Atlantic Council
GLOBAL ENERGY CENTER and
DINU PATRICIU EURASIA CENTER

COMPLETING EUROPE

GAS INTERCONNECTIONS IN CENTRAL AND SOUTHEASTERN EUROPE—AN UPDATE

John Roberts

Foreword by David Koranyi
and Ian Brzezinski

COMPLETING EUROPE

GAS INTERCONNECTIONS IN CENTRAL AND SOUTHEASTERN EUROPE—AN UPDATE

John Roberts

Foreword by David Koranyi
and Ian Brzezinski

Eurasian Energy Futures Initiative

As a joint initiative of the Atlantic Council's Global Energy Center and Dinu Patriciu Eurasia Center, the Eurasian Energy Futures Initiative covers critical energy issues in the wider Eurasian space.

ISBN: 978-1-61977-479-7

Cover photo credit: REUTERS/Sergei Karpukhin. An employee works on pipes made for the South Stream pipeline in Vyksa, Russia, in April 2014.

This report is written and published in accordance with the Atlantic Council Policy on Intellectual Independence. The author is solely responsible for its analysis and recommendations. The Atlantic Council and its donors do not determine, nor do they necessarily endorse or advocate for, any of this report's conclusions.

August 2016

TABLE OF CONTENTS

FOREWORD

Twenty-five years after the fall of the Berlin Wall, much progress has been made toward fulfilling the vision of a Europe whole and free. However, work remains to complete a critical element of this vision, the creation of a single European market. That will require the development of infrastructure networks that bind together the economies of Central and Southeastern Europe with the rest of European Union.

The Atlantic Council and Central Europe Energy Partners (CEEP) rolled out their report, *Completing Europe—From the North-South Corridor to Energy, Transportation, and Telecommunications Union*, at the Council's Energy and Economic Summit in Istanbul in November 2014. The study, co-chaired by former US National Security Advisor Gen. James L. Jones, Jr., USMC (Ret.) and the Chairman of the Board of Directors of CEEP Pawel Olechnowicz, called for the accelerated construction of a North-South Corridor of energy, transportation, and communications links stretching from the Baltic Sea to the Adriatic and Black Seas. The report's recommendations were addressed to policymakers at national and regional levels in the European Union, policymakers in the United States, and decision-makers in the business sector. It provided a road map for how transatlantic cooperation on the North-South Corridor can play a vital role in fostering economic growth and energy security in a Europe that is whole, free, and at peace. The *Completing Europe* study was led by the Atlantic Council and CEEP, in coordination with the Central & Eastern Europe Development Institute and with the support of Grupa LOTOS S.A. and Przedsiebiorstwo Eksploataciji Rurociagow Naftowych S.A. (PERN "Przyjazn").

The *Completing Europe* report inspired and advised a meeting at the heads of state level of the concerned countries convened by Croatian President Kolinda Grabar-Kitarović at the margins of the UN General Assembly in New York in September 2015. The participants agreed to give new impetus to the buildup of energy, transport, and telecommunications infrastructure across the Corridor. Indeed, while significant progress has been made on the ground ever since the publication of the original report, critically important infrastructure is still missing especially on the energy front, where Europe is the most vulnerable.

This paper—written by John Roberts, the author of the *Completing Europe* report's energy chapter—explores the progress and remaining shortcomings in natural gas interconnections in Central and Southeastern Europe. The paper identifies seven gas infrastructure projects in Central Europe whose completion is critical to transforming the vision of a single European energy market into reality—one that will strengthen the continent's energy security and advance its economic prosperity and resilience.

This paper's analysis and policy recommendations are intended to inform the second meeting of the leaders to be convened by President Grabar-Kitarović in Dubrovnik on August 25-26, 2016 to push forward the Corridor connecting the Adriatic with the Baltic and Black Seas.

David Koranyi
Co-director of the Completing Europe Report
Director
Eurasian Energy Futures Initiative
Atlantic Council

Ian Brzezinski
Co-director of the Completing Europe Report
Senior Fellow
Brent Scowcroft Center
Atlantic Council

EXECUTIVE SUMMARY

European gas development is in a strange flux: There are increasing prospects that consumers will benefit as the market enters a low price era amidst competition between Russian, Norwegian, and US liquefied natural gas (LNG)—and a continuing need for upgraded infrastructure to ensure that the benefits of such competition reach all sectors of the continent and that this infrastructure is also capable of coping with a crisis should major pipeline imports from Russia or Norway be cut off.

This paper addresses these key points, with particular stress on the need to implement an effective distribution system within the member states of the European Union and the Energy Community that would enable gas to flow freely between LNG terminals on the Baltic, Adriatic, and Aegean Seas and import points on and around the Black Sea.

It makes two major recommendations. The first is that the Action Plan for Central Eastern and South Eastern Connectivity (CESEC) approved in Dubrovnik on July 10, 2015 should be fully implemented.

Essentially this requires further financial and diplomatic support for six of the CESEC Action Plan projects, since the seventh, the development of the Trans-Adriatic Pipeline (TAP) from Turkey's border with Greece to southern Italy, is already well under way.

The six remaining projects are:

- The Interconnector Greece-Bulgaria (IGB);
- The Interconnector Bulgaria-Serbia;
- The phased reinforcement of Bulgaria's domestic system to allow utilization of both interconnections that are already in existence and those under development;
- The phased reinforcement of the Romanian domestic system to allow utilization of existing interconnections and interconnections being developed, including necessary reinforcements at those interconnection points in adjacent systems;
- An LNG terminal in Croatia, with potential for phased development;
- An LNG evacuation system from Croatia toward Hungary together with the necessary reinforcement of Croatia's domestic system.

The second major recommendation is that national and European officials concerned with developing the European Energy Union should focus, in particular, on developing a robust North-South Interconnector to link the Polish LNG terminal at Świnoujście with Croatia's planned LNG terminal at Omišalj in the Adriatic, together with an effective connection through to the Black Sea and the Aegean.

This proposal for a "Backbone" pipeline, contained in an appendix to this report, remains a concept, rather than a detailed plan for a specific project. What it stresses, however, is the need for a system of sufficient capacity both to boost competition within Europe and to serve as an emergency distribution system should one major supplier, such as Russia or Norway, for one reason or another prove unable or unwilling to continue deliveries. The Backbone concept is presented as a way of upgrading existing and planned interconnections in a coordinated manner to serve both commercial purposes and the energy security of Europe as a whole.

Development of the Backbone concept is particularly important in the light of current Russian policy objectives concerning gas supply to Europe. Firstly, it creates a distribution system that is both flexible and substantial, ensuring that Europe can take full commercial advantage in terms of promoting competition between gas supplies from different sources should Russia's current Nordstream II pipeline project actually be implemented. Secondly—in conjunction with the development of the planned BRUA system to connect Bulgaria, Romania, Hungary, and Austria—Backbone would ensure countries that currently receive Russian gas via Ukraine possess an alternative distribution system, if and when Gazprom implements current plans to terminate gas deliveries through Ukraine.

In this regard, there is also a need to ensure backhaul—reverse capability—on the Brotherhood system that currently brings the largest volumes of Russian gas to Europe via Ukraine.

The report also addresses progress in ensuring an end to the "island" status of the northeastern Baltic members of the European Union: Estonia, Latvia, and Lithuania.

INTRODUCTION

The issue confronting the European Union (EU), the Energy Community, and the member states of these two organizations is how to provide the firm infrastructure basis for the impending EU Energy Union and to ensure energy security throughout Europe, whether inside or beyond the EU.

Significant steps have been taken toward this goal in the year since the Atlantic Council, Central Europe Energy Partners, and the Central & Eastern Europe Development Institute published their report *Completing Europe: From the North-South Corridor to Energy, Transportation, and Telecommunications Union* under the chairmanship of former US National Security Advisor and former Atlantic Council Brent Scowcroft Center Chairman Gen. James L. Jones and Chairman of the Board of Directors of CEEP Pawel Olechnowicz. The report inspired and advised a meeting at the heads of state level of concerned members at the margins of the UN General Assembly in New York in September 2015, convened and chaired by Croatian President Kolinda-Grabar Kitarović, and attended by Bulgarian President Rosen Plevneliev, Romanian President Klaus Iohannis, Polish President Andrzej Duda, Slovakian Deputy Prime Minister and Minister of Foreign Affairs Miroslav Lajčák, Lithuanian Minister of Foreign Affairs Linas Linkevičius, Czech Minister of Foreign Affairs Lubomír Zaorálek, Estonian Minister of Foreign Affairs Marina Kaljurand, Hungarian Minister of Foreign Affairs and Trade Péter Szijjártó, Austrian Permanent Representative to the United Nations Jan Kickert, Slovenian Permanent Representative to the United Nations Andrej Logar, US Special Envoy and Coordinator for International Energy Affairs Amos Hochstein, Atlantic Council President and CEO Frederick Kempe, and Atlantic Council Executive Vice President Damon Wilson.

This paper focuses on progress made in the development of gas interconnectors, the single most important element in the creation of an effective energy union and in assuring energy security for Europe. It addresses four key issues:

- the alignment of market conditions with the requirement for Energy Security
- the prioritization of energy corridors and gas interconnection projects
- the mobilization of investment to secure these goals
- corruption and the role of Gazprom

The prime focus of this report is the situation in Southeastern and Central Europe, in particular the countries that comprise the Energy Community, an institution that in energy policy and development terms effectively unites the EU with seven non-EU states in Southeastern Europe—Albania, Bosnia and Herzegovina, Kosovo, the former Yugoslav Republic of (FYROM), Moldova, Montenegro, and Serbia—also Ukraine and Georgia. Norway, Turkey, and Armenia have observer status.

[G]as interconnectors [are] the single most important element in the creation of an effective energy union and in assuring energy security for Europe.

These are the countries that can most benefit from the development and integration of regional gas infrastructure, since they are the most dependent on a single supplier, Russia, which means that they generally have to pay more for their gas imports than countries with a broader range of suppliers and, of course, are thus far more vulnerable in energy security terms should Russian gas supplies be reduced or curtailed. The EU's dominance in this structure is illustrated by the fact that it pays for 94.5 percent of the Energy Community's budget whilst the most important ongoing process within the community is the steady adoption of the EU's energy *acquis* by Energy Community member states, thus ensuring that eventually the EU's developing Energy Union will extend not just within the EU itself but throughout the Balkans and as far east as Ukraine and Georgia.

In addressing these issues, this paper will seek to assess just what needs to be done to bridge the gap between the kind of market-justified infrastructure that should be able to secure commercial sources of financing and the prospective requirements for the

Table 1 Natural gas supplies to Europe, 2010–2014, (in bcm)

	2010	2011	2012	2013	2014
Supplies by major gas exporters					
OAO Gazprom (long-term contracts)	138.6	150	138.8	161.5	146.6
Algeria (including LNG)	57.3	52.4	46.5	36.6	31.7
Libya (including LNG)	10.3	2.5	6.7	5.7	6.5
Qatar	32.9	43.9	31.3	24.4	23.7
Nigeria	13.5	18.1	12.1	7	6
Total	252.6	266.9	235.4	235.2	214.5
Supplies by major European producers					
Norway	115.4	109.4	121.4	114.7	116.8
Netherlands	76.5	72.9	72.6	77.7	63.1
UK	64.5	51.1	43.8	41.2	41.2
Other	100.8	56.6	73.5	71.5	50.4
Total	357.2	290	311.3	305.1	271.5
Total	**609.8**	**556.9**	**546.7**	**540.3**	**486**

Source: Gazprom Annual Report 2014, May 2015, p. 49.
Gazprom Note: Data for 2010–13 may differ from data in Annual Report 2013 due to amendments to international statistics.

greater-capacity infrastructure required to ensure Pan-European energy security.

In essence, the situation can be summed up as follows: The market, backed by firm regulatory initiatives from the European Commission, can eventually be expected to deliver at least a modicum of interconnection and integration in gas infrastructure, including the development and expansion of new pipelines and liquefied natural gas (LNG) regasification facilities. Such developments, however, fall in the category of being "necessary, but not sufficient," in terms of being able to deliver the gas distribution system required to deliver energy security for Europe.

The European Commission is working steadily with the Energy Community to ensure the alignment of the various transmission codes governing the movement of gas in the region, in effect, ensuring that the various pipelines under consideration—the hardware, so to speak—all operate using compatible software. The software issue, however, is beyond the scope of this paper, which deals primarily with the hardware involved and with the issue of how to develop a coherent "Backbone" for Europe's gas infrastructure to ensure that the European gas distribution network of the 2020s is sufficiently resilient to cope with a major supply interruption as well as to handle greater regional interplay—and thus lower prices—in eastern, central, and southeastern Europe.

