The Impact of the Russia-Ukraine Crisis on European Gas Security & Infrastructure Investment

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EXECUTIVE SUMMARY

The ongoing Ukraine crisis and annexation of Crimea by Russia in 2014 has attracted international attention and moved energy security to the forefront of the European Union (EU) policy agenda. Increasingly, European leaders are expressing the need for an energy union capable of reducing the impacts of natural gas supply disruptions, in the event of Russia’s decision to curtail the delivery of gas to Europe. In light of these growing concerns, this study seeks to evaluate the security of supply in Europe and identify policy responses and opportunities that would mitigate those concerns.

This research relies on expert interviews as well as an in-depth literature review and analysis of current events. The very first finding of this research challenges the assumption that Europe faces major challenges with regards to security of natural gas supply. In fact, the major challenge at this time is the inadequate natural gas infrastructure and not an insufficient supply of gas reserves. This finding paints to a shifting role for Russian gas in Europe – one where Europe is not entirely dependent on Russian gas, but continues to import Russian supplied gas at increasingly favorable prices for a sizeable portion of its gas supply. This change is facilitated by the convergence of European supranational economic and political developments and the integration of the European energy market.

In recent years, Europe has responded to vulnerabilities inherent in Russian gas supply by growing the region’s ability to deliver gas internally from where it is available to where it is needed. While Russia will remain Europe’s primary gas supplier for years to come, liquefied natural gas (LNG) import capacity adds essential supply flexibility. The growth in LNG import capacity in recent years has the potential to allow Europe to take advantage of competitive LNG offerings, particularly as Asian LNG premiums continue to decline and American
LNG exports come online. On the other hand, the development of indigenous shale resources – a potential domestic source of gas – is impeded by regulation in member states and an adverse price situation (i.e. Poland and the UK) as well as by environmental moratoria in the most favorable cases (i.e. France).

Gas demand on the other hand, has declined slightly and has contributed to Europe’s diminishing reliance on Russian supplies. Indeed, Europe has already witnessed a decline in gas demand since the financial crisis of 2008. Meanwhile the energy mix of European countries is fundamentally changing with the growth of renewable sources of energy. As Europe revises its emissions commitments to increase the cost of carbon, gas demand is slated to grow again, slowly displacing coal. However, the region’s gas demand by volume will remain relatively flat in the short-term.

Europe’s ongoing strategy to reduce gas supply vulnerability is rather one of integration. Since 2007, the Trans European Energy Networks program (TEN-E) has supported the gradual integration of electricity and gas networks that support a well-functioning internal market across member state’s borders. To this end, the European Union created the Agency for the Cooperation of Energy Regulators (ACER) to support the harmonization of network codes, and the European Network of Transmission System Operators for Gas (ENTSOG) to identify infrastructure gaps in the gas transmission network and to provide EU financial assistance to critical projects. In fact, research reveals that the core European gas market is now better integrated than ever before, and as a result is less vulnerable to Russian supply disruptions.

An ongoing and critical barrier to Europe’s energy integration with the most vulnerable peripheral markets is the lack of commercial viability of many of the proposed infrastructure projects. As the security benefits of cross-border energy flows is not priced into project cash flows, many projects fail to be realized. Furthermore, industry participants consider the current amount of European
Commission funding insufficient. From a project sponsor’s perspective, several Projects of Common Interest face high regulatory burdens on the rate of return. As a consequence, while the core of the European gas network is well integrated, smaller peripheral markets, particularly in the South East region, remain highly vulnerable to Russian supply disruptions.
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1. INTRODUCTION

In early 2014, mass protests on Kiev’s Maidan square toppled the government of then-president Viktor Yanukovich. Since then, Ukraine, under the leadership of President Petro Poroshenko has been engulfed in conflict with Russian-backed separatists in the aftermath of Russia's annexation of Crimea in March 2014. The disputed territory constitutes a region larger than the Netherlands and makes up roughly 25 percent of Ukraine’s territory. According to the Deputy Permanent Representative of the US Mission to the Organization of
Security and Cooperation in Europe (OSCE), the conflict “has left more than 5,700 people dead, and displaced nearly 1.5 million”.¹

As Russian authorities try to camouflage their involvement in the conflict with a hybrid warfare strategy and propagandistic efforts – described as “Orwellian doublespeak”² – most observers believe that Russia is directly involved in the conflict. Indeed, the annexation of Crimea is read by many as manifestation of Russia’s intent to secure spheres of influence beyond its territory. The West has been responding to this security threat by attempting to weaken Russia’s economy, while simultaneously providing assistance to Ukraine’s weakened economy. More specifically, the EU and its representatives have responded with a variety of policy actions, ranging from peace negotiations and ongoing diplomacy to economic sanctions on Russia.³

Ukraine is not only relevant from a security standpoint, but also for its role in Europe’s energy supply security. Ukraine’s geographical position has long established the country as a major transit route for natural gas supply in Europe. In 2013, 16 percent of the total natural gas consumed in Europe was delivered through Ukrainian pipeline networks to users in Austria, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Greece, Hungary, Moldova, Poland, Romania, Slovakia, and Turkey.⁴ In the last ten years, supply cuts from Ukrainian transit routes have twice had considerable impact on the gas supply of continental Europe. The conflict has furthermore highlighted EU’s


³ For more information on sanctions on Russia cf. the EU special coverage at: http://bit.ly/19wwzP3

⁴ US EIA, 2014b
dependency on Russia as a supplier of natural gas: In 2013, Russian gas accounted for a total of 30 percent of the total natural gas consumption in the EU.

In the past, Russia has repeatedly used its role as a primary gas supplier to Europe as a political lever, fueling concerns that today’s crisis could be used by Russia to strong-arm Europe in accepting its widening influence in Ukraine. However, experts have adopted a different view regarding the recent crisis. In reference to the recent crisis, experts at the Oxford Institute for Energy Studies comment, “the use of gas as a political or strategic weapon seems unlikely”\(^5\). Indeed, “Europe is in a better position to handle a potential disruption than it was on previous occasions” especially “following the completion of the Nord Stream pipeline in 2012, only about 50 percent of the Russian gas to Europe transits via Ukraine, down from 80 [percent] previously”\(^6\).

**Figure 1: Russian Natural Gas Exports to Europe through Ukraine, Oct. 2008- Dec. 2013**

(Billion cubic feet per day)

Source: EIA, 2013

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\(^{6}\) ibid., p. 8
Nonetheless, the risk of supply disruptions remains a threat to Europe’s energy security given the substantial indebtedness of Naftogaz Ukrainy,\(^7\) the Ukrainian state oil and gas company and pipeline system operator, to Gazprom Russia’s state owned oil company. Naftogaz’s ability to pay has only worsened due to the current crisis and subsequent downturn of Ukraine’s economy.

### 1.1 Reducing the vulnerabilities of the European Energy Market

This report specifically examines how the EU’s energy strategy and political landscape has and will continue to respond to its dependence on Russian natural gas over the next five years. To date, the push for the development of a robust European gas market has largely stemmed from disruptions to supply in 2007. As a result, today’s energy policies are not the direct result of the Russia-Ukraine crisis. Nonetheless, events over the last 13 months have contributed to Europe’s ongoing energy security debate. For example, the recent presentation of the ‘Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy’, also known as the Energy Union Package carefully referenced the Russo-Ukrainian Crisis stating, “when the conditions are right, the EU will consider reframing the energy relationship with Russia based on a level playing field in terms of market opening, fair competition, environmental protection and safety, for the mutual benefit of both sides”\(^8\). While the Energy Union Package largely reinforces previous European energy security policies, the Russia-Ukraine crisis is an incentive for the EU to diversify its supply of natural gas and build resiliency into its gas transmission system.

\(^7\) ibid., p. 20
1.2. European Gas Security of Supply Actions

Coordinated European Union responses to gas security concerns have led to changes across member states’ regulatory environments and an increasingly integrated European gas market. Council Directive 2004/67/EC Concerning Measures to Safeguard Security of Natural Gas Supply established the first legal framework at the supranational level to guide the security of gas supply. In the aftermath of the 2009 Russian-Ukrainian gas crisis, the EU determined that the provisions of 2004/67/EC were insufficient and required additional regulations. In 2010, Regulation 994/2010 was enacted. This regulation superseded Council Directive 2004/67/EC and established a common framework in which security of supply is designated to be a “shared responsibility” amongst EU member states. The 2010 Directive also called for risk assessments every two years beginning in 2011. Additionally, the Directive outlined the role for the Commission by creating the Gas Coordination Group composed of EU country representatives, as well as the newly created Agency for the Cooperation of Energy Regulators (ACER) and European Network of Transmission System Operators (ENTSOG) for gas, as well as industry and consumers.

