; 2020: 0.2 bcm. [e] Without Montenegro and Kosovo. [f] The most updated figure for 2020.
Note: Declines are highlighted in grey.

[42] Regarding Estonia and Latvia, much more gas was purchased in 2007 than in the base year 2008. When investigating gas balances and data for the Baltic States, one should consider gas storage activities in Latvia (i.e. winter and summer supplies).

A key question is to evaluate the extent of additional gas demand in the CEE region. Table 4, however, illustrates that the forecasts are contradictory. However, the magnitude of the ongoing infrastructure projects does not support optimistic expectations regarding additional gas demand. Nonetheless, Poland's importance is incontestable, despite TYNDP[43] (2011), which exhibited the highest growth in absolute terms in the Czech Republic and Hungary.

3.3. CEE diversification efforts through domestic production

In CEE, only Romania has substantial gas production (10.6 bcm of the CEE total of 21.9 bcm in 2013). But gas production in Poland, Croatia and Hungary must also be mentioned (see Fig. 4). Romania and Croatia have been largely self-sufficient, respectively producing 84.1% and 70.4% of gas consumed domestically in 2013 (see Fig. 5).

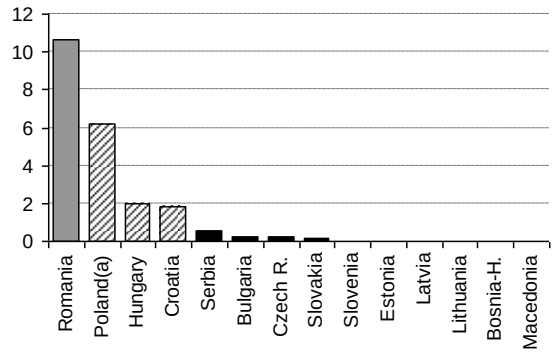

Fig. 4. Gas production in CEE (2013 est., bcm).
Source: See Fig. 4.
[a] Compare this (i.e. 6.2 bcm) with other data sources. For example, due to methodological differences, according to BP (2014), domestic gas production was 4.2 bcm in 2013.
Note: The different colours indicate different groups according to the level of gas production in CEE.

Total CEE gas production has been declining. But a few countries have managed to increase their gas production (see Tables S49 and S50 in the Supplementary material).

[43] The Community-wide Ten-Year Network Development Plan (TYNDP) and the six Gas Regional Investment Plans (GRIP; there are six regional groups with partial overlaps) are published every two years by the European Network of Transmission System Operators for Gas (ENTSOG), and the European TSOs, respectively.

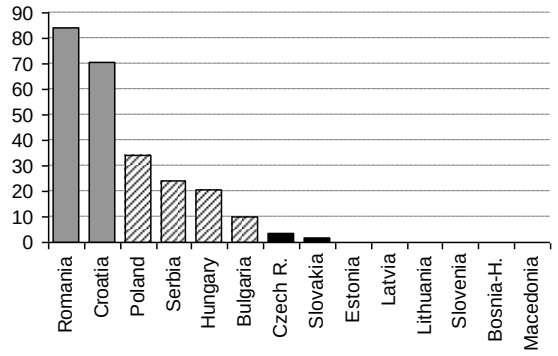

Fig. 5. Self-sufficiency in gas in CEE (2013 est., %).
Source: See Fig. 3.
Note: The different colours mean different groups according to the self-sufficiency in gas in CEE.

Many hope unconventional gas will bring competition to the Russian-dominated CEE markets, and thus lower gas prices. However, Bulgaria is now focusing on Black Sea gas. Romania has maintained its focus on both, but is also supposed to focus only on Black Sea gas.

Shale gas was regarded as a genuine prospect, not only in Poland, but also in Romania and Bulgaria (House of Lords, 2012), but has so far failed. In Poland, there have been several negative signals, including low(er) resource assessments (see Fig. 6) and decisions by foreign companies to pull out after disappointing results. Gény (2010) suggests that Polish projects will not be cost competitive with imports over the next decade.

US DOE/EIA (April 2011)	>	US DOE/EIA (June 2013)	>	Polish Geological Institute (March 2012)	>	USGS (July 2012)

Fig. 6. Shale gas resource assessments in Poland by different institutions.
Source: Own compilation.

Environmental resistance is a centrepiece of the future of shale gas in Europe (House of Lords, 2012). In January 2012, after witnessing several protests throughout the country, hydraulic fracturing for shale gas exploration and extraction was banned and Chevron's exploration permit was revoked in Bulgaria. Shale gas is still not back on the agenda, prompting Chevron to pull out of the market. In Romania, after the *de facto* but not *de jure* moratorium on hydraulic fracturing for shale gas exploration and

exploitation, Chevron, the only player, has faced local resistance despite government consent. After completing its first resource assessment, Chevron decided to cease its activities. Similarly, there is only a *de facto* moratorium in the Czech Republic. In Lithuania, Chevron, the only participant in, and winner of, the shale gas exploration tender, withdrew its bid in October 2013 due to tax and regulatory hurdles. Thus Chevron has given up its shale gas plans for all CEE countries.

According to TYNDP (2013), domestic gas production is expected to decline in all CEE countries.[44] Moreover, no unconventional gas production is foreseen for the examined period up to 2022.[45] However, investigating a narrower range of CEE countries (see Table 4), Kantor – Booz & Co. (2012) proposed an additional scenario that included the possibility of shale gas production in Poland commencing in 2020. In its Golden Rules Case or best-case scenario, the IEA (2012a) predicted unconventional gas production in the EU will be led by Poland, starting in the middle of the 2010s. Poland wants the state-controlled PGNiG company to double gas production with both conventional and unconventional gas by 2019 (Reuters, 2012). In September 2011, Polish Prime Minister Donald Tusk believed Poland would basically be able to switch to using its own gas sources by 2035 (Vzglyad, 2011). Climate incentives are not (strongly) considered here. Poland aims instead at eliminating dependence on Gazprom. Romania would also like to see conventional offshore gas make the country independent from gas imports within a few years.

3.4. Transit through the Western CIS and CEE

The bulk of Russian piped gas exports to non-CIS European consumers transits through Ukraine, Belarus and Moldova (see Table 5, fifth column). But there are certain direct links, both onshore (with Finland and Estonia) and offshore (with Turkey via the

[44] In Slovakia, production remains at the same level. GRIPs (2014a and 2014b) suggest Bulgaria is the only CEE country with increasing gas production. In Poland and Slovakia, gas production is projected to continue at the same level.

[45] Only biogas production is predicted to take place and only in Hungary. Although there is very minor early unconventional gas activity in Hungary, so far it has been a failure and only represents a long-term possibility. Dániel Magyari, a Hungarian energy specialist, reported that the Hungarian authority had not issued any new permits for hydraulic fracturing operations in the previous two years (personal communication, 27 February 2014).

Table 5
Transit directions, transit avoidance and Gazprom's ownership in transmission pipelines.
Source: Own compilation (data sources for transit volumes: Belarus: Gazprom Transgaz Belarus; Ukraine: Naftogaz; Moldova: Moldovagaz; Nord Stream: Itar-Tass (2014); Blue Stream: Gazprom).

Country	Asset	Russian share (%)	Transit routes of Russian gas to CEE[a]	Transit volumes in 2013[b]
Via the Western CIS transit states				
Belarus	Gazprom Transgaz Belarus (formerly Beltransgaz)	100	• via & to 1) LT 2) UA • to 3) PL	14.1 (N/A)[d]
	Belarusian section of Yamal-Europe	100	• via & to 4) PL → DE → CZ	34.7 (34.7)
Ukraine	–	–	• to 5) PL 6) RO • via & to 7) SK → CZ → AT → HU → AT → SI → HR 8) HU → RS → BA 9) MD → UA → RO → BG → MK	86.1 (83.7)[e]
Moldova	Moldovagaz	50[c]	• via & to 10) RO (see above, Route 9)	20 (19.7)[d]
Via the transit-avoidance pipelines				
Via & to Germany	Nord Stream	51	• via 11) DE → CZ	23.8 (23.8)
To Turkey	Blue Stream	50	–	13.7 (13.7)

[a] This column is a supplement to Fig. 10.
[b] Transit volumes to Europe are in brackets.
[c] In 2005, Transnistria's stake (13.44%) was transferred to Gazprom in trust management.
[d] The reason for this difference is that a portion of the total volume heads towards Ukraine.
[e] The reason for this difference is that a portion of the total volume goes to the Moldovan market.

trans-Black Sea Blue Stream pipeline and with Germany via the trans-Baltic Sea Nord Stream pipeline) (see Figs. 7 and 8).

In the CEE region, the three main transit routes via the Western CIS lead through Slovakia (Ukrainian corridor), Poland (Belarusian corridor) and Romania (Ukrainian/Moldovan corridor) (see Fig. 7). Gas transit through Slovakia reached a peak in 1999. Commissioned that year, Yamal-Europe reduced the significance of Slovakia, while Poland became an important transit country. Fig. 8 shows transit routes of Russian gas to CEE.

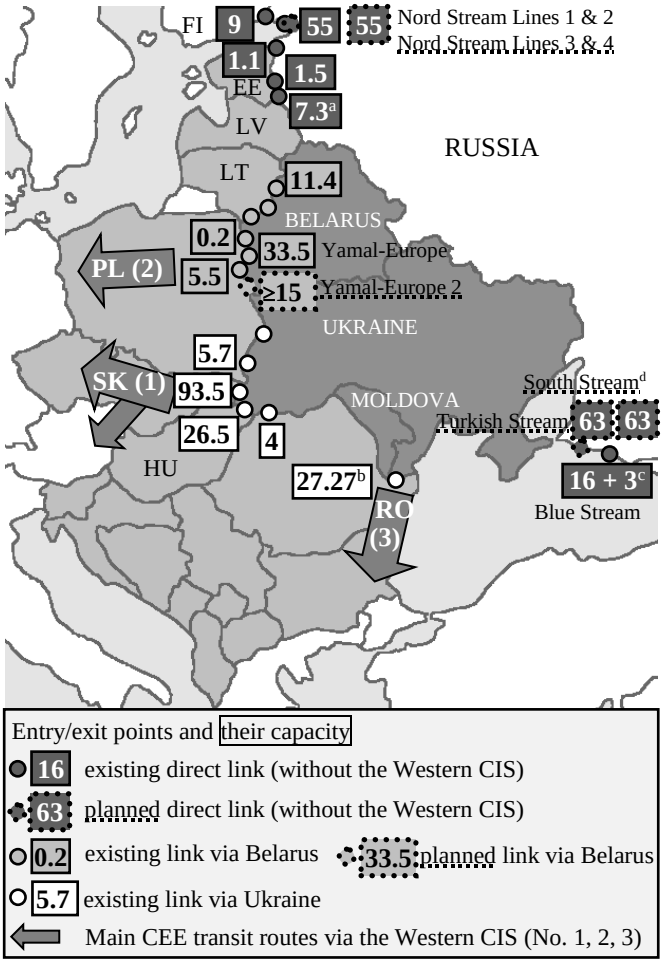

Fig. 7. Cross-border entry/exit points of Russian gas to Europe and capacity data.
Source: Nord Stream, South Stream and Blue Stream: Gazprom; RU/FI: Gasum; RU/EE: Estonian Competition Authority; RU/EE/LV and BY/LT: ERRA–ECA–PUC–NCC (2013); BY/PL and UA/PL: Gaz-System; UA/SK: Eustream; UA/HU: FGSZ; UA/RO: Borodin (2013) and Transgaz (2013c).
Blank map: <http://www.youreuropemap.com/>.
[a] See Note (b) below Table 8.
[b] Designed technical capacity. At current operating pressure: 21.35 bcma.
[c] It is intended to raise the capacity of Blue Stream to 19 bcma.
[d] A new project (Turkish Stream) was proposed instead of South Stream, with the same capacity and starting point.
Note: Figures are (or are suspected to be) at 20°C. In this map, the CEE countries are highlighted in light grey, while the Western CIS transit states are in dark grey. See also the Note below Fig. 9.

Except for Romania, Ukraine's CEE neighbours have already provided physical reverse flow services to Ukraine (see Fig. 9). Slovakia holds the largest capacity into Ukraine, ahead of Hungary and Poland. As Korchemkin (2013a) argues, using the physical reverse flow scheme is also advantageous to EU importers of Russian gas, because Ukraine helps fulfil the take-or-pay clauses.

