THE EUROPEAN SIDE OF THE LEDGER

American LNG will not free Europe from Russian gas. Even if planned export terminals were available today, they would not provide Europe with enough gas to replace Russian supply nor inflict enough economic pain to prompt a change in current Russian foreign policy. Expanded US natural gas exports can, however, improve European negotiating leverage, reduce long-term Russian influence in Europe, and significantly reduce European natural gas expenditures through increased competition and supply diversification. Even if US LNG supply does not routinely enter the European market, increased diversity of supply improves Europe’s ability to weather temporary supply disruptions. Consistent with the US DOE’s recent procedural change to eliminate conditional approvals, the Department should continue implementing its statutory authority to approve LNG export applications in a way that allows commercial considerations rather than regulators to determine the ultimate quantity of LNG export capacity built in the US. Capturing the benefits of US LNG will require European action as well, and expanding LNG imports is only part of an effective energy security strategy. Such a strategy should aim to reduce Europe’s vulnerability to a disruption in Russian gas supply rather than simply reduce its dependence on Russian gas. The EU can do so by:

- boosting natural gas infrastructure investment;
- applying EU competition law to promote an integrated European gas market;
- increasing physical gas storage;
- increasing EU gas production; and
- improving energy efficiency.

INVEST IN INFRASTRUCTURE FOR CENTRAL AND EASTERN EUROPE

Even if parts of Europe are able to import more LNG, other parts will have difficulty accessing volumes. The supply emergencies of 2006 and 2009 put the infrastructure gaps among Central and Southeastern European countries in a particularly sharp light, and underlined the importance of creating an interconnected and integrated gas market in the region. While LNG import capacity can help—Lithuania is set to have a floating terminal in place by the end of 2014, for example—the natural gas transmission infrastructure in Central and Eastern Europe was developed during the Soviet-era, primarily to supply Western European gas markets, as discussed in the previous section. As a result, the primary orientation of the gas pipelines in Central and Eastern Europe is from east to west. North-south connections were almost entirely missing among Central and Eastern European member states until about a decade ago.

In the aftermath of the 2006 and 2009 gas supply disruptions, building out infrastructure has become a key priority, and the EU Commission has provided considerable co-funding for cross-border gas pipeline projects and other investments aimed at strengthening the European gas transmission grid, but there is much more to do. Since the 2009 gas crisis, new cross-border gas pipeline links have been constructed, notably between Hungary and Romania, Hungary and Croatia, Hungary and Slovakia, and Romania and Bulgaria. Transmission system operators in Central and Eastern Europe have also set out to strengthen the resilience of existing cross-border pipeline links by adding flow reversal capabilities to pipeline connections. For Ukraine specifically, there is some capacity to bring new supplies from neighboring countries. Ukraine and Slovakia, for example, signed a gas deal in July 2014 to supply 1 bcf/d (10 bcm) through the use of a previously inactive pipeline by 2015.

Completing the missing infrastructure links in vulnerable Central and Eastern European countries should remain a key goal. New north-south interconnectors and reverse flow capabilities among the Eastern EU member states cannot entirely replace imported Russian gas with other sources. Indeed, in many cases they will continue to transit Russian gas, just via different routes. Rather, the main ben-
The benefit of stronger interconnections between these countries is to provide flexibility if one of the main Russian import routes suddenly shuts down—presumably the Ukrainian flow—causing another supply emergency.

The EU Commission’s recently adopted energy security strategy emphasizing the need to complete the internal energy market and build the missing infrastructure links across the EU is a step in the right direction. A continued commitment by the EU Commission to support the construction and later expansion of the so-called Southern Corridor, which will take Caspian gas to the European market via Turkey and the Trans-Adriatic Pipeline (TAP) around 2020, remains essential. At present, particularly with the demise of the Nabucco pipeline project, Russia is expanding its grip on the European gas market—its so-called “bear hug”—through the recently completed Nord Stream—OPAL—Gazelle pipeline system linking Russia with Germany and the Czech Republic, along with its continuing efforts to complete the South Stream pipeline.