In light of rising tensions in Ukraine, the European Commission recommended a series of stress tests on June 27, 2014. These stress tests evaluated the resiliency of gas supply in Europe and examined Norway’s responsiveness to potential disruptions as a source of supply given its importance in Europe’s supply mix. The Commission focused on three regions with the highest risk of disruption:

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10 Ibid.
11 Ibid.
The Baltic States (Estonia, Latvia, and Lithuania) and Finland
The Southeast region (Bulgaria, Romania, Greece, Hungary, and Croatia)
The Energy Community Contracting Parties (Albania, Moldova, Ukraine, Serbia, Bosnia, Macedonia, Kosovo, and Montenegro)

Participating countries were asked to simulate their security of supply situation in two different scenarios: 1) a complete halt of Russian gas imports into the EU; and 2) a disruption of the Ukraine gas transit route. Both disruptions were planned to take place during autumn/winter and with periods of one month and six months for each.\textsuperscript{12}

The stress test estimated that five to nine billion cubic meters (bcm) of gas would be missing from the overall supply of the EU and the Energy Community Contracting Parties (excluding Ukraine) after the reshuffling of resources.\textsuperscript{13} The Commission recommended that a market-based approach should be the “guiding principle,” with non-market measures including strategic stock releases, fuels switching, and demand curtailment, only enacted when the market fails.\textsuperscript{14}

The European Commission highlighted several considerations regarding the use of storage in the event of supply disruption. Firstly, increasing the physical capacity of storage in Europe in the short term is not realistic. While, secondly, reliance on storage for short-term supply must be well calculated as it can result in the rapid depletion of resources and future consequences in the event that a supply disruption is extended.

\textsuperscript{13} Ibid.
\textsuperscript{14} Ibid.
In terms of increasing domestic production to replace a potential shortage of supply, the European Commission found “little to no scope for increased domestic EU gas production” in the short term, particularly due to technical constraints.\(^\text{15}\) As such, LNG imports were identified by the Commission as the biggest potential source of supply in response to Russian supply disruption. The Commission also found that existing LNG terminals have sufficient capacity (currently at 200 bcm/year) to import the required LNG volumes in the event of a supply disruption.\(^\text{16}\) However, the main challenge with LNG imports remains the lack of interconnections necessary to transport the imported LNG from terminals on the Mediterranean and Atlantic coast to the rest of Europe.

The Commission issued several recommendations based on the stress tests to manage supply disruptions in the short-term and medium-term.\(^\text{17}\) The following is a summary of those recommendations:

1. **Restructuring the Market in the Short-term**

1. Increasing interconnector capacity and eliminating cross-border trade barriers;
2. Boosting the use of underground gas storage using the Gas Storage Europe (GSE) as a platform;
3. Timely completion of infrastructure projects, in particular the Slovak-Hungarian interconnector and the Swingoujście LNG terminal in Poland;

\(^{16}\) Ibid. 12.
\(^{17}\) Ibid.
4. Implementing the “supply standard obligation” as outlined in the Security of Gas Supply Regulation which requires a 30 day supply flexibility in the event of disruptions to critical gas infrastructure;\(^\text{18}\)
5. Potential consideration of lower supplier standards in case of a regional or EU-wide emergency;
6. Deploying and optimizing fuel switching and ensuring its operational implementation;
7. Short-term energy efficiency and demand reduction plans will be deployed;
8. Clarification on the role of transmission system operators (TSO) in emergency settings;
9. Increased regional cooperation on gas supply security;
10. Improved transparency;
11. Ongoing monitoring and use of the Gas Coordination Group by the European Commission;
12. Enhanced cooperation with non-EU nations and key energy partners.

1.2.2. Restructuring the Market in the Medium-term (by end of 2015)

13. The Commission will issue a recommendation to EU Member States to cooperate with contracting parties in the application of the Third Energy Package on questions of security of supply;
14. Projects of Common Interest (PCIs) and Projects of Energy Community Interest will be prioritized;
15. Physical reverse flow exemptions will be re-evaluated;

\(^{18}\text{Ibid. 21.}\)
16. Fuel switching through district heating and cogeneration in the residential and industrial sectors will be considered.

17. Industry will be encouraged to reduce heat demand and to implement energy efficiency measures.
2. GAS SUPPLY

Europe has responded to potential disruptions in gas supply with a variety of proposals at both the supranational and national levels. However, a critical uncertainty pertains to the effectiveness of these interventions on reducing European dependency on Russian gas. The following section seeks to address this point and takes a closer look at the supply and demand of natural gas across the EU. A key aim is to determine the extent to which a disruption of supply remains a critical issue for the EU gas market and the associated investment climate.

2.1. Sources of Supply

According to the Statistical Review of World Energy Report produced by British Petroleum (BP), Europe imported 397.1 bcm of natural gas through pipelines and an additional 51.5 bcm in the form of LNG in 2013. The charts below represent Europe’s main natural gas imports in the form of pipeline and LNG based on exporting country.  

<table>
<thead>
<tr>
<th>From</th>
<th>bcm</th>
<th>Share of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>53.2</td>
<td>13%</td>
</tr>
<tr>
<td>Norway</td>
<td>102.4</td>
<td>26%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>8.9</td>
<td>2%</td>
</tr>
<tr>
<td>Other Europe</td>
<td>28.1</td>
<td>7%</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>162.4</td>
<td>41%</td>
</tr>
<tr>
<td>Other Former Soviet Union</td>
<td>3.3</td>
<td>1%</td>
</tr>
</tbody>
</table>

Russia, Norway and Netherlands are the largest suppliers of natural gas to European markets with Russia supplying 41 percent (162.4 bcm) of the total volume. A report produced by Gazprom and Eastern Bloc Energy, EIA (Energy Information Administration) estimates that Ukraine’s pipeline network delivers around 16 percent of Europe’s total consumed natural gas. Meanwhile, the second and third largest natural gas suppliers are Norway (102.4 bcm) and Netherlands (53.2 bcm) with 26 percent and 13 percent of Europe’s total natural gas imports, respectively.

---

**Table: LNG Imports to Europe and Eurasia, 2013**

<table>
<thead>
<tr>
<th>From</th>
<th>Bcm</th>
<th>Share of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trinidad &amp; Tobago</td>
<td>2.2</td>
<td>4%</td>
</tr>
<tr>
<td>Peru</td>
<td>1.5</td>
<td>3%</td>
</tr>
<tr>
<td>Norway</td>
<td>2.3</td>
<td>4%</td>
</tr>
<tr>
<td>Other Europe</td>
<td>1.0</td>
<td>2%</td>
</tr>
<tr>
<td>Oman</td>
<td>0.2</td>
<td>0%</td>
</tr>
<tr>
<td>Qatar</td>
<td>23.4</td>
<td>45%</td>
</tr>
<tr>
<td>Yemen</td>
<td>0.2</td>
<td>0%</td>
</tr>
<tr>
<td>Algeria</td>
<td>13.5</td>
<td>26%</td>
</tr>
<tr>
<td>Egypt</td>
<td>0.4</td>
<td>1%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>6.9</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Total Imports</strong></td>
<td>51.5</td>
<td>100%</td>
</tr>
</tbody>
</table>

---

The following section takes a closer country-specific look at the primary suppliers of Europe’s natural gas.

2.1.1. Russia

Russia provides roughly 41 percent of Europe’s total natural gas via five export pipelines - The Yamal-Europe I, Northern Lights, Soyuz, Bratstvo, and Nord Stream. The respective transit countries for these pipelines are Ukraine, Belarus and the Baltics through which the total gas import capacity is 170 bcm per day.\(^{21}\)

Three of the major pipeline systems deliver gas to Europe through Ukraine, which amounts to 60 percent of Russia's total natural gas exports. This makes regional stability paramount for the future of Europe's energy security. These pipelines are the Soyuz (Union), Trans-Balkan and Bratstvo (Brotherhood). In fact, Bratstvo is Russia's largest pipeline to Europe capable of supplying both the northern and southern regions. Meanwhile, the Soyuz pipeline mainly...
supplies central and northern Europe, whereas the Trans-Balkan delivers natural gas to the Balkan countries and Turkey. Prior to the completion of the controversial Nord Stream pipeline, which became operational in 2011, 80 percent of Russian exports were delivered to Europe through Ukraine. This pipeline links Russia and Germany under the Baltic Sea.\textsuperscript{23}

\subsection*{2.1.2. Nord Stream}

Nord Stream, also known as North European Gas Pipeline, is an offshore natural gas pipeline connecting Russian gas supply directly to Germany, removing tariffs, which lowers the price of gas. Aside from the commercial benefits, political and energy security considerations are also essential to the decision-making process of the European Union. Ultimately, previous Russian-Ukrainian gas disputes and geo-political implications of the Ukrainian presidential elections in 2005 were all driving factors in the development of the Nord Stream pipeline, among others.\textsuperscript{24}

Although some estimates have concluded that costs associated with this pipeline were three times the costs for constructing a similar pipeline through the Baltic States, Nord Stream was selected as a mean to bypass Soviet-era gas transmission infrastructure. It also established Germany’s role as the primary distributor of Russian gas in Europe.\textsuperscript{25}

