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The EU's Gas Security of Supply: Risk Analysis and Management

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Abstract

The energy world is today full of uncertainty: many developments contributed to a situation where it has become increasingly difficult to predict future trends. At the same time, the European Union's gas import dependency is growing, and thereby also risks that have the potential to jeopardise the EU's security of gas supply. Thus, while the situation becomes increasingly difficult, it is also more and more important for the EU to know the risks that challenge its secure supply of gas. Only when the EU is able to identify and evaluate the different risk dimensions adequately, it will be able to successfully manage and reduce these risks. As a growing international actor the EU will have to assume the task of risk management, not only because of the added value of its action in this field but also because this will prevent the member states from drafting risk management strategies which are entirely national. This paper asks what the main risks to the EU's security of gas supply are and how they can be reduced. It provides a comprehensive risk analysis, followed by a second part dedicated to the management of these risks. It is argued that the transit risk posed by Ukraine represents the highest risk to the EU's security of gas supply. Moreover, although the EU has some useful means at hand to reduce the transit risk, its capacity to do so will largely depend on Russia's policies towards Ukraine.

1. Introduction: natural gas and EU energy security

“The energy world faces unprecedented uncertainty.”¹ These are the first words of the executive summary of the *World Energy Outlook 2010*, published by the International Energy Agency (IEA). By nature, uncertainty is closely linked to insecurity. Thus, more than ever, uncertainty has also the potential to put at risk the energy security of the European Union (EU).

What can be said with certainty is that the EU’s gas import dependency increased significantly in the last decade and will also do so in the future,² making the EU up to 80% dependent on imported gas in the next decades.³ This is mainly due to the depletion of domestic gas reserves but also to the EU’s increasing demand for gas as low-carbon fuel natural gas is likely to be boosted by the EU’s ambitious climate change policy.

More than 80% of the global natural gas reserves are located in areas that allow EU gas imports through pipelines.⁴ In addition, liquefied natural gas (LNG) supplies are transported by cargoes to the EU’s regasification terminals with sea access. Thus, the EU will not run out of natural gas in the foreseeable future. However, it will become increasingly important for the EU to identify and evaluate the risks related to the gas import dependency. As a growing international actor the EU relies on objective risk assessments in order to be able to manage those risks successfully.⁵ Thus, while it is not useful to stoke fears of energy insecurity, the EU should at the same time not underestimate the potential risks stemming from its strong import dependency either.

This paper tries to find an answer to the following question: what are the main risks to the EU’s security of gas supply (SoS) and how can they be reduced? Concerning the SoS analysis, the hypothesis is that the risk dimensions changed significantly in the last decade, making the transit risk the most threatening for the EU’s gas SoS. With regard to the risk management, which represents the second part

¹ International Energy Agency, *World Energy Outlook 2010*, Paris, 2010, p. 45.

² A. Macintosh, “Security of Europe’s Gas Supply: EU Vulnerability”, *CEPS Policy Brief*, no. 222, Brussels, Centre for European Policy Studies, 2010, p. 1.

³ F.-L. Henry, “Europe’s Gas Supply Security: Rating Source Country Risk”, *CEPS Policy Brief*, no. 220, Brussels, Centre for European Policy Studies, 2010, p. 4.

⁴ A. Behrens, “Learning from the Crisis: A Market Approach to Securing European Natural Gas Supplies”, *CEPS Policy Brief*, no. 183, Brussels, Centre for European Policy Studies, 2009, p. 2.

⁵ The necessity to carry out risk assessments was also acknowledged in the Regulation No. 994/2010 concerning measures to safeguard security of gas supply of December 2010. European Commission, DG Energy, *Security of gas supply in the EU*, Brussels, 2010.

of the study, it is argued that the EU has the potential to significantly reduce the Ukrainian transit risk but that its capacity to do so will in the long term strongly depend on Russia's policies towards Ukraine. This is due to the fact that Russia's benevolence will be crucial to the success of both the European Energy Community and a tripartite gas consortium.

It is worth underlining that import independence is not an objective in itself and would imply tremendous investments, if it is feasible at all.⁶ Since the EU's import dependence will further rise in the future and thereby also the risks related to the import of gas, the focus should rather be on how to deal with import dependence instead of how to eliminate it. Moreover, even full energy independence would not entail full SoS for the EU. Indeed, many of the supply interruptions that the EU faced in the last decades were also caused by domestic problems.⁷

Yet, the EU's high gas import dependency implies risks that have mainly external origins. Thus, drawing on the concept of SoS brought up by Stern,⁸ mostly the external risks to the EU's SoS will be analysed, not denying that there are also considerable internal risks.⁹ This focus on the external risks will be reflected in the risk management.

2. The changing context of the security of gas supply

"The global financial crisis and following economic recession have caused major confusion in energy and gas markets fundamentals around the world. While gas demand declined in the wake of the economic downturn, new supply surged thanks to an increase in the world supply of liquefied natural gas (LNG) and an increase in shale gas production in the US."¹⁰

The EU's import dependency was recently affected by four different but partly interlinked developments: (1) the global financial and economic crisis, (2) the rise of LNG on the global energy markets, (3) the US shale gas revolution, and (4) the EU climate change and energy policy.

⁶ J.-M. Chevalier, "Security of energy supply for the European Union", *European Review of Energy Markets*, vol. 1, no. 3, 2006, p. 6.

⁷ Behrens, *op.cit.*, p. 2.

⁸ J. Stern, *Security of European Natural Gas Supplies: The Impact of Import Dependence and Liberalization*, London, The Royal Institute of International Affairs, 2002.

⁹ For instance, technical failures of the EU's pipeline system or the lack of reverse flow and storage capacities can be considered as internal risks to the EU's SoS.

¹⁰ A. Honoré, "Economic recession and natural gas demand in Europe: what happened in 2008-2010?", *NG 47*, Oxford, The Oxford Institute for Energy Studies, 2011, p. 14.