**Map 2: The Ukrainian and the Yamal-Europe gas pipeline system**

Building the missing infrastructure links only provides the backbone of a truly liberalized and competitive gas market in Europe. For the interconnected national gas markets to effectively function as a single market, regulatory and policy action is also required. Recognizing this, the European Commission introduced a set of measures to further liberalize European gas markets shortly after the 2009 gas crisis. This so-called third energy package set the goal of creating a truly integrated European energy market by the end of 2014, a target that is likely to be missed. Europe remains a patchwork of national gas markets, which are liberalizing under their own models, and subjected to increasingly complex regulations, which the Commission will ultimately need to harmonize.

Destination restrictions remain an obstacle to an integrated European market. Although they have been illegal for a decade, to the extent they remain in existing long-term contracts, the EU Commission’s antitrust case against...
THE IMPORTANCE OF SOUTH STREAM

Gazprom’s controversial South Stream project, which would carry gas across the Black Sea to Bulgaria and eventually Austria, would bypass Ukraine for European gas transit, similar to the Yamal pipeline through Belarus to Poland or the Nord Stream pipeline linking Russia to Germany through the Baltic. The $46 billion project would add 6.1 bcf/d (63 bcm) of gas import capacity in Europe, and open an additional supply route for Central and Southeast European markets. From a purely supply security perspective, the project could enhance energy security in Europe by ensuring that enough transit capacity is available, even if gas flows through the main Ukrainian route are completely stopped. The pipeline would also be advantageous for transit countries, which explains why countries such as Bulgaria, Hungary, and Austria favor the pipeline.

Yet South Stream does nothing to reduce European dependence on Russian gas or vulnerability to a disruption of Russian supply. It should not be mistaken for a purely commercial project or for a genuine effort by Gazprom to improve supply security in Europe. Instead, South Stream is a vastly expensive geopolitical project with questionable commercial rationale. It was conceived primarily as a geopolitical tool to advance Russia’s strategic objectives, namely to undermine Ukraine’s bargaining power in the two countries’ complicated gas relationship, and to further strengthen Gazprom’s market position in certain Central and Eastern European and Southeast European markets. The enormous project cost will at least partially be paid for by European transit countries and consumers, while Ukraine would lose revenue and see its bargaining position severely eroded.

At this time, in the wake of the Ukraine crisis, the Commission is blocking the project. It has refused to provide exemption from third-party access for South Stream, among other necessary approvals, which undermines the feasibility of the project. In 2013, the Commission ruled that Gazprom’s intergovernmental agreements with South Stream’s European transit countries were in violation of EU gas market rules, and ordered the renegotiation of these agreements. Brussels has also recently ordered Bulgaria to suspend construction work on the Bulgarian section of the South Stream pipeline due to the country’s non-compliance with EU rules for awarding public contracts. In June 2014, EU Energy Commissioner Gunther Oettinger said he saw no point in further discussions with the Russian government or with Gazprom about bringing South Stream into conformity with the EU’s Third Energy Package.1 The Commission should continue to ensure that competition issues related to the South Stream project are properly addressed. Ultimately, the resolution of the regulatory issues around South Stream need to be viewed in a boarder geopolitical context and be part of an overall settlement of the territorial and gas pricing disputes between Russia and Ukraine.

Map 3: The Blue Stream and the proposed South Stream pipelines

Gazprom needs to eliminate them, notably restrictions on reverse flows and third party access to the main Russian transit pipelines in Europe, such as Yamal Europe.\textsuperscript{116}

Even if destination clauses are not explicitly in contracts, Gazprom can effectively block reverse flows under its long-term gas transportation contracts. This is particularly problematic in Eastern European transit countries of Russian gas, such as Poland, Romania and Bulgaria, where pre-liberalization transit agreements remain in place, guaranteeing preferential access for Gazprom and its local partners to the transit pipelines and thus restricting third-party access.\textsuperscript{117} The transit pipelines represent significant cross-border capacities, which, at present, are effectively owned by Gazprom. Opening these pipelines to third parties could facilitate reverse flows from west to east, and challenge the dominance of Russian gas in the Central and Eastern Europe gas markets.\textsuperscript{118} These transit terms are typically enshrined in intergovernmental agreements, which would have to be renegotiated by the respective national governments and Russia. The problem is that transit countries benefit more from the ship-or-pay revenues received from Gazprom under these legal arrangements than from the timely implementation of the EU’s market liberalization rules.