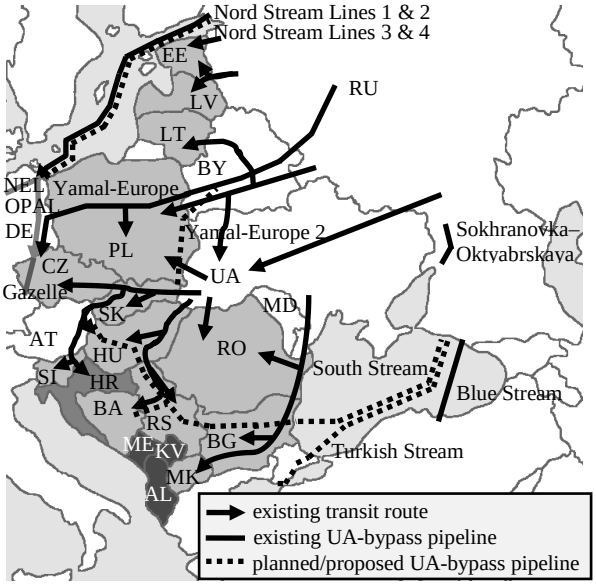

Fig. 8. Transit routes of Russian gas to CEE vs. Russian-backed Ukraine-bypass pipelines and pipeline plans and projects to Europe.
Source: Own compilation.
Blank map: <http://www.youreuropemap.com/>.
Note: HR: No LTSC with Gazprom. ME, KV and AL: No import capacity. For a legend of the different colours, see also Fig. A1.2 and Note (l) below Table A1 in the Appendix. The European onshore connecting pipelines of Nord Stream (NEL and OPAL) and the Gazelle pipeline are also indicated and marked in dark grey. The CEE countries are highlighted in light grey. The Sokhranovka–Oktyabrskaya gas pipeline is intended to transport gas to Southern Russia without transiting Ukraine. The map shows the latest version of South Stream before being abandoned. A South Stream leg planned to Macedonia has not been included. Yamal-Europe 2 is not on the agenda either.

3.4.1. Transit diversification pipelines and their effects

Fig. 8 illustrates Russian-backed Ukraine-bypass pipelines to Europe, including (1) Yamal-Europe, (2) Blue Stream, (3) the Sokhranovka–Oktyabrskaya (Russia–Ukraine–Russia) gas pipeline to Southern Russia and (4) Nord Stream, which was soon to be followed by the trans-Black Sea South Stream.

Gazprom explicitly plans to export gas in pipelines in which it owns at least a 50% stake (Korchemkin, 2013b) (see Table 5). In doing so, two options have been considered: (1) to buy pipeline ownership stakes in Western CIS transit states (and perhaps subsequently expand these pipeline capacities), or (2) build transit-avoidance marine pipelines. But regardless of geopolitical concerns, both options could be justified by security of supply arguments. First, transit-avoidance pipelines can increase security of supply for CEE consumers by reducing transit and facility risks related (mostly) to the

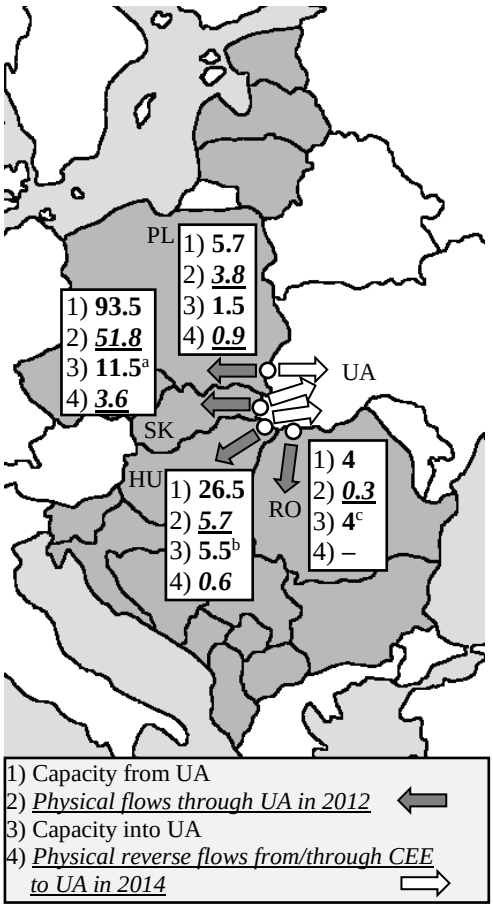

Fig. 9. Cross-border entry/exit points on the UA/CEE borders: capacity and utilisation (in forward and reverse flow) (bcm).
Source: 1) & 3): PL: Gaz-System; SK: Eustream; HU: FGSZ; RO: Borodin (2013). 2): PL, SK, HU and RO: Borodin (2013). 4): Ukrtransgaz.
Blank map: <http://www.youreuropemap.com/>.
[a] From March 2015 onwards: 14.6 bcma.
[b] On the Ukrainian side. From the Hungarian side: 6.2 bcma at 20°C (6.1 at 15°C).
[c] No reverse flow capacity is available. The figure is only indicated by Borodin (2013).
Note: Figures are (or are suspected to be) at 20°C. The cross-border point of local significance on the UA/PL border is naturally not considered here. The CEE countries are highlighted in grey.

Ukrainian and Ukrainian/Moldovan corridors. Second, evidence supports the assumption that Russian owner- and operatorship (or at least a 50% co-operatorship) may reduce transit and facility risks across the Western CIS countries, since Gazprom can control the gas flows (RFE/RL, 2007) and bring new investments, providing a feasible perspective on the use of that particular transit corridor. Thus it would be advisable to adjust the Transit Risk Index introduced by Le Coq and Paltseva (2012). Whichever option is chosen, EU Members and Energy Community Contracting Parties should implement the *acquis communautaires* (i.e. the body of EU regulation) on energy.

Nonetheless, despite its ownership, Gazprom intends to reorient transit from Moldova, which could be explained by the fact that: (1) Moldova is not only on the Ukrainian, but also on the Balkan corridor; (2) Moldova is an Energy Community Contracting Party with an unbundling commitment,[46] and (3) Moldova is burdened with the Transnistria issue (debt, transit and maintenance problems).

Nord Stream Line 1, with a capacity of 27.5 billion cubic metres per annum (bcma), became operational in 2011, followed by Line 2 in 2012. Gas from Nord Stream feeds into the NEL and OPAL pipelines in Germany. The Gazelle pipeline, opened in January 2013, is the continuation of OPAL through the Czech Republic (see Fig. 8). As a vocal opponent of Nord Stream, Poland decided not to connect to OPAL. Russia would like to see a third and fourth line of Nord Stream, but no real progress has been made and the project was put on hold in January 2015. But in June 2015, it revived the project with a preliminary deal *(memorandum of intent).* Meanwhile, in 2013, Russia came up with the

Table 6
South Stream: planned partners, ownership and routes.
Source: Own compilation.

Country/asset	Russian share (%)	Transit route[a]	Comment
Offshore section	*50*[b]	RU → Black Sea (→ BG)	
Northern branch			
• Bulgarian section	50[c]	→ BG	
• Serbian section	51[c]	→ BG → RS	
• Hungarian section	50[c]	→ BG → RS → HU	
• Austrian section	50[c]	→ BG → RS → HU → AT	Dropped in 2012, chosen in 2014.
• Leg to the Bosnian Serb R.[d]	60[c]	→ BG → RS → BA	
• Leg to Macedonia[d]	50[c]	→ BG → RS → MK or BG → MK	
Dropped sections			
On the northern branch[e]			
• Slovenian section	50[c]	BG → RS → HU → SI (→ IT)	Chosen in 2012, dropped in 2014.
• Leg to Croatia[d]	50[c]	BG → RS → CR	Due to the lack of interest by Croatia.
Southern branch			
• Greece	50[c]	BG → GR (→ IT)	Dropped in 2012.

[a] This column is a supplement to Fig. 10.
[b] At the end of 2014, Gazprom agreed to buy the remaining 50% stake.
[c] Requirements of the Third Energy Package should have been implemented.
[d] Company should have been set up.
[e] Montenegro and Kosovo were also said to have the opportunity to join the project, but these sections were not expected to be realised due to lack of interest. Romania did not join the South Stream project.
Note: Except for Slovenia, all CEE participants were state-run companies. However, the route to and through Slovenia was dropped before abandoning the South Stream project.

[46] However, the deadline for implementation of the unbundling was extended to 1 January 2020, instead of 1 June 2016 (see Note (h) below Table 7).

old plan of building a Yamal-Europe 2 gas pipeline, which was eventually dropped. But Russia again raised this question just prior to unexpectedly abandoning the South Stream project in December 2014.[47]

The offshore South Stream pipeline would have provided transport capacity of 63 bcma, with European onshore sections indicated in Fig. 8 and Table 6. In June 2014, under EU and US pressure, construction was suspended in Bulgaria. In the end, without informing its partners, Russia cancelled the extremely costly project because of the EU's tough position on the Third Gas Directive and Russia's worsening financial situation due to sanctions and falling oil prices (Dow Jones Newswires, 2014).

The European onshore sections of South Stream are subject to the Third Gas Directive, so the problems of third-party access, transportation tariffs and unbundling should have been resolved. Unbundling has also been a serious source of conflict with Russia regarding existing gas assets with Russian ownership (see Table 7).

In place of South Stream, Russia proposed building an undersea pipeline to Turkey (which is not an Energy Community Contracting Party), with the same capacity as South Stream (dubbed Turkish Stream by Turkey). Instead of the expansion and extension of Blue Stream, South Stream was proposed in 2007 in order to avoid duplicating the gas transit security issues raised by Ukraine.

The role of South Stream emerged from the new LTSCs concluded with Serbia and Bulgaria. With the initiation of supplies via South Stream, Serbia was poised to receive much more gas from Russia than before (Itar-Tass, 2013). No similar steps were being contemplated in Bulgaria. However, with the commissioning of South Stream, gas would have been delivered via this route (Gazprom Export, 2012a). In April 2010, additional gas purchases by OMV totalling 2 bcma were envisaged as part of South Stream (Gazprom, 2010). Also, in June 2013, Gazprom and EDF signed a *heads of agreement* on gas supply via South Stream (Gazprom, 2013b). Thus South Stream was first and foremost planned as a transit-avoidance pipeline, and carrying additional volumes would only have been a secondary benefit. However, South Stream was widely

[47] Yamal-Europe 2 would not be a parallel pipeline to Yamal-Europe 1, but would run from the Belarusian border via Poland to Slovakia and would have lower capacity (but not less than 15 bcma).

Table 7
Consequences of the Third Gas Directive on existing assets with Russian ownership in EU-member CEE countries.
Source: Own compilation.

Country	Company	Unbundling model	TSO	Russian owners of the transmission system (%)[a]	Date/ Deadline
Poland	EuRoPol GAZ[b]	ISO	Gaz-System	Gazprom: 48	Nov. 2010
Lithuania	Lietuvos Dujos[c]	OU	Amber Grid	–[d]	Oct. 2014
Estonia[e]	Eesti Gaas[c]	OU	AS EG Võrguteenus	Gazprombank: 37.03;[f] Itera Latvija: 10.02[f]	1 Jan. 2015
Latvia[e]	Latvijas Gāze[c]	N/A[g]	Latvijas Gāze	Gazprom: 34.0; Itera Latvija: 16.0	3 Apr. 2017
Serbia	Yugorosgaz[h]	N/A	Yugorosgaz Transport	Gazprom: 50	1 Jun. 2016

TSO – transmission system operator; ISO – independent system operator (i.e. the ownership of the physical transmission system is retained but it is managed by an independent system operator); OU – [full] ownership unbundling (i.e. the transmission system will be independently owned and operated from gas production and supply activities); ITO – independent transmission [system] operator (i.e. a company with production and supply interests may continue to own the transmission system, but the management of the network must be done by a subsidiary).
[a] See also Table A2 in the Appendix.
[b] Owner of the Polish section of Yamal-Europe.
[c] The three Baltic "national" gas companies.
[d] In June 2014, Gazprom sold its 37.1% stake to Lithuania's state-owned EPSO-G.
[e] Has a derogation.
[f] Has to sell its stake.
[g] Latvijas Gāze secured a gas transmission, storage, distribution and sales monopoly in Latvia until 2017. The model of unbundling is currently being worked out by the Ministry of Economy and will be approved by the parliament of Latvia (Janis Eisaks, personal communication, 12 June 2014).
[h] Yugorosgaz of Serbia has not been unbundled properly according to the Second Gas Directive. The deadline was 1 July 2007. Being an Energy Community Contracting Party, unbundling rules of the Third Gas Directive should be implemented only by 1 June 2016 (Energy Community, 2013; European Commission, 2012a).

suspected of also being an instrument to prevent European source diversification through the Southern Corridor (see Section 3.5.2) and to put pressure on Ukraine as a transit country.

Transit-avoidance pipelines would create large additional capacity, compared to Gazprom's current supply contracts with non-FSU Europe (a minimum amount of 158 bcma of gas for 2020 to 2025, see Gazprom, 2013e). This would enable Russia to arbitrage across the transit corridors:

- *Belarusian corridor.* Gas transit through Belarus and Poland are not at stake. In fact, Gazprom has wanted to increase transit through Belarus at the expense of Ukraine, which has neither ship-or-pay guarantees (i.e. to get paid regardless whether the contracted shipper moves gas), nor Russian ownership of the transmission pipelines.

