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STUDY

A cold winter to come?
The EU seeks alternatives to Russian gas

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Abstract

The crisis in Ukraine has led to seven rounds of sanctions between Russia and the EU – and may well lead to more. Energy is the most alarming casualty in this clash, with the EU and Russia largely interdependent in the domain. The level of dependency among EU Member States varies greatly, as does their ability to respond to Russian warnings and actions.

Ukraine's gas situation is also at stake. The Russian gas exporter Gazprom ceased exporting to Ukraine in June. In late September, gas cuts were registered in Slovakia, Austria, Poland and Romania – in some cases to prevent Russian gas from being diverted to Ukraine. A provisional solution for Ukraine's winter supplies was reached in Berlin on 26 September, but has yet to be completely endorsed by Moscow and Kiev.

However, the risk of gas shortages for the rest of Europe has not been averted. Military and political tensions have obliged the EU to boost its energy security mechanisms and seek alternatives to Russian gas. The European Commission has just concluded a stress test on the EU gas system to assess the impact of a potential gas crisis. Several studies have suggested that, in the short term, the EU could substitute Algerian, Norwegian and Qatari supplies for Russian gas, although this would cost more and require new gas terminals. The Union's reserves – at present 90 % full – will also help, but for how long depends on the coming winter.

In the longer term, gas supplies from Azerbaijan, the United States, Iran, Mozambique, Australia, Israel and Turkmenistan could also supply the thirsty European market. EU energy policies (on renewable sources, greater efficiency, shale gas and interconnection of energy grids) could also play a role in reducing – if not completely eliminating – Europe's dependence on Russian gas.

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1 The effects of the Ukrainian crisis on the energy market

1.1 The Ukrainian crisis and the Russian energy card.

The European Council examined the energy implications of the Crimean crisis …

On 21 March 2014 the European Council addressed the growing military tensions between the EU and Russia following Russia's annexation of Crimea. Evoking the related problem of EU energy security, the Council backed efforts to reduce Europe's dependence on Russian gas. This was to be accomplished by enhancing energy efficiency, diversifying sources (from the 'Southern Corridor' pipelines and possibly the USA) and developing indigenous resources with improved electricity and gas grid interconnections. This, however, would only work if Member States acted in solidarity with one another in the event of asymmetric shocks.

Energy security is a priority of Mr Juncker Commission.

A comprehensive strategy to reduce EU energy dependency was requested from the European Commission and published on 28 May 2014[1]. A stress test on EU gas network was also performed, with the results published on 17 October 2014[2]. Energy security is one of the priorities of the Juncker Commission: a new portfolio on Energy Union has been created, with the aim of uniting negotiating power vis à vis third countries and seeking alternatives to eastern sources of gas, should they become too expensive or politically unbearable. European Council as well has put energy security high on its agenda in all its meetings since March 2014 (See Chapter 2).

…as did the EU-US summit.

The EU's partners have followed the situation. At the EU-US summit held in Brussels on 26 March 2014, US President Barack Obama promoted energy cooperation between the parties, pressed for a rapid conclusion of the Transatlantic Trade and Investment Partnership (the 'TTIP', which would facilitate energy exchanges across the Atlantic) and promised to assist Europe with the US's abundant shale gas. He did not, however, hide the fact that exporting liquefied natural gas (LNG) from the US to Europe would not provide an immediate solution: legal, commercial and technical obstacles would first have to be overcome. Obama encouraged European countries to make better use of indigenous resources by lifting environmental bans on shale gas and by not phasing out nuclear power[3].

Russian President Vladimir Putin threatened to halt gas deliveries to Ukraine, then followed through.

On 10 April 2014 Russian President Vladimir Putin sent a letter to the leaders of the 18 EU countries that import gas through Ukraine, threatening to discontinue gas supply for Ukraine´s domestic consumption[4]. Aware of the ramifications this could have for EU, Putin wrote, 'Undoubtedly, this is an extreme measure. We fully realise that this increases the risk of siphoning off

[1] See EU Commission, Communication on European Energy Security Strategy, and In-depth study of European Energy Security, 28 May 2014.
[2] See Communication on the short term resilience of the European gas system, 17 October 2014.
[3] Germany, the EU's biggest consumer of energy, started phasing out nuclear energy following the March 2011 Fukushima nuclear disaster. This deepened the country's dependency on Russian gas. The Nord Stream pipeline began to supply Germany the same year.
[4] See Putin threatens Ukraine gas supply in EU letter, Financial Times, 10 April 2014.

natural gas passing through Ukraine's territory and heading to European consumers.' In fact Russian gas exports to Ukraine were cut in June.

Dependency is a two-way concept: the EU as a whole imports one third of its gas from Russia, and Russia exports 61.7 % of its gas to the EU. Changing this pattern of trade would be difficult for both parties in the short term, although Russia has demonstrated that it is prepared to do so; on May 21 2014, Moscow signed 'the largest contract in the history of the gas sector of the former USSR' with Beijing[5].

The EU has not targeted the Russian gas sector with its sanctions.

The growing tensions between the EU and Russia, deriving from Russia's involvement in Ukraine, have led to seven rounds of sanctions, ranging from asset freezes to trade sanctions. Hostilities in Ukraine flared up again after the ceasefire of 5 September 2014. To date, the EU has not envisaged sanctions that would affect the gas sector. They are unlikely without a military escalation. In the latest package, adopted on 12 September[6], the Russian oil industry was targeted: EU services to the Russian oil industry and to its access to credit were the focus of EU sanctions for the first time. Yet this was in many ways less painful than targeting gas: oil can easily be found on the international market and is simple to transport and store, so both Russia and the EU will certainly find alternative partners (with China the most likely buyer – see Chapter 3.2). Gas, on the other hand, differs from oil in one very significant way: it is mainly traded via extensive, expensive pipelines, the cost of which is generally offset by long-term contracts. Pipelines may be subject to local instability when they cross sovereign countries, as shown by the Ukrainian gas crises of 2006 and 2009, when Russian gas flowing through Ukraine to south-western Europe was cut off.

Russia and Ukraine are negotiating on gas supplies but have not reached a definitive agreement yet.

A similar scenario is not excluded for winter 2014-2015. In June, Russia cut off the gas supplies for Ukrainian internal consumption because of a price disagreement (see Chapter 3.1). This has not affected gas transit, for the time being. A provisional agreement between Ukraine and Russia was reached on 26 September in Berlin[7]. But if the agreement is not confirmed before the winter, the risk that gas destined for the EU is cut off as it transits through Ukraine is considerable. (The talks, last held in Brussels on 21 October, were scheduled to resume one week later.) Russia has shown itself ready to play the energy card if its interests are affected: gas deliveries to Poland, Slovakia, Austria and Romania were also reduced between September and the beginning of October. While various explanations were given, the cuts were apparently done to avoid diverting Russian gas to Ukraine – a diversion that Russian gas exporter Gazprom has said is illegal.

[5] See China and Russia sign $400bn gas deal, Financial Times, 21 May 2014.
[6] See Council Regulation (EU) No 959/2014 of 12 September 2014.
[7] See Russia and Ukraine near deal on gas supplies, Financial Times, 26 September 2014.

1.2 The challenges posed by the crisis and the EU energy strategy.

LNG is growing in importance globally but represents less than 15 %% of the EU gas supply.

The Ukrainian crisis has underscored the importance for the EU to rapidly diversify its energy sources. As it is, EU countries that are completely dependent on Russian imports are subject to political pressure and to higher gas prices[8] – particularly if they import via Ukraine. The EU's dependence may weaken the Union's position as a credible actor speaking with one voice vis-à-vis Russia.

Spain is the leader in this field within the EU but it is not interconnected with the rest of Europe.

The EU's reliance on pipelines for its energy imports is also being challenged for this reason. An alternative form of delivery – delivery of liquid natural gas (LNG) via cargo ships– is growing in importance around the globe, although not necessarily the EU. In 2012 LNG delivery accounted for 19.4 % of total imports into the EU – some 60.5 billion cubic meters (bcm) – but this decreased in 2013 to 44.4 bcm[9] – about 14.1 % of total EU gas imports. Higher gas prices in Asia, particularly in Japan, are attracting suppliers of LNG in cargo ships. Compared to LNG, the gas Europe imports through Russian pipelines is relatively inexpensive.

The EU's extensive – and growing – pipeline network raises its dependency on Russia.

In addition to its higher price tag, LNG requires huge investments in infrastructure. Liquefying natural gas, a costly, energy-consuming process, takes place in export terminals built by the exporting countries. Import terminals are also necessary. If the EU hopes to use more LNG – a way of diversifying its gas suppliers – it would have to build these terminals[10], as well as an adequate network of internal pipelines to bring gas from the coast to landlocked countries. Of the EU's total capacity to use LNG, Spain controls 38 % and could theoretically provide concrete help, increasing the EU's LNG imports by 14 bcm. However, Spain's interconnections with France – and therefore with the rest of Europe – are very poor.

The EU's internal pipeline and electricity grids are far from interconnected. The Commission strategy suggests a target of 15 % for interconnection of electric capacity by 2030[11]. The Commission has also proposed several projects to improve gas pipeline connections and, notably, to allow for 'reverse flow' – pipelines through which gas could flow in either direction, which is currently not the case. This has not yet been achieved because of a number of technical obstacles, compounded by the proprietary and sometime less-than-cooperative attitudes of Member States regarding energy and strategic connections. However, in the current situation of rising tensions with Russia, interconnecting the gas grid is of the utmost importance. The level of dependence of EU countries on Russia varies greatly, largely

[8] The correlation between gas prices and dependency is impressive: for example, in January 2013 the price of gas in Germany, which has both diversification of sources and strong demand, was 24.3 EUR/MWh, while it was 37.9 EUR/MWh in Lithuania and 43.3 in Bulgaria, which respectively depend 100 % and 85.5 % on Russian gas. (Source, European Commission).

[9] See Paying the piper, The Economist, January 2014.

[10] There are currently 18 operating LNG import terminals in the EU, five confirmed projects to be operational by 2015 and 21 potential projects for 2014-2019. Source: Gas LNG Europe.

[11] Interconnection of electric capacity is the ratio between (the EU's) import and export capacity, on the one hand, and installed generation capacity on the other.

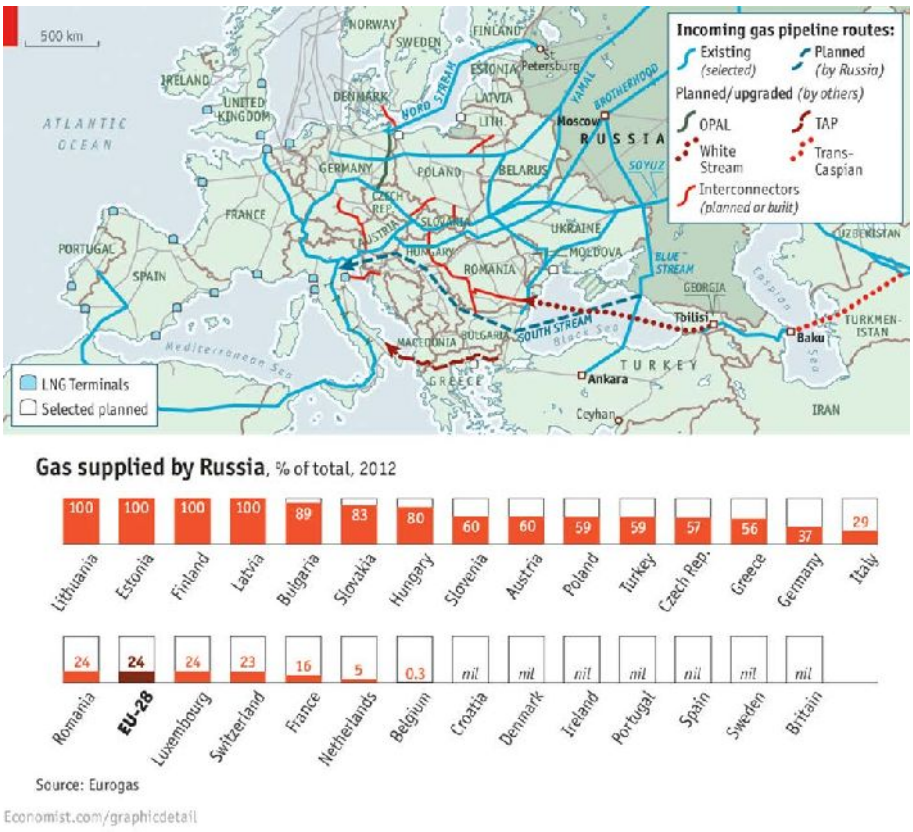
depending on their proximity to the country. The eastern EU Member States have the first terminals in the large-scale pipeline network built by the former Soviet Union during the Cold War and extended to western countries after 1991. Not only is this pipeline system impressively extensive, but there were also plans – launched before the Ukrainian crisis – to increase its capacity with new pipelines.

An additional pipeline bypassing Ukraine from the South is highly controversial and is opposed by the Commission

The most important pipelines envisaged constitute the highly controversial 'South Stream', which would reach the Italian and French markets through Bulgaria, Serbia, Hungary, Slovenia and Austria, and the 'Nord Stream' supplementary route (Nord Stream 3 and 4), which was planned to reinforce Germany's direct connection with Russia by 55 bcm. These new eastward transit lines would bypass Ukraine to the north and south, thereby avoiding the risk of supplies being cut in the event of a Ukrainian crisis, as happened in 2006 and 2009 (see Chapter 3). If these additional lines were completed, the total export capacity from Russia to Europe would be 374 bcm. For Russia, these new pipelines served to neutralise competitors (especially Azerbaijan, whose gas will transit through the 'Southern Corridor') and to discourage EU countries from diversifying by making Russian gas available at better prices. The Commission study regards Nord Stream as one of the key elements to compensate for a possible disruption in gas transiting through Ukraine, provided Russian gas to Germany flows regularly[12]. On the other hand, the completion of South Stream is opposed by the Commission because of alleged legal inconsistencies. In its energy security strategy, the Commission clearly states that the project should be suspended.

[12] It should be noted that Gazprom considers re-export of Russian gas illegal.

Figure 1
Major EU pipelines, LNG terminals and MS dependency



Russia's extensive pipeline network is underused: its total export capacity is currently 256 bcm, while actual gas flow to Europe in 2013 was between 135.9 bcm (according to BP Statistics[13]) and 138.8 bcm (according to Gazprom[14]). In any event, overcapacity and low prices are what will cause the EU's dependency on Russia to increase in the long run … unless the political situation forces alternative channels to be found, as this study forecasts.

For the moment, however, the EU's dependence has effectively prevented the Union from targeting the gas sector in the packages of sanctions it adopted following the events in Crimea and Ukraine[15].

[13] See BP Statistical Review of World Energy, June 2014.
[14] See Gazprom, Delivery statistics, 2014.
[15] Sanctions against Russia were decided on 17 March 2014, with the asset freezing and visa ban established for a list of 21 people, a list deepened and enlarged at subsequent meetings of the European Council and Foreign Affairs Council (the list extended to 95 people and 23 entities on 30 July). Following the downing of flight MH17, the restrictive measures were extended to the energy sector (as well as dual use and arms export restrictions, a ban on investments in Crimea and financial limitations on Russian banks). As decided on 31 of July and 12 September, restrictive measures limit export of energy-related technology equipment and forbid exporting equipment for deep water oil and shale oil exploration. From 12 September on they also limit access to financial market for the Russian oil industry. The gas sector has not yet been directly targeted, however.