This will require an insurance policy in the form of a pipeline system of somewhat greater capacity than might be justified if market conditions constituted the sole criterion; a system capable of ensuring the continuation of gas supplies throughout Europe should deliveries from a major gas supplier be interrupted. If that gas supplier were Russia, which accounted for one-third of all European gas consumption in 2014 and for a staggering 73 percent of European net gas imports (imports minus exports) that year, then what kind of infrastructure would be needed to cope with such a disruption, and who would pay for it?[1]

1 According to the *BP Statistical Review of World Energy June 2015*, http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html, in 2014 Europe (defined here as the EU, Switzerland, Norway, the Balkans, and Turkey, but excluding Ukraine and some smaller European and Eurasian states), consumed 443.3 bcm of gas, with Russia supplying 147.7 bcm (33.3 percent). Europe—including Norway, which is associated with the EU through the European Economic Area (EEA) but excluding Ukraine—produced a total of 241.1 bcm, ensuring that it required net imports of 202.2 bcm. Russia thus supplied Europe with 73.0 percent of its net imports last year. The situation is somewhat

The provision of such an insurance policy is discussed in the appendix: The Backbone Concept Revisited.

The development of a resilient infrastructure network capable of tackling the loss of a major supplier should be seen in the context of what could well prove to be rapidly changing market conditions.

There are three main reasons for this. The first is the drive for integration of European gas markets, the subject of this paper. The other two are:

- the prospective arrival of large volumes of liquefied natural gas (LNG) from the United States on the global market and their impact on European markets in particular; and
- the possibility that Russia might radically change its gas supply policies, abandoning its historic emphasis on price maintenance for a policy based on the protection and promotion of market share, with its strategy being to undercut the price of any alternative supplier who might threaten this market dominance.

US LNG

Liquefied natural gas produced in the United States entered world markets in early 2016, with the first delivery to Europe taking place on April 26, 2016, when the Creole Spirit docked at Sines in Portugal with cargo purchased on the spot market. So far, the US Government has approved export licenses for around 126 bcm per year of LNG. Since it is not yet clear whether all these licenses will be taken up, US officials commonly talk of an ability to export around 100 bcm per year by around 2021 or 2022. The exact figures, and timing, are less important than the fact that a substantial volume will be coming on line and that current price conditions, with shipping costs favoring European destinations over the Asia-Pacific market, make it likely that a substantial proportion of US LNG will wind up in Europe.

A CHANGE IN RUSSIAN GAS STRATEGY

Traditionally, Gazprom has been able to utilize its role as a monopolistic supplier and leverage the lack of alternative delivery systems to maximize prices paid by a number of European customers, with varying results; at one stage in 2013, Macedonia was paying $564 per thousand cubic meters whereas Germany, located at a similar distance from Russia's main gas fields, but with a plethora of alternative suppliers, was paying just $379. The development of interconnectors is enabling markets that currently are totally or overwhelmingly dependent on Gazprom for their gas imports to end this state of affairs. This may be one factor prompting a change in Russian policy away from a focus on prices and toward retention—or expansion—of market share; another may be pressure from other Russian gas producers, who account for more than a quarter of Russian gas output but whose export options are currently confined to LNG projects that have yet to enter service.[2] Indications that Russia may one day move to a policy based on prioritizing market share over pricing include Gazprom's experimentation with the auctioning of small volumes of gas in the autumn of 2015; its preparedness to offer deep cuts to Turkish private company purchasers in the summer of 2015; and rebates offered to various European customers to bring its prices, in effect, more into line with hub prices.

The auctions, in particular, seem intended to demonstrate to the European Commission that nobody else is interested in using the spare capacity on the OPAL gas line from northern Germany to Central Europe, thus giving Gazprom an argument to say that the Commission should allow it to make full use of OPAL, and thus pave the way for Nordstream II and the delivery of Russian gas to Gazprom customers in Central Europe via Nordstream II and OPAL, instead of via Ukraine and the Brotherhood pipeline system.

THE EC'S OVERALL GOAL

The European Commission's overall goal remains very simple: To establish both the regulatory structures and the necessary infrastructure that would ultimately create an integrated European gas market. It is not necessary to create a major series of large scale pipelines capable of carrying 30 or 40 bcm/y to all parts of Europe. Instead, as one Ukrainian economist said recently: "It's really about swaps, separating physical volumes from trading," so that "gas can arrive at Zeebrugge as LNG for Hungary, but be delivered from Germany using Russian molecules delivered by pipeline."[3]

clouded by the fact that overall European imports recorded by the *BP Statistical Review* actually totalled 361.9 bcm, but with many EU member states, as well as Norway, exporting some of their gas, European exports also amounted to 179.2 bcm. Ukraine consumed 66.7 bcm/y in 2014, but produced 18.6 bcm; its imports of 39.8 bcm included direct supplies from Russia of 12.9 bcm, but indirect supplies from or via Russia included 17.9 bcm from Belarus; 4.3 bcm from Kazakhstan; and 4.8 bcm from other former Soviet states.

2 In 2013, Gazprom accounted for 73 percent of Russian gas output of 64.6 billion cubic feet per day and other producers for 17.4 bcf/d (27 percent), according to the US Energy Information Administration.

3 The economist was speaking at a recent EU energy workshop. Author's notes.

Map 1. Existing, Planned, or Proposed Long-distance Pipelines in Southeastern Europe

Source: Atlantic Council.

In terms of the role that Gazprom can—and should—play in European gas supply, the goal is simply to ensure that Russia's state monopoly has to compete in Europe with hub prices at a time when hub prices will reflect the impact of US LNG imports. As the gas dimension of Europe's Energy Union takes shape in the next five to ten years, the hope is that the key issue should not only address who will provide Europe's gas imports, but who is prepared to set the lowest price to access the European market.

Achieving this, however, requires determination and cooperation, and it is not clear that this is present throughout the European Union and the Energy Community. The dilemma was neatly summed up by Oliver Koch of the European Commission's Energy Directorate, when he said, in June 2015, that there was a need to replace national perspectives with a Pan-European one. Koch added:[4]

> Let us imagine for a moment that Russia has turned off gas taps. Member states will think twice before they share gas supplies with their neighbors. Solidarity sounds great, but as stress tests have demonstrated it is just an empty word in a scenario where a country has its access to gas cut off.

FINANCIAL ISSUES

For the consumer, creating an integrated single market is clearly beneficial. Greater integration of internal infrastructure coupled with equivalent improvements in both the ability to diversify import sources and to distribute those diversified supplies within Europe obviously exerts a downward pressure on prices.

However, the scale of projects required to achieve market integration on a day-to-day basis, involving the kind of infrastructure development for which commercial financing is (or ought to be) available, is not necessarily the same as the scale of projects required to ensure Pan-European energy security. In gas, while it is important from a market perspective to stimulate competition and the development of both internal and cross-border markets by creating systems that can import 2-5 bcm/y of LNG at a regasification terminal or that can transport similarly sized volumes from one country to another, the scale of projects required to ensure energy security will generally be much larger. By definition, commercial financing cannot be expected to fund the gap between projects that are commercially self-sustaining and those required for emergencies. This is where European institutional funding is required. And for such funding to play an effective role, coordination is obviously required between those private and public entities seeking to develop commercially scaled projects of immediate benefit to gas marketers and consumers and the national, international, and supranational bodies trying to make sure that gas can still flow freely around Europe in the event, for whatever reason, of a loss of Russian (or Norwegian) imports.

The European Commission, the EU's executive authority, is committed to achieving both market integration and energy security. To this end, it has encouraged a series of initiatives, the most prominent of which are:

- the creation of a list of 248 projects of common interest (PCIs), subsequently revised to 195 projects;[5]
- the creation of the €5.85 billion Connecting Europe Facility to ensure the development of "non-competitive" infrastructure, i.e., infrastructure that might be considered non-competitive in the short-term but which has long-term strategic significance; and
- the Trans-European Networks (TENs) process, aimed at promoting the development of Pan-European infrastructure for transportation, energy, and telecommunications.

The chief development in 2015 was a demonstration of the EC's readiness to winnow out the long list of projects and to develop action plans to implement a more limited range of specific objectives. This was reflected in the revised list of Projects of Common Interest produced by the European Commission on November 18, 2015, a revision with particular importance for the development of the Backbone pipeline concept detailed in the original *Completing Europe* report, not least since it seeks to integrate previously discrete projects (see Appendix: The Backbone Concept Revisited).

4 Oliver Koch, "Address to the European Financial Congress," Sopot Poland, June 22, 2015.

5 The full PCI list (as of January 27 2016) can be found at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:JOL_2016_019_R_0001&from=EN

ALIGNING MARKET CONDITIONS WITH ENERGY SECURITY REQUIREMENTS

While understanding the need to consider how best to ensure the strategic aspects of gas supply security, the European Commission's main focus remains the alignment of markets, in effect, the demolition of tariff and non-tariff barriers that prevent markets developing between countries as well as within countries. "If there is not liberalisation, if the network codes are not in place, you will not see gas flowing across borders," one senior European gas official said recently.[6]

In general, the Commission considers that while spot markets are developing quite well, it still faces problems in merging wholesale markets. The need to find a compensatory mechanism for different tariff regimes remains a problem, for example, in the closer integration of the Czech and Austrian gas markets.

The Commission seems to place its strongest emphasis on improving the regulatory framework. Yet the lack of physical interconnection necessarily limits market integration. To this dilemma the Commission has two approaches: One is to question whether new infrastructure is actually required on the scale proposed by the countries or institutions concerned—in effect, to ensure that projects are not, as it puts it, over-built; the other is to focus on "debottlenecking" existing infrastructure.[7] Moreover, the Commission does not seem eager to develop a new round of energy regulation, a Fourth Energy Package as it were; its focus seems firmly placed on getting existing rules implemented and enforced.

To coordinate actual development, energy projects developed in the framework of the Trans-European Networks have to be submitted to the European Network of Transmission System Operators for Gas (ENTSOG) for inclusion in ENTSOG's Ten-Year Network Development Plan (TYNDP). ENTSOG's current TYNDP 2015 report brings together no fewer than 259 proposals for projects covering gas transmission, storage, and LNG terminal development submitted to ENTSOG by the end of September 2014.[8]

6 Comment to the author, October 2015.

7 "Debottlenecking" Debottlenecking is the process of identifying specific areas and/or equipment in oil and gas facilities that limit the flow of product (otherwise known as bottlenecks) and optimizing them so that overall capacity in the plant can be increased. Audubon Companies Blog, "Debottlenecking: What it is and How it can Help Optimize Downstream Processes," August 21, 2014, http://www.audubooncompanies.com/debottlenecking-what-it-is-and-how-it-can-help-optimize-downstream-processes/.

8 ENTSOG, Ten Year Network Development Plan, 2015, http://www.entsog.eu/public/uploads/files/publications/TYNDP/2015/entsog_TYNDP2015_main_report_lowres.pdf.

PRIORITIZING CORRIDORS AND PROJECTS

Europe's energy security problems—and also its issues concerning differential prices for imported Russian gas—vary from country to country. But broadly speaking, as of mid-2016, it seems reasonable to consider three broad regions of Europe separately, whilst fully acknowledging that any major effort to attain Pan-European energy security, at least so far as gas is concerned, requires all three regions to be interconnected.

The three regions are:

- Southeastern Europe;
- Northern Europe; and
- The Baltic.

This section will largely focus on Southeastern Europe—defined for the purposes of this report as the countries lying to the south of the Danube, together with Slovakia, Hungary, Ukraine, and Moldova—since this is the region that (in general) currently has to pay the highest prices for Russian gas and therefore stands most to gain from gas supply diversification. Moreover, as Russia is commonly the only gas provider, it is the region that has the most to lose from any cut-off of Russian supply.

In Northern and Central Europe—essentially limited here to Poland and the Czech Republic—there has been a steady improvement in recent years in their ability to secure gas from alternative sources. They do stand to benefit commercially from regional interconnectors and both have a crucial role to pay in the development of a core system to ensure full connectivity between the Baltic, the Adriatic, and the Black Seas.