- *Ukrainian/Moldovan corridor (Balkan corridor).* With the commissioning of South Stream, gas running through the Balkan corridor was set to divert to the Black Sea corridor (Dobrev, 2012). While Romania was poised to lose its transit role, Bulgaria would have become the biggest transit country for Russian gas in Europe (Bloomberg, 2012). Turkish Stream Line 1 may be utilised for diverting gas supplies to Turkey from the Balkan corridor, while South-East European countries on the Balkan corridor can be supplied from Turkish Stream Line 2 via Turkey by using reverse flow schemes (Natural Gas Europe, 2015).[48] But even these two lines have an increasingly uncertain future, not to mention four lines. Nord Stream expansion is supposedly related to this uncertainty.
- *Ukrainian corridor.* The Slovakian transit route has already been negatively affected by the Nord Stream pipeline. The Czech Republic is in a special position due to the Gazelle pipeline. Transit is only being reoriented from the east-west transit corridor to the north-south one.[49] Countries on the Ukrainian corridor do not have the infrastructure to import gas via Turkey and are not expected to take part in the construction of new gas transportation infrastructure from the Western border of Turkey (via Greece–Macedonia–Serbia–Hungary).

Nonetheless, until their transit contracts expire, ship-or-pay commitments guarantee all the CEE transit countries (i.e. Poland, Slovakia, Romania and Bulgaria) will achieve certain transit revenue levels (Medvedev, 2012; Sejm, 2010; Transgaz, 2013a; ACER, 2013) (see Table 8). Despite speculation, Ukrainian transit will be needed for some time after its long-term transit contract expires in 2019.

[48] In principle, however, 47 bcma of the Turkish Stream capacity would go towards the Turkish/Greek border. The necessary transportation capacity in Turkey is also lacking.

[49] According to ACER (2013), based on information derived from the Czech energy regulator ERU, contracts for the transit of Russian gas from Slovakia to Germany and onwards have been shifted from the existing pipeline system into Gazelle. But Gazprom Export (2013) argues that Russian transit travels along the Slovakia–Czech Republic route (from Slovakia) and also through the Yamal-Europe and Nord Stream/OPAL pipelines with two entry points (from Germany) (see Fig. 8).

Table 8
Gazprom's long-term transit contracts through the CEE region.
Source: EE: ACER (2013), ERRA–ECA–PUC–NCC (2013); LT: Gazprom, Lietuvos Dujos; PL: Gaz-System; SK: Gazprom Export (2013), Medvedev (2012); CZ: Gazprom Export (2013), Net4Gas; RO: Transgaz (2013a, 2013b); BG: Gazprom Export (2013).

	End date	Contracted volume (bcma)[a]
Estonia	N/A	N/A (7.3)[b]
Lithuania	2015	2.5
Poland (Yamal-Europe)	2019	N/A (32.9)
Slovakia	2028	50
Czech R.		
Traditional (east-west) routes	2035[c]	30.5[c]
Gazelle (north-south route)	N/A[c]	N/A (30.5)[c]
Romania		
Transit Pipeline II	2015	N/A (8.04)
Transit Pipeline III	2023	N/A (8.04)
Bulgaria	2030	17.8 (+ 5)[d]

[a] Transit capacity is shown in brackets where the contracted volume is not available.
[b] These are gas flows transiting Estonia from Russia to Latvia's underground gas storage facility (in summer), and from Latvia's underground gas storage facility to Russia (in winter) (Egert Luukas, personal communication, 20 February 2014). See Fig. 8.
[c] See footnote 49.
[d] Gazprom Export (2012b) still mentioned a customer option for an additional 5 bcma of gas.
Note: The three main CEE transit routes via the Western CIS are highlighted in grey.

3.5. CEE countries on the way to source diversification

Regarding short-term security of supply, Fig. A1.1 (Appendix) shows that, according to my data, seven of the 11 EU Member CEE countries meet the binding infrastructure standard "N-1" of the EU Regulation No 994/2010.[50] While EU Member States had to ensure this by December 2014 at the latest, the regulation, unfortunately, is not part of the Energy Community's *acquis communautaires* on energy.

Not only the January 2009 gas crisis, but also the period since 2008, have revealed the differing conditions of each CEE state. The latter has illustrated how each state has taken advantage of the benefits of gas market changes in terms of diversification (see Table 1). This has depended on the existence of sufficient interconnections (and virtual reverse flow services) and LNG regasification terminals, as well as on the ability to purchase gas at market prices. Moreover, gas incumbents have been limited by take-or-pay commitments on oil product-linked LTSCs. Thus new entrants bringing gas to the country have been worsening gas incumbents' positions.

[50] In the event of an outage of the single largest gas supply infrastructure, the remaining infrastructure should be sufficient to satisfy total gas demand for an entire day of exceptionally high gas demand.

Real source diversification of the CEE region would entail a critical mass of additional non-Russian gas supplies to be met by either pipeline or LNG deliveries. Since CEE gas import markets are very different in size, a small amount of non-Russian gas would bring significant source diversification in most countries (in the Baltics and countries south of Hungary). LNG, including future US LNG, and piped Azeri gas (see in Section 3.5.2) are the most likely supplies to be available in medium term (Dickel et al., 2014), though IEA (2009) still suggested that the lowest cost incremental sources of gas to Europe by 2020 were to be found in North Africa and the Norwegian Sea. Regarding the largest extra-EU gas suppliers, among the CEE countries, the Czech Republic and Lithuania have LTSCs with Norway, while Poland signed an LTSC with Qatar. No LTSC is currently in place with Algeria due to Slovenia's contract expiration without extension. The future of LNG imports into CEE depends on (1) the physical infrastructure to receive these supplies (either via CEE or other European LNG terminals, see Section 3.5.1), (2) limitations by Russian or other existing contractual commitments to import (see Table A1 in the Appendix) and (3) LNG prices compared to Russian gas (Dickel et al., 2014). However, Russia has the option to (1) lower its prices for LTSCs and (2) to influence prices by reducing or increasing gas supplies to European hubs. According to Dickel et al. (2014), Gazprom can decrease its European border prices to $7.50 per million British Thermal Units (mmBtu) (with a 10% real rate of return on a full cost basis) or even lower (on a marginal cost basis).[51]

In certain cases, the infrastructure is already there to be utilized for source diversification and, for different reasons, only the commercial deal is missing. But in most cases, one should also provide the necessary infrastructure. The European Commission's November 2010 communication on energy infrastructure priorities identified three priority projects in the CEE region: (1) the North-South Corridor in Central Eastern and South-East Europe, (2) the Southern Corridor, and (3) the Baltic Energy Market Interconnection Plan for gas.

[51] Based on Gazprom's most expensive Yamal Peninsula gas, and including Russian export duties.

3.5.1. Diversification through interconnections and LNG/CNG projects

As Figs. A1.2 and A1.3 (Appendix) illustrate, there are still no cross-border pipelines between many neighbouring CEE countries. Thus, in contrast to the large projects, the importance of interconnections is also emphasised. Some recent progress has been made. Hungary has taken notable steps in this area. According to my collected data, six new gas interconnections (the Czech–Polish STORK, the "German–Czech–German" Gazelle, the Hungarian–Romanian, the Hungarian–Croatian, the Hungarian–Slovakian and the Romanian–Moldavian interconnections[52]) have been completed since the January 2009 gas crisis (apart from an Austrian–Slovak mini gas pipeline and, naturally, also excluding expansions as well as reverse flow projects[53]). Among the planned new interconnections, only one (the Romanian–Bulgarian interconnection) is still under construction (see Tables A2 and A3 and Fig. A1.4 in the Appendix). Gas interconnectors built or under construction in CEE since 2009 are or will be owned and operated both by private and state-controlled TSOs, with a larger share of the latter. Almost all these interconnectors have received EU funding.

Among LNG regasification projects in the region, the Lithuanian project was completed, while the Polish one is projected for 2016. Both are state projects. But while EU funds have been allocated to the Polish project, only a European Investment Bank loan was granted to the Lithuanian one (see Table A4 and Fig. A1.4 in the Appendix). The Lithuanian project has linked up with the Baltic gas island, but not the Polish–Lithuanian or the Finnish–Estonian interconnector, which are far from being implemented.

The other CEE LNG/CNG projects remain in the planning stages (see Fig. A1.4 in the Appendix):

- Estonia and Finland, the two potential host countries, were unable to agree on the location of a regional LNG terminal in the Baltic States and thus proposed two separate terminals.

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[52] The Hungarian–Slovak gas interconnector was inaugurated in March 2014, but it became operational only in July 2015. However, there is no demand for the capacity. The interconnector between Romania and Moldova was inaugurated in August 2014, but was first used only in March 2015.

[53] EU Regulation No 994/2010 obliged the TSOs to enable permanent bi-directional capacity on all cross-border interconnections between Member States at the latest by December 2013 (with some exceptions), but has not been fully complied with.

- In Croatia, the Adria LNG international consortium project stalled. An alternative project, the state-owned LNG Hrvatska, is now seeking both investors (to develop the terminal) and customers (to book capacity). Despite the plans, there is no evidence the project will go ahead.
- Another LNG importing idea in the Western Balkans is the Eagle LNG in Albania.
- On the Black Sea coast in Romania, the Azerbaijan–Georgia–Romania–Hungary Interconnector (AGRI) project would develop an LNG regasification plant.
- In Bulgaria, CNG has emerged as an option. This would clash with the AGRI LNG. But no perspective has been given to these Black Sea plans either. CNG is not on the agenda and the State Oil Company of the Azerbaijani Republic (SOCAR), a member of AGRI LNG, admitted that the likelihood of AGRI LNG has diminished as well (ABC.az, 2013). Rather than to the Black Sea, Azerbaijan prefers Turkey as an export route. AGRI LNG would be based on gas outside the Shah Deniz project of Azerbaijan (see Section 3.5.2) and would be a diversification project for Azerbaijan (and the Eastern Caspian) in the 2020s (Natural Gas Europe, 2013a).

Besides the expansion of the Revithoussa LNG terminal, two LNG terminals (the Aegean and Alexandroupolis LNG's) in Greece have also been proposed, and a Turkish LNG project could also serve regional needs.

Bartuška (2008) aptly formulated that there is no energy security without willingness to pay. But can CEE countries afford to develop diversification projects irrespective of cost? Some CEE countries have been buying gas from non-Russian suppliers under long(er)-term contracts since the 1990s, even though, under normal circumstances, these would only have been considered contractual and not physical diversification. But during the January 2009 gas crisis, this scheme worked well and consumers benefited from this option (e.g. Hungary had contracts with E.ON Ruhrgas and GDF Suez at that time). Typically, however, consumers have paid a price for diversity.[54] In 2004, László Varró, now a Division Head at the IEA, drew attention to the rule of thumb that, starting around Munich, North Sea gas became more expensive than Russian imports and,

[54] Hungary was paying about 20-30% higher prices for gas via contracts with E.ON Ruhrgas and GDF Suez than for Russian gas (Világgazdaság, 2006). Russian gas was also cheaper than Norwegian when Poland had a small contract with Norway for the period 2000–2006.

starting around Florence, gas coming from Algeria cost more than Russian gas (Világgazdaság, 2004). But the situation has begun to change with hubs and hub pricing (see also the Czech RWE's successful price revisions with its Norwegian suppliers [RWE Transgas, 2013]).

As for LNG, "PGNiG agreed a contract with Qatar for one of the highest prices seen in any gas contract anywhere in the world".[55] In contrast, Norwegian LNG prices for Lithuania might be higher than Russia's, but will be market-based and competitive, providing bargaining power against Russia (Reuters, 2014). So while the European Commission very strongly suspects that Gazprom has been trying to prevent diversification and the free flow of gas, in many cases the lack of diversification can be explained with reference to simple economic explanations, such as the lower price of Russian gas compared to other options (most notably in the Baltic States until 2008) and the lack of demand required to make an infrastructure project viable.[56] The case of the planned Slovak–Hungarian interconnector clearly illustrates that a private company (in this case the Hungarian TSO) can be replaced by state-owned participants if the expected return does not exceed the required rate of return. But in CEE, diversification projects have gone ahead very slowly despite the role of state-controlled participants and the possibility of getting EU-funded support.

3.5.2. Diversification through the Southern Corridor

The Southern Corridor initiative includes routes going through and from Turkey and the Eastern Mediterranean, as well as other routes that could pass the Black Sea to the EU (both pipeline as well as CNG and LNG options). The Trans-Caspian Pipeline would also be a major project in the Southern Corridor.

Azeri gas, namely gas from the second stage of the Shah Deniz field development (Shah Deniz 2), seems to be the only guaranteed source for Europe. The Shah Deniz

[55] Personal communication with Jonathan Stern (14 January 2013). A 2009 source states that LNG supplies from Qatar might be 30-50% more expensive than Russian gas (GOwarsaw.eu, 2009). Another source, with precise numbers, suggests more than 50% higher prices (Reuters, 2013b). Poland and Lithuania have only one LNG supply contract each (see Table A4 in the Appendix).