Table 1

EU sanctions against Russia.

Date	Triggering event	Content
17 March	Referendum in Crimea	21 people targeted with a travel ban and a freeze of their assets in the EU
20 March (measures adopted on 21 March)	Annexation of Crimea and Sevastopol	EU-Russia Summit cancelled; the list of persons subject to visa bans and asset freeze expanded (by 12)
14 April (measures adopted on 28 April)	Armed individuals in east Ukraine; Russian troops near the border	15 people added to the list of individuals subject to restrictive measures.
12 May	Absence of steps to de-escalate	names of 13 separatists added to the list; sanctions for two energy firms under the control of the Crimean government.
27 June (measures adopted on 11 July)	The cease-fire does not led to the full cessation of military hostilities	11 people added to the list
22 July (measures adopted on 25, 30 and 31 July)	The downing of flight MH17	25-30 July - 23 more people and 21 more entities added to list; further trade and investment restrictions for Crimea and Sevastopol. 31 July - restrictions on five state-owned Russian banks. Embargo on the import and export of arms and related material from/to Russia. Prohibition on exports of dual-use goods and technology for military use in Russia or to Russian military end-users. Restrictions on export of certain energy-related equipment and technology to Russia
12 September	Further Russian involvement in the conflict	24 more people added to list; restrictions on financing of Russian oil companies - Rosneft, pipeline operator Transneft and Gazprom Neft

An embargo on Russian gas would constitute a blow both to EU Member States most dependent on Russian gas (and those with a greater ratio of gas in their energy mix), as well to Russia, which would lose revenues (see Chapter 3.2).

As highlighted at various moments – at the EU-US summit of 26 March, in the European Energy Security Strategy of 28 May, at the G7 meeting on 4 June 2014[16] and in the stress test of 17 October – the EU must envisage emergency and long-term solutions to meet its energy needs in the event that international tensions create serious gas disruptions.

Finding substitutes for Russian gas in the short term is not impossible but would prove a shock to the EU economy.

In the short term, a disruption would create several obstacles for the EU to obtain sufficient energy. These are linked to the need to build new import terminals for LNG, to find enough 'spare' gas on the spot market (a challenge, as gas is normally supplied though long-term contracts), to convert electric plants that currently use gas to other energy sources, and to convert home heaters and gas burners. Replacing gas imports from Russia with gas from

[16] See The Brussels G7 Summit Declaration, 4-5 June 2014.

Algeria, Norway and Qatar would be theoretically possible, although it would hugely increase the energy bill and likely therefore create an external shock to the EU economy, resulting in inflation and possibly recession. The Commission has nonetheless advocated enhancing EU energy security by next winter, by increasing storage capacity in the most vulnerable Member States, developing reverse flows, creating a short-term mechanism to switch to alternative fuels, and setting up regional plans for securing the supply.

In the long term, several policies could reduce dependency, but they need to be adopted now

In the long term, security could be strengthened by creating optionality by for example – completing new pipelines (such as the trans-Adriatic pipeline, which would connect Azerbaijan with Italy). Options could also be developed by building LNG terminals, opening and stabilising patterns of trade with new countries such as Iran, reducing energy consumption through appropriate energy efficiency measures, increasing renewable energy production, and 'cleaning' coal energy its huge carbon bio-product (using new technologies called 'carbon capture and storage'). The Commission's Security Strategy lists priority gas infrastructures for the short and medium term. In the long run, Russia's parallel dependency on EU purchases will also decrease, as the 21 March agreement between Russia and China makes clear. The opening of new routes envisaged from western Siberia and Sakhalin island would also reduce EU-Russia interdependence (see Chapter 3.2)[17].

The following pages will analyse the EU's dependence on Russian gas. Alternatives to Russian gas will be examined, with a consideration of their short- and long-term viability. Two scenarios are explored: one is a 'Ukrainian disruption scenario' (whereby 50 % of gas flows from Russia would be blocked) and another is a (very unlikely) 'Russian disruption scenario' (in which gas from Russia is totally cut). Possible alternatives for the short term and long term, when other policies will appear, will also be explored.

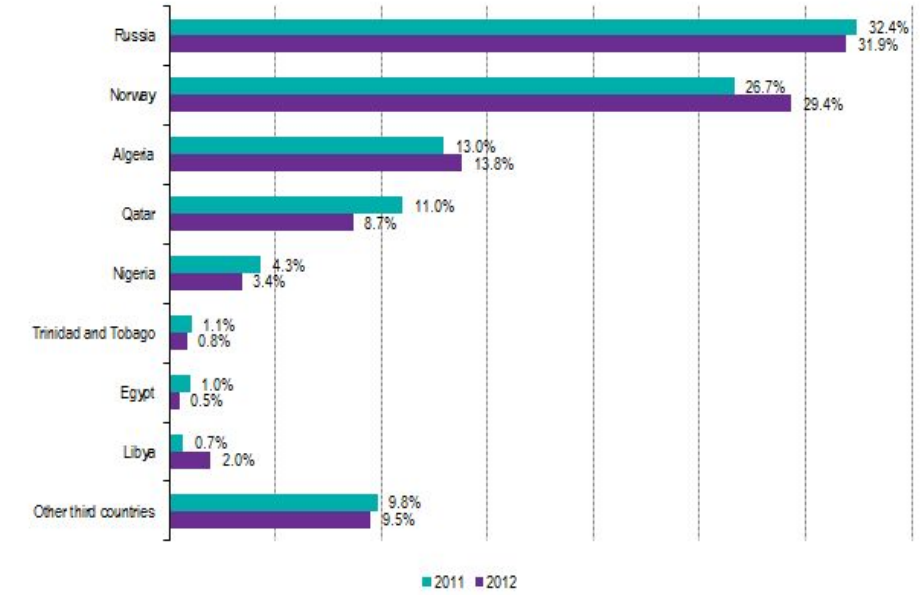
[17] See: See China and Russia sign $400bn gas deal, Financial Times, 21 May 2014.
and Gazprom looks east to restore fortunes as US shale gas booms, Financial Times, 17 June 2013.

2 The EU and Russia: The extent of dependence

Russia is likely to maintain its position as the EU's leading energy supplier.

The Russian Federation has been the main exporter of oil, gas and coal to Europe for many years. In 2013 it provided 43.2 % of the EU's gas imports, 31.38 % of its oil imports and 26.7 % of its coal imports.[18] Russia is also the EU's first supplier of uranium: 27 % of the EU's uranium imports originate in Russia.[19] More problematic is the EU's dependence on Russian gas, which is why this study focuses on this specific fuel.

Figure 2
Gas imports to the EU, by exporter (2011-12)

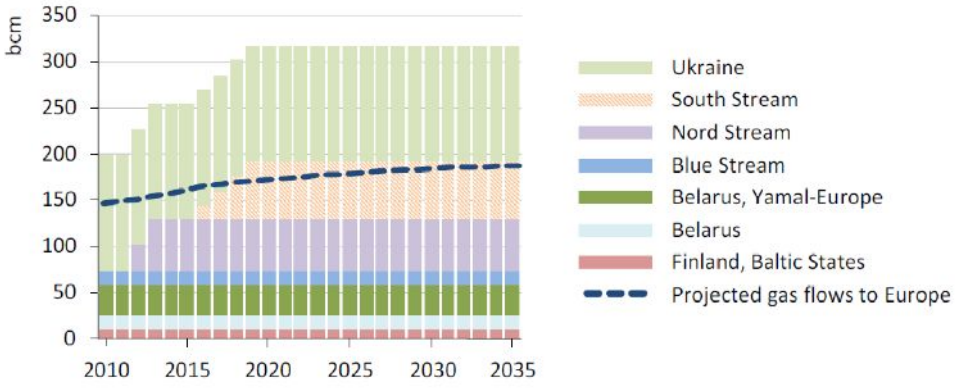


Provisional data for 2012

Source: Eurostat

This dependence is expected to increase in the long run, with the present policies in force (see figure 2). This is a consequence both of environmental policies and of the extensive pipeline network (see figure 1).

Figure 3
Projected gas flows from Russia to the EU and growth in gas pipeline capacity



Source: WEO2011, IEA

[18] BP.

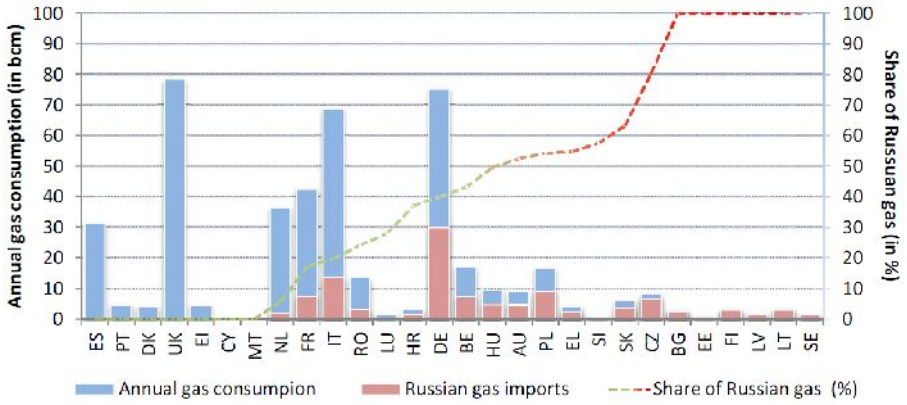
[19] European Commission, Euratom Supply Agency, Annual Report 2012, *Member States' Energy Dependence: An Indicator-Based Assessment*, 2013.

Dependence on Russian gas varies greatly among EU Member States …

… resulting in different prices.

The dependence of Member States on Russian gas exports varies greatly, as figure 1 makes clear. Some northern and eastern Member States depend on a single Russian supplier, and often on a single supply route, for 80-100 % of their natural gas consumption.[20] Others rely on a more diverse range of suppliers, in which Russian imports nevertheless dominate. This is true for Germany, for example, which in 2012 relied on Russia for almost 40 % of its natural gas supply (and which is Russia's biggest market in the EU). Some Member States, mostly in Western Europe (e.g. the United Kingdom, Ireland, Spain and Portugal), do not import any natural gas from the Russian Federation.[21] After Mr Putin broke the Gazprom monopoly in December 2013, Russian companies Novatek and Rosneft are trying to enter these markets by exporting liquefied natural gas (LNG) by sea. The first contract with Spain was concluded in October 2013.[22]

Figure 4
Imports of Russian gas in relation to total annual gas consumption of the EU-28 (aggregated 2012 data)



Sources: BP (2013), EIA (2013 and 2014).

However, the ownership of the pipeline network allows Gazprom to vary the level of prices, producing a situation with different prices for different Member States. Facts demonstrate that the more Member States diversify, and the greater the volumes they consume, the better prices they can negotiate.

An on-going antitrust case against Gazprom targets segmented gas prices in the EU Member States.

This variable price situation was addressed by the European Commission in an antitrust case launched by Commissioner Almunia in September 2012 against Gazprom.[23] The goal of equalising gas prices in the EU has also been pursued through efforts to open and integrate markets and to increase cross-border trade and develop competition.[24] The European Council of March 2014 (see Chapter 4) confirmed the objective of completing the internal energy market by 2014 and of developing interconnections (with reverse-flow technology) in

[20] European Commission, *Energy challenges and policy*, Commission contribution to the European Council of 22 May 2013.
[21] CRS R42405, Europe's Energy Security: Options and Challenges to Natural Gas Supply Diversification, 20 August 2013.
[22] See Reuters, No point for LNG to rival Gazprom piped exports, 1 November 2013.
[23] The case is based on the following factors: (i) market partitioning, meaning that gas price differences between east and west European countries are not always justified by market and tax differences; (ii) barriers to supply diversification, as Gazprom is suspected preventing third parties from using its pipelines[23]; and (iii) unfair pricing, since natural gas contracts have linked gas and oil prices.
[24] European Commission, Energy challenges and policy, Commission contribution to the European Council of 22 May 2013.

order to put an end to the isolation of Member States from the European gas and electricity grids by 2015. In addition, the Commission has attempted to pursue, to a great extent before the Ukrainian crisis, the goal of diversification by means of new routes, new supplier countries and new energy sources.

The new Commission has dedicated a portfolio to 'Energy Union', which will help EU address Russia with a single voice.

Lastly, Commission President-designate Jean-Claude Juncker has endorsed the idea, first proposed to Alenka Bratušek[25], then to Maroš Šefčovič[26], of creating an Energy Union by establishing a specific Vice-Presidential portfolio in the 2014 Commission. The proposed objectives of this initiative would be to strengthen energy security on a European scale, counteract any possible energy shortages over the first three to twelve months, and reduce the EU's energy dependency by diversifying sources and routes of energy imports and by pooling the Union's negotiating power vis-à-vis third countries. The specific mission clearly reflects concerns about dependence on Russian resources as well as short-terms security concerns.

3 Two main gas disruption scenarios

Gas disruptions to the EU may occur next winter. There are two possible scenarios: a gas embargo imposed by Russia (or, more unlikely, by the Member States) or an interruption of the transit of gas to the EU at the behest of Ukraine, as it happened in 2006 and 2009.

3.1 Scenario A: Ukrainian flow disruption

The Russian pipeline network is subject to local instabilities.

Quite surprisingly, despite sanctions and reciprocal embargoes, gas relations with the EU continued smoothly until September 2014. Already on 16 June, however, Gazprom had stopped gas deliveries to Ukraine by switching to pre-payments, allegedly on purely commercial grounds. Ukraine imports huge quantities of gas from Russia: 32.9[27] bcm in 2012 (second only to Germany, 34 bcm in 2012) and 25.8[28] bcm in 2013.

As a consequence, the Ukrainian gas company Naftogaz is heavily indebted to Gazprom, to the amount of USD 5.3 billion[29] – one reason the gas supply from Russia was discontinued in June. If the current dispute is not settled by next winter, Ukraine could be tempted to tap gas in transit to the EU, when its reserves are depleted, as happened in 2006 and 2009. At the same time, Ukraine benefits substantially from the transit of Russian gas through its territory to Europe, a trade which earned it USD 3.2 billion in 2011[30]. A settlement with Gazprom is therefore very much in Ukraine's interest.

Recent increases in Ukraine's gas prices were justified by Gazprom as contractual retaliation.