In the Baltics, there is already considerable progress in ending the "island" status of the trio of former Soviet republics—Lithuania, Latvia, and Estonia—not least as a result of the opening, in December 2014, of a floating regasification and storage unit (FRSU) at Klaipėda, Lithuania, and the commitment of EU funding for work on a 7.2 bcm/y, 534 km interconnector between Poland and Lithuania. In November 2014, Finland and Estonia also agreed to build twin LNG regasification terminals, together with an interconnector across the Gulf of Finland, which should contribute to their energy security and to market competiveness within both states. On July 15, 2015, the European Commission agreed to supply a €187.5 million grant for this interconnector, the Balticconnector, with completion scheduled for 2019. Five days earlier, the new €81 million Finnish terminal at Pori received its first LNG cargo from Zeebrugge in Belgium, ending Finland's previous 100 percent reliance on Russia for gas supplies.

The following section on southeastern Europe should not, however, obscure the ongoing requirement to develop interconnectivity between all three regions, so that gas reaching the Adriatic, the Baltic, and the Black Seas can, if necessary, flow from one sea, or region, to another. This point was stressed at the Adriatic-Baltic-Black Sea Leaders' Meeting in New York on September 29, 2015, coordinated by the Atlantic Council and attended by heads of states or foreign ministers of nine countries, together with senior diplomats from three others in the region as well as the US State Department's Special Envoy and Coordinator for International Energy Affairs Amos Hochstein. The meeting focused, *inter alia*, on the way in which the new Polish LNG terminal at Świnoujście and the anticipated development of an LNG terminal in Croatia were capable of changing the dynamics of both European energy security as a whole and regional energy markets in particular.

One specific outcome was a decision by Croatia to appoint a special envoy to develop the North-South Corridor, one of the core recommendations of the Atlantic Council's 2014 *Completing Europe* report. Overall, the meeting's chief significance lay in the stress placed by the leaders on the need for bidirectional interconnectors and the way in which this emphasis was supported by a focus on key elements in the development of a system connecting all three seas. These included the interconnectors between Bulgaria and Romania; between Romania and Hungary; between Poland and Lithuania (and also the lines that would connect Poland and its southern neighbors); and the interconnectors that would ease the vulnerability of Slovakia and improve the connectivity of Hungary.

SOUTHEASTERN EUROPE

CESEC PRIORITY PROJECTS

In Dubrovnik, on July 10, 2015, energy ministers or senior officials from thirteen countries in and around Southeastern Europe, together with the European Commission's two most senior energy officials, signed up to an Action Plan intended to create an integrated gas market within their region that would "pave the way for the closer integration of the EU and Energy Community energy markets" and thus further develop the European Energy Union.[9]

The Action Plan for Central Eastern and South Eastern Connectivity (CESEC) specifically proposed seven priority projects for the countries gathered in Dubrovnik: Albania, Austria, Bulgaria, Croatia, Greece, Hungary, Italy, the former Yugoslav Republic of Macedonia, Romania, Serbia, Slovakia, Slovenia, and Ukraine, and also for two other countries Bosnia and Herzegovina and Moldova, who agreed to sign up later, as Moldova did in October.

Of the seven projects, by far the biggest is the Trans-Adriatic Pipeline (TAP), an 870 km line from the Turkish border with Greece to a connecting point in southern Italy with the main Italian gas grid. Since this project—with its costs estimated at anything up to $6 billion—is already under way, the key point in this context is to note that the line is both designed initially to carry some 10 bcm/y of gas to customers in Greece, Albania, and Italy—with deliveries due to start in early 2020—and eventually to carry twice as much, thus creating a facility to transport gas to other countries in southeastern Europe should the relevant infrastructure be developed.[10] Indeed, from the start, the line is expected to be connected up to the planned Interconnector Greece-Bulgaria (IGB), in order to deliver one bcm of Azerbaijani gas per year to Bulgaria. In market terms, TAP should transform the gas markets in southern Europe. At present, there is no real arbitrage between the Turkish and Italian gas markets in terms of price. But, once TAP is built, it will ensure equalization of prices along the whole chain from Turkey to Greece. Moreover, it will do the same for all areas that might be connected to it by such projects as the Interconnector Greece-Bulgaria or the Ionian Adriatic Pipeline (IAP).

CESEC'S NEW PRIORITIES

TAP is thus a crucially important project for energy development in the region, but since it is in an advanced phase, with orders already placed for physical pipe and a mass of road building under way to enable subsequent pipelaying, the focus in terms of the context of what still needs to be done must be firmly placed on the other six CESEC priority projects, as they are either still in early stages of development or have yet to get off the ground.

These projects are:

- the Interconnector Greece-Bulgaria;
- the Interconnector Bulgaria-Serbia;
- the phased reinforcement of Bulgaria's domestic system to allow utilization of both interconnections that are already in existence and those under development;
- the phased reinforcement of Romania's domestic system to allow utilization of existing interconnections and interconnections being developed, including necessary reinforcements at those interconnection points in adjacent systems;
- an LNG terminal in Croatia, with potential for phased development; and
- an LNG evacuation system from Croatia toward Hungary, together with the necessary reinforcement of Croatia's domestic system.

CESEC'S CONDITIONAL PRIORITY PROJECTS

In addition, the CESEC task force came up with three conditional priorities, which address very different functions.

The first is the reinforcement of the Romanian gas system and the laying of new lines to connect Romania's newly discovered offshore gas fields to the existing network. This, of course, depends very much on progress in developing the offshore fields (see Romania section below).

9 European Commission Press Release, Dubrovnik, July 10, 2015, http://europa.eu/rapid/press-release_IP-15-5343_en.htm.

10 TAP itself has not disclosed how much the TAP line is expected to cost. However, Azerbaijani Energy Minister Natiq Aliev, addressing the Caspian Oil and Gas Conference in Baku on June 2, 2016, said that overall costs for the Southern Gas Corridor projects had fallen from an initially estimated $45 billion to a revised figure of $39.1 billion, with TAP accounting for $6 billion of this sum.

The second is the development of an interconnector between Croatia and Serbia, seen as a backup project in case the interconnector between Bulgaria and Serbia should not materialize.

The third is the establishment of a new LNG terminal in Greece, in the event that the Greek economy recovers and there is increased demand in both Greece and its neighbors to justify additional regasification capacity. Greek plans for a possible LNG terminal, in the form of an FRSU stationed in or around the northern Aegean port of Kavalla, are seen as possible tie-ins to both the TAP line and to the IGB.

The CESEC task force specifically noted that one prominent project under consideration in recent years, the Ionian Adriatic Pipeline, would be "part of the next phase of the CESEC initiative," along with an interconnector between Romania and Serbia.[11]

The six new priority projects listed above should—if and when they are completed—considerably improve the energy security of Southeastern and Central Europe. At the very least, they should serve to ensure that almost all the CESEC countries can start bargaining with Gazprom on both the price and conditions of Russian gas supply.

Prospects for actual implementation of the Action Plan, however, are mixed. It does look as if the IGB will, finally, get off the ground soon. Romania, too, is likely to start improving its domestic infrastructure in order to be able to bring its recent offshore gas discoveries to market. But there will still be doubts concerning Croatian LNG. And, in the background, is the issue that is essentially being addressed by the EU as a whole, rather than by any particular sub-group: The development of interconnectors involving Ukraine and the hoped-for transformation of what was formerly one of the most corrupt energy administrations in Europe.

IGB AND BULGARIAN CONNECTIONS

On July 1, 2016, the first gas flowed from Greece to Bulgaria via a pipeline normally used to deliver Russian gas dispatched by Gazprom via Ukraine, Romania, and Bulgaria to Greece. This represents both the first time that Greece has acted as an exporter and as a modest triumph for European policies aimed at turning previous single direction lines into interconnectors able to carry gas in either direction and that open up to third party access lines that were previously only available to monopoly suppliers. The small volumes dispatched through the Sidirokastro connection by the Greek M & M Gas Company were also symbolic in that almost certainly the molecules originated in LNG imported into Greece via the Revithoussa terminal.

In the long run, however, the final investment agreement signed on December 10, 2015, by Bulgarian, Greek, and Italian companies to build the long-planned 182 km Interconnector Greece-Bulgaria may turn out to be more important. The IGB is aimed at connecting Bulgaria and the Balkans to both the TAP line carrying Azerbaijani gas to Europe and to Greek LNG regasification facilities. A new company, ICGB, will build and operate the line between Komotini in Greece and Stara Zagora in Bulgaria. The state-owned Bulgaria Energy Holdings is taking a 50 percent stake in the venture whilst IGI Poseidon—itself an equal joint venture between Greece's DEPA and Italian-registered Edison—part of the Electricité de France group—is taking the other 50 percent.

> [The Interconnector Greece Bulgaria] is considered a barometer of Bulgaria's willingness to play an active role in the development of practical, commercial, local interconnector projects. . .

In April 2016, ICGB announced that nine companies had submitted non-binding offers to take capacity in the planned line, with bidders interested in shipping gas northward from Greece laying claim to 4.3 bcm of capacity, and bidders seeking to send gas southward from Bulgaria interested in securing 1 bcm/y of capacity. This constitutes an encouraging start for a project that is initially aimed at providing some 3 bcm/y of two-way capacity, but with an ability to expand capacity to 5 bcm/y through added compression at a later date. The initial 3 bcm/y system is currently costed at around €220 million, of which one-fifth will be covered by EU funding pledges.

The project is considered a barometer of Bulgaria's willingness to play an active role in the development of practical, commercial, local interconnector projects for which financing is available, as opposed to large-scale, strategic, multi-country pipelines for which funding has yet to be identified. In this context, the role of IGI

11 Appendix to the Action Plan: List of all CESEC projects. https://ec.europa.eu/energy/sites/ener/files/documents/Appendix percent20to percent20the percent20CESEC percent20Action percent20Plan_pre-HLG_rev.pdf.

Poseidon and Edison in developing not only IGB but also in seeking to revive the Poseidon project for a 210 km subsea pipeline from Greece to Italy will be closely watched in coming months and years, since these two companies were also involved in signing a tripartite memorandum of understanding (MoU) with Gazprom on February 24, 2016 that envisages a revival of the Poseidon project and an associated 580 km onshore pipeline across Greece to serve Poseidon. Curiously, the MoU, for which CEO Alexei Miller provided the Gazprom signature, did not say where the gas would come from that might be carried to Italy via such a system, but Russia constitutes the obvious choice. Moreover, with South Stream falling victim to EU opposition and Turkish Stream looking highly doubtful in the wake of Russian-Turkish disputes over both gas pricing and military involvement in Syria, during the first half of 2016, it looked as if Russia was once again looking to Bulgaria as a landing place for a new pipeline system under the Black Sea that would be intended to serve as a southern bypass to Europe for gas currently transiting Ukraine. As of late July 2016, however, it is quite possible that such an approach might be dropped in favor of a revival of Turkish Stream as a result of the Turkish-Russian rapprochement at the end of June 2016 and in light of the potential policy changes in Ankara in the wake of the abortive Turkish coup of July 15-16.

[It is quite possible to envision] a revival of Turkish Stream as a result of the Turkish-Russian rapprochement at the end of June 2016 and in light of the potential policy changes in Ankara in the wake of the abortive Turkish coup of July 15-16.

Once there is clear timetable for IGB's completion (with 2018 the most likely year, provided initial contracts are awarded this year), it is logical to expect that further progress will be made in upgrading the rest of Bulgaria's gas transmission system. Developing an interconnector between Bulgaria and Serbia, which would really open up the central Balkans to pipeline deliveries from Azerbaijan and LNG supplies via Greece as well as existing supplies from Russia, will, however, require considerable efforts from the European Commission and the Energy Community to ensure development of the necessary alignment of markets. The complexities regarding such an alignment are among the reasons why the EU and the CESEC task force have listed the Croatia-Serbia Interconnector as a standby project for support should it prove impractical to develop the Bulgaria-Serbia Interconnector. Bulgaria had signaled that an agreement to develop a Bulgaria-Romania link would be concluded by mid-2016, but, as of July 1, 2016, this had not yet been confirmed.

ROMANIA

Upgrading Romania's domestic system is closely linked to two ongoing developments, the discovery of new offshore gas resources and moves to progress a 500 km internal line upgrade, which can form the core element of the proposed BRUA system linking Bulgaria, Romania, Hungary, and Austria.[12]

The stated goals of the BRUA project are to enable gas to flow in either direction along a series of mostly pre-existing pipelines across the four countries and, with completion of the IGB, ensuring that gas can either flow northwards from the TAP pipeline currently under construction in Greece or southwards from the Austrian gas hub at Baumgarten.