[56] For the delivery of a larger amount of Norwegian gas to Poland, a new pipeline from Norway to Poland would have been required. But Poland was unable to find other buyers, rendering the pipeline uneconomical (ICIS Heren, 2006).

consortium conducted a three-round selection process among pipelines from the western border of Turkey that would connect to the yet-to-be-built trans-Turkish Trans Anatolian Gas Pipeline (Tanap). In the end, the Trans Adriatic Pipeline (TAP) was chosen (see Table 9 and Figs. 10–12). Apart from Albania, Croatia, Bosnia and Herzegovina and Montenegro have also supported TAP because of the possibility of future gas supplies via the proposed Ionian Adriatic Pipeline (IAP) along the Adriatic coast from Albania to Croatia. As for the fate of Nabucco West, Stern suggests that weak demand for gas in the region is holding back investment (Financial Times, 2013). Finally, in September 2013, Bulgaria, a Nabucco consortium member, gained the opportunity to buy 1 bcma of Shah Deniz 2 gas (from Greece via Turkey), the first result of Bulgaria's geographical location. Shah Deniz 2 gas is expected to reach Turkey in 2018 and "Europe" in 2020.

Table 9
Competition between pipeline projects from the western border of Turkey to Europe on the Southern Corridor.
Source: Own compilation.

Round	Date of decision	Winner project	Loser project	Direction
1st	Feb. 2012	TAP	ITGI	South of Italy
2nd	Jun. 2012	Nabucco West	SEEP	Central and South-East Europe
3rd	Jun. 2013	TAP	Nabucco West	South of Italy vs. Central and South-East Europe

- TAP: Trans Adriatic Pipeline, the Greece–Albania–Italy pipeline.
- ITGI: Interconnector Turkey–Greece–Italy, comprising the already operating ITG (Interconnector Turkey–Greece) and the IGI (Interconnector Greece–Italy) project, the latter including IGI Onshore and IGI Poseidon.
- Nabucco West (Turkish/Bulgarian border–Bulgaria–Romania–Hungary–Austria): an already scaled-down version of Nabucco "classic".
- SEEP: South East Europe Pipeline, BP's 2011 concept (from Western Turkey across Bulgaria and Romania to Hungary's eastern frontier).

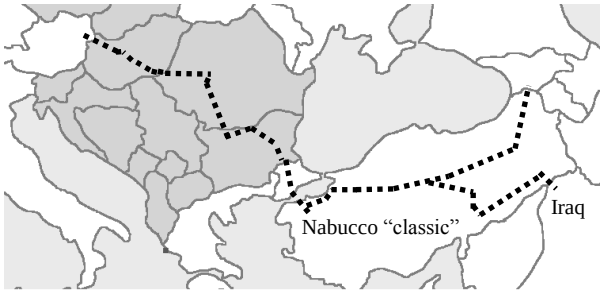

Fig. 10. The planned route of Nabucco "classic".
Source: Own compilation.
Blank map: <http://www.youreuropemap.com/>.
Note: Nabucco "classic" was a large-scale version of Nabucco. The CEE countries are highlighted in light grey.

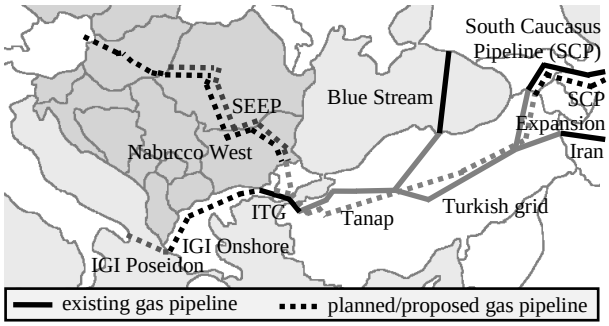

Fig. 11. The losing gas pipeline projects from the western border of Turkey to Europe.
Source: Own compilation.
Blank map: <http://www.youreuropemap.com/>.
Note: For abbreviations, see Table 9. The CEE countries are highlighted in light grey. White Stream, a trans-Black Sea pipeline plan from Georgia to Romania, is not indicated on the map because this plan has never been in competition for Shah Deniz 2 gas with other pipeline projects.

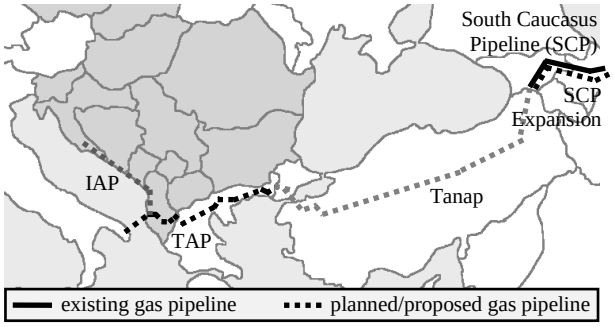

Fig. 12. The winning gas pipeline project from the western border of Turkey to Europe.
Source: Own compilation.
Blank map: <http://www.youreuropemap.com/>.
Note: For abbreviations, see Table 9. The CEE countries are highlighted in light grey.

Price is a critical issue for buyers. While the Shah Deniz 2 gas buyer E.ON said that gas would be supplied at conditions reflecting European gas markets, SOCAR insisted the long-term formula would not be purely hub-based, but would incorporate a link to oil prices as well (Interfax, 2013). But one of the buyers, GDF Suez, has signed a contract to buy the gas at market prices (and not at prices tied to oil products) (Bloomberg, 2014).

It must be reiterated that diversification alone does not inevitably lead to supply security. And Azerbaijan has not yet demonstrated that it is a reliable supplier (Rausch, 2012). Moreover, new transit risks will emerge. With Shah Deniz 2 gas exports, Georgia's transit role will grow further. Through Tanap (and potentially through Turkish Stream), Turkey will also function as an important transit state. The Trans-Caspian Pipeline, if built, would make Azerbaijan an important gas transit state as well. And with LNG

supplies, the Strait of Hormuz, the Bab el-Mandab passage and the Suez Canal would become part of the security landscape.

4. Conclusions and policy implications

Gazprom's gas market position in Europe has changed significantly. Though opposed to hub-based pricing, Gazprom has accepted a narrowing of the gap between oil product-linked contract prices and hub-based market prices. Although most of the long-term buyers from the CEE countries have received discounts from Gazprom, reflecting their bargaining positions, they still pay higher prices for Russian gas compared to Continental European market prices, and, generally, compared to Gazprom's prices for West European buyers. But due to declining oil prices, Russian oil product-linked gas prices could become the lowest by 2015. Despite this, CEE countries should not stop moving toward market-based gas pricing and should continue diversification.

CEE countries can take limited advantage of the benefits of changed gas market conditions, partly due to the lack of necessary import capacity, and partly due to the take-or-pay commitments of LTSCs. But some countries (e.g. Hungary) have genuinely benefited from these ongoing developments, not only due to price discounts on LTSCs, but also due to the purchase of gas at hub-based prices from non-Russian suppliers.

Gas plays different roles in different CEE energy balances and forecasts for gas demand in the CEE region up to 2020 are vague and differ significantly from each other. It remains to be seen how the falling oil prices of 2014 and the subsequent plummeting of oil product-linked gas prices in 2015 will affect gas demand (and Gazprom's approach to market pricing). But lower gas demand could translate into reduced dependence on Russian gas imports. Poland is considered to be the engine of gas demand growth in CEE.

Domestic gas production has been declining steadily and the future role of unconventional and Black Sea gas remains a conundrum. Falling oil prices could make the situation more difficult. There does not appear to be any revolution in the making,

but the possibility of having visible results in the 2020s cannot be ruled out. Possibly, some Black Sea gas has a greater chance of appearing on the market. In order to see the real potential for shale gas, massive drilling activity and public and environmental acceptance are necessary. Countries that, in principle, tend to support, and see a role for, unconventional gas, must create more favourable conditions (e.g. in Poland). Likewise, to mitigate declining conventional gas production in CEE, contradictions between national goals and existing regulation must be addressed (e.g. in Hungary).

Although Russian transit via the Ukrainian gas corridor has been reduced, it still plays a primary role. Nord Stream has already begun to affect the transit corridors. The Belarusian corridor has a strong position, and ship-or-pay commitments guarantee all three CEE corridors will reach specific revenue levels for a specific period. In contrast to South Stream, Nord Stream is still only marginally about the CEE region. Except for the Czech Republic, no CEE countries have connected to the European onshore connecting pipelines of Nord Stream (though there is the possibility of transiting gas via the Czech Republic), and no direct legs have been built from the offshore Nord Stream pipeline to the Baltic CEE countries. With the abandoning of South Stream, a number of CEE countries lost a transit diversification option. Meanwhile, Turkish Stream has an unclear future.

While CEE governments should accept that the Third Energy Package cannot be avoided when implementing pipeline projects with either Russian or non-Russian participation, the EU and the respective CEE countries should not be cowed by threats from Russia regarding physical reverse flows to Ukraine. As long as these deals do not breach any contractual obligations, they should be supported.

Among the 14 CEE gas importers, except for Latvia, Bosnia and Herzegovina, Bulgaria and Macedonia,[57] 10 countries have been supplied by non-Russian gas suppliers. Under the new gas market conditions, all of them have had the opportunity to buy gas at lower prices than from Russia, but have managed to do so to very different degrees.

The evidence suggests there are strong economic reasons (including prices, costs and sufficient demand) for why diversification has made limited progress. Despite the new gas market circumstances, the Russians have concluded LTSCs with companies in CEE

[57] Emergency gas supplies during the January 2009 gas crisis are not taken into account.

and presumably have preserved the old pricing model. With some exceptions, LNG and interconnection projects are moving forward very slowly. In the case of LNG projects under construction in CEE, state projects play an exclusive role. In contrast, gas interconnectors built or under construction in CEE since 2009 are or will be owned and operated by both private and state-controlled TSOs. When implementing an infrastructure project to diversify, one or more countries may decide to consider the price component of the security of supply measure as a secondary matter. But at the end of the day, someone has to pay the costs.

However, consistent national, regional and European level political support for diversification is also important. Despite many criticisms, the EU has taken a few steps that may help mitigate the fear of Russian influence, by (1) using its regulatory power and (2) providing funding and loans for selected projects. While supporting solidarity, the necessary investments should be made in all CEE countries. Given the failure of Nabucco West and the abandonment of South Stream, the potential importance of interconnection and LNG projects should be emphasised. But CEE countries cannot expect the EU to finance these projects alone. They could, however, successfully strive for additional funds from the EU (e.g. from European Commission President Jean-Claude Juncker's investment package).

CEE countries should accept that regional cooperation is essential in their small, fragmented gas markets (e.g. regional LNG regasification terminals). And for the implementation of diversification infrastructure projects, CEE countries should permanently monitor each other's gas affairs.

Obtaining Azeri gas is still key. By the end of the 2010s, Shah Deniz 2 gas could reach Europe. But since the Nabucco West bid was lost, it has become questionable whether CEE countries, except for Bulgaria, will have the opportunity to receive gas through TAP.

Although CEE countries are waiting for cheap(er) gas and more security of supply with the help of diversification, they should accept that cheaper gas is not guaranteed (see e.g. the Polish or the Lithuanian LNG deals) and, as Stern argued to this author (on 14 January 2013), gas supplies from non-Russian sources are also likely to result in security issues, perhaps even greater than those of Russian supplies.

While supporting diversification efforts, CEE governments should also be aware of the fact that Russia remains the single largest gas supplier, not only to CEE but also to Europe (Natural Gas Europe, 2012b). But CEE long-term contract buyers can and should bargain with Gazprom. Both the new market situation and the planned South Stream pipeline presented opportunities to do so successfully. Having abandoned South Stream, both sides have lost an important bargaining chip. Gazprom could easily have shipped additional volumes via South Stream, and this would have provided an opportunity to lock-in CEE consumers using a first-mover advantage. Gazprom is expected to concentrate in particular on countries where diversification still has not been resolved, but there are many ongoing attempts to achieve this goal. On the other hand, assuming adequate demand, since price is a very important factor for CEE consumers and there are a lot of uncertainties surrounding diversification projects and plans, further gas price reductions from Gazprom (which have already taken place in 2015 because of lower oil prices) could have the effect of extending gas supply contracts (even if other options are available) and/or selling additional gas volumes in CEE, despite diversification efforts.

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Appendix

Table A1.
Gazprom's long-term gas supply contracts in CEE and price discounts (Disc.) by Gazprom since 2010.
Source: Own compilation.