First, the global financial and economic crisis curbed down the EU's demand for gas, thereby obviously strengthening the EU's SoS in the short term since additional and relatively cheap gas supplies were available.¹¹ However, the drop of the gas demand resulted in a sharp cutting of all investments in the energy sector, thus putting at risk the EU's gas SoS in the long-term view.¹² It is difficult if not impossible to estimate how severely this lack of investments will affect the EU's SoS in ten to fifteen years, depending mainly on how investors will react to a growing EU demand for gas. This double-effect was best described by Lewiner: "the financial crisis has hit both demand and the planned investments in energy leading to short-term relief in electricity and gas security of supply. This may change in the long term because of deferred infrastructure investments and new technology".¹³

Second, the global rise of LNG on the energy markets¹⁴ had also a two-fold impact on the EU's SoS: most importantly, LNG increased the EU's SoS by strengthening the diversification of the origins of gas imports and transport routes. However, LNG is not in itself a panacea for the EU's SoS, as it requires large investments and as the transport of gas is capital-intensive compared to traditional pipeline transport. In addition, the share of LNG in the EU's gas imports can only be increased to a certain extent, mainly due to long-term contracts with traditional pipeline suppliers.¹⁵ As a secondary effect, LNG helped to link the traditionally regional gas markets, meaning that the EU's SoS is now increasingly influenced by the gas supply and demand in other parts of the world.

Third, US shale gas revolution that almost resulted in self-sufficiency of the US energy market would be a rather regional development without the global rise of LNG.¹⁶ Indeed, the profound transformation of the US energy market through the development of shale gas significantly affected the EU's SoS: the sharp decline of

¹¹ Thus, the IEA observed a cutback in the gas demand of 5,6% in OECD Europe in 2009 compared to the previous year. Honoré, *op.cit.*, p. 3.

¹² According to the IEA, this already in 2009 resulted in an estimated reduction of more than 20% of investments in the oil and gas sector. International Energy Agency, *The Impact of the Financial and Economic Crisis on Global Energy Investment*, Paris, 2009, p. 3.

¹³ C. Lewiner, "The Financial Crisis and its Impact on European Energy Security of Supply", *ParisTech Review*, Paris, The Paris Institute of Technology, 29 July 2010, p. 3.

¹⁴ Considerable cost reductions in all parts of the LNG chain made LNG imports increasingly profitable for shorter distances. P. Cayrade, "Investments in Gas Pipelines and Liquefied Natural Gas Infrastructure. What is the Impact on the Security of Supply?", *INDES Working Paper*, no. 3, Brussels, Centre for European Policy Studies, 2004, p. 4.

¹⁵ Today, LNG imports represent about 15% of EU gas imports, whereas 85% of EU gas is still imported through pipelines. A. Goldthau & J.M. Witte, *Global energy governance: The new rules of the game*, Berlin, Global Public Policy Institute, 2010, p. 235.

¹⁶ International Energy Agency, *Medium-term oil & gas markets 2010. Executive summary*, Paris, 2010, p. 4.

LNG imports in the US made additional LNG supplies available on the global LNG market. Since energy hungry countries such as India or China are expected to experience their own shale gas development, it is the EU that is likely to benefit the most from the US shale gas revolution.¹⁷ However, the EU's capacity to benefit from additional LNG supplies will depend on the number of regasification terminals in the EU and means to transport the additional gas to those member states that do not have sea access. Moreover, it is extremely difficult if not impossible to predict the future development of US shale gas. Tighter regulations could reduce economic incentives for the shale gas production in the US, thereby reducing the positive SoS effect for the EU.¹⁸

Fourth, the EU's energy and climate change policy itself had and will have a decisive impact on the EU's gas SoS. Due to the integrated approach taken by the European Commission to deal consistently with climate change and energy,¹⁹ the demand for gas will be dependent on the EU's commitment to its climate change policy. On the one hand, gas as a relatively low-carbon energy source is promoted by the Commission. Hence, the gradually growing EU demand for gas will go hand in hand with increasing import dependency and related risks to the large-scale import of gas. The more member states will phase out nuclear energy, as Germany did recently, the faster the EU demand for gas will grow and the sharper the increase in the import dependency will be. On the other hand, considerable investments in renewable energy and a bigger share of renewables in the EU's overall energy mix have the potential to slow down the EU's growing gas import dependency.

Thus, while all those four developments recently improved the EU's gas SoS, some of them obviously did more than others. The impact of the global financial and economic crisis and the EU's energy and climate change policy is rather ambiguous in contrast to the rise of LNG and the shale gas development that considerably strengthened the EU's SoS in the medium- to long-term view.

¹⁷ E. Paszyc, "Nord and South Stream won't save Gazprom", *OSW Commentary*, issue 35, Warsaw, Centre for Eastern Studies, 2010, p. 5. However, due to higher environmental standards and a higher population density, the EU is not likely to see an internal shale gas development.

¹⁸ Henry, *op.cit.*, p. 3.

¹⁹ A. Behrens, A. Checchi & C. Egenhofer, "Long-Term Energy Security Risks for Europe: A Sector-Specific Approach", *CEPS Working Document No. 309*, Brussels, Centre for European Policy Studies, 2009, p. 5.

3. The concept of gas security of supply

The concept of security of supply is a rather flexible approach depending on the security dimension (political, economic, environmental, etc.) that is analysed. Accordingly, international organisations do not follow a homogenous definition for SoS.²⁰

The following SoS analysis relies on the concept of SoS as introduced by Stern in 2002; he divides the risks related to the import of gas supplies into source dependence, transit dependence and facility dependence, resulting in three different risk dimensions.²¹ Hereby, the facility risk will be broadened to include also the investment risk dimension.

3.1 Source risk

The source risk is determined by the self-sufficiency capacity and import dependency of a country, as domestic gas reserves generally reduce the risk related to the import of gas.²² Moreover, the number and the reliability²³ of gas suppliers have an important impact on the SoS. In addition, the question of vulnerability of a gas importing country is important, being determined by the country's structure of gas consumption.²⁴ Since gas can be easily substituted by other energy sources such as coal or renewables, the degree of diversification of a country's energy mix in general also plays an important role. Last but not least, the diversification within the gas import sector itself can also affect positively the country's SoS. Thus, a considerable share of LNG imports might help to reduce the negative impact of sudden rupture in pipeline supplies.

In order to determine a country's source risk, all these criteria have to be taken into account. Therefore, even if a country imports its gas from a single supplier and even if these imports represent a large share of the domestic energy mix, a country

²⁰ Even the European Commission and the European Parliament have a quite different understanding of SoS. C. Egenhofer, T. Legge & C.-E. Nyquist, "Security of Energy Supply. A Question for Policy or the Markets?", *Report of a CEPS Working Party*, Brussels, Centre for European Policy Studies, 2001, p. 4.

²¹ Stern, *op.cit.*, p. 12.