In 2012, ExxonMobil, OMV, and Petrom discovered the offshore Domino field, with resources initially estimated at between 42 and 84 bcm. In February 2015, ExxonMobil and Petrom discovered a smaller field, Pelican, with perhaps 20-25 bcm in reserves, while in October Lukoil discovered Trident, which initial studies reported as having 29.7 bcm in reserves.[13] A Canadian company, Black Sea Oil & Gas, has also reported offshore discoveries at Ana, Doina, and Eugenia. Wood Mackenzie, the UK energy analysts, have already described Romania's offshore discoveries as a potential game changer, and that, in a regional context, "gas from Domino . . . can be delivered at a more competitive price than both Azerbaijani and Russian supply," adding that "this price could even be improved if more gas is discovered at Domino."[14]

There are potential markets for Romanian gas in Bulgaria, Serbia, and, in particular, Hungary, where demand is

12 The name BRUA comes from the Romanian initials for the four countries involved.

13 ExxonMobil have not commented on the Pelican reserves, pending further evaluation. The 20-25 bcm estimate comes from Romanian press sources.

14 Wood Mackenzie, "Analysing the competitiveness of Black Sea deepwater gas," April 2015, http://www.woodmac.com/content/portal/energy/highlights/wk4_Apr_15/Black%20sea%20gas%20video%20transcript%20April%202015.pdf (May 2015).

relatively high and where current contracts to purchase Russian gas will be winding down in the 2020s.

However, extensive efforts by the EU to secure reverse flow on an existing line from Hungary to Romania have yet to bear fruit, while progress in developing the relatively modest 25 km, 1.5 bcm/y Bulgaria-Romania Interconnector is only just coming to fruition following the withdrawal, in September 2015, of the contractor hired to lay the line.

Nonetheless, Wood Mackenzie considers that by 2025 Domino should possess the ability to deliver around six bcm/y and that the new Lukoil discovery might hypothetically add a further 2 bcm/y. All in all, given ExxonMobil's Pelican discovery and prospects for further discoveries in both existing and new locations, it is quite possible that in ten years' time Romania's offshore might be producing around 10 bcm/y, with perhaps half of this available for export. For this to happen, improvements to both the domestic and regional networks favored by the CESEC task force will have to be in place.

In recent months, the key development has been the steady drive by Romania's gas transport system operator (TSO), Transgaz, to implement the Romanian elements of what has become known as the BRUA Corridor. In essence, BRUA is intended to implement reverse-flow (also called backhaul) capabilities on existing pipelines which, with the proper interconnectors in place, would ensure the creation of a bidirectional pipeline system connecting Austria and Bulgaria via Hungary and Romania. In January 2016, the EU member states approved a Commission proposal to provide €179.3 million toward the estimated €560 million cost of developing an initial 500 km pipeline through a combination of renovation, expansion, and new pipe.

The line would connect Giurgiu, on the border with Bulgaria just south of Bucharest, with Horea, the starting point (on the Romanian side) of a 47 km, 1.4 bcm/y capacity interconnector with Hungary completed in 2010. (The interconnector is sometimes called the Arad-Szeged pipeline, since Horea is near Arad and the Hungarian terminal at Algyő is on the outskirts of Szeged.)

Significantly, the 294 km, 7 bcm/y Hungary-Croatia Interconnector from Városföld in Hungary to Slobodina in Croatia passes by Szeged. This means that should a genuine north-south interconnector be developed along the lines of the Backbone Concept detailed in the appendix to this paper, the Hungarian compressor station at Városföld would stand to become the junction for bidirectional lines connecting it northwards to the Polish LNG facility at Świnoujście on the Baltic, south-west to the anticipated Croatian LNG facility at Krk Island in the Adriatic and southeastward via the BRUA system to the Black Sea and further, via the BRUA/IGB system, to the Aegean.

Transgaz also currently envisages, with Energy Community and EU support, the development of a 300 km feeder into the system from the country's offshore gas fields as a second phase to the 500 km internal pipeline development. It has estimated the joint costs of both parts of the project at €1 billion, indicating that it expects the essentially new gas field line to cost around €440 million.

Current BRUA goals are relatively modest. The capacity to handle flows between Austria, Hungary, and Romania would be a maximum of 4.4 bcm/y and between Bulgaria and Romania just 1.5 bcm/y. The small size of the latter would appear to reflect limited infrastructure on the Bulgarian side of the border, limiting the capacity envisaged for the roughly 50 km of line between the Bucharest area and Giurgiu.

In 2015, Transgaz considered that once financing was in place, it might be able to start project implementation in March 2017.

Meanwhile, one key element of the BRUA system is currently being put in place. The 1.5 bcm/y interconnector between Romania and Bulgaria was due to have opened in 2013 and to have been fully operational in 2014. It is only a small project, involving just 25 km of pipelaying, but it does include a crossing of the Danube and this has delayed the project considerably. In April 2016, however, Austria's Habau secured a €4.577 million contract to lay 2.1 km of pipe under the Danube—and promised to complete the work in August 2016. The project will initially have the capacity to transport 1.5 bcm/y of gas from Bulgaria to Romania and just 0.5 bcm/y of gas in the other direction. But once a new compressor is installed at Podisor, just to the west of Bucharest, as part of its 500 km internal BRUA-related pipeline development, Romania will be able to send 1.5 bcm/y of gas south to Bulgaria.

Podisor has also been earmarked as the point at which the planned 300 km pipeline to serve Romanian offshore gas fields would connect to the country's main gas distribution system.

CROATIA'S LNG PROJECT

Proposals for an LNG regasification terminal at or near Omišalj on Krk Island have been around for twenty

The Urengoy-Pomary-Uzhgorod pipeline, connecting Russia and the European Union via Ukraine, was modernized starting 2011. *Photo credit:* Dmytro Glazkov/World Bank.

years. While it does now look as if Croatia may be able to receive LNG as early as 2018, this is because the focus has switched from a permanent onshore facility to a floating regasification and storage unit (FRSU) along the lines chosen by Lithuania at Klaipėda. Although pressure from the European Commission makes it likely that the FRSU project will now go ahead, there are still concerns that the regulatory side of transit from Croatia to Hungary still needs to be sorted out.

Throughout 2015, Croatia LNG remained focused on constructing a permanent LNG regasification plant, with costs estimated at around €700 million or more, and with the involvement of various major companies, such as Austria's OMV, Germany's E.ON and RWE, and France's Total. In May 2015, LNG Croatia Director Mladen Antunovic even said construction should start in mid-2016.

The onshore option continued to dominate Croatian thinking well into 2016, with Croatia LNG reporting, in January 2016, that it had received at least seven bids from companies to build the project. As recently as March 2016, the European Investment Bank said that it was still appraising a possible €339 million loan for a full onshore project that would include construction of an LNG tanker jetty, two LNG storage tanks to hold up to 360,000 m3 of LNG, and be capable of handling some 6 bcm/y of LNG imports. Preliminary costs were put at €678 million, although the EIB did note that final costs would be defined at a later stage.

However, just one year after Antunovic had expressed his hope for the start of construction on a land-based facility in 2016, Croatian Economy Minister Tomislav Panenić said the immediate focus was now on installing an FRSU option, which might then be followed by an onshore facility. A month later, on May 26, 2016, Antunovic said Croatia LNG was looking to charter an FRSU vessel for an initial five years, with a further five-year option, and that this might then enter operation in 2018. The aim would be to import around 5 bcm/y from 2018 to 2024 and around 2 bcm/y thereafter.

Elaborating on this subsequently, Antunovic said a tendering process was due in late 2016 and that a final investment decision could be taken in early 2017. Costs are put at just €40-50 million per year to hire an FRSU vessel with these specifications, but some onshore terminal facilities will still be required. By comparison, Lithuania's Klaipėda Nafta is paying around €55 million per year to rent its FRSU, while its ground facilities cost €101 million.

After some foot-dragging in 2015, Croatian ministers now consider the LNG project critical for market development and regional energy security.

An FRSU stationed off Krk Island has the ability to play a key role in gas supply for Hungary and Ukraine as well as Croatia. However, it is not clear just how much Budapest really wants the project. Croatia and Hungary currently appear to be at odds over how to operate the existing interconnector effectively while there are also persistent disputes over another key energy issue: the future direction of Croatia's leading oil company, INA, in which the Republic of Croatia holds a 45 percent stake and Hungary's MOL Group 49 percent.

UKRAINE

One of the most encouraging recent developments in terms of improving regional energy security was the successful introduction of 10 bcm/y of reverse flow capacity on the pipeline between Vojany in Slovakia and Uzhhorod in Ukraine in September 2014. This alone has the capacity to handle well over half of Ukraine's net imports, thus easing Ukrainian reliance on gas imported directly from Russia. The situation is complicated by the fact that gas imported via Slovakia is invariably composed of Russian molecules—but those molecules are available to Ukraine at a cheaper price than gas supplied directly from Russia, since they can be purchased on competitive markets to the west (rather than bought directly from a monopolist supplier to the east). In 2015, when Ukraine consumed 33.7 bcm, it was able to import 10.3 bcm of its total 16.4 bcm of imports from suppliers to the west, with no less than 9.7 bcm imported through the Slovak corridor. A further 0.5 bcm came in via Hungary and 0.1 bcm from Poland. The ability to import from suppliers to the west meant that almost all Ukraine's 8.9 bcm reduction in gas consumption from 2014 to 2015 was effectively translated into an 8.4 bcm fall in direct gas imports from Russia, which stood at 14.5 bcm in 2014 but at only 6.1 bcm in 2015.

In 2016, Ukraine is hoping to improve still further on these figures, with overall consumption reduced to 32 bcm as energy efficiency measures continue to bite. As for Russian imports, Ukraine's Naftogaz halted purchases from Gazprom on November 25, 2015, saying that Russian prices were not competitive. It did not buy any gas from Gazprom in the first quarter of 2016, and on April 1, 2016, it announced that it had no immediate plans for further direct purchases from Russia, as it was cheaper to purchase gas from alternative suppliers.

BACKHAUL ON BROTHERHOOD

In late 2014, Ukraine's Naftogaz proposed that Slovakia's Eustream gas operator should follow up the success of the Vojany-Uzhhorod connection by working on a joint project to install reverse flow, commonly known as backhaul, on the giant Brotherhood System. The multi-pipe Brotherhood system has a theoretical capacity of close to 100 bcm/y, enough to carry approximately three-quarters of all Russia's exports to the European Union. In practice, as a result of the construction of the Russia-to-Germany Nordstream pipe across the Baltic and the shrinking of European gas demand, it is currently carrying barely 50 percent of its potential capacity.

This means there is considerable technical scope for installing backhaul capability. The problem is that Gazprom, whose Soviet predecessor developed the line, does not want this to happen while the Slovak government, nervous about its own dependence on direct supplies of Russian gas, is also reluctant to take steps to give the Brotherhood line a reverse capability.

Ukraine argues that "full implementation of European energy legislation and integration of the Ukrainian gas transmission system into the European gas market will considerably improve the European market's liquidity and potentially lead to a reduction of gas prices for final consumers across the continent."[15] However, full implementation will entail elimination of endemic corruption, and, although that is what a younger generation of Ukrainian energy technocrats is seeking, it will not prove an easy task to root out malpractices developed in almost a quarter-century of post-Soviet crony capitalism.

In securing the reversal of the Vojany-Uzhhorod pipeline, Slovakia and Ukraine proved that their gas system operators could work together to create a major cross-border market. To one EU official this constituted a real victory for the EU's approach to find market solutions for complex energy security issues.

"Two people with their teams in one room, sitting down, going through the issues one by one and getting a solution: not a huge, new physical pipeline but intense regulatory discussion at very high level," was how the official described the process.[16] It was, he said a triumph not for planning but for implementation.

15 Press service of the Ministry of Energy and Coal Industry, Kyiv, October 22, 2014, http://www.kmu.gov.ua/control/en/publish/article?art_id=247698059.

16 Private comment to the author, October 2015.

Port of Klaipėda in Lithuania. *Photo credit:* Žiedas/Wikimedia.

NORTHERN EUROPE

The core issue concerning northern Europe is not so much the development of commercial interconnections as the question of how to ensure that commercial projects under way or expected in the near future can be integrated and upgraded to form a coherent network. This issue was addressed in the Atlantic Council's *Completing Europe* report of 2014,[17] which specifically recommended the development of a 15 bcm/y capacity bidirectional pipeline between Lwówek in Poland and Sisak in Croatia, through the Czech Republic, Slovakia, and Hungary, together with 6 bcm/y connections to Poland's new LNG regasification plant at Świnoujście and Croatia's planned LNG regas facility at Omišalj on Krk Island. This project, dubbed the Backbone Pipeline, was intended not as a specific recommendation for any one route, but as a concept intended to ensure the development of a North-South gas corridor capable of supplying gas to the landlocked countries of Central Europe, notably the Czech Republic, Hungary, and Slovakia, as well as being able*, in extremis,* to feed gas to Ukraine via Poland, Hungary, and Slovakia.