What brought about the gas cut is the new price arrangement. Russian President Putin and Ukrainian President Yanukovich had agreed on a special

[25] See Mission Letter to Alenka Bratušek, Vice-President for Energy Union, 10 Sept. 2014.
[26] See Mission Letter to Maroš Šefčovič, Vice-President for Energy Union, 15 Oct. 2014
[27] See GAZPROM Annual Report 2012,.
[28] See Gas Export and Enhancing Reliability of Gas Supply to Europe, Gazprom 2014 .
[29] See Reuters, Russia's Gazprom says Ukraine's gas debt grows to $5.3 bln, 8 July 2014.
[30] See M. Hafner, Russian Strategy on Infrastructure and Gas Flows to Europe, Polinares, December 2012.

gas price on 17 December 2013, down from USD 405/ tcm to USD 268.8/ tcm. This special price was part of a rescue package proposed by Russia for macroeconomic stabilisation, worth USD 15 billion, a loan which easily induced Yanukovich not to sign the Association Agreement with the EU, with its incomparably lower promised resources (EUR 610 million). However, the Euromaidan revolution and the change of government induced the Russian government to withdraw the promised loan. This shift in attitude was quickly mirrored by Gazprom's declaration, on 4 March 2014, that it intended to terminate the gas discount to Ukraine.[31] The price was set at USD 485/ tcm, an increase of 80.4 %, but, in announcing it, Gazprom CEO Alexsei Miller did not refer to the political crisis or the change of government in Kiev. Instead he mentioned that the December agreement was conditional on the full repayment of Naftogaz' debt and prompt payment for new gas supplies. Ukraine has yet to repay its debt. The country gained some time in the negotiations when it paid USD 786 million on 30 May[32], but it failed to reach an agreement in subsequent negotiations with Gazprom, in the presence of the European Commission, over the share of the debt to be paid immediately to Gazprom and over the gas price.

Gas flows through Ukraine may be held hostage next winter …

Successive events proved Russia taking a tough stance vis-à-vis Ukraine, with Gazprom now demanding a contractual pre-payment clause and advanced payment of gas supplies as of 16 June 2014.[33] Discussions resumed on 26 September under the aegis of the EU's outgoing Energy Commissioner Günther Oettinger, and a provisional agreement was reached[34] on the provision of 5 bcm at USD 385/ tcm, with a pre-payment clause and an option for supplementary 4 bcm. The agreement has yet to be confirmed by Moscow and Kiev. Even if confirmed, the volume is much less than what Ukraine needs, but it could be enough to satisfy the demand this winter, since Ukraine holds huge reserves, thereby avoiding gas transit cuts. Reduced quantities of gas available for Ukrainian consumption should also favour bolder efforts to pursue energy efficiency options and reduce gas misappropriations.

…but are unlikely if the Berlin agreement of 26 September is endorsed, and the debt to Gazprom paid off.

On the question of the repayment of the debt of USD 5.3 billion, claimed by Gazprom, the September agreement foresees a payment of USD 3.1 billion by the end of the year. According to the Commissioner Oettinger, this sum should definitely settle the Ukrainian arrears, should the Ukrainian position prevail in the on-going proceeding in the arbitration court in Stockholm (a decision by which is expected by next year). The debt with Gazprom is supposed to be paid in part through a two-year IMF aid programme of USD 17 billion and an EU grant of EUR 850 million. Russians are asking the EU to guarantee the debt payment with a "bridge loan" until the IMF loan is operative. According to recent reports, Ukraine has accepted the pre-payment

If there is no agreement on the repayment of the Ukraine´s USD 5.3 billion debt to Gazprom, the consequences to gas supply to the EU could be real and imminent.

[31] See Decision taken to discontinue gas price discount for Ukraine starting from April, Gazprom press release, 4 March 2014.
[32] See , Gazprom gives Ukraine more time to pay off gas debt, The Guardian, 2 June 2014.
[33] See official communication by Gazprom, 16 June 2014.
[34] See Russia and Ukraine near deal on gas supplies, Financial Times, 26 September 2014.

principle but has requested that the payment be made in three instalment of USD 1.5, 0.8 and 0.8 billion[35].

These developments notwithstanding, even if the Berlin agreement is endorsed and the ceasefire in Ukraine is observed, future gas shortages cannot be excluded, especially if the demand for gas in Ukraine increases in the coming winter months. Should Russia continue its hold on gas deliveries, Ukraine can be tempted to cover its gas needs from the flow destined for the EU, as it did in 2006 and 2009. This constitutes an **imminent energy security threat** facing the EU.

EU Member States' efforts to return Russian gas to Ukraine led to the first gas cuts in the EU.

Some Member States have tried to supply Ukraine by reselling gas purchased from Russia, but this has triggered a fierce reaction from Gazprom, with CEO Miller declaring such measures to be "totally illegal"[36] and threatening gas cuts to those states violating contracts in this way[37]. The response has been as intended: Poland, Slovakia, Austria and Hungary began supplying Ukraine with reverse flow in June, but following a visit by Mr Miller to Hungary on the eve of the Berlin talks, Hungary decided to halt these operations. Likewise, following the reported reduction of Russian supplies to Poland, Austria and Slovakia, reverse flow from these countries has been reduced or halted. Gas cuts to Romania followed a raid by antitrust prosecutors on the offices of the Romanian branch of the Russian oil company Lukoil. These events are of utmost significance as they demonstrate Russia's willingness not only to isolate Ukraine and make it pay its outstanding debt, but to launch a winter gas war. In its security strategy the Commission is promoting technical feasibility of reverse gas flow. However, until the Energy Union is implemented and Russian gas contracts with member States´ companies are confidential and diverging, the legal obstacle remains.

[35] See Naftogaz is willing to pay $ 1.9 billion to Gazprom at the expense of new gas supplies in winter, Itar-Tass, 2 October 2014.
[36] Gazprom CEO Alexei Miller warned that reversed flows would be illegal without the company's agreement. See 'Gazprom says "reverse flow" gas for Ukraine raises legal questions', Reuters, 5 April 2014.
[37] See Russia threatens EU states with gas cut-offs., EU Observer, 26 September 2014.

Table 2
Alleged gas cuts
in fall 2014

Country	Date	Possible triggering event	Percentage of cut quantities
Ukraine[38]	16 June	Price and debt dispute with Gazprom unresolved	100 %
Hungary[39]	25 September	Meeting between Prime Minister and Gazprom CEO A. Miller on 22 September	0 % but Hungary halted reverse flow to Ukraine
Poland[40]	8 September	Gazprom accused Poland of illegally reversing flow to Ukraine	20-45%
Slovakia[41]	1 October	Gazprom accused Slovakia of illegally reversing flow to Ukraine	50%
Romania[42]	2 October	Raid on Lukoil as part of anti-corruption probe	13%
Austria[43]	11 September	Gazprom accused Austria of illegally reversing flow to Ukraine	15%

Ukraine's gas supply might originate in Norway.

It should be noted that reports on gas cuts by the parties involved is not always consistent, a consequence of the opacity of gas contracts and supplies. For instance, Naftogaz claims that the extra supply from Slovakia does not come from reverse flow but from Norway. The Ukrainian company claims to have concluded an agreement with Statoil to halt its dependency on Russian gas on 3 October.[44]

Russia's disruption of the gas flow to Ukraine will be less serious than it was in 2006 and 2009, but southern and central Europe will be affected.

If the Ukrainian flow disruption scenario comes to pass, some EU countries will be less affected than they were in 2006 and 2009. Today only 50 % of Russian gas passes through Ukraine, amounting to no more than 16 % of EU's consumption.[45] The northern flow has been redirected through Nord Stream and the Yamal pipeline (see figure 6), so disruption is likely to hit "only" South and Southeast Europe (countries experiencing shortages will be Italy, Germany, Czech Republic, Hungary, Slovakia and Austria, see table 3). **South Stream**, the pipeline designed to bypass Ukraine to the south is the only way to permanently dismiss this scenario, but it was criticised and delayed by the European Commission prior to the Euromaidan revolution.[46] It is unlikely to be completed as the situation stands at present, given that the EU is rather

The South Stream pipeline provides the

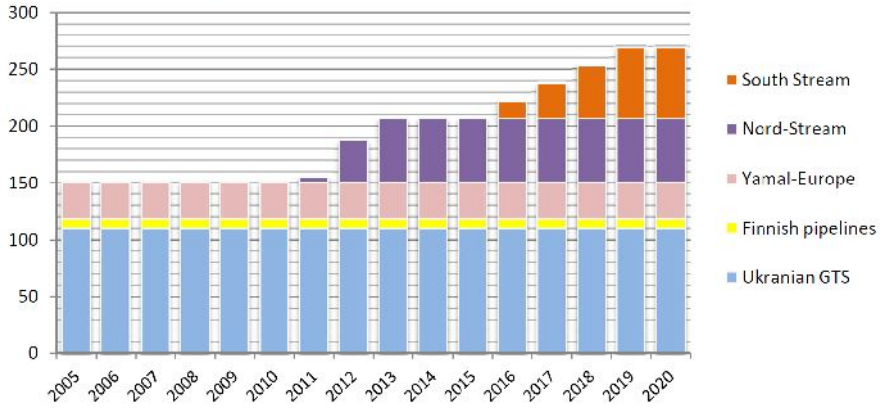
[38] Ukraine crisis: Russia halts gas supplies to Kiev, BBC, 16 June 2014.
[39] See Hungary halts flow of gas to Ukraine, Financial Times, 26 September.
[40] Russia threatens EU states with gas cut-offs, EU observer, 26 September 2014.
[41] Gas war escalates as Russia halves Slovakia supplies, EU observer, 2 October 2014.
[42] Russia cuts gas exports to Romania after Lukoil raid, Business News Europe, 3 October 2014.
[43] Russia restricting Austria's gas supplies, The Local, 11 September 2014.
[44] See Norway's Statoil sells gas to Ukraine's Naftogaz, Reuters, 3 October 2014.
[45] See 16% of natural gas consumed in Europe flows through Ukraine, EIA, 14 March 2014.
[46] As the European Commission declared on 5 December 2013, South Stream was in breach of the EU's 'Third Energy Package', a legislative package that requires vertically integrated companies in the EU to 'unbundle' production and transport activities. See Delays to South Stream benefit Ukraine, European Parliament, DG External Policies, Policy Department, December 2013.

only way to permanently avoid 'Scenario A' – a disruption caused by a partial cut in Russian gas supplies.

looking to diversify Russian gas imports (as stated in the Mission Letter to the Vice-President designate for Energy Union Maroš Šefčovič [47]), and that US sanctions against Russia's de facto annexation of Crimea are likely to block the construction of the Bulgarian part of the pipeline[48]. However, Member States most directly involved (Austria, Croatia, Greece, Hungary, Italy, Serbia and Slovenia) have put pressure on the Commission to lift its veto, while the Bulgarian government has blocked it.[49] Moreover, in the EU Energy Council meeting of 6 October 2014, the Italian Presidency declared that the EU is not hostile to South Stream, provided that its compatibility with the EU regulatory framework is assured.[50]

Delaying South Stream construction has had a counter effect, however. As figure 5 shows, it is clear that without South Stream, the Russian gas flow will continue to be determined by Russia's and Ukraine's bilateral relations.

Figure 5
Russia's export capacity to Europe (2005-2020)



Data sources: IEA (2012a & 2012b) and the websites of Gazprom (www.gazprom.com) and Naftohaz (www.naftogaz.com).

The Nord Stream pipeline has capacity to spare.

It should be noted that the **Nord Stream** pipeline, directly connecting Russia and Germany, did not work at full capacity of 55 bcm in 2013 – the gas flow totalled only 30 bcm. In theory, should the Russian gas flow to Ukraine be discontinued, 25 bcm of gas can still be redirected to supply Ukraine, but this would be opposed by Gazprom, as the recent experiences of Hungary, Slovakia and Poland have shown.

The Ukrainian transit halt scenario would likely to have a particularly strong impact on the countries listed in Table 3, and the volume of gas that would need to be reallocated in this scenario would be on the order of 86 bcm per year.

[47] See Mission Letter to Maroš Šefčovič, Vice-President for Energy Union, 15 Oct. 2014.
[48] This is a consequence of the US freezing the assets of Russian oligarch Timchenko, whose company Stroystransgaz won the tender for the construction of the Bulgarian part of the pipeline. See South Stream victim of Crimea annexation, Euractiv, 23 March 2014.
[49] See Renzi leads belated effort in support of South Stream, Euractiv, 6 June 2014.
[50] See EU's Oettinger expects Russia-Ukraine gas deal this month, Reuters, 6 October 2014.

Table 3
Russian gas imports, by country (2013-2012)

	2013	2012
Italy	25.33	15.08
Turkey	13	14.02
Germany	11.71	21
Czech Republic	7.32	7.28
Hungary	6	5.29
Slovakia	5.42	4.19
Austria	5.23	5.22
France	3.21	3.04
Bulgaria	2.76	2.53
Greece	2.63	2.5
Romania	1.19	2.17
Serbia	1.16	0.74
Slovenia	0.54	0.5
Switzerland	0.37	0.3
Bosnia-Herzegovina	0.19	0.26
Macedonia	0.04	0.08
Total	**86.1**	**84.2**

Sources: Gazpromexport, Ukrtransgaz, Argus estimates in Argus FSU, 27 February 2014, Defensive measures, p.3

Ukraine needs to reform its energy sector. Gas shortages may force the reform.

Under any circumstance, however, Ukraine needs to reform its energy sector. Its gas consumption is too high, and waste and excessively burdensome subsidies need to be addressed. The sector is completely opaque, partly as result of the extensive bribery that has characterised the gas market[51] and partly owing to the lack of clear measurements of gas flows. Import meters are not in place, leaving room for corruption and parallel gas flows. Implementation of the Berlin agreement of 26 September, with a severe reduction of Russian gas and higher prices to pay, may provide the incentive for a bolder efficiency policy.

3.2 Scenario B: General flow disruption

If Russia halts gas deliveries completely, the EU would experience serious shortages.

The second scenario, a general flow disruption, through less likely than the one discussed above, has been analysed by major European think tanks[52]and is discussed in the Commission´s Strategy. In the event of rising military tension with Russia, EU sanctions affecting gas sector could be envisaged. A Russian threat to discontinue the gas flow in wintertime, limiting or halting gas flows in the Nord Stream and Yamal pipeline as well (see figure 1), would also be conceivable. This would have serious implications for many Member States, given the huge volumes of Russian gas imported by countries such as Germany, Italy and Poland, and the total dependence (though on smaller

Bulgaria, Hungary, Slovakia and the Baltic

[51] See Alan Mayhew, Energy sector reform in Ukraine, Wider Europe, Working Paper 2, 2010.
[52] See An embargo of Russian Gas and Security of Supply in Europe, University of Cologne (EWI) 2014; Georg Zachmann Can Europe survive without Russian gas? Bruegel Institute, March 2014 and Arno Behrens and Julian Wieczorkiewicz, Is Europe vulnerable to Russian gas cuts? CEPS, March 2014.

countries would be the most seriously affected countries.

volumes) of others countries, in particular Bulgaria, Estonia, Latvia, Lithuania, Hungary and Slovakia. Sweden and Finland[53] import gas exclusively from Russia, but in small quantities and both countries have alternative energy sources.

In the general flow disruption scenario, the quantity of gas that would need to be reallocated could amount to the total Russian export, but this is not a given. There are several reasons for this uncertainty:

It is difficult to determine the actual quantities needed: statistics are not coherent…

- While the **quantities** of gas imported from Russia have increased in recent years, there are no exact figures as EU statistics diverge from those of the private sector. 2013 was characterised by a particularly harsh winter, which increased gas consumption for heating, and by terrorist attacks on Algerian production plants and pipelines[54], favouring Russian exports. Gazprom states that exports to Europe in 2013 amounted to 139.1bcm[55], a slight increase relative to the 125.1bcm[56] exported in the previous year (although the figure for 2011 was 127 bcm[57], so 2012 showed a slight drop in imports). LNG imports (and prices) declined as well owing to competition from Asian exporters (see Chapter 4), and this also accounted for the increasing share of Russian gas exports.