²² Van der Linde, Coby *et al.*, "Study on Energy Supply Security and Geopolitics," *Final Report*, Clingendael International Energy Programme, The Hague, Institute for International Relations 'Clingendael', 2004, p. 65.

²³ Henry, *op.cit.*, p. 1.

²⁴ For instance, if gas imports provide mainly for the supply of households, a sudden shortage might have quite serious consequences. P. Noël, "Beyond dependence: how to deal with Russian gas", *Policy Brief*, London, European Council on Foreign Relations, 2008, p. 13.

can still have a relatively strong gas SoS. This is, for example, the case when there is significant political stability in the exporting country or high disincentives in terms of economic losses to interrupt the gas trade.

3.2 *Transit risk*

The pipeline transport of gas to the EU often involves transit countries, whereby the number of transit countries has a direct impact on the EU's SoS: "[e]ach border crossed adds an additional layer of security risk with the potential for conflict within these transit countries".²⁵ There are at least three parties involved in the gas trade of which all have widely different interests: the exporting, the transit and the importing country.

The consumer's SoS can be negatively affected by political instability in the transit country or by the fact that the transit country is itself a remarkable consumer of gas since it might be tempted to prioritise its own SoS over EU concerns. Thus, the transit risk does not only refer to the physical rupture on the territory of the transit country but also to its possible monopolistic behaviour.²⁶ Moreover, the degree of transit risk is also shaped by the quality of relations between the three parties involved in the gas trade. Often, there is a strong political or commercial dimension related to the transit risk which makes it "much trickier to handle".²⁷ As Stevens points out, transit pipelines induce an inherent instability to the gas trade:

for any transit pipeline agreement there is no overarching jurisdiction to manage it, and as a result no obvious mechanism for its enforcement. Thus ultimately a 'sovereign' government can simply ignore what is after all only a piece of paper. [...] Put simply, oil and gas transit pipelines are inherently unstable with no obvious mechanism, at least to date, to control or constrain that instability.²⁸

Thus, the transit risk does not only appear as the most complex involving at least three parties with partly opposing interests, but so far it is also the risk that is the least manageable by the means of an overarching legal framework.

3.3 *Investment and facility risk*

Another risk dimension relates to the sufficiency of investments in the export, transit and import infrastructures that are necessary to ensure the long-term

²⁵ Stern, *op.cit.*, p. 14. Therefore, by bringing the EU and Russia closer together, the EU's enlargement process towards Eastern Europe substantially helped to boil down the transit risk.

²⁶ Macintosh, *op.cit.*, p. 5.

²⁷ Henry, *op.cit.*, p. 2.

²⁸ P. Stevens, "Transit troubles: Pipelines as a source of conflict", *A Catham House Report*, London, Royal Institute of International Affairs, 2009, p. 1.

adequacy of gas supplies. While this concerns investments within but also beyond the EU,²⁹ this paper focuses mainly on the investments in the transit and exporting country. By nature, the investment risk is higher in times of economic crisis where all kinds of investments are reduced by uncertainty. A special feature of the investment risk is the difficulty to determine its scope since the effect of cancelled investments becomes only evident with a time lag of ten to fifteen years.

Closely linked to the lack of investments is the facility risk, as sufficient investments in pipelines, upstream infrastructure and storage facilities in the importing, exporting and transit country significantly help to reduce the possibility of technical failures posing a serious risk to the EU's gas SoS. While it may be relatively easy for the EU to carry out necessary investments in its own pipeline system, it is much more difficult for the EU to reduce the facility risk in the transit and supply countries.

4. Risk analysis of the EU's gas security of supply

4.1 Source risk

Due to the decreasing EU domestic gas production and an increasing demand for natural gas in the long term,³⁰ the EU will face a growing import dependency in the next decades.³¹ As a consequence, at least in theory also the risks related to the import are expected to grow, including the source risk. For the time being, all of the EU's main gas suppliers can be described as reliable and safe partners.³² In 2008, 46% of the overall gas imports came from Russia, while 27% were imported from Norway and 20% from Algeria, making them the EU's most important partners in gas trade.³³

In terms of gas reserves, logistics and geography, Russia should be considered as the "the most obvious supplier for Europe's growing gas demand".³⁴ For many reasons, there is nearly no source risk related to gas imports originating from Russia, at

²⁹ A. Behrens, C. Egenhofer & K. Pedersen, "Energy Policy for Europe. Identifying the European added-value", *CEPS Task Force Report*, Brussels, Centre for European Policy Studies, 2008, p. 21.

³⁰ Although the EU's gas demand saw the sharpest decline in its history following the global economic and financial crisis, it is expected to recover in the next years.

³¹ Behrens, Checchi & Egenhofer, *op.cit.*, p. 14.

³² Henry, *op.cit.*, p. 1.

³³ S. Nies, "Ukraine : un pays de transit dans l'impasse ? Edition actualisée après les élections de 2010", *Gouvernance européenne et géopolitique de l'énergie*, no. 9, Paris, Institut Français des Relations Internationales, 2010, p. 44.

³⁴ Goldthau & Witte, *op.cit.*, pp. 234, 235.

least in the short term:³⁵ the existing pipeline connection between Russia and the EU creates a strong interdependence that is reinforced by a lock-in effect. From Moscow's perspective, building new pipelines to deliver Russian gas to Asia at the expense of the EU's SoS would imply tremendous investments that Gazprom cannot afford due to its miserable financial situation.³⁶ In the words of Riley, "Russia really has nowhere else to sell its gas and certainly no other such rich market".³⁷ Especially after the global financial crisis that resulted in a lower EU demand and a considerable Russian gas glut, Russia will not be able to convincingly threaten to interrupt its gas supplies to the EU since its economy relies heavily on the EU's gas bills. The only risk related to Russia as origin for EU gas imports may be its possible incapacity to satisfy the growing EU gas demand in the long-term:

According to available estimates, in order to meet its obligations by 2020, Gazprom will have to seriously revamp and expand its gas transportation system, including the trunk pipelines and compressor systems, in order to maintain gas supply, potentially costing billions.³⁸

Pre-crisis forecasts already predicted an approaching Russian gas deficit caused by insufficient investments in recent years.³⁹ The cutting of investments in the wake of the economic crisis may lead to an even more dramatic scenario for the EU in ten to fifteen years. Hence, Riley can be confirmed when he says that

the core issue for the EU is not the threat of a politically motivated gas cut off. Rather it is the prospect of Russia, through lack of investment, not being able to produce enough gas to cover Russian and EU demands.⁴⁰

While the source risk for Russia is low, it is very low for Algeria and almost non-existing for Norway: despite Algeria's relative political instability, the EU's third gas supplier proved to be a reliable partner in terms of gas trade: "It remains a fact, of course, that there have never been problems in the supply of gas as a consequence of domestic unrest in Algeria."⁴¹ As a member of the European Economic Area and

³⁵ The Russian source risk is even declining: since the 1990s the Russian gas imports as share of the EU's overall gas imports decreased gradually. Noël, *op.cit.*, p. 5.