Such a pipeline is necessary if Europe is truly to resolve the N-1 (N minus One) conundrum: how to provide alternative arrangements should the primary energy supply be curtailed for any period of time. In other words, should Russian gas go offline for some reason, there would be a need to gather together, and then distribute gas from other sources capable of handling sufficient volumes to meet the demands of Poland (16.3 bcm in 2014); Czech Republic (7.5 bcm); Slovakia (3.7 bcm); Hungary (8.4 bcm); and Ukraine (38.4 bcm).

The EU's commitment to resolving the N-1 issue is demonstrated by the fact that, in the revised November 2015 PCI list, the N-1 issue is cited as a justification for a number of projects, notably several incorporated into the Backbone Concept.

An analysis of how the Backbone Concept might be implemented is appended (see Appendix: The Backbone Concept Revisited).

17 Gen. James L. Jones, Jr., USMC (Ret.) and Pawel Olechnowicz, *Completing Europe – From the North-South Corridor to Energy, Transportation, and Telecommunications Union*, Atlantic Council, November 20, 2014, http://www.atlanticcouncil.org/publications/reports/completing-europe-from-the-north-south-corridor-to-energy-transportation-and-telecommunications-union.

THE BALTICS

The Baltic was once the most vulnerable area in terms of susceptibility to Gazprom cut-offs. No longer. An FRSU at Klaipėda in Lithuania, the development of a gas pipeline from Poland, and plans for an interconnector between Finland and Estonia are all helping to ease the situation.

THE POLAND-LITHUANIA GAS INTERCONNECTOR

On October 15, 2015, EU President Jean-Claude Juncker, together with the heads of government of Poland, Lithuania, Latvia, and Estonia, signed a joint declaration in Brussels on the construction of the Gas Interconnector Poland—Lithuania (GIPL), with construction to start by the end of 2019. The €558 million, 534 km pipeline, the first to connect the two countries, is designed to be capable of delivering 2.4 bcm/y from Poland to Lithuania and one bcm/y from Lithuania to Poland. The project is intended both to end the isolation of the three Baltic states that signed the Brussels declaration and to improve Lithuania's security and resilience. The project is more advanced than a mere declaration might suggest. When the Commission issued its latest *List of actions selected for receiving financial assistance under CEF-Energy*, detailing planned disbursements to November 21, 2014, only three of the seventeen gas-related projects included cash approved for actual works, the rest being allocated for studies. The GIPL secured by far the largest disbursement, $295.4 million, for construction and support infrastructure (and also €10.5 million for an additional study), while Lithuania's Klaipėda-Kursenai Gas Transmission Pipeline received a further €27.6 million for field works. The only other works allocation was €33.8 million for twinning a gas line in Southwest Scotland.

LITHUANIA'S FLOATING REGASIFICATION FACILITY

On December 3, 2014, Lithuania opened a floating storage and regasification unit at the port of Klaipėda capable of regasifying some 1.5 bcm/y initially and eventually having the capacity to handle 4-5 bcm/y. The costing of this project, however, remains controversial. Onshore facilities were built for €101 million, but the actual FRSU, stationed off Klaipėda, was built in South Korea for Norway's Höegh LNG for €243 million with Lithuania's Klaipėda Nafta paying hiring fees of €151,000 a day and buying gas from Norway's Statoil at an undisclosed rate, but which Lithuanian analysts understand to be 10-15 percent above market prices. Against this however, is the fact that as soon as it became clear, in May 2014, that Lithuania would go ahead with the FRSU project, Gazprom immediately reduced the price of its gas supplies to Lithuania by 20 percent. Lithuanian sources reported that the new price was around $370 per thousand cubic meters, indicating that the country must previously have been paying Gazprom around $460. In early 2016, it was disclosed that Lithuania had also secured a 10-15 percent reduction in the price for Statoil's LNG.

[A]s soon as it became clear, in May 2014, that Lithuania would go ahead with the FRSU project, Gazprom immediately reduced the price of its gas supplies to Lithuania by 20 percent.

FINLAND-ESTONIA

These two countries have agreed to develop an interconnector, complete with LNG regasification facilities. But they have yet to agree on the details. The project is backed by the government of Finland, but it is not clear that Gasum, the Finnish gas company, is still keen on the idea. Gazprom, which had previously been expected to take a 25 percent stake in the project, (and which traditionally supplies both Finland and Estonia with all their gas) dropped out in September. Finland has "take or pay agreements" to buy 5.5 bcm of Russian gas per year, but only needs about 3 bcm/y. The interconnector opens up the possibility that Finland could export the surplus to Estonia. However, Estonia would have reciprocal rights in the interconnector, and Estonian companies would be likely to use it to develop new gas markets in Finland, potentially to Gasum's detriment (although beneficial to Finnish consumers).

MOBILIZATION OF INVESTMENT

There are two key questions that still require answers concerning financing of EU gas interconnections. The first is who can provide financing for commercial projects. The second is who can provide funds for more strategic projects. Some EU member states have sought to place the financing responsibility for both elements in the hands of commercial companies. For example, the UK government has told companies that they have to operate in a commercial market, but that they also have an obligation to supply. This coming winter may provide a stern test of the effectiveness of this approach.

In general, however, the issue is, as one senior consultant has said, "the contradiction between energy efficiency and security of supply"—in other words, who pays for the insurance policy. There is a natural assumption that so long as the right regulatory structures are in place, commercial finance can develop a range of modest cross-border interconnectors. But there is still the issue of who will pay for the larger-scale infrastructure necessary to provide security of supply in a crisis that involves the loss of gas from a major supplier.

"We may not need new regulatory action, but we desperately need finance and equity," one senior banker commented at a recent workshop on European energy integration.[18] The banker was referring to the need to finance new infrastructure, particularly the interconnectors required to ensure the effective operation of a single market in gas and thus enhance European energy security as a whole. However, he was speaking in a world in which private sector financing is increasingly wary of investments that take a long time to secure a commercial return and in which public sector financing is strictly limited. National governments are still grappling with the consequences of the economic and financial crises of 2008-09, and thus the key issue is what the European Commission can do, both through its own disbursements and by using the cash at its disposal to leverage much greater infrastructure investment.

CAN THE EUROPEAN COMMISSION PROVIDE MORE MONEY?

The European Commission seems to be adopting an approach that favors project developers first seeing whether they can secure some commercial funding, with one official citing the way in which the Croatian government was seeking to marry public funding for new infrastructure with commercial initiatives that would link to the TAP pipeline connecting Turkey, Greece, Albania, and Italy. The official said that if governments were to argue as follows: "We are ready to spend 'X' money but we need 'Y' more money," and then go to the European Commission, that would increase the chances of getting the finance." What's more, he said, such an approach would work even for projects that were not part of large EU-backed initiatives. The official also said that the EU was already working along the lines of the suggestion made in the Atlantic Council's *Completing Europe* report of 2014 that spending on cross-border projects which enhanced Europe's energy infrastructure should be exempt from government debt restrictions set out by the European Central Bank.[19]

In particular, the EU has sought to mobilize private sector financing by means of new institutions such as the 2020 European Fund for Energy, Climate Change and Infrastructure, commonly known as the Marguerite Fund. Marguerite brings together six financial institutions, each of which has contributed €100 million to the Fund's initial capital, while a further €110 million has been contributed by the Commission itself and two other contributors. Helping to secure investments for the Trans-European energy networks is one of the Fund's core sectors.

18 Author's notes from Energy Community workshop.

19 Discussion with the author in October 2015.

TWO KEY PROBLEMS: CORRUPTION & GAZPROM

While there are a host of specific problems that need to be addressed in terms of the development of individual cross-border interconnections, there are also two more general problems that need to be tackled. One is corruption; the other is Gazprom.

CORRUPTION

To a certain extent the two problems are interconnected. Solo incumbency—the presence of just one significant supplier in an individual market—promotes bad practice. In recent presentations, senior officials trying to address the issue of how best to create well-functioning energy markets in southeastern Europe voiced the following comments:[20]

- "We have seen in the past what incumbents do, and believe me it is not in the interest of the customer, it is not in the interest of their economies."
- "As long as there is exclusivity, the authorities in Belgrade and Sarajevo are not going to challenge decisions made in Moscow as they have their own personal interests to protect."
- "No one will invest in Southeast Europe because of corruption and incumbency. But they will in Turkey."
- "One of the biggest problems for Ukraine is corruption."
- "Why are CESEC countries so satisfied with Russian gas when it is often so much more expensive than Russian gas in Germany?"
- "We don't want something that requires exception. If it requires exception from rule of law, that does not make it attractive."

There are two underlying elements to these comments. The first is that corruption is viewed as endemic, particularly in those countries that remain extensively dependent on a single supplier—with that supplier being Gazprom and the beneficiaries being those who deal with Gazprom. The second is that there is a real appetite within those countries to end such corruption, not least through the development of open markets and, in the context of this paper, through increased interconnections between neighboring states to ensure that, at least *in extremis*, there are alternative supplies available to those routinely coming from Gazprom.

One practical consequence, as noted above, is that if some countries are viewed as corrupt, others stand to benefit. Turkey's moves to liberalize its gas market may seem overly laborious to some observers (it has still to implement fully the major gas reform legislation passed in 2004), but it is still viewed as a far more transparent market than some others in the region. So long as Turkey continues to enjoy such a reputation—and so long as it is still considered stable in political and security terms—it remains much better placed than most of its neighbors in Southeastern and Central Europe to secure investment and thus promote a virtuous cycle of fresh investment promoting economic growth, which, in turn, encourages further investment.

Concern regarding corruption is almost certainly a major factor behind EU reluctance to move swiftly to embrace more grandiose multi-country gas interconnection projects such as Eastring and Tesla. There is concern that these two projects, in particular, were overly associated with Russian plans to develop substitute systems for the distribution of Russian gas in Europe, if and when Gazprom should be in a position to end supplies to Europe via Ukraine, possibly as a result of developing its Turkish Stream proposal.

In the appendix to the CESEC Action Plan listing priority projects, the CESEC task force said in July: "In agreement with its promoters, the Eastring project is not part of the current phase of the CESEC work as it substantially differs from the other, more region-specific projects considered, particularly as regards its size, objective and scope and can therefore not be appropriately assessed in a CESEC regional modelling framework."

The appendix added: "Similarly, other large-scale pipeline projects, such as Tesla, are at present not included in the CESEC regional modelling framework."[21]

20 The following quotations all come from officials dealing with the subjects under discussion and were recorded in contemporary notes made by the author in October 2015.

21 Appendix to the Action Plan: List of all CESEC projects, https://ec.europa.eu/energy/sites/ener/files/documents/Appendix%20to%20the%20CESEC%20Action%20Plan_pre-HLG_rev.pdf.

Gazprom building in Moscow, Russia. *Photo credit:* Thawt Hawthje/Flickr.

For the record, recent multi-country gas projects involving Southeast Europe include:

- Eastring
- Tesla
- Vertical Gas Connector
- South Stream
- Nabucco
- ITGI
- BRUA
- Ionian Adriatic Pipeline

Of these, only BRUA, and perhaps the Ionian Adriatic Pipeline, appear to offer a realistic prospect of near- to medium-term implementation.

GAZPROM ISSUES

The role played by Gazprom in EU markets has helped shape European attitudes toward energy security. But perhaps the most Gazprom-related question today concerns the role the Russian gas behemoth should play in future European gas arrangements.

In addressing Gazprom's current and prospective role in European gas issues, several key elements need to be considered. These include:

- The need to end the situation whereby countries are forced to rely on Gazprom supply, and thus on Gazprom's directed price structures, because they have no current or prospective alternative suppliers.
- The need to cope with the Gazprom—or Kremlin—fixation with developing pipeline projects whose prime purpose is simply to bypass Ukraine; projects that require Russia to spend billions of dollars or euros on "projects that simply bring the same gas from the same fields to the same consumers," as Amos Hochstein said earlier this year.[22]
- The need to tackle destination clauses that restrict the onward flow of gas by customers. As one diplomat told the author: "These are almost like dinosaurs in EU competition law. They should have been abandoned years ago. . . ."[23] Such resale restrictions are already banned under European

22 Hochstein, Baku, as cited by Azad Hansli, "Southern Gas Corridor - form of true diversification of Europe's energy security," *Trend News Agency*, February 29, 2016, http://en.trend.az/business/energy/2500915.html.