\subsection*{2.1.3 Ukraine}


\textsuperscript{25} Ibid
Despite having the third largest shale gas reserves in Europe, over 60 percent of Ukraine’s natural gas used for consumption is provided by Russia.\textsuperscript{26} In fact, Russia intends to halt its gas delivery to Europe through Ukraine by 2020.\textsuperscript{27} If Russia follows through with that promise, an already struggling Ukrainian economy will experience a further setback. Furthermore, previously signed contracts with Royal Dutch Shell and Chevron for the exploration of shale gas have been cancelled due to the escalation of the conflict with Russia in the eastern Ukraine, adding on to the economic burden of Ukraine.\textsuperscript{28}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{ukrainian_gas_pipelines.png}
\caption{Ukrainian Gas Pipelines}
\end{figure}


2.1.4. Norway

Norway is Europe’s second largest supplier of natural gas to Europe. According to 2013 statistics, Norway provided over 21 percent of Europe's total imported.\(^{29}\) Primary European destinations include United Kingdom, Germany, France, the Netherlands, Belgium, and Italy.\(^{30}\) In addition to pipeline exports, Norway also supplies small amounts of LNG via tanker ship. However, Norway’s natural gas exports have recently been declining due to reservoir depletion, a trend that is expected to continue.\(^{31}\)

2.1.5. Netherlands

The Netherlands is an important contributor to the European gas market. It supplies nearly 14 percent of Europe’s total gas consumption.\(^{32}\) In 2013 the total gas production in the Netherlands was 84.9 of which 53.0 bcm was supplied to Europe. In addition, the Netherlands is a key distributor of LNG, which it delivers through trucks, small ships and large tankers. The Netherlands has 25 interconnections with 4 European countries.\(^{33}\) Interconnections that are based in Belgium and Germany serve both gas exports and imports, whereas the Balgzan Bacton Line (BBL) pipeline in the United Kingdom only exports Dutch natural gas. Despite producing and exporting large amounts of gas, the


\(^{33}\) http://www.eia.gov/countries/country-data.cfm?fips=nl
Netherlands also imports gas from Norway via pipeline. While natural gas from the Netherlands contributes to the diversity and security of gas supply in Europe, it primarily serves the northwestern region and thus has a negligible impact on addressing the vulnerability of the southeastern region to supply disruptions.

<table>
<thead>
<tr>
<th>Country</th>
<th>Entry Capacity (mcm/d)</th>
<th>Exit Capacity (mcm/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>38</td>
<td>114</td>
</tr>
<tr>
<td>Germany</td>
<td>43</td>
<td>188</td>
</tr>
<tr>
<td>Norway</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td></td>
<td>46</td>
</tr>
</tbody>
</table>

Source: IEA

2.1.6. Algeria

According to the EIA, Algeria was the seventh largest LNG exporter in 2013, contributing 5 percent of the world’s total LNG exports, and the second largest non-European gas supplier to Europe, exporting more than 80 percent of to Italy, Spain and other European countries in 2013.

As the exports from Norway are set to gradually decline, Algerian gas has the capacity to serve as a viable replacement. However, despite the country’s growing degree of economic liberalization, the threat of domestic terrorism constitutes a major challenge to the future stability of natural gas production and exportation.


36 Ibid
The chart below illustrates the main pipelines, which supply natural gas from Algeria to Europe.\(^{37}\)

### Figure 7: Natural Gas Export Pipelines Algeria-Europe

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Transit</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrico Mattei (GEM)</td>
<td>Tunisia</td>
<td>Italy</td>
</tr>
<tr>
<td>Pedro Duran Farel (GPDF)</td>
<td>Morocco</td>
<td>Spain</td>
</tr>
<tr>
<td>MEDGAZ</td>
<td>Mediterranean Sea</td>
<td>Spain</td>
</tr>
</tbody>
</table>

Source: EIA Algeria, 2014

### Figure 8: Natural Gas Export Pipelines Algeria-Europe, 2013\(^{38}\)

- Spain: 34%
- Italy: 27%
- France: 12%
- Other European: 7%

Source: EIA Algeria, 2014

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2.1.7. Qatar

Qatar ships roughly 30 percent of its LNG to Europe and is set to increase its shipments following new contracts with German and British importers. The largest European markets for Qatari LNG include Belgium, the United Kingdom and Spain. Although there has been speculation that Qatar’s natural gas may become part of the Southern Corridor supply mix, to date there have been no tangible developments in this regard. Notably, the escalation of regional proxy wars across the Middle East between Shia and Sunni groups prevent this plan from realization. Regional unrest, in particular has the potential to disrupt exports from Qatar due to the country’s strong reliance on the Straits of Hormuz as a key export route.39

2.1.8. Nigeria

Nigeria is one of the largest LNG exporters in the world. Presently, Nigeria exports roughly 31 percent of total Nigerian LNG to Europe.40 Nearly half of the country’s LNG exports to Europe are sent to Spain, while the remaining is sent to the rest of the European continent. This is a significant decrease from prior years where Nigerian exports to Europe represented roughly 67 percent of the country’s LNG exports. This shift is largely the result of Nigeria’s increased LNG sales to Asia in an effort to benefit from economically beneficial arbitrage opportunities in Asia. Furthermore, despite its natural gas exporting potential, Nigeria has high levels of economic inequality, religious animosity between Christians and Muslims, and a significant threat of terrorism and growing

religious radicalism. As Nigeria only has one LNG facility located in Bonny Island, growing levels of violence may have significant impact on the country’s total LNG exports capacity.\textsuperscript{41}

2.2. Shale Gas Prospects in Europe

While Europe is home to significant shale natural gas, large-scale production is not at present commercially viable. A variety of industry experts highlight difficult geologic conditions, the uncertainty over fiscal and regulatory policies as well as widespread environmental concerns and growing public opposition as the primary barriers. As a result, shale gas production is not expected to significantly impact Europe’s natural gas supply or offset imports from Russia.

2.2.1. Shale Gas Reserve in Europe

According to the 2013 EIA report \textit{Technically Recoverable Shale Oil and Shale Gas Resources}, the total technically recoverable shale gas in Europe is estimated to be 883 tcf.\textsuperscript{42} In the EU, the onshore shale gas resources are contained in four main basins: “from eastern Denmark and southern Sweden down into southeast Poland and up into the Baltics; from northwest England through the Netherlands into northern Germany; from southern England into the Paris basin in France; and from Slovakia and Hungary through Romania and Bulgaria to the Black Sea.”\textsuperscript{43} Among the 11 European Union countries with

\begin{footnotesize}
\begin{enumerate}
\end{enumerate}
\end{footnotesize}
shale gas resources, Poland has the largest estimated shale gas reserves, followed by France.\textsuperscript{44}

\textbf{Figure 9: Unconventional Gas Resources in Europe}\textsuperscript{45}

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|}
\hline
\textbf{Rank} & \textbf{Country} & \textbf{Technically Recoverable Reserves (Tcf)} \\
\hline
1. & Poland & 148 \\
2. & France & 137 \\
3. & Romania & 51 \\
4. & Denmark & 32 \\
5. & UK & 26 \\
\hline
\end{tabular}
\end{table}

\textsuperscript{44} According to EIA 2013 shale gas report, 14 European countries have shale gas resources, among which 11 are European Union countries. The other three countries are Russia, Ukraine, and Kaliningrad.


\textsuperscript{46} Ibid.
The only existing legislation on shale gas production at the EU level is the 2014/07/EU Recommendation published on January 22, 2014. The Recommendation lists the minimum principles and requirements for the exploration and production of shale gas using hydraulic fracturing. As mandated by the EU, the energy mix of every member state is different and the decision to explore shale gas falls to each member state individually. The Recommendation seeks to provide countries with an overarching guidance and regulatory framework, but has no stance on individual country initiatives. An absence of EU-level regulation has led to a diverse exploratory environment across the EU as member states consider domestic shale gas production. Exploratory drilling operations are currently active in the UK, Poland, Romania, Denmark and Hungary. This speculative shale drilling has thus far enabled a better understanding of Europe’s present and future potential shale reserves. However, member states like France and Germany have banned or restricted shale exploration, in large part as a result of growing environmental concerns. At the time of this writing, there are no active commercial drilling operations in the EU.