³⁶ Henry, *op.cit.*, p. 4.

³⁷ A. Riley, "The Coming of the Russian Gas Deficit: Consequences and Solutions", *CEPS Policy Brief*, no. 116, Brussels, Centre for European Policy Studies, 2006, p. 8.

³⁸ Macintosh, *op.cit.*, p. 5.

³⁹ M. Emerson & E. Gnedina, "The Case for a Gas Transit Consortium in Ukraine: A Cost-Benefit Analysis", *CEPS Policy Brief*, no. 180, Brussels, Centre for European Policy Studies, 2009, p. 5.

⁴⁰ Riley, *op.cit.*, p. 1.

⁴¹ Van der Linde *et al.*, *op.cit.*, p. 61.

as the EU's second most important source of natural gas, Norway proved to be the EU's safest partner in the gas trade.⁴²

Finally, it is worth emphasising that also LNG imports are in general not free of a certain source risk.⁴³ However, cancelled LNG cargoes can be easily compensated by other LNG supplies, thereby making LNG imports in general less prone to the source risk compared to pipeline deliveries.

Looking at the EU member states individually, it is rather obvious that they all face different degrees of source risk since the origin of their gas imports and the share of their LNG imports varies significantly. Thus, while the overall source risk of the EU is rather low, some individual member states in Eastern Europe face a considerable source risk.⁴⁴

4.2 Transit risk

Most of the EU's gas imports are transported through pipelines that cross either Ukraine or Belarus.⁴⁵ Since the transit risk related to gas imports from Algeria is low and non-existing in the case of Norway (as the country is the EU's direct neighbour), the focus in this section will be on the considerable transit risk linked to Russian gas imports crossing Ukrainian territory.⁴⁶

Ukraine has been described as "one of the world's primary energy transit countries"⁴⁷ and has been identified by the EU as a key transit country in terms of gas imports.⁴⁸ This is due to the fact that around 80% of Russian gas transits Ukraine on its way to the EU.⁴⁹ From the EU's perspective, about 40% of the total amount of

⁴² F. Harbo, "The European Gas and Oil Market: The Role of Norway", *Gouvernance européenne et géopolitique de l'énergie*, Paris, Institut Français des Relations Internationales, 2008, p. 7.

⁴³ Stern, *op.cit.*, p. 16.

⁴⁴ In 2005, Finland, Estonia, Latvia, Lithuania, Romania, Bulgaria and Slovakia faced a 100% dependence on Russian gas imports. F. Umbach, "Global energy security and the implications for the EU", *Energy Policy*, vol. 38, no. 3, 2010, p. 1236.

⁴⁵ Macintosh, *op.cit.*, p. 5. While around 80% of Russian gas supplies to the EU transits Ukraine, only 20% cross the territory of Belarus.

⁴⁶ Henry, *op.cit.*, p. 3.

⁴⁷ N. Shapovalova, "Ukraine: Lynchpin for European Energy Security", *FRIDE Democracy Backgrounders*, Madrid, Fundación para las Relaciones Internacionales y el Diálogo Exterior, 2007, p. 2.

⁴⁸ K. Malyhina, "Die Erdgasversorgung der EU unter besonderer Berücksichtigung der Ukraine als Transitland", *Arbeitspapiere und Materialien*, no. 105, Bremen, Forschungsstelle Osteuropa, 2009, p. 26.

⁴⁹ *Ibid.*

imported gas transits Ukrainian territory before reaching the EU border.⁵⁰ With a powerful pipeline system of more than 35.000 km, a yearly gas transit capacity at an average of more than 120 bcm,⁵¹ and globally the third largest gas storage capacities, Ukraine is of tremendous importance for the EU's SoS.

However, the combination of many factors makes Ukrainian gas transit a delicate issue: Ukraine's obsolescent pipeline system; the fact that it is itself a considerable gas consumer; and most importantly commercial and political disputes between Ukraine and Russia about the gas transit. While Ukraine tries to maintain its significance as a transit country and ensure transit fees, Russia is willing to reduce the transit risk posed by Ukraine through efforts to take over the Ukrainian pipeline system or by building new pipelines such as North Stream that allow circumventing Ukraine. So far, Ukraine has rejected all initiatives made by Russia to gain control over its pipeline system since the system is of a strategic importance for the government and allows domestic gas prices to be subsidised heavily.⁵² The lack of privatisation, corruption and immense inefficiency led in the past to Ukraine's incapability to pay its gas bills to Russia, causing the disruption of Russian gas supplies and usually Ukraine's threat to cut off gas deliveries to the EU.⁵³

Until now, there is no legal framework that has the potential to effectively regulate the gas transit and thus reduce the transit risk for the EU. In theory, the European Energy Charter Treaty (ECT) could help to reduce risks related to the transit through Ukrainian territory.⁵⁴ However, Russia signed but did not ratify the treaty yet, which contributed to the ECT's failure. This has been evident in both crises in 2006 and 2009 where the ECT did not play any role in the conflict resolution.⁵⁵ Negotiations on a transit protocol that would have allowed broadening the scope of the transit provisions and including a legally binding dispute resolution procedure were equally unsuccessful.⁵⁶

⁵⁰ J. Grätz & K. Westphal, "Die Ukraine in der Energiegemeinschaft: Die Zukunft des Gastransits. Der ukrainische Gasmarkt zwischen Monopolisierung und Entflechtung", *SWP-Aktuell*, no. 13, Berlin, Stiftung Wissenschaft und Politik, 2011, p. 5.

⁵¹ Nies, *op.cit.*, p. 43.

⁵² S. Pirani, "Ukraine's gas sector", *NG 21*, Oxford, Oxford Institute for Energy Studies, 2007, p. 73.

⁵³ Malyhina, *op.cit.*, p. 46.

⁵⁴ Henry, *op.cit.*, p. 2.

⁵⁵ Malyhina, *op.cit.*, p. 42.