Buyers	End date	Disc.	Buyers	End date	Disc.	Buyers	End date	Disc.
Estonia[a]			Czech Republic			Bulgaria[h]		
Eesti Gaas	2015	Yes	RWE Supply & Trading CZ	2035	Yes[f]	Bulgargaz	2022	Yes[i]
Latvia[b]			Vemex	2017	Yes	Slovenia		
Latvijas Gāze	2030	Yes	Slovakia			Geoplin	2017	Yes
Lithuania[c]			SPP	2028	Yes	Serbia		
Lietuvos Dujos	2015	Yes	Hungary			Yugorosgaz/Srbijagas	2021	Yes[j]
Achema	2015	N/A	Panrusgáz/Magyar Földgázkereskedő	2015[g]	Yes	Bosnia and Herzegovina[k]		
Dujotekana[d]	2020	N/A	Centrex Hungária	2028	Yes	Energoinvest d.d. Sarajevo	2015[l]	Yes
Kaunas power plant	2017	Yes	Romania			Macedonia		
Haupas	2015	N/A	WIEE	2030	Yes	Makpetrol	2015[l]	N/A[m]
Poland			Conef Energy	2030	Yes			
PGNiG[e]	2022	Yes						

[a] The fertiliser producer Nitrofert purchased gas directly from Gazprom. In February 2009, it suspended its activities due to high gas prices. At the end of 2012, Nitrofert finally reinitiated its gas imports. But these were stopped again in mid-2013 (Egert Luukas, personal communication, 14 January 2014; Estonian Competition Authority). No information is available about this contract. Also, no precise information is available about gas supplies from Russia's Itera Oil and Gas Company to Estonia and Latvia. During 2012 and 2013, Russia's independent gas producer Itera Oil and Gas Company was acquired by Russia's state-controlled Rosneft from Itera Holdings Limited (Cyprus). Consequently, Rosneft holds a 66% stake in Latvia's Itera Latvija. Eesti Gaas purchases gas from Itera Latvija, but in small quantities. According to a 2009 presentation regarding the gas sales chain of Itera Oil and Gas Company in 2008, gas belonging to Itera arrived at Itera Latvija through Gazprom Export, and then, in turn, was transferred from Itera Latvija to Eesti Gaas and Latvia's Latvijas Gāze. Henderson (2010: 70) claimed Itera had an LTSC to supply 0.6 bcma of gas to Latvia by 2030, while supplies to Estonia were only 0.1 bcma. Reportedly, in 2011, Gazprom became the sole supplier of gas to Latvia and Estonia. If all the above-mentioned points are true, then presumably Itera used Gazprom Export as an agent, but under the new system presumably sells gas to Gazprom (DELFI, 2011; Interfax-Azerbaidzhan, 2011). Gazprom Export argues the three Baltic States are supplied by Gazprom and not Gazprom Export (Gazprom Export Communications Team, personal communication, 6 June 2014). Also, see Note (b) below. Egert Luukas reported (personal communication, 14 January 2014) that Gazprom had been storing gas for winter supply in Latvia and, as curious as it may be, there was no normal sale between Eesti Gaas and non-Gazprom companies.

[b] In Latvia, all import operations are handled by Latvijas Gāze on the basis of an LTSC among Latvijas Gāze, Gazprom (and not Gazprom Export) and Itera Latvija (PUC, 2011; ERRA–ECA–PUC–NCC, 2013; Janis Eisaks, personal communication, 16 June 2014).

[c] Rimas Valungevičius of Lithuania's energy regulator provided this information on 14 June 2013.

[d] Since October 2008, Gazprom has been supplying gas through the intermediary LT Gas Stream AG to Dujotekana.

[e] In 2010, an annex to the existing LTSC was signed, allowing an increase in gas purchases.

[f] Only due to an arbitration award.

[g] No new LTSC will be signed for a while, because unused gas will be available in the following years.

[h] Gazprom Export and Overgas Inc. extended the current contract for gas supply in Bulgaria of 109.6 mcm for the first quarter of 2013 (Gazprom Export, 2013). But, according to the financial statements of Bulgargaz, it has not bought any gas from Overgas since 2013.

[i] Bulgaria received a price discount for Bulgargaz's three contracts (with Gazprom Export, WIEE and Overgas) from April 2012 until the end of 2012. Moreover, Bulgargaz's new LTSC with Gazprom Export is priced at a preferential rate.

[j] In December 2011, Serbia achieved a price cut for 2012. The new LTSC, signed in 2013, has brought a price cut as well.

[k] In February 2015, Gazprom signed a gas supply contract with Gas-Res of Bosnia's Serb Republic for the period from July 2015 to December 2016.

[l] Gazprom Export claims it has yearly contracts with both Makpetrol of Macedonia and Energoinvest of Bosnia and Herzegovina "which are either renegotiated on a yearly basis or simply prolonged for another year". Makpetrol signed an LTSC for 15 years in 1992, while Energoinvest's 15-year contract was concluded in 1997. I have assumed these LTSCs are extended annually. But Gazprom Export argues it does not disclose any contract details (Gazprom Export Communications Team, personal communication, 9 June and 16 July 2014). For the above-mentioned reasons, these two contracts were left among the LTSCs.

[m] In January 2015, a media source said a more favourable agreement had been concluded (Independent.mk, 2015).

Note: Contracts signed or extended with Gazprom under the new circumstances (i.e. since 2009, excluding Latvijas Gāze's contract, see footnote 36) are marked in grey in the table.

Table A2.
CEE transmission system operators and their owners.*
Source: Own compilation.

Country	TSO	TSO's owners (%)
Estonia	• AS EG Võrguteenus	• AS Võrguteenus Valdus (Gazprombank: 37.03; Fortum Heat and Gas OY: 51.38[b]; Itera Latvija: 9.99; Other shareholders: 1.60)
Latvia	• Latvijas Gāze	• E.ON Ruhrgas International GmbH: 47.2[c] • Gazprom: 34.0 • Itera Latvija: 16.0
Lithuania	• Amber Grid	• UAB "EPSO-G" (state-owned): 56.6[d] • Gazprom: 37.1 • Minority shareholders: 6.3
Poland	• Gaz-System[e]	• State Treasury
Czech Rep.	• Net4Gas	• Allianz Capital Partners: 50[f] • Borealis Infrastructure (Ontario Municipal Employees Retirement System): 50[f]
Slovakia	• Eustream	• SPP Infrastructure, a.s. (SPP, a.s. [owned by the National Property Fund]: 51; Slovak Gas Holding B.V.: 49[g])
Hungary	• FGSZ	• Mol (Hungarian state [MNV Zrt.]: 24.74; foreign investors [mainly institutional]: 25.12; CEZ MH B.V.: 7.35; OmanOil [Budapest] Limited: 7.00; Magnolia Finance Limited: 5.75; OTP Bank Plc.: 5.44; ING Bank N.V.: 4.99; UniCredit Bank AG: 3.9; Crescent Petroleum: 3.02; Dana Gas PJSC: 1.42; Crédit Agricole: 2.04; domestic institutional investors: 2.40; domestic private investors: 4.46; Mol Nyrt. [treasury shares]: 2.36)
	• Magyar Gáz Tranzit	• State[h]
Romania	• Transgaz[i]	• Romanian State by the Ministry of Public Finance: 58.5 • Other shareholders – natural and legal persons (free-float) 41.5
Bulgaria	• Bulgartransgaz	• Bulgarian Energy Holding EAD (Ministry of Economy and Energy)
Slovenia	• Plinovodi	• Geoplin d.o.o. Ljubljana (Republic of Slovenia: 39.6; Petrol Ljubljana: 32.0; Salnal: 7.5; Ekopur: 7.1; own shares: 4.0; others: 10.5)
Croatia	• Plinacro	• State
Serbia	• Srbijagas	• State
	• Yugorosgaz Transport[j]	• Yugorosgaz (Srbijagas: 25; Gazprom: 50; Central ME Energy and Gas, Vienna: 25)
Bosnia & H.	• BH Gas	• Government of the Federation of Bosnia and H.
	• Gas Promet a.d. Istočno Sarajevo-Pale (Republika Srpska)	• Share Fund of Republika Srpska: 65.2 • Pension and Disability Insurance Fund of Republika Srpska: 10.0 • Restitution Fund of Republika Srpska: 5.0 • Investment funds and individuals: 19.8 (ZIF Aktiva invest fond a.d.: 16.5; ZIF Bors invest fond: 1.45; small shareholders: 1.85)
	• Sarajevo-gas a.d. Istočno Sarajevo (Republika Srpska)[k]	• Share Fund of Republika Srpska: 29.99 • Pension Reserve Fund of Republika Srpska: 10.00 • Restitution Fund of Republika Srpska: 5.00 • ZIF Kristal invest fond a.d.: 23.94 • Polara invest fond a.d.: 17.95 • Investment fund Profi-plus dd Sarajevo: 4.23 • Other shareholders: 8.89
Macedonia[l]	• GA-MA	• State: 50 • Makpetrol: 50

[a] According to the last available information.
[b] In 2014, Fortum increased its shareholding in both AS Eesti Gas and AS Võrguteenus Valdus from 17.72% to 51.38% by acquiring the 33.66% stake held by E.ON Ruhrgas International GmbH. However, in November 2014, an agreement was made to sell the entire stake in AS Võrguteenus Valdus to the state-owned Estonian electricity TSO Elering AS.
[c] E.ON Ruhrgas International GmbH is planning to sell its stake.
[d] In May 2014, the state-owned Lithuanian EPSO-G acquired a 38.9% stake from E.ON Ruhrgas International GmbH, followed by an offer to buy the minority-held shares.
[e] Owned by EuRoPol GAZ, the Polish section of Yamal-Europe is operated by Gaz-System.
[f] RWE sold Net4Gas in 2013.

[g] In 2013, E.ON Ruhrgas and GDF Suez sold their combined 49% stake in SPP (i.e. sold Slovak Gas Holding) to the Czech energy company Energetický a Průmyslový Holding.
[h] In the autumn of 2014, the stakes held by MVM Magyar Villamos Művek (Hungarian Electricity) Zrt. (49.983%) and MFB Invest Zrt. (49.983%) were purchased by Magyar Nemzeti Vagyonkezelő (Hungarian National Asset Management or MNV) Zrt. Hungary's interior ministry was appointed to exercise ownership rights on behalf of the state until 2020.
[i] Having a conditional and provisional certification, Romania's TSO Transgaz is now acting as an independent system operator, though it owns most of Romania's gas transmission assets.
[j] Its parent company, Yugorosgaz, owns the transmission system.
[k] Sarajevo-gas appears to be mostly privately owned.
[l] In 2012, the state-owned Makedonski energetski resursi (Macedonian Energy Resources) applied for a transmission system operator license (Energy Community Secretariat, 2013).
Note: State-controlled TSOs are marked in grey.

Table A3.
Some characteristics of the interconnections built or under construction in CEE since the Russo–Ukrainian gas crises of January 2009.[a]
Source: Own compilation.

Interconnection	Country	Owner and TSO[b]	Private/ state-control (P/S)	EU funds (Y/N)	Project status (B/UC)
Gazelle	CZ	Net4Gas	P	N	B
STORK	PL	Gaz-System	S	Y	B
	CZ	Net4Gas	P		
KIP	AT	Gas Connect Austria	P	N	B
	SK	Eustream	S[c]		
CR–HU	CR	Plinacro	S	Y	B
	HU	FGSZ	P		
RO–HU	RO	Transgaz	S	Y	B
	HU	FGSZ	P		
SK–HU	SK	Eustream	S	Y	B
	HU	Magyar Gáz Tranzit	S		
RO–MD	RO	Transgaz	S	Y	B
	MD	Moldovagaz	S[d]		
RO–BG	RO	Transgaz	S	Y	UC
	BG	Bulgartransgaz	S		

S – state-controlled; P – privately controlled (marked in grey).
Y – received EU funds; N – no EU funds received (marked in grey).
B – built (have been used, are currently being used, or are ready to be used); UC – under construction (marked in grey).
[a] This is a supplement to Fig. A1.4 in the Appendix.
[b] See Note (e) below Table A2 in the Appendix.
[c] See Note (h) below Fig. A1 in the Appendix.
[d] See Note (i) below Fig. A1 in the Appendix.

Table A4.
Some characteristics of LNG regasification projects under construction in CEE.
Source: Own compilation.

Country	Type of LNG regasification technology	Owners	Regas capacity (bcma)	LNG procurement	Start
Lithuania (Klaipėda)	On-board regasification	• FSRU: Norway's Höegh LNG. Klaipėdos Nafta has a 10-year lease with a purchase option. • Jetty, gas pipeline and metering station: Klaipėdos Nafta (majority state-owned)	4[a]	One contract with Norway (Litgas–Statoil; signed in 2014; 0.54 bcma for 5 years from 2015)[b]	2015
Poland (Świnoujście)	Onshore terminal-based regasification	• Gaz-System (state-owned)	5	One contract with Qatar (PGNiG–Qatargas; signed in 2009; 1.5 bcma for 20 years from 2014)	2016

FSRU – floating [LNG] storage and regasification unit.
[a] To be achieved after the capacity expansion of the Klaipėda–Kiemėnai gas pipeline in Lithuania.
[b] To be delivered from the end of December 2014. Litgas also has 16 non-binding master trade agreements with other LNG suppliers.