2.2.3. Development and Stagnation

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49 Ibid.
Among the countries where exploratory drilling operations are active, Poland is the most advanced player with a total of 66 exploration wells, 12 of which perform horizontal drilling.\textsuperscript{50} Only a small amount of Poland’s gas consumption comes from its own production. The rest of its consumption is met by imports from Russia, under a long-term oil-indexed contract with Gazprom in place until 2022.\textsuperscript{51} Poland is keen to exploit its geological potential in shale gas, which is considered by the Polish authorities as key to improving the diversity of its energy mix as well as its degree of energy security.\textsuperscript{52} In an effort to promote investments in this field, in 2014 the Polish government announced a tax exemption for shale gas extraction until 2020.\textsuperscript{53} Despite the tax incentive fewer unconventional wells were drilled in 2014 than in 2013.\textsuperscript{54} Much of this decline is attributed to the poor performance of existing well sites and regulatory delays in permit processing. Coupled with difficult geologic conditions and the uncertainty over fiscal and regulatory policies, companies such as ExxonMobil, Marathon, and Talisman have pulled out from their drilling operations in Poland.\textsuperscript{55}

The United Kingdom has also seen substantial shale exploration. However, these activities have recently slowed as a consequence of two small earthquakes near Cuadrilla’s drilling site in Blackpool in northern England. These seismic events suggest a possible link between “fracking” activities and seismic

\textsuperscript{52} Ibid.
activities. As a result, the government announced a temporary moratorium on hydraulic fracturing in July 2011.\textsuperscript{56} On December 13\textsuperscript{th} 2012, the Secretary of State announced that hydraulic fracturing could resume in UK, and that the Government would act in accordance with regulatory recommendations regarding future production and environmental risk assessments.\textsuperscript{57} Only a total of seven shale gas wells have been drilled in UK. Industry experts estimate that 20 to 40 wells need to be drilled in order to adequately assess the real potential of shale gas in the UK, which would take at least five years.\textsuperscript{58}

In other countries the progress of shale development is even slower as most activities are only at a very preliminary stage. Before the Federal Elections in September 2013, the German parliament drafted legislation to regulate hydraulic fracturing, but soon after withdrew the proposal.\textsuperscript{59} Presently, the country’s moratorium on fracking is still in place, but the government is in the process of establishing new rules to include strict environmental audits and bans on drilling in water rich areas to avoid possible environmental damage.\textsuperscript{60}

One of the main reasons major shale development in Europe in the short term is unlikely is due to the growth of environmental activism, which has impeded the progress of a current exploration. In Poland, farmers from Zurawlow and


four nearby villages blockaded a proposed Chevron shale drilling site for 400 days, which finally forced the company to abandon the project.\textsuperscript{61}

In Romania, over 15,000 citizens signed a petition to ban domestic fracking out of concern that such activities contaminate water and air and directly led to an increase in the number of serious diseases infections.\textsuperscript{62} In the opinion of many environmentalist groups signatory to this petition the exploration of shale gas is just as harmful as production, because advanced exploration still relies on hydraulic fracturing, although on a smaller scale.\textsuperscript{63}

France is the most geologically and technically promising country for developing shale gas in Europe given its abundant reserves and infrastructure capacity. Despite an estimated 137 tcf of technically recoverable shale gas reserves, France has since 2011 implemented a moratorium on shale gas hydraulic fracturing.\textsuperscript{64} Several exploration and hydraulic fracturing licenses have been revoked since the moratorium was issued. The current French President François Hollande has promised to uphold the fracking ban through his current term in the office, which ends in 2017.\textsuperscript{65}

3. GAS DEMAND

\begin{itemize}
\item \textsuperscript{63} Ibid.
\end{itemize}
Gas demand in Europe has been influenced by a multiplicity of factors. Winter in 2014 was milder than the previous year, which hampered residential demand. In the power sector, renewable energy deployment and efficiency gains, coupled with the switch to coal, resulted in a drop in demand for gas. Last but not least, the crisis in Ukraine, once again highlighted the need for diversity of gas supply in Europe. The following section is a review of European gas demand, which can be analyzed by investigating its three contributing components, consumption, demand for LNG and storage supplies. We expect demand for gas to remain flat in the short-term.

In recent years, Europe has witnessed a decline in gas demand. Sluggish economic recovery, lower coal and carbon prices, higher levels of renewable penetration, increased energy efficiency, and most recently, a mild winter have all contributed to this trend. According to Eurogas, consumption of natural gas in the EU decreased by 1.5 percent in 2013 relative to 2012 and the declining trend is expected to continue. The majority of this decline stemmed from lower demand for gas in electricity generation. In 2013 alone, the power sector in Europe reduced its gas consumption by 17 percent as coal increased its share. With gas displacing coal in the U.S., and given lower emission prices in Europe, the price of coal has continued to decline, providing a more economic option for electricity generation in Europe.

Looking forward, as the EU strives to meet its carbon and emission reduction goals, it will expand the scope of activities covered under the Emissions Trading System (ETC) and eliminate distribution of free allowances. Existing regulation requires reduction of emissions by 20% below 1990 levels by 2020. Further, the 2050 emission targets require 40% cut by 2030 and 60% reductions by 2040 below 19990 levels. Accordingly, the price of carbon in ETS is expected to rise to $22 per mtCO2 in 2020; a nearly four-fold increase from 2013 prices at $6 per mtCO2. Fuel switching from coal to gas will be a necessary transition in order to achieve these targets and in light of higher carbon prices. Given EU’s leadership in climate negotiations, EU member states will likely increase the

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70 IEA, World Energy Outlook 2014, pg 220
share of gas in electricity generation in the long-term. In particular, as global LNG export capacity expands, gas will become a more economically viable option for Europe. However, this increase will be offset with the growth of renewables and increased energy efficiency. As a result European gas demand will remain stable over the medium to long terms. The COP 21 climate negotiations in Paris this year will signal the extent to which the EU is willing to commit to more aggressive renewable energy deployment incentives.

3.2. Demand for LNG Demand

So far, increased imports from Russia and Norway have compensated for the decline in indigenous natural gas production. However, as Norwegian resource depletion accelerates, potential supplies from offshore Romanian reserves and additional LNG imports may be needed to offset some of the future drop in production. The European LNG markets have played a role as both importer and exporter of gas. LNG imports have declined steadily since 2011 and on average dropped by 50 percent in 2013. Higher prices in the Asian market significantly contributed to this shift with many European countries (e.g. Spain) opting to re-export their imported LNG supplies. Qatar is and will likely remain Europe’s largest LNG supplier given its abundant resources and competitive prices.
3.3. Gas Storage Supplies

The addition of six new storage facilities in 2013 resulted in increased peak output of 4 percent and improved total working volume of 3 percent\textsuperscript{72}. Three of these facilities were underground storage in Austria, Germany and Portugal and the other three were LNG peak shaving units built in Italy. Generally speaking however, market conditions for the expansion of existing storage facilities or investments in new ones have been rather unfavorable.


Long term take-or-pay contracts coupled with sluggish economic growth and the emergence of alternative supplies, have led to an oversupply of gas in Europe. This oversupply has in turn pushed storage operators to sell their gas at a discount. Gas Storage Europe, the association representing 32 storage operators, has also been advocating for regulatory reforms that would improve the market environment for storage operators. They argue that these reforms, related to fees, access, and penalties are needed to ensure storage's role as the backbone of the European gas supply network.

3.4. The Increasing Impact of Demand on Prices

Traditionally, European gas supply contracts are indexed to oil prices. This indexation raises concerns that in the current low priced oil environment, the price of existing contracts will drop accordingly, thus shrinking the gas supply to European markets. However, according to a recent Boston Consulting Group (BCG) report, the indexation structure of gas supply contracts in Europe has changed significantly over the past decade. Notably, in 2005, roughly 70 percent of European natural gas volumes were indexed to oil prices. By 2013, this share fell to only 20 percent. Nearly 80 percent of natural gas volumes in 2013 were indexed to European hub prices such as UK’s NBP and Netherland’s TTF, marking a shift in contracting practices. Moreover, since 2014 the European hub prices have been gradually decoupled from oil prices.

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74 Ibid.
75 Ibid.
This change in Europe’s gas price indexation structure has largely been driven by midstream players seeking to alter their supply portfolios in order to reflect the existing gas market environment.\(^{76}\) Should this trend persist, the hub-based indexation will significantly reduce the sensitivity of European gas supply to price fluctuations of the global oil market.

However, for the existing gas supply contracts, which remain indexed to oil prices, prices will continue to have a direct impact. Specifically, lower contract prices may result in decreasing revenues for traditional pipeline gas suppliers like Gazprom, while at the same time providing such companies with the opportunity to strengthen market share in Europe. This price advantage gives holders of oil price indexed contracts less incentive to renegotiate their contracts, as they render traditional pipeline gas more competitive in the European market.\(^{77}\) As a result, the decrease in global oil prices may do more to stimulate gas demand in Europe than it does to shrink gas supply.

\(^{76}\) Ibid.

For most hub-indexed contracts, the impact of lower oil prices on European gas supply will be rather indirect. Specifically, looking at the international LNG supply, Europe has been acting as a sink for surplus international LNG volumes. Following the Fukushima nuclear disaster, large quantities of US LNG supply were redirected to Asia, which was further accelerated by Asia’s premium spot LNG prices. However, as most LNG supply contracts in Asia, either long-term or spot, are indexed to oil prices, falling prices is reducing the relative degree of US LNG competitiveness. This has the potential to benefit European hubs, which can absorb the surplus of global LNG supply and capitalize on the growth of U.S. LNG exports beginning in 2015.