⁵⁶ *Ibid.*, p. 19.

Again, the overall EU picture is different from the SoS situation in the member states. Especially some Eastern member states rely extremely on Ukrainian gas transit which was demonstrated by the 2009 gas crisis when they were seriously affected.

While the North Stream pipeline will reduce the Ukrainian gas transit volume, it will certainly not have the potential to resolve the Ukrainian transit problem, since a considerable amount of gas will still cross Ukrainian territory.⁵⁷

4.3 Investment and facility risk

By creating unprecedented uncertainty, the global financial and economic crisis has led to a boiling down of all kinds of investments in the energy sector, thereby considerably increasing the investment risk compared to pre-crisis times.⁵⁸ Uncertainty can create serious damage to investment projects and thereby put at risk the long-term EU security of supply:

Contradictory estimates in gas demand present a pertinent threat, as they cause exporters to underinvest in new supplies or fail to develop necessary new infrastructure. The result of the present lack of clarity within the EU and consequent underinvestment would lead to serious security of supply issues in natural gas that could not be solved in the short or medium terms.⁵⁹

It is nearly impossible to measure the extent of uncertainty and the impact it will have in the end on the EU's SoS. However, it is clear that uncertainty and the related delay of investments have more than ever in the past the potential to jeopardise the EU's long-term SoS. The EU may partly be able to reduce the investment risk through investments in gas pipelines, storage capacity, reverse flow capacity and interconnectors within the EU. However, the much bigger investment risk for the EU stems from the lack of investments in the Russian upstream sector. Palpably, it will be too late to carry out these investments when the EU demand will have swallowed the current Russian gas glut. This is due to the long-time lag between the investment decisions and the moment where the investment actually affects the SoS. Hence, much depends on the right moment for the execution of investments in order to prevent the EU from undergoing supply shortages due to an investment gap.

⁵⁷ Henry, *op.cit.*, p. 4.

⁵⁸ Uncertainty among investors has been further reinforced through other phenomenon such as the rise of LNG, the shale gas development, but also by the EU's policies to boost renewables in its energy mix and strategies to diversify its import sources and routes. Van der Linde, Coby et al., *op.cit.*, p. 131.

⁵⁹ Macintosh, *op.cit.*, p. 6.

In addition, tremendous investments are necessary in the old-fashioned Ukrainian transit system that has been constructed during the Soviet era. In 2010, 21,5% of its pipelines exceeded the economic lifetime that Naftogaz estimated at 33 years. Another 65,8% were between 10 and 33 years old and only 13% less than 10 years.⁶⁰ This explains the “urgent need to modernize the network and fund its expansion”.⁶¹ However, Naftogaz’ disastrous financial situation and the lack of foreign investment resulted in an extremely slow modernisation process.⁶² As the Ukrainian government will not be able to provide on its own for the immense investments, and since the privatisation of the pipeline system is forbidden by law, the country will be dependent on external financial support.⁶³ However, bearing in mind the strategic significance of the pipeline system, the country was in the past skeptical if not reluctant to accept any external involvement in its gas production or transit management.⁶⁴ Moreover, the prospective of finding investors for the modernisation of the pipeline system is paralysed by “the political battles and prolonged uncertainty over the network’s future management and ownership”.⁶⁵ At this point, the investment and facility risk is fairly interwoven with the transit risk posed by gas imports across Ukraine.

Again, all member states do not face the same investment and facility risk. Nevertheless, it is possible to identify a group of member states that is likely to be particularly concerned: those member states that import a large share of their overall gas from Russia will be significantly affected by both investments that are not carried out in the Russian upstream sector and the Ukrainian pipeline system.

4.4 Summary

Putting the SoS analysis in the context of the global financial and economic crisis, the global rise of LNG, the US shale gas development and the EU’s energy and climate change policy help to understand that the EU’s gas SoS in general looks rather safe. More specifically, the SoS analysis allowed to explore the different risk dimensions and to confirm the first hypothesis: while the source risk is the lowest, especially in the short term, the transit risk must be considered the most threatening

⁶⁰ Nies, *op.cit.*, p. 45.

⁶¹ Pirani, *op.cit.*, p. 86.

⁶² For instance, only 5% of the overall compressor units have been replaced between 2000 and 2005. Pirani, *op.cit.*, p. 81.

⁶³ Nies, *op.cit.*, p. 45.

⁶⁴ *Ibid.*, p. 41.

⁶⁵ Pirani, *op.cit.*, p. 74.

to the EU's SoS both in the short and long term. This is due to the tremendous risk related to the transit of Russian gas through Ukrainian territory. Moreover, there is a constant facility risk linked to Ukraine's pipeline system. The investment risk has increased dramatically with the financial and economic crisis, representing an obvious risk to the EU's SoS in the long run. Indeed, postponed investments in the Russian upstream sector could in the long term trigger also a significant source risk for the EU. Clearly, the investment and facility risk is strongly interwoven with the two other risk dimensions.

5. Risk management of the EU's gas security of supply

Building on the results of the SoS analysis, the following part examines how the different risks can be tackled most adequately, aiming at answering the second part of the research question. Since the transit risk has been identified as the most threatening to the EU's SoS, this will be reflected in the risk management. The second hypothesis is the following: while the EU has some instruments at hand to effectively reduce the transit risk, the success of the EU's risk management will largely depend on Russia.

The EU's growing gas import dependency by nature implies that a certain level of all risks will always persist. Moreover, addressing those risks has to be seen in a cost-benefit analysis: at a certain point it will become exorbitantly expensive to strengthen the SoS through further measures while the additional gains in terms of reduced risks may be rather insignificant.