23 Comment to the author, October 2015.

law, which prevents dominant suppliers—Norway as well as Russia—from restricting the flow of gas either by unilateral directive or by bringing strong market power into play while stipulating that set volumes of gas have to stay in one place. This means that the EU will either have to persuade Gazprom that it is time to end this practice, or that it will have to order it to do so. This issue might, however, be settled in negotiation should Gazprom opt to settle with the European Commission over current charges that it has abused its dominant position in various European markets.

- Tying the provision of gas and the terms for such provision to other matters, such as support for South Stream in the case of various southeastern European countries, notably Bulgaria before December 2014 and for Turkey—and potentially Greece—since then.

It is important to stress that Europe should not be seeking to develop an anti-Russian gas policy; Russia can, should, and will continue to be a major source in the supply of gas to Europe. However, as EU officials constantly aver, whenever countries are 100 percent suppliers, it does not usually end well for the consumer.

In this regard, the European Commission and EU member states should not get too concerned about the role of long-term contracts in gas pricing. These commonly provide the financial basis for major infrastructure development. What really matters is the development of multiple entry points into a market, which can then develop into the kind of hub that will encourage gas-on-gas pricing. As one market analyst observed recently: "Two years ago, a lot of people wanted hub prices; now they want a long-term oil price link. What counts is that they want the best price."[24]

Overall, the toughest task the European Commission is likely to face in its dealings with Gazprom—apart from settling the abuse of market dominance case—is the issue of instituting a reverse flow capacity on the Brotherhood system. The Ukrainians are quite right to argue that unlocking the Brotherhood's unused capacity for backhaul will strengthen energy security in vulnerable countries and ensure diversification of supply routes for CEE countries such as Poland, Romania, Hungary, Bulgaria, and Serbia as well as boosting Ukraine's own energy security.

THE TIMING ISSUE

The European Commission recognizes that interconnection is a precondition for market integration, hence its promotion of programs to develop cross-border gas lines, such as the CESEC Action Plan. But one senior EC official has posed the question: If the required physical and/or market infrastructure is not yet in place, can this be realistically expected before, for example, 2020?

As yet, there is no clear answer. In all probability, they will not meet the full N-1 standard by 2020. But if the CESEC Action Plan is implemented in the way the Dubrovnik signatories envisage, the next four or five years will see the states of Central and Southeastern Europe go a long way toward achieving the twin goals of gasification and market development as a commercial and industrial benefit, and an ability to diversify supplies and supply delivery systems as a strategic benefit to overall energy security. At the same time, the steady improvement of Poland's infrastructure and its connections to its neighbors, notably Lithuania, will have the same effect. In the absence of a further jolt to the system, such as those occasioned by the Russia-Ukraine gas crises of 2006 and 2009, and given the reluctance of some EU and Energy Community member states to move as quickly as they should, it might be more reasonable to anticipate the attainment of an essentially integrated European gas pipeline network capable of passing the N-1 test in, or around, 2025.

24 Comment to the author, October 2015.

RECOMMENDATIONS

There is an overriding need to focus on one paramount priority: the implementation of the remaining six Priority Projects identified in CESEC Action Plan launched in Dubrovnik in July 2015.[25]

- The Interconnector Greece-Bulgaria (IGB);
- The Interconnector Bulgaria-Serbia;
- The phased reinforcement of Bulgaria's domestic system to allow utilization of both interconnections that are already in existence and those under development;
- The phased reinforcement of the Romanian domestic system to allow utilization of existing interconnections and interconnections being developed, including necessary reinforcements at those interconnection points in adjacent systems;
- An LNG terminal in Croatia, with potential for phased development;
- An LNG evacuation system from Croatia toward Hungary together with the necessary reinforcement of Croatia's domestic system.

Additional priorities:

- Create a true North-South Interconnector capable of handling up to 15 bcm/y—the Backbone concept elaborated in the Atlantic Council's *Completing Europe* report.
- Institute backhaul on the Brotherhood system to ensure Ukraine can be supplied with gas in the event of Russian gas ceasing to flow directly to Ukraine.
- Promote the Ionian Adriatic Pipeline to ensure that connections between the Trans-Adriatic Pipeline and the gas systems of southern and Central Europe in the Black Sea region are matched by a connection along the Adriatic.
- Promote greater public sector investment in developing gas infrastructure, reflecting President Obama's call before the G-20 Summit in November 2015 for greater public investment in infrastructure projects.[26] This is particularly an issue for national governments to consider, since the European Commission is concerned that companies and consortia may be seeking to rely too much on EU funding, which is limited and aimed mostly at stimulating private sector investment. Firm public sector commitments are also likely to prove necessary to ensure that chicken-and-egg situations do not arise where there are two (or more) projects with each waiting for the other to proceed.
- Press the European Commission and both EU and Energy Community member states to secure exemptions from European Central Bank fiscal restrictions for infrastructure projects involving more than one country.
- Ensure Ukraine becomes a full player in the European market, getting supply without any exceptions and possessing both a liquid market and a transparent gas transportation system within Ukraine so that Gazprom cannot complain about transit issues. This will involve considerable efforts to help Ukraine eliminate corruption in the gas sector.
- Ensure the development of the necessary interconnectors—and the necessary cross-border regulatory structures—that can enable Romania to play a role in European energy security consonant with its impending status as a significant gas producer.
- Clarify the obligation to supply. Gazprom, and other major providers, started out with obligations to supply. In a fully free market, particularly one in which companies are not allowed to insist on any further control over where their supplies go once they entered the EU, there is a need to define what kind of obligation to supply they should have.

25 There were seven projects identified in the Action Plan, but since one is the Trans-Adriatic Pipeline (TAP), which is already proceeding according to plan, there is no need for a specific recommendation in this section.

26 Barack Obama, "America's bold voice cannot be the only one," *Financial Times*, November 12, 2015, http://www.ft.com/intl/cms/s/0/2614c636-8930-11e5-90de-f44762bf9896.html#axzz3rkkkO5Il. Mr Obama also, quite rightly, called for particular investments in clean energy.

APPENDIX: THE BACKBONE CONCEPT REVISITED

On December 12, 2014, Croatia and Poland agreed that connecting Poland's almost completed LNG terminal Świnoujście on the Baltic with Croatia's planned LNG terminal on Krk Island in the Adriatic would play a vital role in ensuring European energy security. "The cooperation between our countries in connecting LNG terminals into the North-South gas pipeline corridor is crucial for the region's energy security," Croatian Economy Minister Ivan Vrdoljak declared in Zagreb in the wake of a meeting with Polish Treasury Minister Wlodzimierz Karpinski.[27]

Since then, new governments have come to power in Zagreb and Warsaw, but the need to create an effective North-South Corridor between the two terminals has not diminished. Europe needs such a link to serve as a backbone for efforts to ensure the development of an effective single gas market in eastern, central, and southeastern Europe and to direct replacement gas flows should deliveries from a major existing supplier be cut.

The Backbone Concept for a pipeline to connect the Baltic with the Adriatic lies at the heart of how the authors of the original *Completing Europe* report considered the European Union should address the principal energy security issue concerning European gas: how to ensure the continent's infrastructure is capable of delivering alternative gas supplies to all European Union and Energy Community member states in the event of a loss of gas imports from Europe's principal supplier, Russia.[28]

This remains as relevant as ever. But it is also the case that the creation of a substantial system enabling gas to flow in either direction between the Baltic and the Adriatic—and, subsequently, the Black Sea—would also ensure the equalization of markets on a fully competitive basis. Provided EU regulations were adhered to, prices along the entire route—in Poland, Czech Republic, Slovakia, Hungary, and Croatia—would be more or less the same, both amongst themselves and by comparison with prices in Italy, Austria, and Germany. This, indeed, is a major rationale in EU references to the need for a North-South Energy Corridor.

Moreover, with the prospective development of Gazprom's Nordstream II pipeline project and its complementary plan to discontinue exports to Europe across Ukraine, the case for Backbone becomes all the stronger. The Nordstream II project does have the potential to improve competition within Europe in that the addition of a further 55 bcm/y of pipeline import capacity, accompanied by the application of EU regulation to ensure that Nordstream II delivers Russian gas in strict conformity with the EU's Third Energy Package, would create the conditions for major price competition with Norwegian pipeline supplies and LNG imports, notably from the US. However, it also poses geopolitical risks, since Russia clearly views the project as an integral element in a broader energy supply policy regarding Europe that includes the termination of transit across Ukraine. These are already in steady decline, but in 2013 Ukraine still transited some 86.1 bcm and 62.2 bcm in 2014.

Moreover, a cluster of countries in Central and Southeastern Europe still depend on receiving all their Russian gas imports via Ukraine. These are: Austria (4.2 bcm in 2014); Greece (1.7 bcm); Bulgaria (2.8 bcm); Hungary (5.4 bcm); Romania (0.5 bcm); Slovakia (4.4 bcm); Czech Republic (4.76 bcm); Slovenia (0.4 bcm); Croatia (0.2 bcm); Serbia (1.5 bcm); FYROM (0.1 bcm); and Bosnia and Herzegovina (0.2 bcm).[29] In addition, Italy received all its 21.7 bcm of Russian gas imports in 2014 via Ukraine, while close to half of Turkey's 27.3 bcm of Russian gas imports in 2014 (and of 27.0 bcm of Russian gas imports in 2015) were delivered via Ukraine.

For Europe to ensure it can cope with the aftermath of Russia's planned termination of gas exports through Ukraine (originally set for 2019-20 but with Russia subsequently indicating it would still have to ship 10-15 bcm/y across Ukraine after 2020) and thus to benefit from any contribution that Nordstream II might

27 Natural Gas Europe, "Bloomberg: Croatia, Poland Plan LNG Terminal to Boost Security," December 12, 2014, http://www.naturalgaseurope.com/croatia-poland-plan-lng-terminal-link-to-boost-security.

28 Jones and Olechnowicz, "Completing Europe," op. cit.

29 For detailed statistics of gas transit across Ukraine, see Simon Pirani and Katja Yafimava, "Russia Gas Transit Across Ukraine Post-2019," Oxford Institute for Energy Studies, February 2016, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2016/02/Russian-Gas-Transit-Across-Ukraine-Post-2019-NG-105.pdf.

make to price competition within Europe, it needs to have in place a robust distribution system capable of providing a substitute for the loss of gas transited via Ukraine as well as serving to meet the N-1 requirement for a distribution system to cope with loss of supply from a single major supplier. This is precisely the issue that is addressed by the Backbone Concept and an attendant link to Southeastern Europe, such as might be provided by an enlarged BRUA system.

In the last year or so, considerable progress has been made, both in terms of conceptual thinking about the integration of Europe's Projects of Common Interest and in terms of actual implementation of key interconnectors that would, in effect, constitute part of the Backbone system.

What is still needed, however, is an understanding that the projects developed to date do not yet match the scale, particularly in terms of pipeline capacity required to handle the volumes of alternative gas supplies that countries in Central and South-Central Europe would need should Russian gas—for whatever reason—cease to flow westwards.

Development of the Backbone is one of two core elements required to ensure that the countries of Central and South-Central Europe—Poland, Czech Republic, Slovakia, Hungary, Ukraine, and Croatia—can meet the N-1 test, i.e., the ability to survive the loss of their leading gas supplier. The second is the ability to reverse flows along the full length of the Soviet-developed Brotherhood pipeline system between Ukraine and Germany. Some key sections, notably those connecting Germany to Czech Republic and Austria and Czech Republic to Slovakia, have already been reversed, but the core of the system through Slovakia and Ukraine still needs to be transformed into a true bidirectional system connecting east and west, thus complementing the proposed Backbone system linking north and south.

There are three critical points on the Backbone system. The first is the junction at Lwówek in Poland, where the existing Polish gas system coming south from the new LNG regasification terminal at Świnoujście intersects with the Yamal pipeline connecting Russia to Germany. The second is Slavonski Brod in Croatia, where the existing Croatian network, into which the planned LNG regasification facility at Omišalj would be plugged, is planned to connect with a new interconnector between Croatia and Bosnia and Herzegovina. The third is the Hungarian compressor station at Városföld, since this would then become the junction with the Hungarian-Romanian interconnector and thus provide a connection to the Romanian section of the planned BRUA system and the IGB.