From an energy security standpoint, it is in Europe’s long-term interest to diversify its gas supply by importing LNG from the U.S. Theoretically, emergence of U.S. as a gas supplier to the European market could force Gazprom to cut prices in order to stay competitive in the European market. This shift could push European hub prices lower and thus squeezing out traditional pipeline suppliers like Gazprom and gaining more market share in the European gas market.

### 3.5. Demand’s Effect on Vulnerability

The discussions above lead to three main conclusions:

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81 Ibid.
Demand for natural gas will likely be driven by a higher carbon price that incentivizes the switch from coal to natural gas in the power generation sector. The IEA estimates that Europe would witness the “largest absolute drop in coal use” among the OECD countries in its 2040 outlook.\textsuperscript{82}

Declining demand provides Europe with the opportunity to fill and expand its storage capacity and supply thus increasing resiliency in face of short-term supply disruptions.

Switching from oil indexed pricing to hub pricing has the potential to facilitate the growth in LNG imports into Europe thereby reducing dependency on traditional pipeline supplies from Russia. Integrating the European gas market to address key vulnerabilities.

The following section assesses various EU policy mechanisms designed to facilitate the integration of the European gas market. Particular attention is paid to the Projects of Common Interest (PCIs), structural funds, and European Fund for Strategic Investments (EFSI). More specifically, the effectiveness of these policy mechanisms in removing existing fiscal, regulatory, and bureaucratic hurdles is evaluated from both a public and private sector perspective. This section also provides an in-depth look at those current and projected projects, which experts emphasize as having the largest potential impact on European gas market integration.

4. A EUROPEAN ENERGY UNION

\textsuperscript{82} IEA World Energy Outlook 2014, pg 197
European leaders, especially in Eastern Europe and the periphery, have long expressed concern over Russia’s dominance over their energy markets. In the aftermath of the Russia-Ukraine crisis, Polish Prime Minister Donald Tusk took the lead in advocating for the creation of a European energy union that could mitigate security of supply concerns. In a Financial Times editorial, Tusk wrote that “[t]he seed of the EU was planted by a simple vision: common control over – and a common stake in – steel production and coal mining. It is time to strengthen the community in the field of energy.”

In February, the European Commission released its framework for a European Energy Union. The plan calls for the development of a unified regulatory framework for energy rules across the EU, in contrast to the status quo of 28 national regulatory frameworks.

The Commission has developed five dimensions for their strategy including:

- Energy security, solidarity and trust;
- A fully integrated European energy market;
- Energy efficiency contributing to moderation of demand;
- Decarbonizing the economy, and
- Research, Innovation and Competitiveness

The Commission expanded its Energy Security Strategy developed in May 2014 in order to develop parameters for energy security, solidarity and trust. The Energy Union communiqué calls for the diversification of supply – notably

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through completion of the Southern Gas Corridor, addressed in more detail below, as a means to enable exports of gas from Central Asia to Europe; the establishment of liquid natural gas hubs in Northern Europe, and the eventual construction of similar hubs in the Mediterranean, Central, and Eastern Europe.

Additionally, the Commission plans to support infrastructure development, including assets that can deliver gas supplies to Europe, by pursuing funding through vehicles such as the European Fund for Strategic Investments (EFSI, which aim to address market gaps by mobilizing private investment, and other European financial institutions. Internally, the Commission will also explore the possibility of reverse flows capabilities in order to strengthen gas distribution to critical demand points. The Commission has also stated that it will “explore the full potential” of LNG as a backup in the event that pipeline supply is inadequate for European needs.\(^85\) Included in this strategy are several policies:

- The Commission will prepare a comprehensive LNG strategy and will also work to remove obstacles to LNG imports from the US and other LNG producers.
- The Commission’s 2014 Report on short-term resilience in the gas sector stressed the need for stronger cooperation in responding to a potential supply disruption.
- The Commission will propose preventive and emergency plans at the regional and EU level, including the Energy Community contracting parties.\(^86\) The experience gained in the implementation will be taken into account when revising security of gas regulation.\(^87\)

\(^86\) These include: Albania, Bosnia and Herzegovina, former Yugoslav Republic of Macedonia, Moldova, Montenegro, Serbia, Kosovo* and Ukraine.
\(^87\) Ibid. Page 5
The Commission will assess options for voluntary demand aggregation mechanisms for collective purchasing of gas during a crisis and where Member States are dependent on a single supplier.88

The EC will pursue more transparent global energy markets and the Commission has pledged to seek energy specific provisions in future trade negotiations.89

The EC will further the energy relationship with Norway will consider revisiting the energy relationship with Russia based on “a level playing field in terms of market opening, fair competition, environmental protection and safety.”90

The Commission will consider Ukraine’s importance as a transit country and will work to upgrade the Strategic Partnership on energy with Ukraine, especially related to market reforms and upgrades of Ukraine’s gas network.91

The communiqué also calls for more engagement in the Intergovernmental Agreement (IGA) process. Renegotiation is very difficult as the Commission does not typically involve itself in negotiations until agreements are finalized. As a result, the Commission proposes adopting an earlier review timeline of these processes in order to ensure that the EU is uniformly represented in negotiations with third countries.92 Overall, EU officials are seeking to complete a “virtuous circle” consisting of an integrated European market that drives down costs, boosts competitiveness, and incentivizes investments. See appendix B for the fifteen-point action plan.

4.1. Outlook for the Energy Union

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88 Ibid. Page 6
89 Ibid.
90 Ibid. Page 7.
91 Ibid.
92 Ibid.
The future of the Energy Union is unclear. Policy experts have criticized the Energy Union communiqué for not offering a detailed outline of how the new policy will be enacted. Energy ministers from the EU’s member states met in Riga, Latvia on April 16 and European Climate and Energy Commissioner Miguel Arias Cañete said the Commission would unveil security of supply proposals for gas in late 2015. The extent of the Energy Union plan’s ambitions is difficult to predict before the Commission clarifies these new proposals.

Additionally, Gazprom officials have warned that the Energy Union plan’s prescription for a common gas price for Europe may result in higher gas prices for a number of countries asserting "[a] common price isn’t the lowest price. It will most obviously be the highest price." Regarding the energy mix, when the European Council published its first statement on the energy union on March 19, the Council called on member states to collectively initiate cooperation, but countries still maintain the ability to individually decide on their own energy mix. Some European nations, such as Hungary, have had tepid reactions to the plan. Hungary’s Prime Minister, Viktor Orban, has said that the Commission’s plan “reflects that [the EU] is heading into an energy union that hinders national sovereignty.”

4.2. Policy Mechanisms for Infrastructure Development

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Whereas the EU’s efforts to reduce climate change and achieve emission reduction targets have long been at the forefront of EU energy policy, the changing geopolitical landscape is increasingly necessitating a refocusing of EU policy on security of supply and end-user costs. To this aim, the EU is witnessing a rise in projects designed to mitigate Europe’s energy island issue through the build-out of new interconnectors as well as expanding gas pipeline flow reversals.

Existing mechanisms for infrastructure development will assist the EC as it seeks to implement the Energy Union plan for an internal energy market. These tools are essential as in today’s market, geopolitical, regulatory, economic, and financial obstacles threaten the development of numerous projects. For example, from a financing perspective alone, building a fully integrated internal energy market for electricity and gas infrastructure will require an estimated €200 billion in the next six years.\(^97\) That figure includes €140 billion for electricity transmission networks and the remaining €70 billion for gas pipelines.\(^98\)

One such mechanism is the European Energy Program for Recovery (EEPR). The EEPR was set up to assist the energy sector in the European Union after the financial crisis of 2008-2009. Proposals corresponding to these projects may be submitted only by member states and by international organizations. The European Commission selects proposals, which are eligible for EEPR funding mainly on the basis of the technical, financial, environmental or socio-economic criteria laid down in the regulation. It also determines the amount of aid to be

awarded to them. Currently, there are several projects that have been qualified to receive funding through this program:99