5.1 Management of the source risk

As has been demonstrated, the risk related to the source of EU gas supplies is rather low and very low when considering only Norway and Algeria.⁶⁶ Therefore, the need for diversification of sources of gas imports should not be overrated. But this takes only into account the picture of the EU as a whole. When considering the individual import profiles of the member states, it is obvious that the exposure among the member states to the source risk related to Russian gas is quite heterogeneous. To be more precise, while some member states are largely dependent on Russia as single gas supplier, others have a strong domestic gas production or have quite diversified gas import sources. As it will be extremely expensive to build new pipelines that will allow diversifying the origins of gas imports for the member states

⁶⁶ Henry, *op.cit.*, p. 3.

concerned, it is rather worth analysing the potential impact of increased LNG imports on the SoS. Since the import of LNG requires regasification terminals that are located close to the sea, this will not be an option for all member states. However, particularly in Eastern Europe where member states face a relatively high source risk, the construction of new LNG regasification plants could have a substantial impact on the member states' SoS. Moreover, in order to make better use of this investment, those member states with sea access "could play the role of [a] receiving station for the rest of the region".⁶⁷ For instance, the planned Adria LNG terminal that could be operational in 2014 has the potential to reduce considerably the source (and also transit) risk in some member states located in South Eastern Europe that traditionally face a high level of source risk.⁶⁸ The construction of other regasification terminals in Romania (Constanța LNG Terminal project), Poland (Swinoujście LNG Terminal), Lithuania and Estonia could further contribute to a higher gas SoS level in the Eastern member states.⁶⁹

Moreover, the source risk could be considerably reduced through internal mechanisms. First, the energy efficiency⁷⁰ could be improved, scaling down the need for gas imports. Second, member states could upgrade their storage capacities⁷¹ and invest in interconnectors.⁷² Upgrading the reverse flow capacities from Western to Eastern Europe would be another option to reduce the effects of gas shortages in particularly concerned member states. Since gas can be easily substituted with other energy sources, investments in other domestically produced energy sources appear useful. Hereby, investments in renewables could make an especially valuable contribution to the member states' SoS. Taking into account the non-existing source risk related to Norway, a further boost of the import levels could also slightly contribute to an improved SoS for the EU in gas.

To make it clear, managing the source risk does not imply replacing Russian gas imports in general. It is rather about increasing diversification of sources of gas imports in some specific member states. In other member states investments in the additional diversification of import sources seem unnecessary.

⁶⁷ Henry, *op.cit.*, p. 4.

⁶⁸ R. Lajtai, "LNG vs. Russian gas dependency in the South Eastern European region", Paper presented at the 24th World Gas Conference, Buenos Aires, 5-9 October 2009, p. 10.

⁶⁹ L. Unihovskiy *et al.*, "Diversification of sources and routes of gas supply: the choice for Europe and Ukraine", *National Security and Defence*, no. 6, Kiev, Razumkov Centre, 2009, pp. 60, 61.

⁷⁰ Chevalier, *op.cit.*, p. 15.

⁷¹ Van der Linde *et al.*, *op.cit.*, p. 68.

⁷² A. Checchi, "Gas Interconnectors in Europe: More than a Funding Issue", *CEPS Commentary*, Brussels, Centre for European Policy Studies, 9 April 2009, pp. 1-2.

5.2 Management of the transit risk

The SoS analysis has demonstrated the following: none of the risks related to the import of gas is as dangerous for the EU as the transit risk and no transit country puts the EU's SoS more at risk than Ukraine does. Therefore, the risk management will focus on means to reduce the transit risk posed by Ukraine. Three different scenarios will be presented: firstly, the strengthening of the Energy Community Treaty which Ukraine joined recently; secondly, the outlook of a tripartite gas pipeline consortium involving the EU, Russia and Ukraine; finally, the perspective of circumventing Ukraine as transit country through new import routes by both pipelines and LNG. The risk management of the transit risk relies on the hypothesis that the EU's capacity to reduce the transit risk posed by Ukraine will to a large extent depend on Russia's policies towards Ukraine.

5.2.1 The Energy Community

The Energy Community was set up in 2005 with the main purpose to "extend the EU internal energy market to South-East Europe and beyond".⁷³ The Energy Community's objective is to strengthen regional energy market harmonisation among the EU's South Eastern neighbours. In the long term, this regional integration project is supposed to become part of an overall European energy market.⁷⁴ All contracting parties committed themselves to "implementing selected parts of the *acquis communautaire* on electricity, gas, renewables, energy efficiency, competition, environment and security of supply".⁷⁵ Through its full membership in the Energy Community in February 2011 Ukraine committed itself to executing within a very limited period of time comprehensive reforms that also include provisions on the security of supply.

Without any doubt, the Energy Community provides for a unique opportunity to improve the EU's SoS by considerably reducing the transit risk related to Russian imports. The inclusion of Ukraine in the EU energy market would allow negotiating the transit issue not between Ukraine and Russia – subject to repeated gas disputes – but shifting on the EU-Russia level.⁷⁶ Similarly, it has been argued that the handing-over of the ownership of the gas from Gazprom to European companies could be shifted

⁷³ Energy Community, Secretariat, *Annual Report on the Implementation of the Acquis under the Treaty Establishing the Energy Community*, Vienna, 2010, p. 8.

⁷⁴ *Ibid.*

⁷⁵ *Ibid.*, p. 9.

⁷⁶ Malyhina, *op.cit.*, p. 46.

from the Ukrainian-European to the Ukrainian-Russian border.⁷⁷ A full integration of the Energy Community in the EU energy market would empower the EU to shape its own Eastern transit region and to manage itself the transit risk in the long term.⁷⁸ Being part of the EU's energy market, more investors would be inclined to contribute to the modernisation of the Ukrainian pipeline system. Moreover, since the takeover of the EU's *acquis* by Ukraine implies more transparency in the gas markets and reduced governmental subsidies for the Ukrainian customers, Ukrainian membership of the Energy Community would have the effect of contributing considerably to improve Naftogaz' financial situation. In the end, this would enable Naftogaz to pay its gas bills to Gazprom and thereby reduce the likelihood of future gas disputes between the two countries.

However, the fate of the Energy Community could be stalled by Moscow's reluctance to accept the takeover of the EU *acquis* by Ukraine.⁷⁹ Not only Russia considers this development as a strengthening of the EU's position in its traditional sphere of influence but it also wants to avoid a reform process that makes Ukraine a more reliable transit country for the EU. Instead, it prefers to make Ukraine appear as an unreliable transit country in order to get the EU's support for new pipelines bypassing Ukraine. This will give Russia economic benefits in terms of lower transit fees and reduce the transit risk that it faces itself. In addition, the EU's weak monitoring and sanctioning powers entail the risk that Ukraine will not be able to carry out the relevant reforms within the indicated time period.⁸⁰

5.2.2 *A tripartite gas pipeline consortium*

From a practical point of view, a tripartite gas transit consortium might be the best option in order to deal with the transit issue, bringing together Russia as gas supplier, Ukraine as gas transmitter and the EU as gas consumer.⁸¹ While both the EU and Russia were traditionally in favour of a tripartite gas consortium, Ukraine opposed this project in the past, fearing Gazprom's dominance.⁸² However, in 2010 Ukraine's

⁷⁷ Grätz & Westphal, *op.cit.*, p. 3.