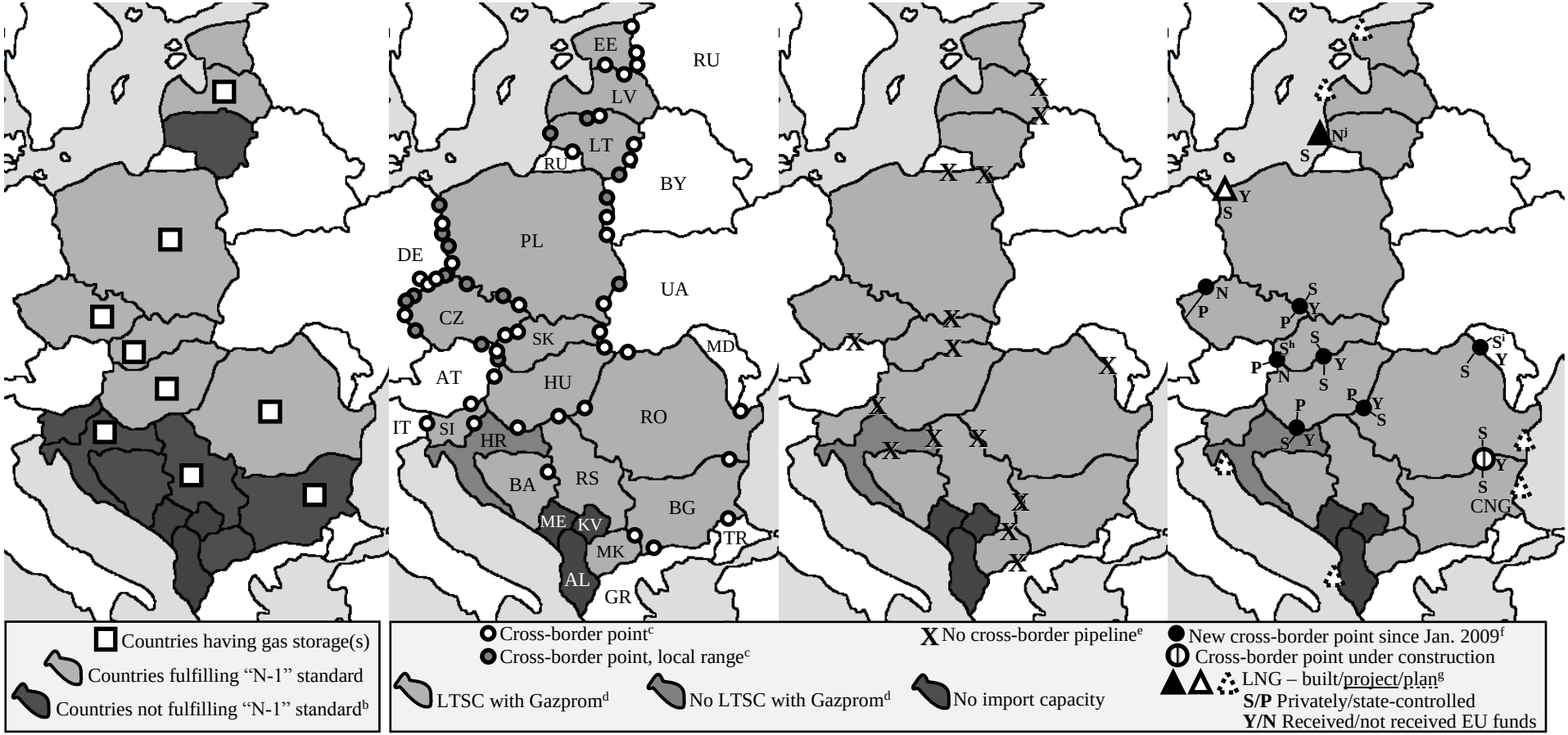

Fig. A1.1. "N-1" standard and gas storages in CEE.

Fig. A1.2. Cross-border points in CEE.

Fig. A1.3. CEE country borders without cross-border gas pipelines.

Fig. A1.4. New cross-border points, cross-border points under construction and LNG projects and plans in CEE.[a]

Fig. A1. Existing and planned gas infrastructure vs. "N-1" standard and LTSCs with Gazprom in CEE.
Source: Own compilation. *Blank map:* <http://www.youreuropemap.com/>.
[a] See also Table A3 for supplementary information. [b] Without taking into account Lithuania's LNG terminal. ME, KV and AL: No import capacity. See Fig. A1.2–A1.4. [c] According to my collected data, all the border crossings are indicated on the map (including pipelines of local significance; either transmission or distribution). [d] In fact, Makpetrol of Macedonia and Energoinvest of Bosnia and Herzegovina still extend their gas supply contracts annually. See Note (l) below Table A1 in the Appendix. [e] The Austrian–Czech border is marked with an "X", because there is only a connection of the distribution networks between Hevlín (CZ) and Laa an der Thaya (AT). [f] It includes new exit and entry points but excludes reverse flow projects as well as capacity expansions. [g] In certain cases, more than one project/location was proposed. [h] From Austria's Baumgarten via the Austrian–Hungarian gas interconnector (HAG), the Kittsee–Petržalka gas pipeline (KIP) – an Austrian–Slovak "mini" gas pipeline – connects with the Southern Bratislava distribution system in Slovakia. KIP was completed after the January 2009 gas crisis broke out. [i] The Moldovan party, Moldovagaz is marked with an "S", though it is half-owned by the Russian-state-controlled Gazprom and half by Moldova (Republic of Moldova: 35.33%; Transnistria: 13.44%; the latter stake is held by Gazprom in trust management). [j] Only a European Investment Bank loan.

Supplementary material

Table S1

Gazprom Export's (GE) gas exports to, and gas sales by, the Gazprom Group (GG) in non-FSU CEE and Europe (∑) (2008–2014).

Source: GE: Gazprom (2011, 2012, 2013a, 2014a, 2015a); GG: Gazprom (2013c, 2014b, 2015b).

	2008		2009		2010		2011		2012		2013		2014		2009/2008		2010/2008		2011/2008		2012/2008		2013/2008		2014/2008	
	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG	GE	GG
	Bcm														Change											
∑	*158.8*	*167.6*	*140.6*	*148.3*	*138.6*	*148.1*	*150.0*	*156.6*	*138.8*	*151.0*	*161.5*	*174.3*	*146.6*	*159.4*	*0.89*	*0.88*	*0.87*	*0.88*	*0.94*	*0.93*	*0.87*	*0.90*	*1.02*	*1.04*	*0.92*	*0.95*
PL	7.92	7.9	9.02	9.0	9.93	11.8	10.25	10.3	9.94	13.1	9.79	12.9	9.10	9.1	1.14	1.14	1.25	1.49	1.29	1.30	1.26	1.66	1.24	1.63	1.15	1.15
CZ	7.61	7.9	6.44	7.0	8.57	9.0	7.59	8.2	7.28	8.3	7.32	7.9	4.76	0.8	0.85	0.89	1.13	1.14	1.00	1.04	0.96	1.05	0.96	1.00	0.63	0.10
SK	6.15	6.2	5.43	5.4	5.77	5.8	5.89	5.9	4.19	4.3	5.42	5.5	4.39	4.4	0.88	0.87	0.94	0.94	0.96	0.95	0.68	0.69	0.88	0.89	0.71	0.71
HU	8.90	8.9	7.6	7.6	6.93	6.9	6.26	6.3	5.29	5.3	5.97	6.0	5.33	5.4	0.85	0.85	0.78	0.78	0.70	0.71	0.59	0.60	0.67	0.67	0.60	0.61
RO	3.58	4.2	2.04	2.5	2.27	2.6	2.82	3.2	2.17	2.5	1.19	1.4	0.33	0.5	0.57	0.60	0.63	0.62	0.79	0.76	0.61	0.60	0.33	0.33	0.09	0.12
BG	3.48	2.9	2.64	2.2	2.65	2.3	2.81	2.5	2.53	2.5	2.80	2.9	2.79	2.8	0.76	0.76	0.76	0.79	0.81	0.86	0.73	0.86	0.80	1.00	0.80	0.97
RS	2.16	2.2	1.49	1.7	1.76	2.1	1.39	2.1	0.74	1.9	1.14	2.0	1.36	1.5	0.69	0.77	0.81	0.95	0.64	0.95	0.34	0.86	0.53	0.91	0.63	0.68
BA	0.31	0.3	0.22	0.2	0.25	0.2	0.28	0.3	0.26	0.3	0.19	0.2	0.16	0.2	0.71	0.67	0.81	0.67	0.90	1.00	0.84	1.00	0.61	0.67	0.52	0.67
MK	0.12	0.1	0.079	0.1	0.12	0.1	0.13	0.1	0.08	0.1	0.05	0.0[a]	0.05	0.1	0.66	1.00	1.00	1.00	1.08	1.00	0.67	1.00	0.42	0.00	0.42	1.00
SI	0.59	0.6	0.51	0.5	0.52	0.5	0.53	0.5	0.50	0.5	0.53	0.5	0.43	0.4	0.86	0.83	0.88	0.83	0.90	0.83	0.85	0.83	0.90	0.83	0.73	0.67
HR	1.05	1.2	1.067	1.1	1.11	1.1	–	–	–	–	–	0.2	–	0.6	1.02	0.92	1.06	0.92	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.50

GE: This gas belongs to Gazprom's gas balance and is supplied by Gazprom Export under LTSCs.

GG: These volumes include both exports from Russia and sales of gas purchased by the Gazprom Group outside Russia. Intra-group sales are not taken into account.

[a] Less than 0.05 bcm.

Note: Light grey indicates (virtually) no change. Increases are highlighted in dark grey.

Table S2

Russian gas exports to the Baltic States (2008–2014).

Source: G (Gazprom): Gazprom (2011, 2012, 2013a, 2014a, 2015a); GG (Gazprom Group): Gazprom (2013c, 2014b, 2015b).

	2008		2009		2010		2011		2012		2013		2014		2009/2008		2010/2008		2011/2008		2012/2008		2013/2008		2014/2008	
	G	GG	G	GG	G	GG	G	GG	G	GG	G	GG	G	GG	G	GG	G	GG	G	GG	G	GG	G	GG	G	GG
	Bcm														Change											
EE	0.6	0.6	0.77	0.8	0.44	0.4	0.66	0.7	0.64	0.6	0.73	0.7	0.42	0.4	1.28	1.33	0.73	0.67	1.10	1.17	1.07	1.00	1.22	1.17	0.70	0.67
LV	0.7	0.7	1.14	1.1	0.74	0.7	1.18	1.2	1.12	1.1	1.13	1.1	0.96	1.0	1.63	1.57	1.06	1.00	1.69	1.71	1.60	1.57	1.61	1.57	1.37	1.43
LT	3.1	2.8	2.74	2.5	3.11	2.8	3.41	3.2	3.32	3.1	2.70	2.7	2.54	2.5	0.88	0.89	1.00	1.00	1.10	1.14	1.07	1.11	0.87	0.96	0.82	0.89

G: Gazprom gas sales are based on management reporting. The Baltic States are treated separately from other CEE customers of the Gazprom Group because these three countries are supplied by Gazprom (not Gazprom Export). However, the transfer of functions from Gazprom to Gazprom Export is ongoing (Gazprom Export Communications Team, personal communication, 6 June 2014).

GG: See Table 1.

Note: Light grey indicates (virtually) no change. Increases are highlighted in dark grey. Differences between the two sources (i.e. "G" and "GG") are only apparent for Lithuania. Group data may not include Lithuania's Kaunas power plant (sold by Gazprom in 2013). See also Table A1 in the Appendix.

Table S3
The share of Russian gas imports in total gas imports, according to Eurostat (2008–2013, %).
Source: Eurostat (2015a, 2015c).