<table>
<thead>
<tr>
<th>Central and South East Europe</th>
<th>Contribution (EUR million)</th>
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</thead>
<tbody>
<tr>
<td>Slovakia-Hungary Interconnector</td>
<td>30</td>
</tr>
<tr>
<td>Gas transmission system Ljubljana, Slovenia to Austria</td>
<td>40</td>
</tr>
<tr>
<td>Interconnection Bulgaria-Greece</td>
<td>45</td>
</tr>
<tr>
<td>Romania-Hungary gas interconnector</td>
<td>30</td>
</tr>
<tr>
<td>Expansion of Gas Storage Capacity in the Czech hub</td>
<td>35</td>
</tr>
<tr>
<td>Reverse flow infrastructure and equipment</td>
<td>80</td>
</tr>
<tr>
<td>Slovakia-Poland interconnection</td>
<td>20</td>
</tr>
<tr>
<td>Hungary-Croatia</td>
<td>20</td>
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<tr>
<td>Bulgaria - Romania</td>
<td>10</td>
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In addition, the Projects of Common Interest (PCI) mechanism is contributing to infrastructure development. In October 2014 the European Commission identified a list of 248 key energy projects - PCIs – with implementation targets for the 2014 to 2020 timeframe. Specifically, these projects will address the electricity and gas transmission systems, storage, liquefied natural gas, oil, and investment in smart grid technology. This first tranche of PCIs were selected by 12 regional groups, established by the Guidelines for Trans-European Energy Infrastructures Regulation (EU) No 347/2013 and will not only benefit from streamlined national regulatory processes, but potentially have access to €5.85 billion in funding through the CEF. The list of selected PCIs is subject to a reselection process every two-years and will therefore undergo a revision at the end of October of 2015.100

Of total CEF funds, energy infrastructure projects were allocated €647 million in 2014, which were allocated primarily to electricity and gas transmissions systems. This will increase slightly to 650 million euros in 2015.\textsuperscript{101}
Figure 14: Natural Gas PCI Projects
Source: ENTSOG
To be qualified for PCI funding, projects must demonstrate a significant impact on at least two EU member states, generate energy market competition, enhance the EU energy security of supply, and contribute to the EU’s energy and climate goals.\textsuperscript{102}

Conversely, in addition to the possibility of CEF grant monies, the PCI can contribute to project planning, a binding three-and-a-half years’ time limit for permit granting processes, minimizing complexity by identifying a single national permitting authority, as well as reducing administrative costs due to streamlined environmental assessment procedures. The mechanism can also facilitate greater transparency for investors and the public while increasing overall public participation in project development.\textsuperscript{103}

Since the beginning of PCI discussions much has changed in this space that will impact the selection process of future projects. Notably, the number of projects is forecasted to decline so as to increase project implementation and efficiency. Additionally, access to capital for long-term debt projects and associated construction risk is on the rise, counter to a previously perceived notion of a funding gap; while, the escalation of the Russian-Ukrainian crisis will continue to highlight the need for increased resiliency of the EU gas market and existing infrastructure.\textsuperscript{104}

However, many experts point to the fact that Europe’s energy infrastructure, on the aggregate, is largely sufficient to meet today’s growing energy needs. Rather, time and money is best-spent optimizing existing capacity and available

\textsuperscript{102} Ibid.  
\textsuperscript{103} Ibid.  
resources. Of greatest concern remains the level of fragmentation across Europe’s gas infrastructure.

The development of the PCI mechanism is one policy tool specifically designed to help finance projects whose value is largely security-based, rather than commercial. This is to compensate that the financing of many gas infrastructure projects fails to consider many wider benefits including those of a socioeconomic nature. The growing tensions with Russia over gas shipments to Ukraine and thus significant portions of European gas are increasingly bringing this to light.

According to experts, if the security benefits were factored into the decision making process, in many instances a more compelling case could be made for project development. For instance, a Baltic LNG terminal could have become a reality offering new alternatives to Russian gas supply and providing greater access to Norwegian gas exports. Such initiatives constitute clear signals to the private sector and can facilitate the investment decision-making process. Specifically, the combination of national and supranational level infrastructure support has the potential to instill greater interest on behalf of private sector stakeholders when considering the development of certain projects.

At the supranational level, the EU cannot legally mandate that either countries or companies build out gas infrastructure, despite the fact that there may be tangible social benefits. The PCI therefore functions as a proxy for supranational mandates, where regional groups of state authorities can select critical infrastructure for PCI grant consideration. The fact remains that the commercial viability is of primary concern to the financial backers.

From a political perspective, the PCI process is groundbreaking. Specifically, the multinational engagement by which PCI projects are selected by regional groupings requires a concerted collaborative effort. The PCI process additionally provides transparency in the cost allocation process. This is particularly important,
as the majority of gas infrastructure projects are financially burdensome at the individual national level. For example, the installation of reverse-flow capacity is largely undertaken by countries, which at the abstract level have no critical interest in the energy supply of their neighbors.

The PCI also provides key support to infrastructure projects that are both commercially and non-commercially viable, but suffer from significant regulatory barriers. This is of particular relevance for projects that are commercially viable as regulatory obstacles amount to as much as 36 percent of the total barriers resulting in delays. To address these concerns the EU seeks to streamline and accelerate regulatory procedures and prevent political interference where possible. As financial backers largely select projects with existing political support, this initiative is thought to have an impact getting otherwise unlikely projects to market.

However, one fundamental area unaddressed by the PCI is the optimization of current infrastructure. As the current trajectory of decreasing European demand for gas continues, leveraging existing infrastructure capacity is a strategic way to strengthen the gas systems overall capacity without overdeveloping it both from a physical and financial standpoint. To this aim, the EU and member states are already adopting policies to reduce gas consumption through energy efficiency improvements. This is achievable for both industrial and residential consumers.

While those working on EU policy developments are well informed as to the opportunities provided by the PCI initiative, many in industry are not. Interviews with private sector experts confirmed this finding. Furthermore, of the few experts

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who were able to comment on this initiative, there was skepticism regarding the size of CEF financial funding, which is deemed “insignificant” in the greater scheme of infrastructure finance requirements for proposed projects.

### 4.3. Role of ENTSOG in Promoting an Integrated Market

While the PCIs work towards increasing EU-wide energy infrastructure integration, policy at the supranational level is actively strengthening system oversight capabilities. To this aim, in 2009, the European Parliament passed legislation officially creating the European Network of Transmission System Operator for Gas and Electricity, ENTSOG and ENTSOE, respectively. ENTSOG’s mission - to ensure optimal management of the gas transmission network of Europe - circumscribed three principal tasks: the development of network codes (i.e. the rules) gas market integration, operation, and development of the system; the periodic release of a Ten Year Network Development Plan (TYNDP); and, the annual release of seasonal supply outlooks.

ENTSOG released its most recent TYNDP in March 2015, covering a supply sensitivity assessment through 2035, a list of projects in the PCI process, and a cost-benefit analysis for deployment of new infrastructure. In this update 259 projects applying for PCI status by the September 2014 deadline. Of those projects previously approved by the European Commission, only South Stream withdrew from consideration. In line with ENTSOG’s vulnerability assessment, Eastern Europe from the Baltics to the South East, represents the largest concentration of projects. The PCI mechanism thus aligns well with the need to promote infrastructure development in gaps along the European gas network’s periphery.

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106 Ibid., p.9.
4.4. Barriers to Infrastructure Development

As previously discussed, the expansion of EU’s energy infrastructure is not without considerable difficulty as a number of highly impactful obstacles stand in the way of project development. According to a survey of the 88 infrastructure promoters submitting projects to ENTSOG, 61 noted barriers to infrastructure development as a key obstacle, which in this case represented 134 projects.\footnote{Ibid., p. 29} Over one-third of promoters identified the regulatory environment as the most commonly encountered barrier to developing projects, followed closely by the market environment.

The most common regulatory barrier identified in this survey was the rate of return. The competency of setting this rate usually falls under the authority of individual national regulatory regimes.[3] Higher rates of return should attract the continued development of the internal gas market. ENTSOG however, makes two
principal observations that reveal adverse effects of the current regulatory and market environments on the development of new projects.

Firstly, the current network codes and transmission tariff structures have led national regulatory agencies to favor low priced short-term capacity products.\textsuperscript{108} In essence, the prioritization of tariff reduction goals by regulators of existing operators dissuades longer-term infrastructure investment as the certainty of future cash flows is reduced. Revised tariff setting procedures that account for the future benefits of increased market integration would reduce the regulatory barriers for new infrastructure by increasing the rate of return of proposed projects.

Secondly, the current incentives for critical infrastructure development under TEN-E Regulation may actually dissuade market-driven development. The anticipation of additional EU financing often reduces the willingness of market players to engage in new projects. Similarly, some promoters see the cross-border cost allocation mechanism of PCI projects as generating additional delays.\textsuperscript{109}

Due to these infrastructure development barriers as well as the inability of participating member states to reach consensus on critical projects, many countries have opted to proceed with project implementation absent EU funding. Prime examples include Lithuania’s unilateral construction of a small scale LNG terminal and a Slovakia-Ukraine interconnection built by the Slovakian Gas Company. Due to the size of the investment project, in some cases it has become less painful to proceed without the EU’s approval of funds.

With regards to infrastructure projects outside the scope of EU financing mechanisms, research shows that there are two catalyst factors at play: 1) the

\textsuperscript{108} Ibid., p. 31
\textsuperscript{109} Ibid., p. 31
investment size of the project, 2) bilateral/multilateral agreement among participating states. If these factors are accounted for, countries either rely on national government financing or develop partnerships with commercial entities.