⁷⁸ D. Ryabkova, "Ukraine and Energy Community: The law of attraction of energy", *European Focus, International Centre for Policy Studies*, Kiev, 2009, p. 2.

⁷⁹ Shapovalova, "The battle for Ukraine's energy allegiance", *op.cit.*, p. 3.

⁸⁰ Grätz & Westphal, *op.cit.*, p. 3.

⁸¹ Emerson & Gnedina, *op.cit.*, p. 6.

⁸² Malyhina, *op.cit.*, p. 44.

newly elected President proposed a tripartite consortium as an alternative to Russia's plan to diversify its export routes.⁸³

A major advantage of the tripartite consortium would be that it brings all parties concerned into an institutional framework, bearing in mind that "the EU cannot have any meaningful cooperation on gas with Ukraine, without Russia being part of [...] a wider cooperation framework".⁸⁴ It has been argued convincingly that the consortium project could be a win-win-win situation.⁸⁵ It would allow Russia to considerably reduce the transit risk that it faces.⁸⁶ Moreover, this would allow boiling down transit fees and increasing Russian influence in the Ukrainian pipeline system. For Ukraine, this would entail the possibility to allocate sufficient funds for the maintenance of its pipeline system. More importantly, the consortium idea would make sure that Ukraine will preserve its major status as transit country.⁸⁷

For the EU, the consortium proposal would have a major effect on its SoS: comprehensive reforms in the Ukrainian gas market would improve Naftogaz' ability to meet its financial obligations vis-à-vis Gazprom, thereby tackling the root of Russian-Ukrainian gas disputes.⁸⁸ Moreover, Russia would rethink its strategy of making Ukraine appear as an unreliable transit country for the EU, hoping for the EU's support for new pipeline projects that circumvent Ukrainian territory. Without a doubt, this strategy played an important role in both gas crises in 2006 and 2009. According to Emerson, the consortium proposal would also allow separating "(technically, politically and legally) the gas transit function of the trunk pipeline from the domestic Ukrainian gas distribution network".⁸⁹ Another major advantage of the consortium project would be its potential to comprehensively refurbish the old-fashioned pipeline system, lowering the transit and facility risks for the EU.⁹⁰

The success of the tripartite gas pipeline consortium will largely depend on whether Russia will agree to a legally binding dispute settlement procedure, as envisaged by the ECT. However, since there is no reason to believe that Russia will ratify the ECT in the foreseeable future, a new and less ambitious legal framework should be envisaged. It will be crucial to find a compromise that is acceptable for

⁸³ Nies, *op.cit.*, p. 4.

⁸⁴ Emerson & Gnedina, *op.cit.*, p. 3.

⁸⁵ *Ibid.*, p. 4.

⁸⁶ *Ibid.*, p. 8.

⁸⁷ *Ibid.*, p. 7.

⁸⁸ Macintosh, *op.cit.*, p. 6.

⁸⁹ M. Emerson, "Time for a Tripartite Gas Pipeline Consortium for Ukraine", *CEPS Commentary*, Brussels, Centre for European Policy Studies, 8 June 2010, p. 2.

⁹⁰ Macintosh, *op.cit.*, p. 6.

both Russia and Ukraine: Russia will refuse a strong legal framework for the tripartite consortium while Ukraine will reject any proposal that could entail Russia's long-term dominance over the pipeline transit system. In addition, with regard to the enormous challenges that the setup of a gas consortium would imply, Nies was right to affirm that

la complexité du groupe, le potentiel du conflit russo-ukrainien et l'initiative parallèle des deux belligérants d'impliquer l'UE comme arbitre pourraient compromettre la coopération dès le départ.⁹¹

Without a doubt, although the realisation of the consortium idea is rather complicated and would not completely resolve the transit issue, it "could contribute greatly to EU gas security".⁹²

5.2.3 *The diversification of import routes*

The first branch of the North Stream pipeline has become operational on 8 November 2011. Russian gas is now directed directly to the EU, allowing reducing the transit volume through Ukraine by 25%.⁹³ This diversification in import routes has a positive impact on the EU's overall SoS. However, it is rather questionable whether North Stream will improve the SoS situation in some Eastern member states that would need it the most due to their high vulnerability to Ukrainian transit.

With a capacity of bringing about 60 bcm to the EU each year, the planned South Stream pipeline could help to reduce Ukrainian transit, too.⁹⁴ However, it is by far not sure whether this pipeline will be built since the current low demand for gas may postpone this investment. Moreover, Serbia would be involved as transit country which may trigger additional transit risks.

The upgrade of the EU's LNG regasification capacity could be an additional instrument that would contribute to the containment of the EU's current transit risk.⁹⁵ Thereby, the EU should support the construction of LNG regasification terminals in those member states and regions that are particularly exposed to problems of transit risk. Simultaneously, this would also help mitigate the source risk in those member states. Of course, the increased LNG imports would not be a general substitute for traditional pipeline imports but rather "improve security of supply by helping to

⁹¹ Nies, *op.cit.*, pp. 79, 80.

⁹² Macintosh, *op.cit.*, p. 6.

⁹³ Grätz & Westphal, *op.cit.*, p. 6.

⁹⁴ Henry, *op.cit.*, pp. 3, 4.

⁹⁵ Stern, *op.cit.*, p. 16.

accommodate seasonal shortages".⁹⁶ As LNG supplies are nearly always available on the global market, an enhanced LNG import capacity would indeed give the EU a guarantee that the consequences of a short-term pipeline gas shortage would be limited.

Although the significance of Ukraine as the EU's most important transit country will be reduced through new import routes,⁹⁷ they will alone not have the potential to resolve the Ukrainian transit problem. In the long term, both the EU and Russia do not have any promising alternative to the transit through Ukraine.⁹⁸ Even if South Stream will be built in addition to the North Stream pipeline and increased LNG imports, a considerable share of gas will still be transported to the EU through Ukraine because, even combined, they cannot replace the Ukrainian transit volume.⁹⁹ Thus, the focus should not be on how to replace Ukrainian transit but how to deal with it. The diversification of the EU's import routes should be considered as an additional option in the risk management, building on the success of the Energy Community and/or a tripartite gas consortium.