In order to ensure that countries to be served by a system linking Lwówek and Slavonski Brod—notably Hungary, Slovakia, and Ukraine, as well as Southern Poland and Croatia—can be supplied without recourse to Russian supplies, a bidirectional system capable of handling around 15 bcm/y over a distance of some 1,445 km is required.[30] The connections from Świnoujście to Lwówek and from Omišalj to Slavonski Brod can be smaller. In the case of Świnoujście to Lwówek, the existing 5-6 bcm/y system is satisfactory. The increase required beyond Lwówek is necessary, so that gas coming from Germany can be inserted into the Backbone system, as well as gas from Świnoujście. In the case of Omišalj to Slavonski Brod, Croatia's planned 6.7 bcm/y system from Omišalj to the point near Bosijevo, where it will join the existing Croatian system, should suffice to ensure that LNG delivered to Omišalj can play a significant role in the event of any supply disruption. At present, the onward connection through Sisak to Slavonski Brod is planned as a 7.1 bcm/y line, with a final investment decision expected in 2017 and completion in 2019, the year the Omišalj LNG plant is most likely to enter service. An increase in capacity to 10 bcm/y should be considered, if the go-ahead is also given for the Ionian Adriatic Pipeline, to ensure that gas entering Croatia via the IAP, which would then utilize the domestic network to reach the junction near Bosiljevo, could also be carried eastward to Slavonski Brod.

From Slavonski Brod onward, a full 15 bcm/y bi-directional system is necessary since Slavonski Brod, the location of a major Croatian gas-fueled power plant, is the designated terminal for an interconnector with Bosnia and Herzegovina and is close to the likely connecting point for planned interconnectors intended to enable gas to flow between the Adriatic and the Black Sea (and vice-versa) by way of Hungary—and/or Serbia—Romania, and Bulgaria.[31]

Such a system would enable as much as 25 bcm/y to be delivered to Hungary, Slovakia, and Ukraine, with 15 bcm heading north to south from Lwówek and 10 bcm heading south to north from Slavonski Brod.

30 This assumes a connection via the Austrian hub at Baumgarten.

31 In the original *Completing Europe* report, a 6 bcm/y connection was proposed between Omišalj and Sisak, with the 15 bcm/y system starting at Sisak. The current proposal considers a 10 bcm/y connection from Bosiljevo to Slavonski Brod to be sufficient, unless either the Omišalj LNG regasification plant or the Ionian Adriatic Pipeline were to be developed to handle much larger volumes than are currently envisaged.

Port of Świnoujście in northern Poland. *Photo credit:* Ministry of Foreign Affairs of the Republic of Poland/Flickr.

This would be enough to secure the immediate requirements of both Hungary and Slovakia. In order to ensure that Ukraine is also able to receive gas, however, the continued reversal of the Brotherhood system—which already allows for gas to flow from Germany to Czech Republic and onwards to Slovakia—is required, with gas able to flow eastwards across the whole of Slovakia and into Ukraine. At present, the Slovakian authorities remain content to transit gas (usually Russian-origin molecules) from points further west by means of the previously disused 14.6 bcm/y capacity pipeline between Vojany in Slovakia and Uzhhorod in Ukraine, which was reopened in August 2014. This ensures that Ukraine currently possesses at least the theoretical capacity to import some 22.2 bcm/y of gas from points further west, as a result of the installation in April 2013 of 6.1 bcm/y of reverse flow capacity on the line between Beregdanic in Hungary and Beregovo in Ukraine and of some 1.5 bcm/y of reverse flow capacity secured in November 2012 on the line connecting Hermenowice (on the Polish-Ukrainian border) with the Ukrainian city of Lviv.

In extremis, this is sufficient to meet Ukraine's gas import demand; in practice, the reversal of some Brotherhood capacity (it need not be 100 percent) is required to ensure gas supply security for Ukraine as well as Central European member states of the European Union.

With regard to the core sections connecting Lwówek and Slovanski Brod, the key remains the ability to develop a coherent system that utilizes PCIs backed by the European Union.

In its latest revision of the extensive PCI list, published in November 2015, the European Commission made significant strides forward by grouping together various elements previously considered as separate projects.

THE BACKBONE CONCEPT—IN DETAIL

The following paragraphs detail the potential elements of the backbone system. The details are listed in order from north to south, with PCI numbers included where relevant.

POLAND

The Świnoujście LNG terminal: This 5 bcm/y capacity regasification facility received its first cargo of LNG on December 11, 2015. It is connected to the main Polish gas transmission system by an 85 km pipeline to Szczecin.

Map 2. Map of the Backbone Concept

Source: Atlantic Council.

Szczecin to Lwówek: A 188 km, 700 mm (twenty-eight-inch) pipeline was completed and ready for use in September 2015 as part of Poland's Gas System LNG Phase One to carry gas from Świnoujście to the rest of Poland. Current capacity is at least 5-6 bcm/y, to match LNG import capacity.

Lwówek to Kędzierzyn-Koźle: This 1,000 mm (about forty-inch) diameter pipeline project is now known as PCI 6.1.2. It includes the original 162 km Lwówek to Odolanow PCI, as well as the related connections onward to Kędzierzyn-Koźle. The first section to Odolanow secured its building permit in December 2015 and is due for completion by the end of 2018. The European Union provided co-financing for project design and further co-financing for actual construction works is expected. The status of the second section, for a line of around 175 km between Odolanow and Kędzierzyn-Koźle, is uncertain. Initial capacity will be around 7.5 bcm/y, but additional compression should enable this to be expanded.

Poland to Czech Republic: The Stork II interconnector. This 1,000 mm pipe is project 6.1.1 in the revised PCI list. It is intended to connect the compressor station at Kędzierzyn-Koźle with the Czech gas terminal at Lanzhot by way of a 55 km line in Poland to the border crossing at Hat' and then by a 52 km pipeline between Hat' and Libhošt'. The EU agreed to help fund pre-investment studies in May 2015. There is an existing Polish-Czech interconnector, Stork I, but its capacity is just 0.5 bcm/y. Initial capacity will be around 7.5 bcm/y but additional compression should enable this to be expanded.

THE CZECH REPUBLIC

Libhošt' to Lanzhot: The Czech system operator Net4gas, as a complementary element to the Stork II project, has a modernization program planned for the existing line between Libhošt' and Tvrdonice, which is located in the immediate vicinity of Lanzhot and the Breclav compressor station. Although it is listed in the November 2015 revision (along with an upgrade to Breclav) as Project 6.1.12, it is not clear just what capacity is intended for this line, or when the work will be carried out. The distance from Libhošt' to Tvrdinoce is approximately 160 km.

CONNECTING TO HUNGARY

Lanzhot (CR) to Mosonmagyaŕovár (Hungary), Alternative One:

Lanzhot to Baumgarten (Austria): A Czech-Austrian Interconnector, PCI 6.4 on the November 2015 list, is being planned to connect Baumgarten with the Czech gathering center at Lanzhot. A grant agreement on EU co-funding for this project was signed in April 2015 and is current. The 12 km Czech section of the line would run from Lanzhot to the border near the village of Reintal (sometimes spelled Reinthal), while the Austrian section would run for 49 km from the border near Reintal to Baumgarten. Two capacity options are under consideration, one of 750,000 Nm3/h (normal cubic meters per hour at zero centigrade) and one of 1,480,000 Nm3/h. These are equivalent to around 6.57 bcm/y and 13 bcm/y. Gas Connect Austria, which operates Austria's gas network, envisages the line becoming operational in 2020.

Austria-Hungary: The 46 km, 700 mm (twenty-eight-inch) Hungary-Austria-Gasleitung (HAG) pipeline, running from Baumgarten to the Hungarian border at Deutsch-Jahrdorf (Austria) and Mosonmagyaŕovár (Hungary), was opened in 1996. The line's capacity is around 4.4 bcm/y.

Lanzhot (CR) to Mosonmagyaŕovár (Hungary) via Slovakia, Alternative Two:

There is already a pipeline connection from Lanzhot to Slovakia, primarily serving the Slovak capital of Bratislava. At peak, this system, approximately 70 km long, can transfer as much as 65 mcm/d, equivalent to 23.7 bcm/y. From Bratislava to Mosonmagyaŕovár is just 45 km. However, there is no connection planned between Slovakia and Hungary at this point. The current interconnector between Slovakia and Hungary is located on the Brotherhood line some 250 km to the east of Lanzhot and runs from Vel'ké Zlievce in Slovakia to the Hungarian central terminal in the Budapest suburb of Vecsés via a border crossing point at Balassagyarmat in Hungary. Construction of a dedicated interconnector between Bratislava and Mosonmagyaŕovár would constitute a useful complement to the existing Czech-Hungary connection via Baumgarten.

HUNGARY

Mosonmagyaŕovár to Gyor: The HAG pipeline extends 43 km inside Hungary to Gyor, with onward connection to Budapest and the Hungarian central terminal in the Budapest suburb of Vecsés. The capacity s 4.4 bcm/y.

Gyor to Városföld: This planned 210 km, 4.4 bcm/y pipeline has long been advocated by the Hungarian gas pipeline operator, FGSZ, primarily as a means of serving western Hungary from the southeastern Hungarian hub at Városföld. On November 6, 2014, FGSZ said it was pressing ahead with plans for this project. The announcement came despite opposition from the Hungarian Energy and Public Utility Authority (MEKH) and at a time when Russia's Gazprom was still anticipating construction through Hungary of a substantial part of its planned South Stream project (which was to be abandoned a few weeks later). The project was originally listed as PCI 6.13.1, but in the November 2015 revision it was renumbered as 6.24.4.

It should be noted that two of the above elements, the HAG pipeline that connects Baumgarten to Gyor and the planned line from Gyor to Városföld, also constitute elements of the BRUA system. While this demonstrates how practical this route is for a gas corridor, it also shows that developing a system to match the existing 4.4 bcm/y capacity of the HAG line is far too small if, *in extremis*, it has to serve not only as a conduit for gas to reach the Black Sea and the Eastern Balkans via BRUA but to reach Croatia and the Western Balkans via the Hungary-Croatia Interconnector (itself considered here as an integral element of the Backbone system).

Városföld to Slavonski Brod/Slobodnica (the Hungary-Croatia Interconnector): This 293 km, 800 mm (thirty-one-inch) bidirectional pipeline opened in August 2011 with a capacity to handle 7 bcm/y. It runs for 205 km in Hungary to the border to just north of the Benicanci compressor station in Croatia and for 88 km in Croatia. Although listed as project 6.5.2 in the 2013 PCI list, it is not mentioned in the November 2015 list, indicating that no further expansion is currently foreseen.

CROATIA

Slavonski Brod to Omišalj: This effectively consists of two main elements, a planned 250 km pipeline via Sisak with a capacity of 7.1 bcm/y between Slavonski Brod and Bosiljevo, and a slightly smaller, 6.7 bcm/y, 80 km pipeline between Bosiljevo and the LNG terminal at Omišalj. Bosiljevo is where the line from Omišalj is to meet the existing Croatian main gas network which, much further south, would be connected to the planned Ionian Adriatic Pipeline. The pipeline system from Zlobin (near Omišalj) through Bosiljevo, Sisak, and Kozarac to Slobodnica (which is one kilometer from Slavonski Brod) have now been grouped together as Project 6.5.2 in the revised PCI list.

Omišalj LNG: LNG Hrvatska (LNG Croatia Ltd), the Croatian LNG company, is now looking at leasing a floating regasification and storage unit, capable of handling some 5 bcm/y, in order to get an LNG regasification terminal up and running as soon as possible—and, perhaps, to take advantage of current low prices for imported LNG, notably from the US. Plans for a 4-6 bcm/y onshore regasification facility to be constructed at Omišalj on Krk Island are now viewed as a long-term objective. Nonetheless, a tender for the proposed onshore facility issued in mid-2015 did attract seven responses, of which four were from industrial investors and three from financing institutions.

Should the FRSU project proceed as LNG Croatia hopes, it should be up and running in 2019 (and possibly in 2018, if Croatian officials' dreams come true), and thus be able to input LNG imports into a system capable of serving not only Croatia, but also Hungary, Slovakia, Ukraine, and perhaps Bosnia and Herzegovina and Serbia.

PAYING FOR BACKBONE

Backbone will cost money. How much will depend both on the size of the pipeline and its routing. However, an indication of the likely costs is possible. At its simplest, Backbone would involve the scaling up of existing or planned projects over a length of 1,445 km, so that it would be capable of routinely handling some

15-20 bcm/y. The problem is that the body, which is coordinating information on the various projects that could be incorporated into the Backbone Concept, namely the European Network of Transmission System Operators for Gas (ENTSOG), has not published costings for the various projects under way.