4.5 Lithuanian Action

After much consideration, the Lithuanian Parliament decided and the Government approved the initiative to build an LNG terminal in the port of Klaipeda. This facility which would ensure an alternative supply of natural gas to Lithuania and would lessen the dependence on monopolistic Russian supply, although it would not eliminate reliance on Russian supplies. The Lithuanian state has also agreed to guarantee 100 percent of the financing provided by the European Infrastructure Bank (EIB). Considering that Lithuania pays the second highest gas prices in Europe after Bulgaria, one would anticipate major interest among investors to finance the project. However, due Gazprom’s position as the lowest cost supplier the development of alternative supply source has been very difficult as Gazprom is able cut prices of necessary to maintain market share.

With these predicaments in mind, the Lithuanian Government decided catalyze investment for the LNG Terminal through comprehensive state guarantees to insure this investment. This action attracted sufficient private sector capital, but guarantees needed to be approved by the EC. Given the security implications and the market situation in the Baltics the Commission decided that granting state aid to this project was necessary.  

Lietuvos Energija, the Lithuanian state-owned power company has contracted with Statoil to import 0.54 bcm of gas annually through the terminal until 2015.\footnote{Reuters, “Lithuania to pay more for Norwegian LNG than Russian gas,” November 13, 2014. http://www.reuters.com/article/2014/11/13/lithuania-lng-idUSL6N0T268X20141113.} Lithuania has contracted with Norway to receive LNG gas at $397 per thousand cubic meters; meanwhile it pays $485 for Russian gas. However, Russia has a capacity to lower its price of gas to $372 per thousand cubic meters.\footnote{Seputyte, Milda, “Lithuania Grabs LNG in Effort to Curb Russian Dominance,” Bloomberg News, October 27, 2014. http://www.bloomberg.com/news/articles/2014-10-27/lithuania-grabs-lng-in-effort-to-curb-russian-dominance.} Lithuania’s domestic consumption was 2.7 bcm in 2013 while the terminal has an annual import capacity of 4 bcm.\footnote{Reuters, “Lithuania may not extend long-term gas import deal with Gazprom,” March 2, 2015. http://af.reuters.com/article/commoditiesNews/idAFL5N0W42ZT20150302.} This extra capacity is beneficial to neighboring Baltic States that are similarly dependent on Russian gas exports.

Lithuania’s example of state guarantees to financial investment point to a potential model for Southeast European states to enable gas infrastructure investment. For this to happen, there must be substantial political support and a recognition of the risk-weighted benefits of increased integration to the core European gas markets.

### 4.6. Key Infrastructure Projects

In light of the information provided above, this section outlines the primary energy infrastructure projects currently selected by industry experts as those with the greatest potential to increase Southeastern Europe’s security of gas supply and ability to increase regional connectivity. Despite the value-added of these projects, in many instances project initiation has been stalled. While many projects have political support they are not economically viable absent governmental or EU support.
Gas Interconnection Poland-Lithuania (GIPL)\textsuperscript{114} seeks to provide access to the global LNG market for the Baltic States via the LNG terminal in Poland. GIPL will connect the Baltic states to Central East European countries; making the project a strategic link between the Baltic Energy Market Interconnection Plan (BEMIP) and North-South priority corridors. From a distributional standpoint, this project will directly ameliorate Europe’s energy island issue and allow for greater supply diversification, particularly from Norway.

However, GIPL has several barriers impeding its implementation including inefficient permitting procedures and the lack of guarantees covering project costs. Also additional barriers exist due to non-maturity of the gas markets in the Baltic States. Though its PCI application has been submitted and accepted, its final investment decision has not been made (non-FID). While the share of public financing is set to be 75 percent for construction works and 50 percent for building permits, multilateral financing will provide additional financing. Application for funding of other stages of the project from the CEF was submitted.

Interconnector Greece Bulgaria (IGB)\textsuperscript{115} Project will help integrate the counties in South East European energy market as well as facilitate interoperability and connectivity with diverse gas sources including Algeria and the Caspian Region. This will reduce the high degree of the region’s dependency on single source gas imports as well as the lack of cross-border gas interconnections. Currently a PCI, commissioning is expected to start in 2018.


\textsuperscript{115} Ibid.
The IGB has a non-FID status. While 20 percent of funding will be made available through public funds and 80 percent will come from the private sector. This project also has access to the EEPR funding program.

The primary barriers to investment for this infrastructure project are regulatory in their nature, which have resulted in delays.

**Croatia LNG Terminal** will provide natural gas to multiple countries in the region including: Hungary, Slovenia, Austria, Italy, Germany, Czech Republic, Slovak Republic, former Yugoslav Republic of Macedonia, Albania, Kosovo, Serbia, Montenegro, Bosnia and Herzegovina, Ukraine, Romania, and Bulgaria. As current gas supply is heavily dependent on one supply route through Ukraine, this project will greatly increase the diversification of gas in the region. Once completed, this terminal will receive gas from Egypt, Algeria, Nigeria, Cyprus, Israel, USA and Mozambique.  

Financing of this project is not yet defined thought a final investment decision is expected in the third quarter of 2015 and commissioning is set to start in 2019. Land procurement will be financed through public funds. Although the environmental assessment has been performed and approved the location permit has not yet been obtained which has contributed to project delays.

**Slovenian-Hungarian Interconnector** will enhance interoperability, connectivity, diversification of sources and supply routes. The main benefit however is its cross border structure. This project along with other Hungarian projects aims to enhance the flexibility of the Hungarian transmission system.

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116 Ibid.
117 Ibid.
This interconnector is a designated PCI project, with non-FID status. Currently, half of the project’s financing is set to be provided through public assistance mechanisms, whereas the other half through multilateral financing. However, there are multiple barriers pertaining to this project, namely regulatory hurdles and a low rate of return.

**Poland – Slovakia Interconnection**\(^{118}\) aims to increase the security of supply in Central Eastern Europe and to contribute to the establishment of a well-functioning gas market. The driving force behind this project seeks to address the current infrastructure gap currently between Poland and Slovakia. There are several expected benefits, which include bottlenecks, connectivity, and diversification of supply sources and supply routes. In addition, it will have a positive impact on the sustainability of overall regional projects. Even though Ukraine is not a member state of the EU, the project has the potential to facilitate reverse flow capacity from Slovakia.

From a financial standpoint, this interconnection is a PCI project that has a non-FID status. As of today, the commissioning is planned to begin in 2019 with 55 percent of its financing stemming from CEF funds while the remaining 45 percent from the private sector. While this project currently constitutes the largest regional infrastructure project it is also subject to infrastructure barriers; particularly, regulatory and financing barriers such as a projected low rate of return.

**Slovakia-Hungary Interconnection**\(^ {119}\) will enhance the security of supply in central eastern European region as well as improve market integration mechanisms, flexibility and functionality. It is commissioned to start in 2015, and market demand is considered its main driver.

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\(^{118}\) Ibid.

\(^{119}\) Ibid.
It is a designated PCI project that has a FID status. Public financing will cover 15 percent of estimated costs, whereas private financing will amount to the remaining 85 percent. There have been several Intergovernmental Agreements signed with regards to the construction, operation, maintenance, reconstruction and breakdown recovery of hydrocarbon transmission pipelines crossing the common state borders. It is defined as one of the largest infrastructure projects in the region.

**Turkey – Bulgaria Interconnection (ITB)** aims to further enhance the interconnection of the networks between Bulgaria and Turkey. Specifically, it will enable natural gas flows between the Bulgarian gas transmission network and Turkey’s pipelines. ITB is an essential extension of the Southern Gas Corridor that will provide Southeast and Central European countries with access to the Caspian and Middle East sources via Turkey.

Commissioning of the project is expected to start in 2017 and it will be carried out in stages over the 2015-2017 timeframe.

**Southern Gas Corridor** plays a critical role as an alternative gas supply source for the EU. As Russia threatens to halt its gas delivery to Europe through Ukraine starting in 2019, the importance of Southern Gas Corridor increases dramatically. The total cost for all the segments of the Southern Corridor are estimated to be nearly 50 billion euros. Though, currently this project involves Azerbaijan, Georgia and Turkey, the European Commission is in the process of adding the trans-Caspian gas pipeline to the project, which will connect Turkmenistan with

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120 Ibid.
Azerbaijan, through the Caspian Sea. Currently only the South-Caucuses Pipeline is operational, while and two other segments, namely Trans-Anatolian (TANAP) and Trans-Adriatic (TAP) pipelines are being constructed. Gas flowing through this region will reach multiple countries in the southern region of the European Union; in particular Greece, Albania, and Italy. After lifting sanctions, Iran may also become part of this project.