…and the quantities 'needed' will shrink with higher prices.

- In the shorter term some of the imported gas can be replaced with **other energy sources** (coal, oil), depending on industrial and household demand patterns. Demand is partly fixed, partly flexible, depending on requirements for electric and industrial plants and for house heating and burning appliances. A portion of the EU demand will simply shrink as a result of the price rise: the higher costs of rapid substitution will rapidly increase gas costs, especially in the short term. This means that gas consumption will be concentrated in areas of essential production, and energy-intensive industry (steel, chemicals, machinery) could be affected in the short term, especially if the winter of 2014-15 is colder than the preceding one. This could shock the whole EU economy, reducing output and raising prices.

A cold 2014-15 winter would heighten the external shock.

Under the circumstances, however, a simple policy of replacing gas sources is not an available option. The high price of substituting gas sources and competing on the market with Asian countries would lead to a contraction of EU gas demand, even in the short term. Other policies to **curb consumption** would urgently be needed, and even drastic cuts to private heating or to energy-intensive industrial plants would be possible. Some authors[58] take the

[53] Finland is developing a nuclear project with Russian technology. The present situation of tension could endanger it.
[54] Attacks on gas plants in Algeria took place in 2004, 2011 and 2013. They resulted in decreased production.
[55] See Gas Export and Enhancing Reliability of Gas Supply to Europe, Gazprom 2014.
[56] See GAZPROM Annual Report 2012.
[57] See GAZPROM Annual Report 2012.
[58] See Bruegel 2014 and CEPS 2014.

optimistic view and maintain that it would be possible to replace the missing gas quantities in the short run. Others[59] are much more cautious and stress that even in the Ukraine disruption scenario, market rigidities and bottlenecks would prevent replacement and generate a severe shock to the EU economy. The Commission study takes a position between these two approaches.

A major gas shortfall would likely hurt the EU economy.

The consequences of a gas embargo by Russia have been analysed in a paper from Cologne University[60]. According to this study, which takes into account the available gas reserves, effects of an embargo would be severely felt

- by Finland after one month,
- and by Bulgaria and Poland after three months,
- and by Greece, Estonia, Hungary, Cyprus, Slovenia and Austria after six months,
- and by Germany, Italy and France after nine months.

Figure 6
Gas disruption following a Russian gas embargo

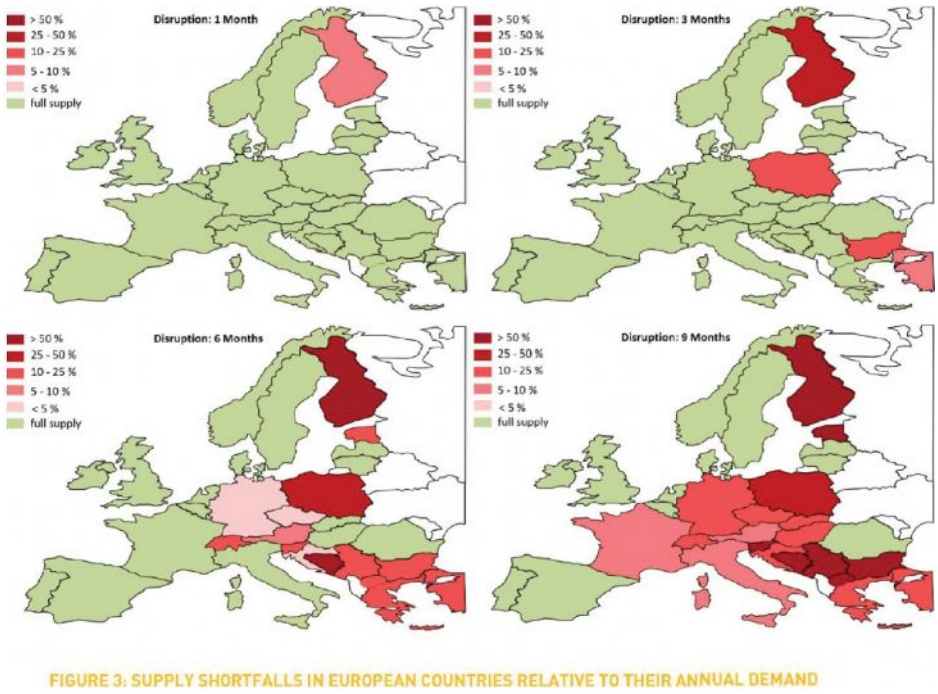


FIGURE 3: SUPPLY SHORTFALLS IN EUROPEAN COUNTRIES RELATIVE TO THEIR ANNUAL DEMAND

Source: EWI, University of Cologne

The results of the **stress test** published by the Commission on 17 October indicate that a six-month interruption of gas supplies from Russia, compounded by a lack of cooperation among Member States, would mean that Bulgaria, Romania, Finland, Lithuania and Estonia could face shortfalls of 40 % or more. (The last three countries would not be affected if Ukraine's gas were cut, as in scenario A.) Hungary and Poland would suffer shortfalls of up to 20 and 30 % respectively.

But is a Russian gas cut realistic? The answer will be determined by Russia's dependence on the EU market.

[59] See European energy security. Conscious uncoupling, The Economist, 5 April 2014
[60] See University of Cologne (EWI), 2014

The EU profits from the relatively low price of Russian gas.

As demonstrated in Chapter 2, EU dependence on Russia is of such magnitude that it cannot be offset from one day to the next. Russian gas is cheaper, and will remain cheaper in the long run, and, what is more, it will be easily available because of the pipelines' overcapacity.

Unless strong and serious decisions are taken in the short term, and unless the energy strategies of major players such as Germany and Italy are modified, the EU's dependence on Russian gas is set to increase in the long run (see figure 3). All other things being equal, the **EU use of gas is expected to rise** from 327 bcm in 2012 to 413 bcm in 2020[61] as a consequence of the Fukushima nuclear disaster and Germany's abandonment of nuclear power.

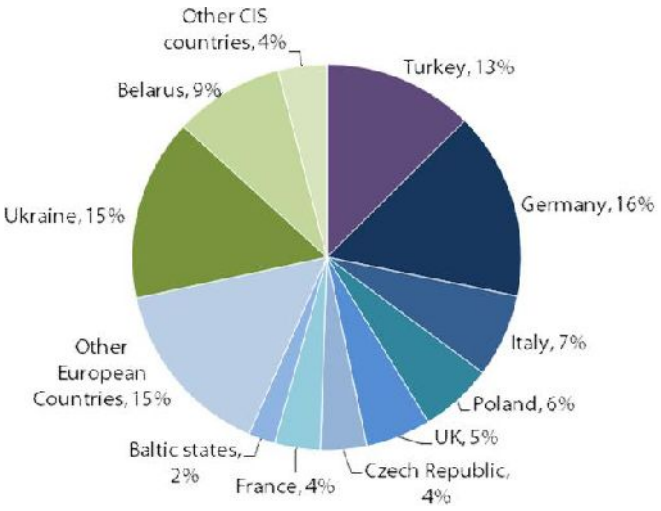
Russia is currently dependent on the EU market for its gas exports.

All studies agree, however, that a scenario in which the gas flow from Russia is brought to a complete halt in consequence of the Russian involvement in Ukraine, is unlikely. Russian oil and gas exports amount to USD 515 billion and represent 52 % of the income to a Russian federal budget supporting a rather fragile real economy.[62] Russia's largest export market is the EU, not only for gas (see figure 7) but also for oil.

In 2012 Russia exported 47.5 % of its oil and 37.3 % of its gas production[63]. Of this, 84 % of the Russian oil and 61.7 % of the gas were bound for Europe, highlighting **Russia's dependence** on European purchases.

Russian exports to Ukraine are also substantial, probably because of inefficient gas use and illegal channelling to neighbouring countries.

Figure 7
Destination of Russian's natural gas exports, 2012



Source: Gazprom

Russia is reducing its dependence on the EU market.

In order to limit its dependence on the mature European market and increase its resilience to EU sanctions, Russia is trying to diversify its exports, such as by supplying LNG to emerging economies in East Asia. The "Power of Siberia" pipeline, which will bring piped gas to the Vladivostok LNG plant, is expected to be ready in 2017 to cost USD 46 billion – the highest amount ever awarded such a project. Economic viability of the project is only conceivable if a

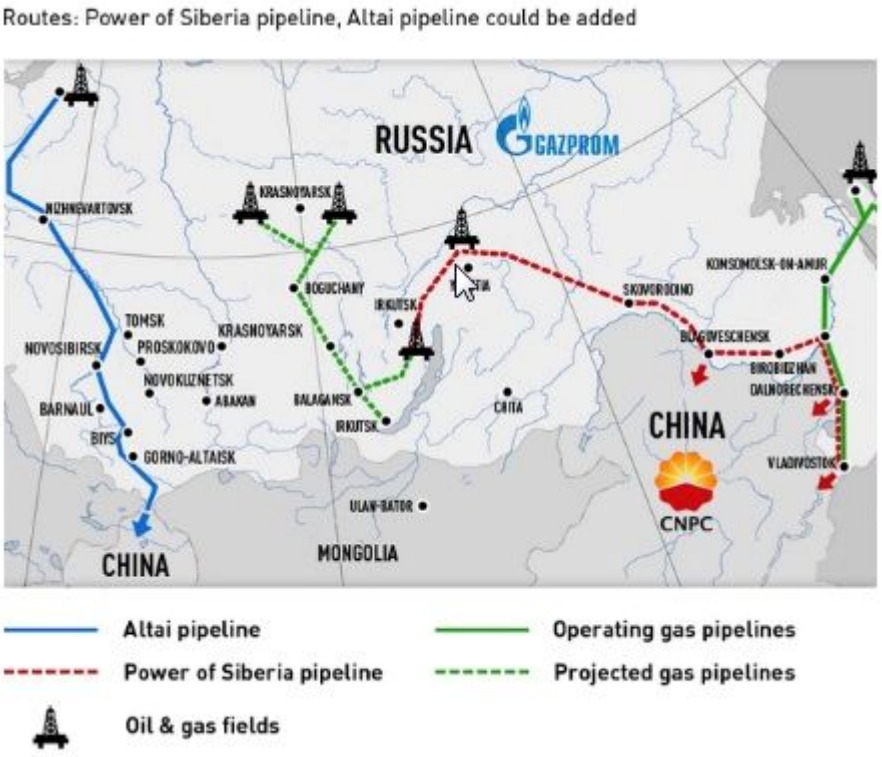
[61] See Oswald, Doerler and Aksath, The future of European Gas supply, AT Kearney, 2011
[62] See Russia Analysis, US Energy Information Administration
[63] See BP, 2014.

pipeline connecting to China is added.

The Russian-Chinese agreement of 21 March opens the Chinese market to Russian gas.

The details of the project were agreed in 21 March 2014 by Mr Putin and Mr Xi, the Chinese president, in a USD 400 billion deal, "the largest contract in the history of the gas sector of the former USSR", as declared by Mr Putin. The contract is aimed at providing 38 bcm of gas to China for 30 years. Although this is not an enormous volume compared with Gazprom's exports to the EU, the agreement paves the way for an eastward rebalancing of the Russian pipeline system.[64] Some experts have anticipated that these 38 bcm could be raised to 100 bcm by adding gas export from Sakhalin, and to 130 by adding the Altai route from Central Asia. On 18 September 2014, a plan for a fast implementation of the Altai route to China (with 30 supplementary bcm) was unveiled by Mr Miller. According to the Gazprom CEO, this western Siberia route could become operative before the eastern pipeline is completed.[65]

Figure 8
New Russian pipelines to Asia.



Source: Business New Europe, 22 May 2014.

In reaching towards such export volumes, Russia may acquire the capacity to become a "swing producer" and to extricate itself from the EU monopsony. Should this come to pass, dependence may become one-sided, and EU sanctions, though still biting, would not suffice to tackle the gas sector.

It is probably for this reason that Mr Barroso, writing to Mr Putin on the day of the agreement, recalled that "gas flows should not be interrupted" and invited

[64] See China and Russia sign $400bn gas deal, Financial Times, 21 May 2014.
[65] See Russia, China to sign new 30 year gas deal via 2nd route, BRICS Post, 18 September 2014.

Gazprom "to ensure the deliveries of the required volumes as agreed in the supply contracts with European companies".[66]

Russian oil could be exported to China without figuring in international financial markets.

The repositioning of Russia alongside its energy-thirsty Chinese neighbour could also favour Russian oil exports. The Russian oil industry has been targeted by the latest package of EU sanctions of 12 September 2014.[67] In theory these could thwart Russian efforts to export oil since such international sales require access to the world's financial markets, and Russian companies need to borrow, and be quoted, on them. This is clearly a last resort option, with heavy consequences for both Russian and western companies, and analysts envisage it only in the event of a Russian attack on NATO allies.[68] However, the agreement with China offers Russia a way to directly divert its oil export, bypassing the financial markets.

4 Policy mix in the short term

Several studies and the Commission´s stress test suggest that interruptions in gas flows from Ukraine – or even Russia – are possible and require developing a response in the short term. Not only must alternative gas sources be found; a sustainable policy mix for energy must be defined that includes both energy savings and rapid changes in the fuels used to generate electricity.

In the long run, it will be easier to find comprehensive solutions. Much of the technological bottleneck can be addressed, although this will require immediate expensive and bold investment decisions. With the energy policies currently in force, dependence on Russia – the cheapest source for gas at the moment – is forecast to increase.

Analysts propose different short-term solutions, varying from a very positive approach[69] to a more cautious one[70].

A recent study projects delayed effects on EU Member States from a Russian embargo on gas exports.

One of the most recent studies on the issue[71], published by the Institute of Energy Economics (EWI) at the University of Cologne, details the delayed effect of scenario B (general flow disruption), taking into account the **available reserves** (85 % of EU storage capacity, equal to 100 bcm, were available at the end of August 2014 and 90 % at beginning of October[72]) and the **counteracting capacity** of the European gas market. Some key elements need to be taken into consideration in a situation of shock: storage, technical

[66] See Letter from EU Commission President Barroso to Russian President Putin, 21 May 2014

[67] See Council Regulation (EU) No 959/2014 of 12 September 2014 : It shall be prohibited to provide, directly or indirectly, the following associated services necessary for deep water oil exploration and production, arctic oil exploration and production, or shale oil projects in Russia: (i) drilling, (ii) well testing, (iii) logging and completion services, (iv) supply of specialised floating vessels. 2.The prohibitions in paragraph 1 shall be without prejudice to the execution of an obligation arising from a contract or a framework agreement concluded before 12 September 2014 or ancillary contracts necessary for the execution of such contracts.

[68] See Bloomberg Government, 2014.

[69] See Bruegel, 2014, and CEPS, 2014.

[70] See the Economist, 2014.

[71] See University of Cologne (EWI), 2014.