	2008	2009	2010	2011	2012	2013
Bulgaria	100.0	100.0	100.0	100.0	100.0	100.0
Estonia	100.0	100.0	100.0	100.0	100.0	100.0
Latvia	100.0	100.0	100.0	100.0	100.0	100.0
Lithuania	100.0	100.0	100.0	100.0	100.0	100.0
Macedonia	100.0	100.0	100.0	100.0	100.0	100.0
Czech Republic	76.1	65.4	87.6	97.0	100.0	100.0
Slovakia	100.0	99.3	100.0	100.0	100.0	98.7
Hungary	77.6	82.6	94.1	99.2	98.0	95.0
Romania	97.5	98.7	97.9	86.0	85.6	91.7
Serbia	98.9	98.8	89.7	84.6	54.5	61.4
Slovenia	47.3	48.5	47.0	48.0	42.0	57.9
Poland	69.4	82.0	0.0	0.0	0.0	0.0
Croatia	88.3	97.1	97.7	0.0	0.0	0.0

Table S4
The share of Russian gas imports in total gas imports, according to the IEA (2008–2013e, %).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Bulgaria	100.0	100.0	100.0	100.0	100.0	100.0
Estonia	100.0	100.0	100.0	100.0	100.0	100.0
Latvia	100.0	100.0	100.0	100.0	100.0	100.0
Lithuania	100.0	100.0	100.0	100.0	100.0	100.0
Macedonia	100.0	100.0	100.0	100.0	100.0	100.0
Bosnia & H.	100.0	100.0	100.0	100.0	100.0	100.0
Czech Republic	78.3	69.0	87.6	97.0	100.0	100.0
Hungary	77.7	82.7	70.3	65.1	43.8	100.0
Slovakia	100.0	99.3	100.0	100.0	100.0	98.7
Serbia	98.9	98.8	89.7	84.6	54.5	97.4
Romania	97.5	98.7	97.8	86.0	85.6	91.6
Poland	69.5	82.0	89.5	85.5	79.8	77.1
Slovenia	47.3	48.5	47.0	48.0	42.0	42.0
Croatia	88.3	95.8	97.8	0.0	0.0	0.0

e – Estimates.

Table S5
Russian gas imports as a share of gross inland gas consumption, according to Eurostat (2008–2013, %).
Source: Eurostat (2015a, 2015c).

	2008	2009	2010	2011	2012	2013
Latvia	82.2	114.1	61.8	109.4	113.8	115.6
Lithuania	96.3	100.4	99.7	100.3	100.1	100.0
Macedonia	100.0	99.9	100.1	100.0	100.0	100.1
Estonia	100.0	100.0	100.0	100.0	100.0	100.0
Czech Republic	75.3	68.2	75.7	108.9	89.0	100.3
Slovakia	99.3	108.1	99.9	104.9	90.7	94.6
Bulgaria	96.2	98.6	92.6	86.1	83.3	93.2
Hungary	68.5	71.4	75.9	70.0	79.6	83.4
Slovenia	47.2	48.4	46.7	47.9	41.9	57.7
Serbia	88.3	89.3	75.9	61.9	46.3	49.4
Romania	28.3	14.9	16.5	19.1	18.3	10.9
Poland	50.6	55.5	0.0	0.0	0.0	0.0
Croatia	33.8	34.3	32.2	0.0	0.0	0.0

Note: A dependency rate in excess of 100% indicates stocks build-up.

Table S6
Russian gas imports as a share of gas consumption, according to the IEA (2008–2013e, %).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Latvia	82.2	114.1	61.8	109.4	113.8	100.0
Estonia	100.0	100.0	100.0	100.0	100.0	100.0
Bosnia and Herzegovina	100.0	100.0	100.0	100.0	100.0	100.0
Macedonia	100.0	100.0	100.0	100.0	100.0	100.0
Czech Republic	86.3	81.7	80.3	107.5	89.1	100.0
Lithuania	96.3	100.4	99.7	100.3	100.1	99.8
Bulgaria	97.8	99.8	93.3	86.7	83.7	90.7
Slovakia	99.3	108.1	100.0	104.9	90.8	94.7
Hungary	67.6	70.3	55.8	45.2	35.3	88.7
Serbia	87.6	89.3	75.9	61.9	46.3	75.1
Poland	47.8	51.1	56.9	58.7	54.4	52.8
Slovenia	47.2	48.3	46.7	47.9	41.9	41.9
Romania	27.0	14.9	16.4	19.1	18.2	10.5
Croatia	33.8	33.8	32.3	0.0	0.0	0.0

e – Estimates.
Note: A dependency rate in excess of 100% indicates stocks build-up.

Table S7
Russian gas imports as a share of gross inland energy consumption, according to Eurostat (2008–2013, %).
Source: Eurostat (2015a, 2015c).

	2008	2009	2010	2011	2012	2013
Lithuania	26.9	25.8	36.6	38.9	37.4	32.4
Latvia	23.3	31.0	19.5	32.2	30.4	31.2
Hungary	27.2	26.0	28.8	26.1	28.1	28.3
Slovakia	28.0	28.5	28.0	27.9	23.7	26.4
Czech Republic	11.9	10.9	13.7	17.2	14.3	16.5
Bulgaria	14.1	12.2	12.0	11.9	11.2	13.3
Estonia	13.0	9.8	9.1	8.1	8.9	8.3
Serbia	10.6	8.2	9.0	7.3	5.3	6.2
Slovenia	5.3	5.7	5.6	4.9	4.3	5.8
Macedonia	3.3	2.3	3.4	3.6	3.9	4.7
Romania	8.5	4.4	5.0	5.8	5.6	3.3
Poland	6.5	7.1	0.0	0.0	0.0	0.0
Croatia	9.6	9.5	9.9	0.0	0.0	0.0

Bulgaria

Table S8
Bulgaria's gas imports, according to Eurostat (2008–2013, million cubic metres or mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	3 432	2 604	2 608	2 764	2 485	2 698
Total	*3 432*	*2 604*	*2 608*	*2 764*	*2 485*	*2 698*

Table S9
Bulgaria's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	3 432	2 604	2 608	2 764	2 485	2 708
Total	3 432	2 604	2 608	*2 764*	*2 485*	*2 708*

e – Estimates.

Table S10
Bulgaria's gas imports, according to BP (2008–2011, bcm).
Source: BP (2009, 2010, 2011, 2012).

	2008	2009	2010	2011
Russia	3.10	2.64	2.16	2.55
Total	*3.10*	*2.64*	*2.16*	*2.55*

Czech Republic

Table S11
The Czech Republic's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	6 620	5 670	7 453	9 041	7 468	8 464
Norway	2 073	3 000	1 057	280	3	4
Total	*8 693*	*8 670*	*8 510*	*9 321*	*7 471*	*8 468*

Table S12
The Czech Republic's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	7 500	6 683	7 453	9 041	7 468	8 475
Norway	2 073	3 000	1 057	280	3	4
Total	9 573	9 683	8 510	9 321	*7 471*	*8 479*

e – Estimates.

Table S13
The Czech Republic's gas imports, according to BP (2008–2014, bcm).
Source: BP (2009, 2010, 2011, 2012, 2013, 2014, 2015).

	2008	2009	2010	2011	2012	2013	2014
Russia	6.60	6.40	8.44	6.88	6.6	7.2	4.7
Norway	2.01	3.00	3.10	3.85	3.4	3.8	2.6
Other Europe	–	–	–	1.30[a]	–	–	–
Total	*8.61*	*9.40*	*11.54*	*12.03*	*10.0*	*11.0*	*7.3*

[a] Imports other than from Denmark, the Netherlands and the United Kingdom.

Serbia

Table S14
Serbia's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	2 177	1 565	1 766	1 478	976	1 158
Hungary	24	19	202	219	814	0
Kazakhstan	0	0	0	50	0	729
Total	*2 201*	*1 584*	*1 968*	*1 747*	*1 790*	*1 887*

Table S15
Serbia's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	2 177	1 565	1 766	1 478	976	1 890
Hungary	NB	19	202	219	814	50
Non Specified	24	–	–	–	–	–
Total	*2 201*	*1 584*	*1 968*	*1 747*	*1 790*	*1 940*

e – Estimates.
NB – No such breakdown is available for that year.

Table S16
Serbia's gas imports, according to BP (2008–2011, bcm).
Source: BP (2009, 2010, 2011, 2012).

	2008	2009	2010	2011
Russia	2.15	1.55	1.91	1.25
Other Europe	–	–	–	0.55[a]
Total	*2.15*	*1.55*	*1.91*	*1.80*

[a] Imports other than from Denmark, the Netherlands, Norway and the United Kingdom.

Macedonia

Table S17
Macedonia's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	121	80	118	137	142	160
Total	*121*	*80*	*118*	*137*	*142*	*160*

Table S18
Macedonia's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	121	80	118	137	142	160
Total	*121*	*80*	*118*	*137*	*142*	*160*

e – Estimates.

Table S19
Macedonia's gas imports, according to BP (2009–2011, bcm).
Source: BP (2010, 2011, 2012).

	2009	2010	2011
Russia	0.08	0.08	0.09
Total	*0.08*	*0.08*	*0.09*

Slovakia

Table S20
Slovakia's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	6 266	5 834	6 098	5 907	4 801	5 509
Not specified	0	44	0	0	0	70
Total	*6 266*	*5 878*	*6 098*	*5 907*	*4 801*	*5 579*

Table S21
Slovakia's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	6 266	5 834	6 098	5 907	4 801	5 509
Non Specified/Other	–	44	–	–	–	70
Total	*6 266*	*5 878*	*6 098*	*5 907*	*4 801*	*5 579*

e – Estimates.

Table S22
Slovakia's gas imports, according to BP (2008–2014, bcm).
Source: BP (2009, 2010, 2011, 2012, 2013, 2014, 2015).

	2008	2009	2010	2011	2012	2013	2014
Russia	5.60	5.40	5.47	5.33	3.8	5.3	4.3
Other Europe	–	–	–	–	0.3[a]	–	–
Total	*5.60*	*5.40*	*5.47*	*5.33*	*4.1*	*5.3*	*4.3*

[a] Imports other than from the Netherlands, Norway and the United Kingdom.

Slovenia

Table S23
Slovenia's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	509	494	495	434	365	490
Austria	216	175	158	199	305	305
Italy	24	50	53	63	61	51
Croatia	1	1	0	0	0	0
Not specified	0	0	0	0	0	1
Subtotal	*750*	*720*	*706*	*696*	*731*	*847*
Algeria	:	:	:	:	:	:
Total	*1 076*	*1 019*	*1 053*	*904*	*870*	*847*
Total – Subtotal = Algeria	326	299	347	208	139	0

: – Not available.

Table S24
Slovenia's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	509	494	495	434	365	356
Austria	NB	175	158	199	305	296
Algeria	326	299	347	208	139	136
Italy	NB	50	53	63	61	59
Croatia	NB	1	–	–	–	–
Non Specified	241	–	–	–	–	–
Total	*1 076*	*1 019*	*1 053*	*904*	*870*	*847*

e – Estimates.
NB – No such breakdown is available for that year.

Table S25
Slovenia's gas imports, according to BP (2009–2011, bcm).
Source: BP (2010, 2011, 2012).

	2009	2010	2011
Russia	0.51	0.50	0.48
Algeria	0.38	0.38	0.25
Total	*0.89*	*0.88*	*0.73*

Romania

Table S26
Romania's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	4 321	1 979	2 230	2 659	2 469	1 341
Hungary	0	0	49	417	399	122
Austria	0	0	0	16	16	0
Turkmenistan	111	27	0	0	0	0
Total	*4 432*	*2 006*	*2 279*	*3 092*	*2 884*	*1 463*

Table S27
Romania's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	4 321	1 979	2 230	2 659	2 469	1 327
Hungary	–	–	49	417	399	121
Non Specified	–	–	–	16	16	–
Turkmenistan	111	27	–	–	–	–
Total	*4 432*	*2 006*	*2 279*	*3 092*	*2 884*	*1 448*

e – Estimates.

Table S28
Romania's gas imports, according to BP (2008–2011, bcm).
Source: BP (2009, 2010, 2011, 2012).

	2008	2009	2010	2011
Russia	3.50	2.05	2.15	2.56
Other Europe & Eurasia	1.00	–	–	–
Total	*4.50*	*2.05*	*2.15*	*2.56*

Hungary

Table S29
Hungary's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	8 855	7 964	9 070	7 951	8 010	7 767
France	138	648	440	68	0	0
Germany	18	383	127	0	0	0
Turkmenistan	1 937	254	0	0	0	0
Uzbekistan	455	0	0	0	0	0
Not specified	0	386	0	0	163	409
Total	*11 403*	*9 635*	*9 637*	*8 019*	*8 173*	*8 176*

Table S30
Hungary's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	8 855	7 964	6 771	5 218	3 576	8 176
Germany	18	383	127	–	–	–
France	138	648	440	68	–	–
Non Specified/Other	–	386	2 299	2 733	4 597	–
Turkmenistan	1 937	254	–	–	–	–
Uzbekistan	455	–	–	–	–	–
Total	*11 403*	*9 635*	*9 637*	*8 019*	*8 173*	*8 176*

e – Estimates.

Table S31
Hungary's gas imports, according to BP (2008–2014, bcm).
Source: BP (2009, 2010, 2011, 2012, 2013, 2014, 2015).

	2008	2009	2010	2011	2012	2013	2014
Russia	8.90	7.20	6.47	5.66	4.8	5.9	5.2
France	NB	0.20	0.70	NB	NB	–	–
Germany	2.10	0.70	0.30	NB	NB	–	–
Other Europe	NB	–	–	1.04[a]	1.1[b]	–	–
Other Europe & Eurasia	0.50[c]	–	–	NB	NB	–	–
Total	*11.50*	*8.10*	*7.47*	*6.70*	*5.9*	*5.9*	*5.2*

[a] Imports other than from Denmark, the Netherlands, Norway and the United Kingdom.
[b] Imports other than from the Netherlands, Norway and the United Kingdom.
[c] Imports other than from Belgium, the Netherlands, Norway, the United Kingdom and Turkmenistan.
NB – No such breakdown is available for that year.