Conclusion

Efforts at the supranational level to facilitate the integration of the European energy market are underway but continue to face a number of challenges. While the escalation of the Ukraine-Russia conflict increasingly highlights the security related vulnerabilities of many European member states, including a lack of supply diversification and isolation from larger energy markets, infrastructure financing continues to be primarily focused on commercial viability. While, initiatives like the PCI are valuable in helping bring many of these projects online and bypassing several regulatory and market-based obstacles, greater funds are needed if the EU is to achieve a fully integrated internal energy market. Furthermore, as illustrated by projects under consideration or initial stages of implementation, addressing these barriers has the potential to significantly alter Europe’s energy landscape in short term.

5. CONCLUSION

The 2014 Russo-Ukrainian crisis has encouraged a closer look at the European natural gas supply security. It has not however, changed the direction of

122 Socor, Vladimir, “Recent from Europe: SCP, TAP, TANAP: Segments of Southern Gas Corridor to Europe,” The Jamestown Foundation, January 15, 2014. http://www.jamestown.org/regions/europe/single/?tx_ttnews%5Btt_news%5D=41821&tx_ttnews%5BbackPid%5D=671&cHash=b19e6b9dceec369702f84a46c2e2d56a#.VUZw6fIViko.
European energy security policy. Rather, regulatory efforts to enhance integration of European natural gas markets to withstand supply disruptions stem from the 2007 and 2009 Russian gas cutoffs to Ukraine. To date, the amount of gas supplied through alternative routes and other suppliers is sufficient to meet European demand, especially in the core markets of Western Europe. Lack of infrastructure in the Southeast however, leaves the region vulnerable to supply disruptions.

To address this challenge, Europe has begun strengthening its interconnector network by deploying a number of regulatory and fiscal developments. Notably, the release of the Third Energy Package in 2009 and the recent Energy Union Package in 2015, which serve as guiding frameworks for enhancing Europe’s energy security, as well as a number of policy and financial assistance mechanisms issued through the Connected Europe Facility. While a majority of natural gas projects provide critical social and security related benefits, the lack of commercial viability and below-average rates of return have been significant hurdles to overcome for project sponsors.

As the EU continues its efforts to streamline the financing, regulatory, and permitting processes for new gas infrastructure projects, efforts to diversity gas supply will serve as a critical tool in the short- to medium-run to reduce the region’s overall vulnerability to supply disruption. In this regard, increasing US LNG imports will be strategic, particularly as a European shale gas revolution is unlikely to come to fruition in the coming years. The recent fall of the Asian LNG premium is also a facilitator of this transition to greater reliance on US LNG.

Overall, efforts to enhance the level of natural gas infrastructure integration of Southeastern Europe with the core EU markets will be the key to strengthening Europe’s security of supply. The creation of a unified internal market will be central to this integration, but is not currently reflective of today’s market conditions. The continued development of supranational energy policies will help
guide this transition, yet over the next five years commercial viability is predicted to be the driving factor of future integration.
Declining Demand

- Shifts in generation mix: lower coal prices in the U.S. along with lower carbon prices in ETS have led to increased coal consumption in the EU and displacement of gas-fired generation
- Renewable penetration and energy efficiency: increased renewable generation in Europe, along with aggressive energy efficiency programs, have contributed to the decline in demand
- Predicted EU measures to increase the price of carbon in its attempts to meet its 2020 and 2050 emission targets
- New opportunities in Europe to fill their storage facilities and enhance resiliency to short-term supply disruptions due to oversupply of gas
- Fall in oil prices leads to reductions in natural gas prices in the case of oil-indexed contracts.
- Cumulative Impact: natural gas will remain flat in medium term across Europe.

Our capstone question was prompted by the crisis unfolding in Ukraine and the challenges it presented to the security of gas supplies in Europe.

Our research revealed an unequal set of supply security challenges across Europe.

Supply Alternatives & Emergence of U.S. LNG

- No prospect for shale gas development in the near future due to politics, regulations, and environmental concern
- While Norway has filled EU’s supply gaps in the past, their declining production levels require Europe to look at alternate supply sources in the future
- Netherlands has become an important supplier in Europe, but primarily serves the Northwestern region
- With declining Asian LNG premiums and shifts to hub pricing in the EU gas market, Europe becomes an increasingly attractive market for U.S. LNG suppliers
- While Europe has sufficient LNG import capacity, it requires infrastructure investment to deliver the imported gas to vulnerable regions in the Southeast

Market Integration

- Since 2007, the EU has established various policy and financial mechanisms to better integrate its gas and electricity market through “Energy Union” packages:
  - Stimulating infrastructure investments through Projects of Common Interest (PCIs) and Connected Europe Facilities (CEF)
  - Ensuring optimal management of gas transmission by the European Network of Transmission System Operator for Gas (ENTSO-G)
  - Identifying barriers to investment: regulatory & political, market, permitting, financing
Appendix I: Outlet Capacity of Export Pipelines at the FSU Border, bcm/year

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Capacity</th>
<th>Destination of exports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Via Ukraine:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orenburg-Western border (Uzhgorod)</td>
<td>26</td>
<td>Slovakia, Czech, Austria, Germany, France, Switzerland, Slovenia, Italy</td>
</tr>
<tr>
<td>Urengoy-Uzhgorod</td>
<td>28</td>
<td>Slovakia, Czech, Austria, Germany, France, Switzerland, Slovenia, Italy</td>
</tr>
<tr>
<td>Yamburg-Western border (Uzhgorod)</td>
<td>26</td>
<td>Slovakia, Czech, Austria, Germany, France, Switzerland, Slovenia, Italy</td>
</tr>
<tr>
<td>Dolina-Uzhgorod - 2 lines</td>
<td>17</td>
<td>Slovakia, Czech, Austria, Germany, France, Switzerland, Slovenia, Italy</td>
</tr>
<tr>
<td>Komarno-Druzdowichi - 2 lines</td>
<td>5</td>
<td>Poland</td>
</tr>
<tr>
<td>Uzhgorod-Beregovo - 2 lines</td>
<td>13</td>
<td>Hungary, Serbia, Bosnia</td>
</tr>
<tr>
<td>Hust - Satu-Mare</td>
<td>2</td>
<td>Romania</td>
</tr>
<tr>
<td>Ananyev-Tiraspol-Izmail &amp; Shebalinka-Izmail - 3 lines</td>
<td>26</td>
<td>Romania, Bulgaria, Greece, Turkey, Macedonia</td>
</tr>
<tr>
<td><strong>Total via Ukraine:</strong></td>
<td><strong>142</strong></td>
<td></td>
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<tr>
<td><strong>Via Belarus:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yamal-Europe (Torzhok-Kondratki-Frankfurt/Oder)</td>
<td>33</td>
<td>Poland, Germany, Netherlands, Belgium, UK</td>
</tr>
<tr>
<td>Kobrin-Brest</td>
<td>5</td>
<td>Poland</td>
</tr>
<tr>
<td><strong>Total via Belarus:</strong></td>
<td><strong>38</strong></td>
<td></td>
</tr>
<tr>
<td><strong>New Projects (Final Investment Decision Stage):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Petersburg-Finland - 2 lines</td>
<td>6</td>
<td>Finland</td>
</tr>
<tr>
<td>Blue Stream (design capacity)</td>
<td>16</td>
<td>Turkey (possible to Greece, Macedonia)</td>
</tr>
<tr>
<td>Nord Stream (design capacity)</td>
<td>55</td>
<td>Germany, France, Czech and other</td>
</tr>
<tr>
<td><strong>TOTAL EXISTING EXPORT CAPACITY:</strong></td>
<td><strong>257</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Other New Projects:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Stream</td>
<td>63</td>
<td>Bulgaria, Serbia, Greece, Italy and other</td>
</tr>
<tr>
<td><strong>Guaranteed contracted exports for 2020-2025:</strong></td>
<td><strong>156</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total new capacity:</strong></td>
<td><strong>133</strong></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL PLANNED EXPORT CAPACITY:</strong></td>
<td><strong>390</strong></td>
<td></td>
</tr>
</tbody>
</table>

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Appendix II: EU’s 15-Point Action Plan

Items germane to this study include:\textsuperscript{124}

- EU diversification of natural gas supply. \textit{(Action Point #2)}
  - The Commission will propose a resilience and diversification package in 2015-2016 by revising the existing security of gas supply regulation.
  - The Commission will develop a comprehensive LNG strategy.
  - The Commission will develop alternative access routes, including the Southern Gas Corridor, Mediterranean, and Algeria.

- Intergovernmental agreements should comply with EU legislation and be more transparent. \textit{(Action Point #3)}

○ The Commission will propose a revised Decision on Intergovernmental Agreements in 2016, which will call for the involvement of the Commission in intergovernmental negotiations.

● The Commission will support the development of major infrastructure projects, especially PCIs. (Action Point #4)

● The regulatory framework based on the 3rd Internal Energy Market Package will be further developed. (Action Point #6)

○ The Commission will review the functioning of the Agency for the Cooperation of Energy Regulators (ACER) and European Network of Transmission System Operators (ENTSOs) and will propose additional reforms in 2015-2016.

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