[72] This data comes from the Commission´s Stress test, 17 October 2014.

features of the gas market, bottlenecks, and the ability to transmit gas even with lower pipeline pressure owing to lower or absent gas flow from Russia.

The most vulnerable Member States may be aided by Member States with energy reserves, but this would also expose those with reserves to shortfalls.

According to the Commission stress test, if Member States were to behave cooperatively and share their gas reserves, the impact on most vulnerable states would be largely alleviated. The 'rescuers' (Austria, Czech Republic, Germany, Italy, Greece, Latvia and Slovakia), however, would then suffer shortfalls of up to 10 %.

This may be contrasted with the results of the aforementioned 2014 EWI study, which details delayed disruptions in Member States on the basis of their interconnections and available local reserves. The available quantities in an embargo between three and nine months are presented in Figure 9.

Figure 9
Gas supply shortfalls in case of Russian cuts

Source: University of Cologne, EWI, 2014

In scenario B, the supply shortfall (unsatisfied gas demand) would be 46 bcm in a 3-month gas cut and 65 bcm in a 6-month cut. In an embargo lasting longer than 7 month, even 65 additional bcm would be insufficient. According to this study, extra gas quantities would come from LNG, but after a certain quantity has been supplied to the EU under existing contracts (around 30-45), EU importers would have to compete with Asian importers at higher Asian prices. After 65 bcm, the price would become prohibitive.

Could the Russian economy afford a gas embargo?

Another aspect, and key element, of scenario B is the following: how long can Russia survive without its gas exports? Each month of embargo entails a loss to Gazprom of EUR 4-4.5 billion. Significantly, the gas sector contributes 20 % of the Russian budget. An economy on the edge of recession (mainly owing to Western sanctions) – with the rouble in deep devaluation, inflation at 8 %, growth at -0.8 % and military expenses set at 4 % of GDP – cannot afford such a revenue cut. Observers[73] remark that Russian state capitalism is not moved by economic reasons but by political ones. However, the same commentators stress that Putin´s power is based on channelling gas and oil revenues to the

[73] See Russia's economy. On the edge of recession. The Economist, 4 October 2014.

consumer sector, and that loosing this source of income would likely weaken the cornerstone of Putin´s electorate.

An optimistic analysis foresees completely replacing Russian sources in the worst-case scenario – at an extra cost to the EU of EUR 3-20 billion.

While the EWI study identifies the supplementary quantities of gas needed to compensate for the supply shortfalls created by an embargo (scenario B), earlier studies from spring 2014 concentrate more on alternative sources. Table 4, taken from Bruegel 2014, suggests not only an increase in imports from Norway and North Africa, but also measures to increase production in the Netherlands, change the electricity generation mix, switch to heating from oil, change fuel in industry and cut household consumption. According to these projections, the complete energy mix would be able to offset Russian imports entirely, with a cost to Europe ranging from just EUR 3 billion to EUR 20 billion.

Table 4 - Policy mix for short-term alternatives in the worst-case scenario

Source	Supplementary quantity available -reduction of gas demand (bcm)	Remaining volume of Russian gas to be imported (from total 138 bcm)	Foregone revenues for Russia (EUR million)	Cost relative to Russian GDP (%)	Additional cost of energy replacement for Europe (EUR million)	Additional cost of energy replacement for Europe (% of EU28 GDP)
Imports: Norway	20	118	5 303	0.32	0	0
Imports: North Africa	5	133	1 326	0.08	189	0
Use LNG	30	108	7 955	0.48	4 091	0.03
Use more LNG	60 *(30+30)*	78	15 909	0.95	12 273	0.09
Production: Nether-lands	20	118	5 303	0.32	0	0
Change electricity generation mix	-40	98	10 606	0.64	303	0
Heat from oil	-10	128	2 652	0.16	3 030	0.02
Switch fuel in industry	-15	123	3 977	0.24	0	0
Households decree-se consumption	-20	118	5 303	0.32	0	0
TOTAL	**190**	**0**	**58 334**	**3.51**	**19 886**	**0.14**

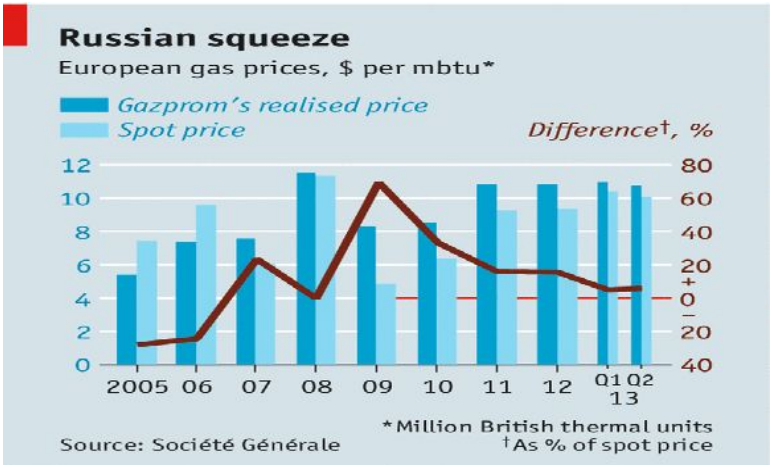
A cautious approach suggests that completely replacing Russian sources in the best-case scenario (and complete eliminating the Ukrainian route) cannot be fully implemented.

A more cautious approach to the short-term solution is presented in another study (Economist, 2014), which looks at the Ukrainian scenario generating a reduction in gas flow of just 80 bcm on an yearly basis: in the very short term this does not affect the EU, since its storage capacity is at present 55 % full (44bcm[74]) after an unusually mild winter. By next winter, however, the situation is likely to become much worse, and the options described in the previous study are presented as much less viable:

- Imports from Norway (the most reliable supplier) can be increased by no more than 10 bcm;
- Imports from Northern Africa, affected by local instabilities, will likely be inferior to those of the previous year;
- LNG is not such a viable option as presented in the previous chart, even though LNG prices have recently declined accompanied by a decline in imports and demand.

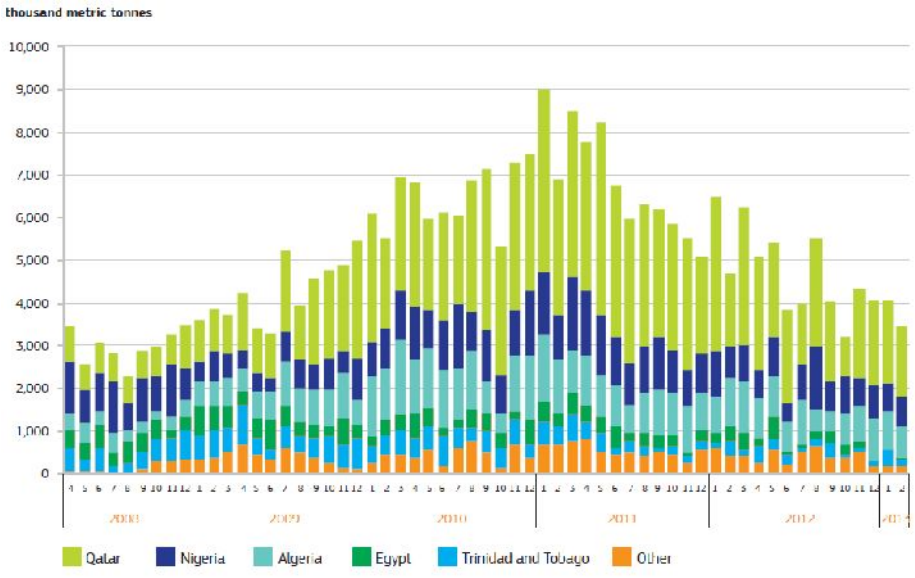
Liquefied natural gas (LNG) commands lower prices in the EU than in Asia.

Figure 10
Gazprom and LNG Prices



Source: The Economist, 4 January 2014

Figure 11
LNG imports in the EU



Source: Eurostat

[74] See EU Commission, In-depth study of European Energy Security, 28 May 2014.

The reason for this apparent paradox is that the Asian market has attracted LNG exports previously aimed at the EU. The construction of LNG terminals is among the most expensive of energy investments and, once built, investors tend to want a rapid return on capital. To this end, they make terminals work at maximum capacity, and they prefer to sell to Asia where prices now are higher[75] owing to Japanese nuclear decommissioning and Chinese efforts to replace the unbearably polluting coal. Lower gas prices in Europe (thanks to cheap Russian gas) and high prices in Asia may explain why the EU's LNG imports have declined in recent years. As described above, the EU may well compete with LNG directed at Asia, but it has to pay a commensurate price for it.

Coal plants are running at maximum capacity.

Burning coal for electricity generation is another option, but there is little generating capacity in coal-burning plants at present, owing to the very inexpensive imports from the USA (which is replacing coal with shale gas) and the very low cost of carbon permits in the EU (as a result of the recession, the CO_2 level has decreased even with polluting electricity generation).

The sum of these four options would only yield 50 bcm in the short run. This means that even a Ukrainian disruption (80 bcm) cannot easily be offset in the short term, and any efforts would need to be complemented by Nord Stream.

Burning oil in electricity generation plants is another possibility, but as oil provides higher revenue than gas, such oil would need to come from other sources than Russia, or dependence would be increased.

The European Commission's security strategy adopts an optimistic approach in the event of a Ukrainian disruption (Scenario A).

The Commission, in its Security Strategy and Stress Test[76] is quite optimistic in its substitution forecast, arguing that of the missing 85 bcm (Ukrainian flow disruption, scenario A), 25 bcm can be supplied via Nord Stream, 15 bcm by Norway, 10 bcm by LNG, 10 bcm by coal and 5 bcm by an initially high storage level owing to the mild winter 2013-2014. What about the remaining 20 bcm? According to the Commission, another mild winter (3 °C higher than average) with strong winds (12 % stronger than average) could suffice to cover the remaining 20 bcm. The only alternative would be to shut down one third of EU chemical industry.

The strategy also makes concrete suggestions for 'Scenario B' (total Russian disruption).

Scenario B (General flow disruption) is much more difficult to cope with in the short run, but as part of its strategy the Commission suggests the following actions and urgent projects:

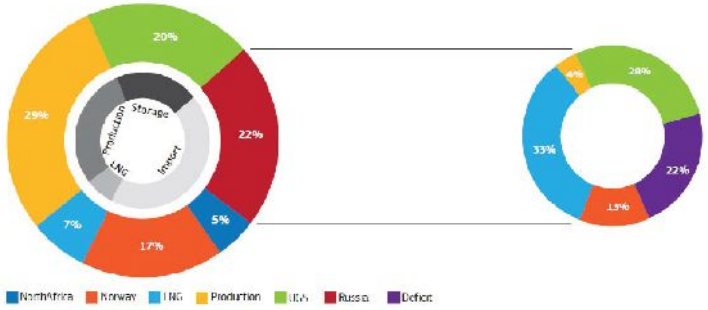
- intensify cooperation within the Gas Coordination Group, monitor gas flows and storage levels, and coordinate risk assessments and contingency plans at EU/regional level;
- update the risk assessments and implementing the Preventive Action Plans and Emergency Plans (including cuts to non-protected customers on the basis of solidarity), as provided for by Regulation 994/2010;

[75] In 2012 the price of one btu of gas was USD 16.75, while in Germany it was USD 11.03.
[76] See EU Commission, In-depth study of European Energy Security, 28 May 2014, p.115 and Communication on the short term resilience of the European gas system, 17 October 2014.

- cooperate further with gas suppliers and transmission system operators to identify possible sources for short-term additional supplies, notably LNG;
- complete before the end of 2014 the following urgent projects: (1) a floating LNG terminal in Lithuania, (2) a LNG terminal in Swinoujscie (Poland) and a connecting pipeline, (3) Greece-Bulgaria permanent reverse flow on existing interconnector.
- maximise the potential of fuel switching and energy efficiency.

Figure 12
Replacement of Russian gas

Figure 1 – Replacement of Russian gas in the 6-month Russian supply disruption scenario



Source: European Commission

5 Policy mix in the long term

Dealing with external shocks requires solidarity and changing purely national points of view.

In the **longer term** other options may be developed. As recalled in the Commission´s strategy, the EU needs to make its own efforts to guarantee its security, and indigenous sources (such as shale gas and a return to nuclear) need to be developed. Aside from the opening of new routes and source countries (analysed in the next chapter), the EU is expected to reflect on the following alternatives for the longer term:

- indigenous sources (shale gas, local gas, coal, renewables);
- interconnection;
- storage capacity;
- energy efficiency.

Possible ways to increase security include developing indigenous resources…

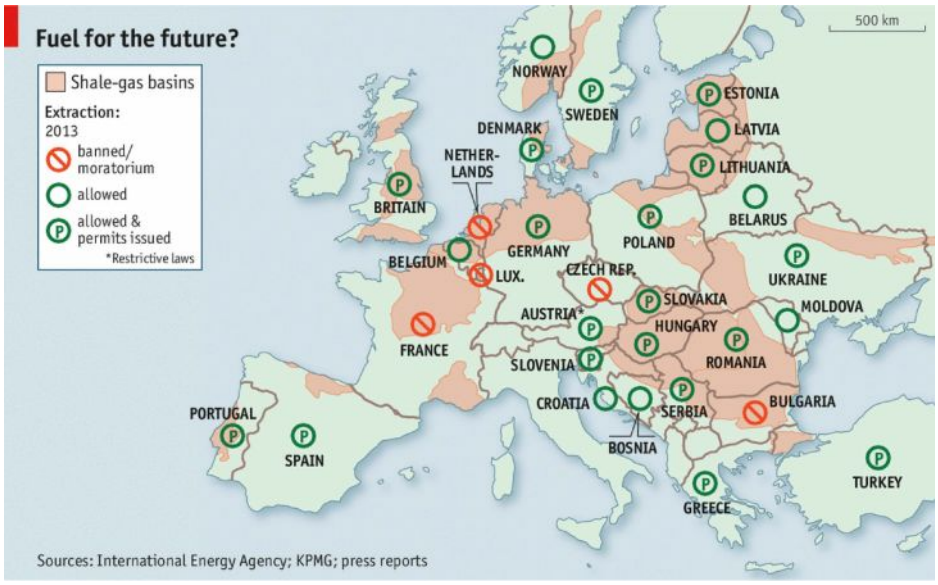
Nevertheless, it is worth noting that Member States are free to determine their own energy mix and the exploitation conditions for indigenous sources (Article 194 TFEU). Action at Union level is rather aimed at guaranteeing security, market functioning, interconnection and renewable energy. The problem is that all these actions are now clearly interconnected, and an external energy shock, such as the Ukrainian crisis, cannot be absorbed other than by joint action based on the solidarity principle. In a situation of international tension, common security interests should prevail over national interests or short-term economic considerations (such as the fact that Russian gas may be cheaper than other options).

The abovementioned Dutch gas field, where production (according to the

Bruegel study) can be increased by 20 bcm, is facing huge popular opposition. The alternative is shale gas production, which is concentrated in some countries (see figure 13) but which faces national bans and opposition from environmentalists in countries such as France and Bulgaria. Extraction technology (hydraulic fracturing) is invasive and noisy, and probably pollutes underground water. Total reserves are expected to be around 11 700 bcm, a quarter of the US reserves. Analysts expect the EU to produce 4 bcm a year in 2020, a very low figure compared to the expected US production (70 bcm).