5.3 Management of investment and facility risk

The management of the investment and facility risk entails a particular challenge: compared to the management of other risks, it is by far more difficult to predict the scale of the risk that stems from cancelled or postponed investments whose consequence the EU will face only in ten to fifteen years. In addition, the EU's power to influence the time and scope of investment decisions in the Ukrainian pipeline system and the Russian upstream sector is rather limited.

As long as the energy world is still shaped by uncertainty following the financial and economic crisis, the EU's focus should be on measures to avoid additional uncertainty among investors. The EU should be transparent about its gas demand projections for the future. Moreover, it should deal carefully with projects that could have a considerable impact on the EU's future demand for gas. Since the replication of the US shale gas revolution in the EU and the construction of the Nabucco pipeline could lower the EU's demand for Russian gas tremendously, those projects should be dealt with utmost caution. From the EU's point of view, it would be equally unwise to use the increase of LNG imports as a leverage to put pressure on

⁹⁶ Goldthau & Witte, *op.cit.*, p. 236.

⁹⁷ Nies, *op.cit.*, p. 79.

⁹⁸ Grätz & Westphal, *op.cit.*, p. 4.

⁹⁹ Henry, *op.cit.*, pp. 3-4. Moreover, the costs related to the transport of the gas would be much higher than the current Ukrainian transit fees. Paszyc, *op.cit.*, p. 6.

Russia: this will only result in giving further disincentives for investments in the Russian upstream sector. New gas import sources should be presented by the EU as additional gas supplies that are not meant to replace traditional supplies from Russia.

With regard to investments in the Ukrainian pipeline system, the EU should be careful, too: the more the EU gives misleading signals concerning efforts to reduce Ukraine's importance as a transit country through the diversification of import routes, the less the country will be inclined to carry out large-scale investments in its decrepit pipeline system. As has been shown in the last section, in the case of the Ukrainian pipeline system the management of the EU's transit risk has a major impact on the investment and facility risk. Thus, both the Energy Community and the prospect of a tripartite gas pipeline consortium can lead to a significant improvement of the country's old-fashioned pipeline system.

By continuing to give Ukraine credits for the modernisation of its pipeline system, the EU could contribute to reduce the facility risk even if no long-term sustainable solution is found for its ownership of the gas transit network.¹⁰⁰ Last but not least, the EU should also make sure that sufficient investments are made in its internal gas markets. This refers to storage facilities, interconnectors and reverse flow capacities.

5.4 Summary

The analysis of the risk management showed that the source risk could be marginally reduced through the increase of gas imports from Norway and LNG in some Eastern member states. However, the general replacement of Russian gas imports by new gas supplies for the EU as a whole cannot be an option since this is economically not feasible.

The diversification of import routes can only be considered as an additional instrument to address the transit risk by reducing the negative effects of a short-term supply shortage, but diversification alone does not allow resolving the transit issue. While both Ukraine's membership in the Energy Community and the prospect of a tripartite gas consortium have the potential to considerably reduce the transit risk in the long term, Russia's tolerance will be decisive for the success of both projects: if Russia will be reluctant to accept Ukraine's reform process within the Energy Community, it is likely to put pressure on Ukraine that will result in no long-term improvement of the EU's SoS. Similarly, in order to be successful, the consortium idea

¹⁰⁰ Grätz & Westphal, *op.cit.*, p. 2.

will need a strong legal framework that Russia is not likely to support. Hence, also the second hypothesis can be confirmed: the EU's capacity to efficiently manage the Ukraine transit risk in the long term will largely depend on Moscow.

Despite its sharp increase in the wake of the crisis, the EU's means to tackle the investment and facility risk are rather limited. The focus should be on measures to avoid additional uncertainty and on giving appropriate signals to influence the right timing of investment decisions. Since the investment and facility risk is manifestly interwoven with the source and also transit risks, measures to tackle it should be part of a coordinated approach to address the SoS as a whole.

6. Conclusion

This paper investigated what the main risks to the EU's security of gas supply are and how they can be reduced. Today, the EU's SoS situation looks rather sound. The new context of the EU's SoS had a largely positive impact on its gas energy security. At least to some degree, the global financial and economic crisis, the global rise of LNG, the US shale gas development, and the EU's energy and climate change policy all improved the EU's SoS. However, this might change in the long term.

The scale of the different risk dimensions related to the import of gas changed in recent years: while the transit risk, and especially the investment and facility risk, increased significantly, the source risk became less important. At the same time, the EU's vulnerability to the risks changed. Today, the transit risk represented by Ukraine must be considered by far the most threatening to the EU's SoS both in the short and long term. Hereby, the SoS concept developed by Stern proved to be an extremely useful tool to analyse the EU's SoS in more detail. Through the Energy Community or a tripartite gas consortium, the EU may significantly reduce the transit risk stemming from Russian gas imports and Ukrainian transit. However, the success of both projects will be limited by Russia's policies towards Ukraine.

Hence, paradoxically the highest risk that stems from Russia as the EU's main gas supplier is not its potential to cut off gas deliveries to the EU but to forestall the EU's capacity to manage the Ukrainian transit risk. Thus, Russia will in the foreseeable time remain the EU's main partner not only in the gas trade itself but also in the management of the risks to the EU's gas SoS. Therefore, the EU's efforts to diversify its gas import sources and routes – strategies often considered the most efficient to strengthen the EU's energy security – have only a very limited potential to successfully address the main risk to the EU's secure supply of natural gas.

All of the EU's member states face different SoS levels. While this may require an individual risk management by the national governments, the EU should make sure that these national risk management strategies are always consistent with the EU's overall risk management. Moreover, the EU can clearly provide an added value by encouraging cross-border policies that improve the SoS in member states of Eastern Europe. Here, some member states face a relatively high source, transit and facility and investment risk. By coordinating between the member states, the EU can make sure that the risk management is carried out in the most cost-efficient way.

This paper argued that (1) the transit risk is the most threatening to the EU' SoS and (2) the EU's risk management capacities will depend heavily on Russia's policies towards Ukraine. Shapovalova was right to claim the following: "As the main route for Russian gas into Europe, Ukraine is vital to both European and Russian energy security."¹⁰¹ Much will depend on how successful the EU will be in convincing Moscow that addressing the Ukrainian transit risk is a matter of common interest.

¹⁰¹ N. Shapovalova, "The battle for Ukraine's energy allegiance", *FRIDE Policy Brief*, no. 55, Madrid, Fundación para las Relaciones Internacionales y el Diálogo Exterior, 2010, p. 1.

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