There is one contemporary and relevant example that helps to indicate what the cost of such a pipeline would be if it were built from scratch. The 1,850 km Trans Anatolia Pipeline (TANAP), which will have an initial 16 bcm/y capacity, is currently expected to cost around $9.3 billion (about €8.15 billion). This might seem to indicate that if the Backbone Pipeline were to be built from scratch, it would cost around €6 billion. However, TANAP is using fifty-six-inch pipe for most of the route, so that eventually (with added compression) it can transport around 30-33 bcm/y; had the TANAP partners opted for a forty-eight-inch pipeline, they would probably have reduced the cost by at least a billion dollars.

Because so much of the Backbone Concept consists of expanding, augmenting, or adjusting existing projects, and because so much depends on the size of the pipe used, estimating the precise costs requires a separate study. A very rough indication of the scope of costs involved can, however, be gleaned from a strictly theoretical study of alternative pipeline costs prepared in 2008 by Gas Transport Services (GTS), a division of the Netherlands Gasunie.[32] The GTS study provided indicative costing for theoretical pipelines intended to deliver a range of volumes from 6 to 20 bcm/y, analyzing the differences between a thirty-six-inch system capable of delivering a maximum of 10 bcm/y and a forty-eight-inch system capable of carrying 10-12 bcm/y initially and, with subsequent extra compression, 20 bcm/y.

The GTS analysis estimated the basic construction costs for a theoretical 400 km section of pipeline to be constructed in Western Europe as follows:

- For a six bcm/y (maximum) system: a thirty-six-inch pipeline with one compressor station costing €560 million for the pipe and €67 million for the compressor station. Total cost: €627 million.
- For a 10 bcm/y (maximum) system: A thirty-six-inch pipeline with three compressor stations costing €560 million for the pipe and €200 million for the compression. Total cost: €760 million.
- For a 12 bcm/y (initial) system. A forty-eight-inch pipeline costing €800m and a single compressor station costing €100 million. Total cost €900 million.
- For a 16 bcm (intermediate) system. A forty-eight-inch pipeline costing €800m and two compressor stations costing €200 million. Total cost: €1.0 billion.
- For a 20 bcm/y (maximum) system. A forty-eight-inch pipeline costing €800 million and three compressor stations costing €300 million. Total cost: €1.1 billion.

It should be stressed that these figures are indicative rather than strictly accurate, since much depends on factors such as the cost of the steel and the cost of borrowing at the time that contracts for ordering line pipe and compressor stations are actually signed. They also do not take into account such factors as the terrain to be crossed and the state of existing infrastructure to enable pipelaying to take place smoothly.[33]

However, they do provide an indication of the comparative costs of different sizes of pipeline. They also indicate that—all things being equal— a 16 bcm/y system built from scratch, covering 1,445 km and utilizing forty-eight-inch pipe might be expected to cost around €3.6 billion (in 2008 values), and thus around €4.4 billion in 2016 values. This figure is not too different from the estimate of $3.7 billion to $4.2 billion (€3.25 billion to €3.7 billion) provided in the original *Completing Europe* report for a slightly

32 Bas Barten, Gas Transport Services, "Investment Costs in the Virtual Test," http://slideplayer.com/slide/8123965/. The author contacted Mr Barten, who stressed the purely theoretical nature of these cost assessments. What is relevant here is the comparative nature of the costs involved in developing pipelines using different diameters and different amounts of compression.

33 One major issue concerns the capacity of the system and the methods used to secure that capacity. In general, capacity is determined by a combination of factors including the size of the pipe (measured by diameter); the strength of the pipe (a combination of the quality and thickness of the steel used); and the pressure used to propel the gas through the system (determined by the amount of compression provided by compressor stations along the route). There is, therefore, no automatic precise correlation between the size of a pipe and its capacity but, broadly speaking, an onshore pipeline of forty-two-inch diameter should routinely be able to carry around 7 to 8 bcm/y from the start and then, with additional compression, around 15-16 bcm/y. Likewise a forty-eight-inch system can start out by carrying 10 bcm/y and then, with added compression, routinely carry 20 bcm/y. In some circumstances it can actually carry a bit more. The forty-eight-inch Georgian section of the existing South Caucasus Pipeline is slated to carry some 23-24 bcm/y to Turkey from 2020 onwards. Usually, however, expanding the capacity of a forty-eight-inch pipeline system would likely take the form of laying a second pipe alongside the first, once throughput of 20 bcm/y had been attained.

smaller forty-two-inch, 15 bcm/y system covering a 1,340 km route between Lwówek in Poland and Sisak in Croatia. With regard to the Backbone Concept, it is quite possible that an intermediate forty-two-inch pipeline would suffice.

The lack of information on the costs currently envisaged for existing or proposed upgrades and interconnectors along the Backbone route makes it impossible at this stage to come up with any realistic figure as to how much *extra* would be required to upgrade the various existing projects into a coherent single pipeline system between Poland and Croatia.

But it is worth noting that this extra amount constitutes the premium that the EU and its member states would—and should—pay to ensure their energy security in the event that a leading supplier, such as Russia, or even Norway, should, for some reason, prove unable or unwilling to maintain current gas flows to EU and Energy Community customers.

The cost of such an insurance policy would have to be found through a combination of funding from the five states principally involved—Poland, Czech Republic, Slovakia, Hungary, and Croatia, plus Austria, as the link to Baumgarten is included—and direct funding from European Union programs.

European funding could come from the €4.7 billion energy section of the Connecting Europe Facility established by the EU precisely to renovate and upgrade Europe's energy, transport, and digital infrastructure. Indeed, as of June 2016 the CEF is launching its second call for energy project proposals, with submissions to be made by October 2016, and prospective disbursements of around €600 million.

CONCLUSION

In effect, the European Union and the key member states involved have already instigated plans for bidirectional pipelines for the entire core of the Backbone concept, with one key feeder system already installed at Świnoujście on the Baltic and another, at Omišalj on the Adriatic, now making real progress. However, as the specific elements detailed in this appendix suggest, current projects remain constrained in scope, and while possibly satisfactory in any immediate two-country trading context, they are insufficient in a security context and, quite possibly, in terms of securing price equalization as well.

There is still a need for an insurance policy that would enable European Union and member states both to receive and distribute alternative gas supplies in sufficient quantities to compensate for a cutoff of supply from the region's principal source, Russia. Moreover, coupled with backhaul on the Brotherhood system and improved interconnections in the Balkans, such a system would ensure gas supply security amongst the majority of Energy Community member states.

Basing a major north-south (or south-north) system on the elements listed in this appendix is not necessarily the only way to create the Backbone. For example, reversing one or more of the pipes that constitute the Brotherhood line in Slovakia would enable the existing Slovakia-Hungary interconnector to be utilized in place of a connection from Lanzhot to western Hungary.

What is required is an upgrading of ambition to put in place a core system capable of carrying 15 bcm/y in either direction, thus ensuring, in gas terms, the energy security of both the Central European member states of the European Union and Ukraine, while contributing significantly to the energy security of southeastern Europe.

ABOUT THE AUTHOR

John M. Roberts is a Senior Fellow at Atlantic Council's Dinu Patriciu Eurasia Center and Global Energy Center. He is also a Senior Partner with Methinks Ltd, a consultancy specializing in the interrelationship between energy, economic development, and politics. He has a particular expertise in the development of energy in the Caucasus and Central Asia and in the pipelines connecting or intended to connect the Caspian to China, Russia, India, and Europe.

Roberts is one of Europe's leading energy security specialists. He served as a Managing Editor at Platts for twelve years and previously with Financial Times Energy, focusing on the development of energy and on the impact of energy on development. In assessing global energy security issues, he has regularly toured the Gulf and the Caspian, as well as visiting the Alaskan North Slope, the Athabasca Tar Sands, China, Norway, and Venezuela. He has also testified to UK parliamentary committees on Turkish, Russian, Caspian, and Mideast energy security issues. He is currently researching energy relations between Russia and China and hydrocarbons development in the Eastern Mediterranean and Northern Iraq.

Atlantic Council Board of Directors

CHAIRMAN
*Jon M. Huntsman, Jr.

CHAIRMAN EMERITUS, INTERNATIONAL ADVISORY BOARD
Brent Scowcroft

PRESIDENT AND CEO
*Frederick Kempe

EXECUTIVE VICE CHAIRS
*Adrienne Arsht
*Stephen J. Hadley

VICE CHAIRS
*Robert J. Abernethy
*Richard Edelman
*C. Boyden Gray
*George Lund
*Virginia A. Mulberger
*W. DeVier Pierson
*John Studzinski

TREASURER
*Brian C. McK. Henderson

SECRETARY
*Walter B. Slocombe

DIRECTORS
Stéphane Abrial
Odeh Aburdene
Peter Ackerman
Timothy D. Adams
Bertrand-Marc Allen
John R. Allen
Michael Andersson
Michael S. Ansari
Richard L. Armitage
David D. Aufhauser
Elizabeth F. Bagley
Peter Bass
*Rafic A. Bizri
Dennis C. Blair
*Thomas L. Blair
Philip M. Breedlove
Myron Brilliant
Esther Brimmer
*R. Nicholas Burns
William J. Burns
*Richard R. Burt
Michael Calvey
James E. Cartwright
John E. Chapoton
Ahmed Charai
Sandra Charles
Melanie Chen
George Chopivsky
Wesley K. Clark
David W. Craig
*Ralph D. Crosby, Jr.
Nelson W. Cunningham
Ivo H. Daalder
*Paula J. Dobriansky
Christopher J. Dodd
Conrado Dornier
Thomas J. Egan, Jr.
*Stuart E. Eizenstat
Thomas R. Eldridge
Julie Finley
Lawrence P. Fisher, II
*Alan H. Fleischmann
*Ronald M. Freeman
Laurie S. Fulton
Courtney Geduldig
*Robert S. Gelbard
Thomas H. Glocer
*Sherri W. Goodman
Mikael Hagström
Ian Hague
Amir A. Handjani
John D. Harris, II
Frank Haun
Michael V. Hayden
Annette Heuser
Ed Holland
*Karl V. Hopkins
Robert D. Hormats
Miroslav Hornak
*Mary L. Howell
Wolfgang F. Ischinger
Reuben Jeffery, III
*James L. Jones, Jr.
George A. Joulwan
Lawrence S. Kanarek
Stephen R. Kappes
Maria Pica Karp
Sean Kevelighan
*Zalmay M. Khalilzad
Robert M. Kimmitt
Henry A. Kissinger
Franklin D. Kramer
Philip Lader
*Richard L. Lawson
*Jan M. Lodal
Jane Holl Lute
William J. Lynn
Izzat Majeed
Wendy W. Makins
Mian M. Mansha
Gerardo Mato
William E. Mayer
T. Allan McArtor
John M. McHugh
Eric D.K. Melby
Franklin C. Miller
James N. Miller
*Judith A. Miller
*Alexander V. Mirtchev
Susan Molinari
Michael J. Morell
Georgette Mosbacher
Thomas R. Nides
Franco Nuschese
Joseph S. Nye
Hilda Ochoa-Brillembourg
Sean C. O'Keefe
Ahmet M. Oren
*Ana I. Palacio
Carlos Pascual
Alan Pellegrini
David H. Petraeus
Thomas R. Pickering
Daniel B. Poneman
Daniel M. Price
Arnold L. Punaro
Robert Rangel
Thomas J. Ridge
Charles O. Rossotti
Robert O. Rowland
Harry Sachinis
John P. Schmitz
Brent Scowcroft
Rajiv Shah
James G. Stavridis
Richard J.A. Steele
*Paula Stern
Robert J. Stevens
John S. Tanner
*Ellen O. Tauscher
Frances M. Townsend
Karen Tramontano
Clyde C. Tuggle
Paul Twomey
Melanne Verveer
Enzo Viscusi
Charles F. Wald
Michael F. Walsh
Mark R. Warner
Maciej Witucki
Neal S. Wolin
Mary C. Yates
Dov S. Zakheim

HONORARY DIRECTORS
David C. Acheson
Madeleine K. Albright
James A. Baker, III
Harold Brown
Frank C. Carlucci, III
Robert M. Gates
Michael G. Mullen
Leon E. Panetta
William J. Perry
Colin L. Powell
Condoleezza Rice
Edward L. Rowny
George P. Shultz
John W. Warner
William H. Webster

*Executive Committee Members
List as of August 24, 2016

Atlantic Council

The Atlantic Council is a nonpartisan organization that promotes constructive US leadership and engagement in international affairs based on the central role of the Atlantic community in meeting today's global challenges.

© 2016 The Atlantic Council of the United States. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means without permission in writing from the Atlantic Council, except in the case of brief quotations in news articles, critical articles, or reviews. Please direct inquiries to:

Atlantic Council

1030 15th Street, NW, 12th Floor,
Washington, DC 20005

(202) 463-7226, www.AtlanticCouncil.org