…including shale gas in the EU.

Figure13
Shale gas deposits and extraction permits



Source: The Economist 5 April 2014

The EU is also exploring increasing renewable energy…

Increasing renewables beyond the threshold of 20 % of the energy mix by 2020 is still under discussion: the Commission has proposed that renewables should account for 27 % by 2030. This notwithstanding, the European Council of 21 March 2014 decided that:

- support mechanisms for renewables must be based on a more cost-effective and market-based system, and more convergence of national support schemes will be required beyond 2020; and
- sustained investment in energy efficiency and demand-side management is required all along the value chain and at the R&D stage.

…and promoting interconnections between gas and electricity grid.

Interconnection of the gas and electricity grids is of utmost importance. Boosting indigenous energy, LNG terminals and renewables all require an efficient way to redistribute energy to countries in need in the event of external energy shocks. National grids were conceived to avoid interconnections, since segmentation of national markets guaranteed monopoly prices for national champions. The Commission has challenged segmentation since 2009, not least by championing reverse gas flow to equalise prices[77] and to be able to share supplies in solidarity as security needs

[77] Gas prices vary widely, ranging from EUR 34.2/megawatt-hour (MWh) in Latvia to EUR 41.9/MWh in Bulgaria. Figures provided by the Commission in May 2013 show that border prices for gas imports to countries such as the United Kingdom, Germany and Belgium are

require. While interconnections have not yet been completed, they have improved in recent years. For example: Poland and the Czech Republic are now linked by a small pipeline (and a larger one is planned, with construction to start in 2017); Germany is connected to Italy, Poland and the Czech Republic; and Slovakia has just been connected to Hungary.

Interconnection is mentioned explicitly in the conclusions of the European Council of 21 March 2014[78] with the aim to end gas and electricity isolation by 2015 (it was supposed to be achieved by 2014 but remains uncompleted). In particular, the Council required the Member States to achieve interconnection of at least 10 % of their installed electricity production capacity, and asked the Commission for a proposal on interconnection targets to be put forward by June and to be achieved by 2030. The objective is "to improve interconnections with the more remote and/or less well connected parts of the single market, including through the improvement and creation of reverse flows, and integrating Member States into the European continental networks".

Table 5
Gas storage capacity of Member States, 2013.

Country	Gas storage capacity (bcm)	Country	Gas storage capacity (bcm)
Belgium	0.7	Poland	1.8
Bulgaria	0.650	Portugal	0. 179
Czech Republic	2.8	Romania	3.135
Denmark	1	Slovakia	2.8
Estonia	0	Slovenia	0
Finland	0	Spain	4.367
France	13.97	Sweden	0.01
Germany	20	United Kingdom	4.3
Greece	--	Austria	7.5
Hungary	5.13	Ireland	0.2
Italy	15.6	Malta	ND
Latvia	4.47	Cyprus	ND
Lithuania	0	Croatia[79]	0.53
Luxembourg	0		
Netherlands	5.2		
Czech Republic	2.8	Romania	3.135

Source: European Commission.

on average well below (by about 35 %) prices for gas imports in countries that depend on a limited number of suppliers, such as Bulgaria or Lithuania.

[78] See European Council conclusions, 21 March 2014.

[79] See Gas Infrastructure Europe, 2013.

Some medium-term gas projects are proposed in the Commission´s security strategy.[80] These include: **interconnectors** in Lithuania-Latvia (2017, to be upgraded in 2020), Greece-Bulgaria (2016), Bulgaria-Serbia (2016), Slovakia-Hungary (2015), Poland-Lithuania (2019), Finland-Estonia (2019), Spain-France (tbd), Poland-Czech Republic (2019), Poland-Slovakia (2019) and Albania-Montenegro-Croatia interconnector with TAP (2020); **new LNG terminals** in Estonia or Finland (2017), Croatia (2019) and Greece (2016); **new pipelines**, namely TAP and TANAP from Azerbaijan to Italy (2019), IAP from TAP to Balkans (2020), PL:3 from the Baltic coast to the Poland-Slovakia and Poland-Czech Republic interconnectors; and **internal systems** in Bulgaria, Romania and Greece.

Gas storage capacity increases is a key component in ensuring EU energy security in the event of gas flow disruptions. The Member States have very different levels of gas storage capacity, as shown in table 3. The Commission communication assesses that 90 % of the EU's gas storage capacity can be filled by the end of the summer.

Energy efficiency – another tool for overcoming EU gas dependence actively pursued by the EU – is not addressed in this study.

6 Alternatives to Russia: Breakdown per country

6.1 The USA: High hopes facing a more nuanced reality

The EU does not import gas from the USA.

Overview of the country's gas sector and capacities

The US has traditionally been an importer rather than an exporter of gas.

In 2013 US total production of natural gas was 687.6 bcm, with total exports of dry natural gas amounting to only 44.4 bcm.[81] The USA both imports and exports natural gas, but so far imports have exceeded exports. This situation is expected to be reversed by 2020 with the projected achievement of self-sufficiency in gas, turning the country into a net exporter.

A short-term perspective

The country lacks LNG export infrastructure.

US law prohibits gas exports to countries that do not have a free trade agreement in force with the US.

In the short term, the USA cannot provide an alternative to Russian gas. The first obstacle is the lack of infrastructure: the only operational LNG export facility is in Alaska, which can export up to 1.12 bcm over a two year period.[82] The US energy strategy has put emphasis on exploiting the country's shale gas resources for industrial production (the so-called "shale gas revolution"), and development of LNG exports has so far not been a priority. US Secretary of State John Kerry stated at the EU-US Energy Council of 2 April 2014 that the EU should not expect LNG exports from the USA until 2015. Indeed, the first LNG export terminal will not open until 2015 (Sabine Pass, Louisiana, with a

[80] See EU Commission, Communication on European Energy Security Strategy, and In-depth study of European Energy Security, 28 May 2014.
[81] See BP Statistical Review of World Energy, June 2014.
[82] See Kenai LNG Exports.

Negotiations on the Transatlantic Trade and Investment Partnership (TTIP) have therefore acquired new urgency since the Crimean crisis.

capacity of 22.7 bcm/y).

Another obstacle is legal: a US 1938 law prohibits the export of natural gas if doing so poses a threat to national security.[83] At the same time, the law establishes that the national interest is verified in the case of exports to countries that have free trade agreements in force with the USA, such as the NAFTA countries. The EU has not signed such an agreement with the USA, making it difficult to import American gas products (should US facilities allow it). However, negotiation on the Transatlantic Trade and Investment Partnership (TTIP) is progressing, and the EU-US summit of 26 March 2014 pressed for its rapid conclusion. Even without the TTIP in force, exceptions can already be granted by the US Administration. However, so far only an authorisation has been granted for exporting LNG to non-FTA countries.[84] Furthermore, the export licences granted by the US government will not directly target European markets, but rather authorise the placing of gas on the open market. The only facility currently in construction is in Louisiana. In 2017 it will produce LNG in quantities equal to a sixth of the EU's consumption, but these have already been reserved, half by India and South Korea, and half by UK and Spanish companies.[85]

The US is developing its LNG export capacities significantly…

… but volumes are unlikely to be sufficient to meet European demand,

In this context, and in particular since the Crimean crisis, TTIP negotiations have taken a crucial turn, as a signed agreement would allow the EU to import US gas more easily, once the infrastructure is operational.

The long-term outlook

The long-term perspective is more promising. There are currently 23 applications pending for the construction of LNG export plants in the US, and six export projects have so far been authorised. The country's LNG capacities could reach up to 66 bcm by 2018-2020. By then, the EU will most probably have signed an FTA with the USA, allowing it to import American gas.

At the same time, the US Senate's Energy Committee is currently working on a series of LNG-related bills intended to achieve alternative goals. The "Expedited Liquid Natural Gas for American Allies Act" of 2013[86] would allow easier authorisation to export LNG to non-FTA partners of the US, notably NATO members, Japan and any other foreign country where gas exports may promote wider US security interests.

LNG exports to Asia are more profitable.

Nonetheless, US gas export prospects are limited in terms of making a significant contribution to EU energy security. Firstly, US LNG exports would primarily go to Asian markets, where prices are higher than in Europe[87],

[83] A similar provision applies to oil and coal. The Energy Policy and Conservation Act of 1975 require a licence aimed at verifying several conditions, the first being the national interest. So far coal exports have never been blocked.
[84] To Sabine Pass-Cheniere (Louisiana), for 22.7 bcm/y.
[85] See US Gas Tantalizes Europe, but It's Not a Quick Fix, New York Times, 7 April 2014.
[86] Proposed bill S 192 of 2013.
[87] In 2012 the price of one btu of gas was USD 16.75, while in Germany it was USD 11.03. (CEPS, 2014)

making them more profitable. European demand for LNG is also expected to rise sharply (42 %) in the next 10 years, up to 113 bcm[88] – the potential US LNG contribution in that context would not represent a significant portion of EU demand. The development of LNG export facilities should not be taken for granted, as this strategy faces domestic opposition. Some voices are raised in concern that Europeans may change its mind and decide to switch back to cheap Russian gas, causing investment losses for the USA. An industrial lobby composed of steel and aluminium manufacturers (industries that are among the most intensive consumers of energy) is in favour of keeping wider gas production only for domestic use, in the hope of promoting a sort of industrial renaissance. Concerns have also been raised over the possible increase in domestic gas prices should the USA engage in a gas export strategy.

In short, the USA cannot serve as an alternative gas supplier for Europe in the short term, mainly because of the lack of LNG export terminals. The long-term outlook is more promising, as US LNG export capacities are expected to rise significantly in the next decade. Nonetheless, the share of US LNG that could go towards meeting European demands is not significant enough to be a game changer for EU energy security.

US supplies will not be a game changer for EU energy security.

6.2 Iran: Encouraging potential in the long run

The European Union does not import gas from Iran.

Overview of the country's gas sector and capacities

Iran possesses the world's second-largest proven gas reserves after Russia.

Iran possesses 15.8 % of world's total gas reserves. This represents the world's second-largest reserves after Russia[89]. South Pars, North Pars and Kish are the country's main natural gas fields; they are situated offshore in the Persian Gulf. In 2013 the country's total production of natural gas was 166.6 bcm, while it exported 9.4 bcm.[90]

A short-term perspective

Lack of infrastructure and current international sanctions are the main obstacles in the short term.

The lack of infrastructures and the current international sanctions against the country represent the main obstacles to Iran's being a reliable short-term alternative to Russian gas.

Though Iran's total export capacity is more than 150 bcm/y, there are currently no pipelines connecting it to Europe. Iran's gas grid is already connected to Turkey through the Tabriz–Ankara pipeline[91], but a connection between Ankara and Europe is needed if Iranian gas is to be imported to Europe.

International sanctions taken by the EU and the US, in particular those targeted towards Iran's energy sector, have slowed down the development of domestic gas infrastructure by discouraging foreign investment. Nonetheless,

[88] See AT Kearney. The Future of the European gas supply. December 2011.
[89] See Oxford Institute for Energy Studies, What the Ukraine crisis means for gas markets. March 2014; EIA ; OPEC.
[90] See BP Statistical Review of World Energy, June 2014.
[91] Capacity: 14 bcm/y.

further to the Geneva conference on 24 November 2013, Iran and the international community have reached an agreement on Iran's nuclear programme. As a result of the co-operation that followed on 20 January 2014, some sanctions have been lifted and a schedule has been made for the repayment of Iranian oil money held in Western banks. This can be seen as a step towards normalising relations between Iran and the West, which is the key to enhancing energy cooperation in the long term.

The long-term outlook

LNG seems to be the most likely way to import Iranian gas into Europe.

In the longer term, Iranian gas is likely to become accessible to the EU, primarily in the form of LNG. Iran is currently developing its LNG export capacities[92], and is also planning new pipelines. A projected pipeline linking Iran to Oman, with a 10 bcm/y capacity, would allow Iran to export its gas via the Omani LNG hub by 2017. Experts believe that Iran will raise its LNG production from 131 bcm in 2009 to 226 bcm by 2030.[93] Should Turkey and Iran reach an agreement on the projected Persian pipeline, the EU would be able to import 25-30 bcm yearly.[94] At the same time, while PKK attacks on the Tabriz-Ankara pipeline have ended as a result of a ceasefire between the PKK and the Turkish government, the rise of ISIS poses a new threat to stability in the region and, more specifically, to the existing and planned gas export infrastructure. LNG seems to be the most reliable way to import Iranian gas.

Iran is in the process of normalising its relations with the West and reforming its energy sector.

The country also seems ready to introduce the reforms needed to make its energy sector more attractive to foreign investment, as recent statements made by the Iranian Oil Minister, Bijan Namdar Zanganeh, indicate.[95]

Iran seems to be a credible alternative to Russian gas in the long term.

In short, Iran is not a credible source for alternative energy supplies in the short term, but in a long-term perspective it holds promise. Its high potential for gas production, the domestic energy sector reforms that are now underway and the on-going normalisation of its relationship with the West make Iran a credible alternative to Russia.

6.3 Qatar: Credible LNG supplier in the long run

Qatar holds the world's third-largest proven natural gas reserves after Russia and Iran.

The European Union imported 23 bcm of natural gas from Qatar in 2013.

Overview of the country's gas sector and capacities

In 2013 Qatar held the world's third-largest proven natural gas reserves, after Russia and Iran, according to the EIA. The country is the world's largest LNG exporter and second-largest gas exporter. In 2013 Qatar's total production of natural gas was 158.5 bcm and its total exports amounted to 125.5 bcm. The main natural gas field is North Field, located near Iran's South Pars field.

[92] Iran plans to have 7 other LNG terminals. See Fondazione Eni Enrico Mattei.
[93] See ATKearney. The Future of the European gas supply. December 2011.
[94] See Reuters. Iran reports Turkey gas deal, Ankara stands back. 23 July 2010.
[95] Tagliapierta S., 2014. Iran after the (potential) nuclear deal: what's next for the country's natural gas market? Fondazione Eni Enrico Mattei.

Exports from Qatar accounted for 7.3 % of all EU imports of natural gas in 2013.[96] Main EU importers of Qatari gas are the UK and Italy. Exports to the EU are in the form of LNG.

A short-term perspective

A sharp increase in the country's LNG supply in the short term is unlikely.

An approximate 9 bcm increase in natural gas deliveries to Europe is expected in 2014.[97] However, LNG is not as flexible as piped gas when it comes to increasing export quantities at short notice, and the volumes to be delivered (and hence produced) have already been agreed on. A significant increase in Qatari gas in the short term is therefore not to be expected

The long-term outlook

Qatar seeks to maximise its export capacities and is actively developing new projects.

Qatar's energy strategy is to maximise its production capacity so as to take advantage of the current high price of LNG. The country is therefore currently considering the development of many new projects in North Field, and is planning to increase its exports to Europe in the coming 5 years. This strategy is partly in response to competition from Australia, forecast to overtake Qatar's leadership in LNG exports by 2020.

Qatar has many features that would make it a potential alternative supplier of gas.