Poland

Table S32
Poland's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	7 783	8 166	3	3	5	6
Germany	906	1 084	1 133	1 714	1 888	2 267
Czech Republic	0	0	0	0	586	584
Turkmenistan	2 508	0	0	0	0	0
Ukraine	5	5	6	0	0	0
Other FSU	0	699	0	0	0	0
Not specified	0	0	9 753	10 073	9 769	9 615
Total	*11 202*	*9 954*	*10 895*	*11 790*	*12 248*	*12 473*

Table S33
Poland's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	7 783	8 166	9 756	10 076	9 774	9 621
Germany	906	1 084	1 133	1 714	1 888	2 267
Czech Republic	–	–	–	–	586	584
Belgium	–	–	–	–	–	1
Other FSU	5[a]	704[b]	6[c]	–	–	–
Turkmenistan	2 508	–	NB	–	–	–
Total	*11 202*	*9 954*	*10 895*	*11 790*	*12 248*	*12 473*

e – Estimates.
NB – No such breakdown is available for that year.

Table S34
Poland's gas imports, according to BP (2008–2014, bcm).
Source: BP (2009, 2010, 2011, 2012, 2013, 2014, 2015).

	2008	2009	2010	2011	2012	2013	2014
Russia	7.20	7.15	9.08	9.28	9.0	9.6	8.9
Germany	1.10	0.50	1.07	NB	NB	NB	NB
Uzbekistan	NB	1.50	–	–	–	–	–
Other Europe	NB	–	–	1.55[a]	2.0[b]	1.8[b]	1.7[b]
Other Europe & Eurasia	1.50[c]	–	–	NB	NB	NB	NB
Total	*9.80*	*9.15*	*10.15*	*10.83*	*10.9*	*11.4*	*10.6*

[a] Imports other than from Denmark, the Netherlands, Norway and the United Kingdom.
[b] Imports other than from the Netherlands, Norway and the United Kingdom.
[c] Imports other than from Belgium, the Netherlands, Norway, the United Kingdom and Turkmenistan.
NB – No such breakdown is available for that year.

Lithuania

Table S35
Lithuania's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	3 071	2 690	3 053	3 349	3 263	2 661
Total	*3 071*	*2 690*	*3 053*	*3 349*	*3 263*	*2 661*

Table S36
Lithuania's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	3 125	2 737	3 106	3 407	3 320	2 707
Total	*3 125*	*2 737*	*3 106*	*3 407*	*3 320*	*2 707*

e – Estimates.

Table S37
Lithuania's gas imports, according to BP (2008–2011, bcm).
Source: BP (2009, 2010, 2011, 2012).

	2008	2009	2010	2011
Russia	3.09	2.77	2.63	2.89
Total	*3.09*	*2.77*	*2.63*	*2.89*

Latvia

Table S38
Latvia's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	1 368	1 743	1 125	1 755	1 716	1 698
Total	*1 368*	*1 743*	*1 125*	*1 755*	*1 716*	*1 698*

Table S39
Latvia's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	1 368	1 743	1 125	1 755	1 716	1 734
Total	*1 368*	*1 743*	*1 125*	*1 755*	*1 716*	*1 734*

e – Estimates.

Table S40
Latvia's gas imports, according to BP (2009–2011, bcm).
Source: BP (2010, 2011, 2012).

	2009	2010	2011
Russia	1.19	0.66	1.50
Total	*1.19*	*0.66*	*1.50*

Croatia

Table S41
Croatia's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	1 083	1 000	1 046	0	0	0
Italy	109	25	0	829	667	595
Hungary	0	0	22	6	379	280
Kazakhstan	0	0	0	0	0	176
Austria	0	0	0	0	27	126
Slovenia	35	5	2	21	139	74
Germany	0	0	0	20	60	19
France	0	0	0	0	86	0
Not specified	0	14	0	0	0	0
Total	*1 227*	*1 044*	*1 070*	*876*	*1 358*	*1 270*

Table S42
Croatia's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	1 083	1 000	1 046	–	–	–
Italy	NB	25	NB	829	667	900
Hungary	NB	–	22	6	379	270
Germany	NB	NB	NB	20	60	NB
Non specified	144	19	2	21	252	99
Total	*1 227*	*1 044*	*1 070*	*876*	*1 358*	*1 269*

e – Estimates.
NB – No such breakdown is available for that year.

Table S43
Croatia's gas imports, according to BP (2008–2011, bcm).
Source: BP (2009, 2010, 2011, 2012).

	2008	2009	2010	2011
Russia	1.06	1.07	1.03	–
Italy	NB	0.13	0.14	NB
Other Europe & Eurasia	0.23[a]	–	–	NB
Other Europe	NB	–	–	0.62[b]
Total	*1.29*	*1.20*	*1.17*	*0.62*

[a] Imports other than from Belgium, Germany, the Netherlands, Norway, the United Kingdom and Turkmenistan.
[b] Imports other than from Denmark, the Netherlands, Norway and the United Kingdom.
NB – No such breakdown is available for that year.

Estonia

Table S44
Estonia's gas imports, according to Eurostat (2008–2013, mmcm).
Source: Eurostat (2015a).

	2008	2009	2010	2011	2012	2013
Russia	946	642	689	627	670	678
Total	*946*	*642*	*689*	*627*	*670*	*678*

Table S45
Estonia's gas imports, according to the IEA (2008–2013e, mmcm).
Source: IEA (2012c, 2013b, 2014).

	2008	2009	2010	2011	2012	2013e
Russia	946	642	689	627	670	678
Total	*946*	*642*	*689*	*627*	*670*	*678*

e – Estimates.

Table S46
Estonia's gas imports, according to BP (2009–2011, bcm).
Source: BP (2010, 2011, 2012).

	2009	2010	2011
Russia	0.71	0.36	0.63
Total	*0.71*	*0.36*	*0.63*

Table S47
Gas consumption in CEE, according to the IEA (2003–2013e, mmcm).
Source: IEA (2008, 2009, 2010, 2011a, 2012c, 2013b, 2014).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013e
Poland	14 638	15 496	16 231	16 185	16 159	16 288	15 990	17 155	17 178	17 973	18 229
Romania	18 434	17 395	17 285	18 128	16 083	16 002	13 257	13 579	13 927	13 533	12 613
Hungary	14 576	14 452	14 983	14 202	13 266	13 103	11 332	12 132	11 557	10 130	9 221
Czech R.	9 658	9 601	9 493	9 292	8 651	8 687	8 184	9 280	8 413	8 386	8 477
Slovakia	6 989	6 720	7 227	6 575	6 216	6 308	5 397	6 099	5 630	5 289	5 820
Bulgaria	3 110	3 145	3 525	3 599	3 582	3 508	2 609	2 795	3 188	2 970	2 986
Croatia	2 884	3 009	2 910	2 878	3 307	3 205	2 959	3 242	3 165	2 972	2 749
Lithuania	2 943	2 935	3 096	3 068	3 615	3 245	2 727	3 115	3 398	3 318	2 712
Serbia[a]	2 246	2 852	2 388	2 458	2 482	2 486	1 752	2 328	2 389	2 107	2 515
Latvia	1 677	1 663	1 695	1 756	1 700	1 665	1 528	1 821	1 604	1 508	1 734
Slovenia	1 104	1 104	1 141	1 105	1 123	1 079	1 022	1 060	906	872	850
Estonia	847	966	996	1 009	986	946	642	689	627	670	678
Bosnia & H.	204	321	381	400	413	410	234	245	279	257	190
Macedonia	81	71	77	83	106	121	80	118	137	142	160
Albania	14	16	17	17	17	9	9	14	15	17	19

e – Estimates.
[a] Data for Serbia include Montenegro until 2004.

Gas consumption in CEE, according to Eurostat (2003–2013, Terajoule).[a]
Source: Eurostat (2015c).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Poland	471 600	497 538	512 337	526 870	523 228	526 204	505 129	536 211	537 527	572 834	574 740
Romania	616 688	583 528	582 936	594 470	534 319	509 092	442 978	451 688	464 946	451 228	410 052
Hungary	497 645	490 368	506 349	479 672	448 190	442 161	383 171	410 955	391 630	347 753	322 601
Czech R.	328 337	326 064	322 528	317 926	303 068	300 342	284 881	337 856	285 086	287 051	290 832
Slovakia	237 337	230 207	246 336	225 161	213 080	216 303	185 238	209 609	194 144	182 767	201 571
Bulgaria	104 654	104 363	117 401	121 442	126 040	122 012	90 465	96 312	110 124	102 625	99 977
Croatia	98 646	102 918	99 220	98 420	113 090	107 884	100 620	110 211	107 610	101 038	95 537
Lithuania	98 561	98 293	103 684	102 747	121 066	108 674	91 327	104 326	113 799	111 119	90 624
Serbia	76 210	96 789	81 514	83 387	84 203	83 812	58 407	77 597	79 658	70 249	78 149
Latvia	56 408	55 785	56 852	58 892	56 922	55 814	51 380	61 206	53 943	50 709	50 438
Slovenia	37 963	37 628	38 888	37 650	38 275	36 789	34 815	36 125	30 883	29 730	28 966
Estonia	28 472	32 429	33 481	33 836	33 635	32 260	21 986	23 551	21 072	22 835	23 233
Macedonia	2 782	2 449	2 624	2 811	3 586	4 077	2 701	4 000	4 618	4 792	5 426
Albania	452	346	377	377	603	302	308	484	503	554	610
Montenegro	0	0	0	0	0	0	0	0	0	0	0

[a] Gross inland consumption; net calorific value (NCV). One NCV equals to 0.9 gross calorific value (GCV).

Table S49
Gas production in CEE, according to the IEA (2003–2013e, mmcm).
Source: IEA (2008, 2009, 2010, 2011a, 2012c, 2013b, 2014).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013e
Romania	13 029	12 965	12 120	11 942	11 523	11 369	11 252	10 855	10 901	10 935	10 640
Poland	5 626	5 939	6 057	5 995	6 040	5 750	5 862	6 079	6 247	6 193	6 206
Hungary	2 945	3 051	3 028	3 095	2 615	2 643	2 968	2 900	2 766	2 234	1 949
Croatia	2 190	2 198	2 284	2 714	2 892	2 729	2 705	2 727	2 472	2 013	1 856
Serbia[a]	364	317	282	291	244	285	263	387	508	533	575
Bulgaria	16	336	535	519	290	214	17	73	436	383	278
Czech R.	168	215	201	194	201	199	178	246	235	263	252
Slovakia	197	165	147	194	128	102	103	104	121	150	124
Albania	14	16	17	17	17	9	9	14	15	17	19
Slovenia	5	5	4	4	3	3	3	7	2	2	3
Macedonia	–	–	–	–	–	–	–	–	–	–	–
Estonia	–	–	–	–	–	–	–	–	–	–	–
Bosnia & H.	–	–	–	–	–	–	–	–	–	–	–
Latvia	–	–	–	–	–	–	–	–	–	–	–
Lithuania	–	–	–	–	–	–	–	–	–	–	–

e – Estimates.
[a] Data for Serbia include Montenegro until 2004.

Table S50
Gas production in CEE, according to Eurostat (2003–2013, Terajoule).[a]
Source: Eurostat (2015c).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Romania	436 622	434 483	406 174	400 190	386 556	376 501	374 234	360 844	362 862	363 527	360 068
Poland	151 197	164 428	162 630	162 463	163 147	154 487	153 980	154 617	161 186	163 570	160 067
Hungary	95 696	99 090	97 580	99 734	83 926	83 981	95 764	93 570	88 562	74 027	64 656
Croatia	74 884	75 175	78 092	92 802	98 910	91 872	91 963	92 725	84 028	68 445	63 107
Serbia	12 351	10 756	9 568	9 873	8 277	8 978	8 762	12 908	16 941	17 786	17 708
Bulgaria	537	11 189	16 096	15 652	9 869	6 546	548	2 474	14 684	12 907	9 380
Czech R.	5 488	6 800	6 453	6 168	6 867	6 721	7 608	8 444	7 930	8 956	8 621
Slovakia	6 970	5 943	5 288	7 368	4 550	3 658	3 670	3 697	4 303	5 325	4 370
Albania	452	346	377	377	603	302	308	484	503	554	610
Slovenia	179	181	144	144	108	108	108	251	72	72	108
Estonia	0	0	0	0	0	0	0	0	0	0	0
Latvia	0	0	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0	0	0
Montenegro	0	0	0	0	0	0	0	0	0	0	0
Macedonia	0	0	0	0	0	0	0	0	0	0	0

[a] Primary production; net calorific value (NCV). One NCV equals to 0.9 gross calorific value (GCV).