One asset for Qatar is the low domestic demand, allowing the country to export a significant part of its production. Another strong point is its highly developed infrastructure for LNG exports, and Qatar is also the world leader in GTL (gas-to-liquids) technologies[98].

Furthermore, Qatar is switching from long-term oil-indexed gas contracts to short-term ones in spot market sales. This represents yet another asset for Qatar as an alternative supplier.

In short, the limited flexibility of LNG means that Qatar is unable to supply a significant additional volume of gas to Europe in the short term. However, low domestic demand, a highly developed infrastructure, new gas contract designs and an active strategy of developing new projects make Qatar a credible alternative supplier of energy to the EU in the long run.

6.4 Algeria: A promising alternative marred by domestic instability

Algeria holds the second-largest reserves of natural gas in Africa after Nigeria.

The European Union imported 34.5 bcm of natural gas form Algeria in 2013.[99]

Overview of the country's gas sector and capacities

Algeria holds the second-largest reserves of natural gas in Africa, after Nigeria.[100] In 2013 Algeria's total production of natural gas was 78.6 bcm and its total exports of natural gas amounted to 42.9 bcm. Algeria is the EU's third-largest gas supplier, accounting for about 11 % of total EU imports of natural gas in 2013. Most of these imports are made via pipelines. Algeria's main gas

[96] See BP Statistical Review of World Energy, June 2014.
[97] See Bloomberg, Qatar to Boost Europe LNG Sales as Gas Trades at 7-Year High, 23 December 2013.
[98] Gas to liquids (GTL) is a refinery process to convert natural gas into liquid hydrocarbons such as gasoline or diesel fuel.
[99] See BP Statistical Review of World Energy, June 2014.
[100] 4.5 trillion cubic meters.

importers in the EU are Spain, Italy and France. Three main pipelines carry Algerian gas to Europe: Medgaz (capacity of 8 bcm/y)[101], the Pedro Duran Farell Gasline (capacity of 12 bcm/y)[102] and the Enrico Mattei Gasline (capacity of 33 bcm/y)[103], representing a total capacity of 53 bcm/y.

In the short term, new pipelines could provide up to 48 bcm/y.

A short-term perspective

In the short term, the European Union could, in a best-case scenario, via pipeline import additional gas up to a volume of 48 bcm/y. Indeed, the Pedro Duran Farell Gasline could be upgraded to carry up to 20 bcm/y.[104] Two additional pipelines should be operational in the short term, bringing them up to 40 bcm/y: the GALSI pipeline (operational in 2014), with a capacity of 8 bcm/y[105]; and the Trans-Saharan gas pipeline, with a 30 bcm/y capacity. However, the latter seems unlikely to become operational in the short term, given that the project is experiencing delays resulting from security risks, increasing costs and the instable political situation in the region.[106] Also, the Algerian government is not enthusiastic about the project.

The threat of terrorism is high, making Algeria an unreliable short-term solution.

A new LNG plant connected to the Gassi Touil fields was opened in 2014 and is expected to provide up to 6 bcm/y. Skikda, another LNG plant (capacity 7 bcm/y), has been put back on stream after being damaged by an explosion.[107]

Despite all these promising developments, one problem remains: the security threat represented by militant groups in the country that in recent years have frequently attacked gas and oil pipelines. This risk undermines Algeria's reliability as a significant energy supplier in the short term.

Many projects exist but their completion has been undermined by administrative delays, lack of investment and technical problems.

The long-term outlook

Algeria's main gas fields – Hassi R'Mel, Rhourde Nouss, Alrar, and Hamra – are being depleted.[108] To compensate the loss, the country has launched a number of new projects, summarised in table 6.

[101] See Medgaz.
[102] See European Commission.
[103] Ibid.
[104] Ibid.
[105] See Edison.
[106] EIA.
[107] See Energy Delta Institute.
[108] See EIA.

Table 6
Upcoming natural gas projects in Algeria.

Project name	Partners	Output (Bcf/y)	Start year
Gassi Touil	Sonatrach	tbd	2014+
In Salah (expansion)	BP/Sonatrach	200	2015
Reggane Nord	Repsol/Sonatrach	102	2016
Timimoun	Total/Sonatrach	57	2016
Touat	GDF Suez/Sonatrach	159	2016
Ahnet	Total/Sonatrach	100-150	2016
Hassi Ba Hamou	BG Group/Sonatrach	70-100	2016+
Isarene (Ain Tsila)	Petroceltic/Sonatrach	tbd	2017

Billion cubic feet per year is Bcf/y.
Field expansion at In Salah is to ensure that the current level of output at In Salah is maintained.
Other gas fields that are expected to begin production between 2018 and 2020 are Hassi Mouina, Zerafa, Djebel Hira, Tinhert, Bourarhet, and field expansion at Haoud Berkaoui.Source: Arab Oil & Gas Directory, Global Insight, Repsol, Total, Oxford Energy, *Oil & Gas Journal*, and Bloomberg

Source: EIA.

In sum, Algeria is a promising solution for European gas supplies, but its potential is undermined by high security risks.

However, many of these projects have had to be postponed owing to delays in government approval, lack of investment, infrastructure issues and technical problems. Furthermore, the risk of the Libyan crisis spreading to Algeria, and the frequent terrorist attacks on pipelines, make reliance on Algeria risky.

In short, while Algeria is the most promising alternative supplier of gas for Europe, in terms of both reserves and infrastructure, there is a high risk of disruption caused by terrorist attacks on gas infrastructure in both the short and the long term.

6.5 Nigeria: Insufficient infrastructure and threat of terrorism

Nigeria holds Africa's largest natural gas reserves.

The European Union imported 5.6 bcm from Nigeria in 2013.

Overview of the country's gas sector and capacities

Nigeria is the world's fourth-largest LNG exporter and holds Africa's largest natural gas reserves. In 2013 Nigeria's total production of natural gas was 36.1 bcm and its total exports of natural gas amounted to 22.4 bcm, most of which was exported in the form of LNG. While Spain and France are the largest EU importers of Nigerian LNG, the Asia-Pacific region is now the main market for Nigerian LNG.[109]

A short-term perspective

Nigerian gas exports to the EU are mainly in the form of LNG, which means that a sharp, short-term increase in exports is unlikely.

Attacks and sabotage against pipelines are frequent.

Most of Nigeria's natural gas resources are located in the Niger Delta, from a security perspective a very unstable region. Frequent attacks against and sabotage of pipelines, and conflicts between rival local groups over resource control, means that Nigeria will be an unreliable exporter of gas for as long as

[109] See BP Statistical Review of World Energy, June 2014.

such circumstances prevail.

The long-term outlook

Nigeria is developing many projects.

With the continent's largest reserves, Nigeria would at first glance appear to be a credible alternative supplier of gas. The country is currently developing the Brass LNG facility, which is to have one loading terminal and two liquefaction trains. The expected export capacity will be 13.45 bcm/y. Many other projects are underway: construction of new gas-gathering facilities; repair of existing facilities; and the development of the Forcado Yokri Integrated Project, the Southern Swamp Associated Gas Gathering Project, the Escravos Gas-to-Liquids plant, the Escravos gas plant development, the Sonam field development, the Onshore Asset Gas Management project, the Assa-North/Ohaji South development, the Gbaran-Ubie project, the Idu project, and the Tuomo gas field.[110]

Investing in infrastructure is key to increasing Nigeria's export capacities.

However, Nigeria's potential is undermined by the lack of infrastructure to monetise natural gas (produced with oil in associated fields). The country flared 21 % of its gross natural gas production in 2011. Investing in Nigerian infrastructure development is therefore key to maximising the country's gas exports to the EU. Such investment is a necessary condition for Nigeria to represent a credible alternative supplier of energy in the longer term.

In short, Nigeria has the necessary profile to become a significant contributor to European energy security. However, the main issues are the lack of infrastructure and the risk of terrorist attacks. For these reasons, Nigeria does not seem to be a credible alternative supplier in the short to medium term, but could become one provided that the necessary investments are made.

6.6 Norway: The most reliable energy supplier

Norway is the second-largest EU gas supplier and the world's second-largest gas exporter after Russia.

The European Union imported 104.5 bcm of natural gas from Norway in 2013.

Overview of the country's gas sector and capacities

In 2013 Norwegian gas accounted for 33.4 % of EU imports of natural gas, making the country the second-largest supplier of gas to the EU, and the world's third-largest exporter after Russia. In 2013 Norway's total production of natural gas was 108.7 bcm and its total exports of natural gas amounted to 106.2 bcm. Norway's main gas fields are Troll, Ormen Lange, Asgard and Sleipner Ost, which together account for 60 % of the country's total production. Gas is mainly delivered by pipeline. Germany, France, the UK and Belgium are the main EU importers of piped Norwegian gas, while Spain is the main receiver of Norwegian LNG.

A short-term perspective

In the short term, Norway could supply an additional 13 bcm/y to the EU.

The new gas field Gjøa was put on stream in 2011, and is expected to export gas to the EU through the Frigg UK Pipeline in Scotland. The pipeline's capacity is roughly 13 bcm/y, meaning that Norway could supply an additional 13 bcm/y to European markets. In addition, an extension of the

[110] Source: EIA.

Snøhvit field (piped gas and LNG) is expected to be on stream by 2014-2015[111].

The main obstacle to using Norwegian gas as an alternative to Russian gas in the short term is the lack of flexibility of Norway's gas exports, as the country's production is more or less exactly tailored to the planned exports.

The long-term outlook

LNG development could supply more, bringing Norway's total EU contribution to 20 bcm/y in the long run.

Norway has many projects designed to increase its gas production, notably its LNG export capacities through the possible expansion of the Melkoya LNG facility and potential developments in the Gjøa field. The possible volume increase in Norway's gas exports to the EU is estimated at 20 bcm.[112]

Norway is the most reliable of all possible energy suppliers.

In brief, in the short term Norway could provide the European markets with an additional 13 bcm/y of piped natural gas. In the longer term, a further 20 bcm/y of LNG could be imported from Norway. Moreover, Norway is the most reliable energy supplier of all the possible sources (particularly in light of its democratic political regime, proximity to EU consumers and low security risks).

6.7 Libya: Domestic turmoil and scarce gas exports

In 2012 natural gas imports from Libya accounted for only 2 % of total EU gas imports.

The European Union imported 5.2 bcm of natural gas from Libya in 2013.

Overview of the country's gas sector and capacities

Libya is the fourth natural gas reserve holder in Africa. In 2013 natural gas imports from Libya accounted less than 2 % of total EU gas imports. The same year, Libya's total production of natural gas was 12.0 bcm and its exports were exclusively bound for Europe.[113] Libyan gas mostly comes to Europe through the Greenstream Pipeline (capacity of 9 bcm/y).

A short-term perspective

In the short term, Libya cannot be seen as a reliable alternative energy supplier because of the political instability within the country and the terrorist threat. Indeed, the Greenstream pipeline that provided 9 bcm/y to Italy stopped in 2011 as a result of the turmoil of the uprisings following the Arab Spring, causing exports to drop. Currently, oil and gas exports are still significantly below the levels that prevailed prior to the Arab Spring.

The long-term outlook

Political instability and terrorist threats undermine Libya's potential.

Gas production is expected to increase with the development of two associated oil and gas fields: Faregh, operated by Waha in the Sirte Basin, and Mellitah's offshore Bouri field.[114] Owing to the continuing political turmoil, there seem to be no other upcoming projects for the development of gas export infrastructure.

[111] See: Statoil.
[112] See Can Europe survive without Russian gas?, Bruegel, 21 March 2014.
[113] See BP Statistical Review of World Energy, June 2014.
[114] EIA.

In short, Libya will not represent a serious option for Europe in the foreseeable future, that is, until the situation in the country is stabilised.

6.8 Azerbaijan: A new key pipeline available soon (TAP-TANAP) with limited capacity

The EU does not import gas from Azerbaijan.

Azerbaijan was, until recently, an importer rather than an exporter of natural gas.

Overview of the country's gas sector and capacities

In 2013 Azerbaijan's total production of natural gas was 16.2 bcm and its total export of natural gas was 7 bcm. Shah Deniz, located in Azerbaijan, is the largest gas field of the Caspian Sea region. It was recently discovered, and has allowed Azerbaijan to become an exporter of natural gas.

A short-term perspective

The infrastructure needed to export Azeri gas to Europe without going through Russia is lacking.

Azerbaijan is a crucial actor in the EU's energy security strategy.

The Commission has long tried to introduce competition to the Russian planned South Stream with an alternative Southern Corridor that would bring Azeri gas to the European market. The EU initially pledged EUR 250 million to support the Nabucco pipeline, which would cross Turkey, Bulgaria, Romania and Hungary and be supplied by various sources. Since then, the project has been replaced by another: in July 2013, the Azeri consortium Shah Deniz II (and its partner BP) chose to pursue the less expensive Trans-Adriatic Pipeline (TAP). TAP will bring gas to Italy after crossing Greece and Albania, and will be connected with the Trans-Anatolian Natural Gas Pipeline Project (TANAP) to Turkey and Azerbaijan. The line will be open only to Azeri gas supplies and will not receive public resources.

The long-term outlook

Gas imports through new pipelines could reach 31 bcm/y by 2026.

Azerbaijan occupies a particular place in the EU's strategy of diversification of energy supplies. The Trans-Adriatic Pipeline (TAP) will finally open the long-awaited Southern Corridor, bringing Azeri gas to Europe, avoiding Russia. This connection is a crucial one, as it would enable the EU to import natural gas not only from Azerbaijan but also from other countries of the Caspian region, such as Iran and Turkmenistan.

The total capacity to be exported to the EU through TANAP and TAP is expected to be only 10 bcm/y by 2018. But capacity is expected to reach 31 bcm/y by 2026.

Azerbaijan lacks proper infrastructure and its export capacities are insufficient.

Lastly, the Azerbaijan-Georgia-Romania Inter-connector (AGRI) project could represent another way to export Caspian Sea resources to Europe, through LNG, with an estimated capacity of up to 8 bcm. The project is still in the feasibility study phase.

In short, Azerbaijan does not represent a credible alternative to Russian gas in the short term owing to the lack of sufficient capacity. Gazprom managers have dismissed Azeri gas as "just about enough for a barbecue".[115] In the long run, however, the project may prove strategically relevant since it is opening a

[115] See Financial Times: Decision time for BP-led group on route of Caspian gas pipeline, 9 June 2013.

new pipeline route which can prove useful to connect EU with the former Soviet countries landlocked by Russia. According to the Commission´s security strategy, this project is "vital in providing a connection to the Middle East". As a first step of the Southern Corridor, this could in the long run be enlarged to include gas from Turkmenistan, Iraq and Iran (see relevant chapters).

6.9 Turkmenistan: Legal disputes locking resources

In 2011 Turkmenistan was the second-largest gas producer in Eurasia after Russia.

The European Union does not import gas from Turkmenistan.

Overview of the country's gas sector and capacities

In 2013 Turkmenistan's total production of natural gas was 62.3 bcm and its total exports amounted to 40.1 bcm.[116] In the same year the country ranked as the second-largest gas producer in Eurasia, after Russia, and it holds the world's sixth-largest natural gas reserves.[117]

A short-term perspective

There is currently no pipeline connection from Turkmenistan to Europe.

The main issue Turkmenistan faces in exporting its natural gas is that there is no direct pipeline connection to Europe. As a result of restrictive policies that discourage foreign investments, the country also lacks monetising infrastructure, which prevents it from exporting LNG. Thus, in the short term, Turkmenistan cannot be seen as an alternative energy supplier.

The long-term outlook

Projects exist to link the Caspian Sea region to Europe that could provide up to 30 bcm/y

There are currently pipelines connecting Turkmenistan to Iran: the Korpezhe-Kurt Kui Pipeline (capacity of 13.36 bcm/y) and the Dauletabad-Khangiran Pipeline (capacity of 11.87 bcm/y). These could potentially serve to pipe gas to the EU, boosting Europe supplies, provided that the connection between Turkey (Ankara) and Europe is completed.

A more direct route is also planned, linking Turkmenistan to Europe, via the Caspian Sea. Two pipeline projects would allow transport of natural gas from the south-east part of the country to Azerbaijan, and then on to Europe: the East-West pipeline (capacity of about 30 bcm) and the Trans-Caspian Pipeline (proposed capacity of about 30 bcm) across the Caspian Sea and through Turkey to Greece and the rest of the EU.

Legal disputes over the status of the Caspian Sea have frozen pipeline projects.

However, the completion of the Trans-Caspian pipeline is hampered by two major problems: the project was originally to be linked to the Nabucco pipeline, which is now abandoned, and legal disputes between Azerbaijan and Turkmenistan over the pipeline route have frozen the project.[118] A way to overcome the obstacle of the Caspian Sea status is to develop Compressed Natural Gas (CNG) technologies that would allow Turkmen gas to be exported

[116] See BP Statistical Review of World Energy, June 2014.
[117] EIA.
[118] See EIA.

to Azerbaijan by ships rather than through pipelines. However, shipping CNG is more costly than a pumping gas through a conventional pipeline, and would also have less capacity (3-5 bcm/y).[119]

Turkmenistan's high potential for EU energy security is undermined by various factors.

In short, Turkmenistan has a high potential for EU energy security, especially together with other gas suppliers in the Caspian Sea region. However, jurisdiction disputes over the Caspian Sea, and a domestic policy discouraging foreign investment prevent, the country from exploiting its potential and from representing a credible alternative energy supplier for Europe.

6.10 Mozambique: A potential 'El Dorado' by 2020

Mozambique has made major gas discoveries since 2010.

Overview of the country's gas sector and capacities

In 2013 Mozambique's natural gas production was 3.6 bcm and the country exported nearly the same amount thanks to its low domestic consumption. Mozambique's gas production relies mainly on two onshore fields: Pande and Temane. Until recently, Mozambique had no hydrocarbon industry. It relies on South Africa for its oil imports. Recent discoveries in the offshore Rovuma Basin have resulted in several LNG projects. In 2013 Mozambique's proved reserves of natural gas accounted for 135 tcm (trillion cubic meters).

There are no connecting routes to Europe.

A short term perspective

Mozambique currently exports most of its natural gas to South Africa through the Sasol Petroleum International Gas Pipeline. There are no connections to Europe and no LNG export facilities. Mozambique cannot become an alternative to Russian gas in the short term.

The country could become a giant in LNG exports.

The long term outlook

Since 2010, the state of play is changing in Mozambique after significant gas discoveries were made in the offshore Rovuma Basin. A total of 3 tcm has been discovered.[120] New LNG projects may turn the country into a "new El Dorado" for gas.[121] Two companies have taken the lead in exploration: the US firm Anadarko and the Italian firm ENI. Anadarko has discovered 0.9-1.82 bcm of recoverable natural gas in the Prosperidade and Golfinho/Atum complexes. ENI's discoveries in the Mamba complex and the Coral site account for 2.1 bcm.[122] Production is expected to begin by 2018.

In short, while Mozambique cannot supply gas to Europe in the short term, the recently discovered large potential, and the launching of many LNG projects, makes Mozambique an interesting option for European gas supply in the longer term.

[119] See Eurasian energy Observer, Turkmen gas into the Southern Corridor: Transcaspian or CNG?
[120] See SPTEC advisory, Mozambique: the emergence of a giant in natural gas. January 2013.
[121] See Italia Oggi, Mozambico, immenso eldorado di gas e carbone, 4 April 2014.
[122] See EIA.

6.11 The Eastern Mediterranean gas fields: Proximate sources held hostage to local disputes

Discoveries of gas in 2009 and 2010 have transformed the Eastern Mediterranean into a natural-gas-producing region and a potential energy exporter for the EU, and, in consequence, the Commission has called for the creation of a new gas hub in Southern Europe. 35 bcm could be made available by 2020, but local disputes and the interest of foreign multinational energy companies (from Russia and the US) are creating uncertainties about their development. The situation is analysed in an in-depth analysis by DG EXPO's Policy Department[123], summarised in table 5.

[123] See'The prospect of eastern Mediterranean gas production: An alternative energy supplier for the EU?', DG External Policies, Policy Department, April 2014 .

Table 5 - Potential sources in the Levant basin for the southern European market (through 2020)

Transport	Partners	Gas capacity achievable for Europe (bcm/year)	Direct cost (USD)	Year	Issues
LNG plant	Cyprus	1 LNG capacity; **7**	10-15 billion	2020	• Lack of investment and gas • Uncertain Israeli strategy
	Israel-Cyprus	1-2 LNG plants; **7 – 14**			
Pipeline	Israel-Cyprus-Greece	**Max. capacity*** / **Pipeline capac.** Israel 11 Cyprus 3 — **30 -40** Total **14**	17-20 billion	Post 2020	• Vulnerable to Turkish EEZ or Egyptian-Greek EEZ agreements • Technical issues: 1000-km pipeline at depths of 3000 meters • The most expensive option
	Israel-Cyprus-Turkey or Israel-Turkey	**TANAP capacity** Spare capacity 5 Turkish needs** 6 Total **5-11**	5-10 billion	2023 - 2025	• Political issues to cross either Syria, Lebanon or Cyprus´s EEZs • Lack of spare capacity within the Turkish Gas Transmission System • Russian opposition
Electricity cable	Israel-Cyprus-Greece	Electric power from gas-fired plants; **2000 MW**	2 billion	2016	• Technical issues: 1000-km cable at depths of up to 2000 meters

Source: Policy Department; based on data on ELIAMEP

Current capacity available for exports excluding possible future contracts and considering agreements already signed (Israel-Jordan and Israel-Palestinian) and domestic long-term demands: Israel (375 bcm) and Cyprus (70-110 bcm), which makes a total of 445-485 bcm.
**Based on a hypothetical commercial 20-year contract whereby Cyprus and Israel commit 60 % of their exports to Europe.*
***TANAP capacity dedicated to Turkish needs could head towards Europe if Turkey covers its domestic consumption with Israeli gas.*

6.12 Australia: LNG boom challenged by competition and rising production costs

The European Union does not import gas from Australia.

Overview of the country's gas sector and capacities

Australia possesses the 10th largest proven natural gas reserves in the world. Most of Australia's conventional gas resources (around 92 %) are located in the Carnarvon, Browse and Bonaparte basins off the northwest coast. The country's total production of natural gas in 2013 was 42.9 bcm, and exports amounted to 30.2 bcm.[124]

A short-term perspective

Australia does not currently offer a short-term alternative to Russian gas. Its production capacity today is limited, with 48 % exported through LNG terminals and the rest consumed domestically. Japan, China and South Korea are the three major importers of Australian LNG. No changes affecting the balance of this supply-demand relationship are foreseen, and extra volumes to meet EU demands are therefore unlikely to become available.

[124] See BP Statistical Review of World Energy, June 2014.

The long term outlook

With new investments in LNG production and export capacities, Australia could produce 115 bcm/y by 2018.

Australia is looking to become a major player in the emerging global LNG market. Projects to increase both production and export capacity are underway. Energy companies have invested USD 200 billion in Australian projects over the past decade, including three LNG plants in Gladstone operated by consortiums led by the UK's BG Group and Australia's Santos and Origin Energy.[125] As a significant part of its gas resources are coal seam gas, the new plants will be equipped to convert this type of gas to LNG and make it available for export. As a result, Australia's LNG production capacity is planned to reach 115.92 bcm by 2018. With China looking to satisfy a part of its domestic demand through new pipeline supplies from Russia and new domestic production, and the competition in Asia from US liquefied shale gas, Europe is certainly a potential market.

But Australia's LNG would be relatively expensive for the EU.

However, the main challenges to Australia's competitiveness in the LNG market, and to its suitability as a substitute for Russian gas, are the country's high labour costs and its distance to Europe. The price for Australian LNG transported to Japan is 15.5–21 % more expensive than US LNG delivered to the same location. The even greater distance to the EU would naturally result in even higher prices.

To conclude, Australia offers no options for the EU in the short term. In a long-term perspective, Australia does have the natural gas reserves, and necessary investments to improve the capacity to both produce and export are being made, making it a supply option for Europe in the future. However, unless Australian production costs are significantly reduced, importing LNG from Australia is not an economically viable option.

6.13 Iraq: Political instability and underutilisation

The European Union does not import gas from Iraq.

Overview of the country's gas sector and capacities

Iraq's proven gas reserves are 3.6 tcm.[126] Gross production in 2013 reached an unprecedented level of 21.4 bcm. However, most of this was flared, lost, vented into the atmosphere or re-injected into reservoirs to boost underground pressure for oil production. Only 5.6 %, or 1.2 bcm, was marketed. Lack of infrastructure for export and low domestic consumption have set the conditions for the ineffective use of gas produced in the country.

A short-term perspective

Local instability prevents Iraq from connecting its gas to the southern corridor pipelines.

Due to political instability and the lack of infrastructure, Iraq does not offer a substitute for Russian exports in the short term.

The long-term outlook

The large reserves of natural gas in the country, and the currently low percentage of Iraqi gas on the market, define Iraq's future potential as a

[125] Financial Times, LNG boom fuels Australia export ambitions, 2 October 2014
[126] See BP Statistical Review of World Energy, June 2014.

source of supply. One major obstacle to the country becoming a supplier for the EU is the lack of pipelines or LNG facilities that would give it access to the European market. Shell, Mitsubishi and South Gas are moving ahead through their joint venture Basra Gas to build the first Iraqi LNG plant in order to allow the export, by 2017, of 6.2 bcm/y of the gas that is currently being flared.

Iraq's production could reach 15 bcm/y by 2017.

After the Nabucco pipeline was substituted by the TANAP-TAP project, there have been no official plans to connect Iraq to the EU market via pipelines. The main reason is the high instability in the country. At the moment, the most imminent threat to Iraq's stability is the ISIS. While this obstacle remains, no development of export infrastructure is possible.

To conclude, Iraq offers no short-term options for the EU. Long-term options exist, but the future for them depends on the level of stability in the country.

7 Imminent prospects

The Russian economy has been severely affected by Western sanctions.

Today, six months after the annexation of Crimea and one month after the official ceasefire in eastern Ukraine, the situation has not returned to normal. War operations in Ukraine's Donbass region are continuing, with secessionists seeking to create a Russophone zone[127], while EU and US sanctions are helping to drive the Russian economy to the edge of recession.

Gas exports to Ukraine were cut in June, while international arbitration on the Ukrainian debt was on-going in Stockholm. On 26 September 2014, an interim agreement was reached in Berlin: if confirmed by Moscow and Kiev, the country's debt to Gazprom will be paid in three instalments made possible by loans from the IMF loan and the EU. Talks in Brussels on 21 October, where the Commission acted as a mediator, did not resolve all the outstanding issues, and were to resume one week later.

Until now Russians have refrained from directly playing the 'gas card' against the EU.

A solution would reopen gas flows to Ukraine, reducing the chance that Ukrainian authorities would also cut off or reduce the gas in transit to the EU, as they did in 2006 and 2009. Even if gas supplies transiting through Ukraine were to be interrupted (scenario A), however, disruptions in the EU would be less serious than in 2009. The effects would largely be limited to southern Europe. Germany receives its Russian gas from Nord Stream, which bypasses Ukraine and which was underutilised in 2013 – running at 41.9 % of its capacity. Only half of Russian gas destined for the EU now crosses Ukraine. This means that Russian gas from the north could partially replace any gas blocked along the southern route. Such a route would not, however, not completely solve the problem: replacing all the gas transiting through Ukraine can only be done with the highly contested South Stream pipeline.

Significantly interrupting gas would inflict a serious blow to the Russian economy.

The question remains, however, what would happen in the event of 'scenario B', if Russia is prepared to use its 'energy weapon' directly against the EU. Gas exports have not yet been the direct targets of EU sanctions or Russian counter-measures, as mutual dependency has made this sector too sensitive.

[127] See *Ukraine : zone russophone en création. Un conflit féroce dans le Donbass*, Bruxelles2, 4 October 2014.

However, Gazprom did interrupt gas flows in September and October 2014, targeting EU countries that had re-exported Russian gas to Ukraine. As Gazprom accused Poland, Slovakia and Austria of violating their contracts, their cuts to had a purportedly legal justification. Nonetheless the precedent is alarming and suggest that Russia would be willing – perhaps even keen – to play the 'gas card' if tensions worsened.

Alternative supply routes are not immediately available.

A general disruption of Russian gas flow (in 'Scenario B') would be a major blow to the EU and Russian economies alike. For the EU, stable alternative supply routes would only be available in the medium term. In the short term, the supply shortfall caused by a Russian embargo would be felt with a delay, thanks to the EU's reserves available at the beginning of winter 2014; the EU could compensate for Russian gas for as long as seven months, with reductions in consumption and supplies of LNG from alternate sources. A complex grid of available pipelines, interconnectors, compressors, storage facilities and LNG import terminals should be able to resist an embargo of up to seven months, assuming the EU could source a supplementary 45 bcm, theoretically available on the spot market at affordable prices. At the same time, a seven-month embargo would cost Russia some EUR 31 billion. Is this affordable for a country whose economy is already deep in recession, aggravated by Western sanctions? Gas revenues represent 20 % of the Russian budget and are contribute to maintaining political consensus[128].

Russia is actively seeking export markets.

While these considerations all argue against the likelihood of major gas cuts, any forecast based on economic reasoning is uncertain at this stage. Economic factors are generally not given precedence when national security concerns are at stake. What is certain is that a gas war risks harming both parties in the short term, and that it would hamper future efforts to re-establish mutually trusting relations.

Russia is working to develop an alternative gas export market in China. Exports there would make Russia less vulnerable to Western financial sanctions. The EU also seems ready to develop alternatives to Russian imports, by adopting policies to promote greater energy efficiency, renewable energy, new gas supplies and alternative energy sources. The recent creation of an 'Energy Union' portfolio in the European Commission was motivated by energy security concerns and the need for the EU to address Russia with one voice.

For the EU, Russian gas is a convenient energy source.

Be that as it may, alternative gas supplies will come at a cost to the EU economy, and run the risk of deepening the current recession in many EU Member States with a supply-side shock. Thanks to massive investments and to the spare capacity of the pipeline network, Russian gas is – and will long continue to be – more convenient in economic and environmental terms than other energy sources.

[128] See Russia's economy. On the edge of recession. The Economist, 4 October 2014.