The fact that Germany or Austria can receive gas at a cheaper price from Gazprom than can Hungary, Poland or Slovakia (Figure 21), even though they are farther from Russia, highlights the lack of pipeline interconnections and market integration. But beyond infrastructure problems, it also indicates that some Central and Eastern European countries could do more to further liberalize their gas markets and open both the wholesale and the retail segments to greater competition.

As of mid-2013, the EU Commission had infringement proceedings in progress against all three countries for failure to transpose third-package rules related to gas transit.\textsuperscript{119} The European Commission should continue to take an active role in eliminating implicit or explicit destination restrictions from European gas trade by vigorously enforcing the EU anti-competition rules and by participating in the renegotiation of restrictive contract terms.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure_21.png}
\caption{Russian long-term contract gas prices to European countries 2010-2013}
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\textit{Figure 21: Russian long-term contract gas prices to European countries 2010-2013}

$ per ‘000 cubic meters

EXPAND EUROPE’S UNDERGROUND GAS STORAGE CAPACITY AND POOLED RESERVES

European countries had a total of 145 underground storage (USG) facilities in mid-2013 and another 54 facilities were under construction, or planned last year, according to Gas Infrastructure Europe. There are some notable gaps on the European underground storage capacity map. EU member states Finland, Estonia, Lithuania and Slovenia as well as non-EU members Macedonia, Bosnia and Moldova, for example, have no underground storage facilities, even though they are heavily dependent on Russian natural gas imports. Ukraine, on the other hand, has one of the largest underground gas storage capacities in Eastern Europe. This can provide the country with a considerable cushion against short-term supply disruptions, even though a large part of the gas in Ukrainian storage serves to ensure the uninterrupted transmission of Russian gas to Europe.

Expansion projects currently under construction and planned would boost European working underground gas storage capacity from 4.5 to 6.0 tcf (128 to 169 bcm). The vast majority of capacity expansion projects are planned in Western Europe—in Germany, Italy, Netherlands and the UK—while the sizeable capacity additions in Eastern Europe are concentrated in Latvia, Poland and Romania. At best, underground storage provides only limited relief in the event of a major supply shortfall, even in countries that have sufficient working gas storage capacity. Underground storage is not a feasible substitute for imported gas over an extended period of time. Storage facilities are typically designed to allow for seasonal balancing—filled during summer months in order to meet peak demand during the winter months. If they are drawn down to meet a major supply disruption, additional supplies will still be needed to meet winter demand. Moreover, withdrawal capacity generally falls short of daily natural gas requirements in many European countries, especially during the peak winter months. The primary purpose of underground storage facilities in Europe is to balance seasonal demand fluctuations, and not necessarily to serve as a last resort option in the event of a supply disruption. Only a handful of European countries, notably Hungary, Italy, Portugal, Romania and Spain, have mandatory strategic gas storage obligations in place, which require a certain amount of gas to be reserved for genuine supply emergencies. This is similar to the approach taken by consumer nations holding strategic oil stocks.

The European Commission’s recent proposal to pool a small part of Europe’s existing strategic gas stockpiles in a virtual common capacity reserve, under the auspices of the IEA, for example, deserves further investigation, and the Commission should be prepared to provide public funding to support such supply security initiatives if necessary. As was proposed in the Hampton Court Summit of 2005, there is merit to the idea of setting up a Europe-wide strategic gas storage requirement, along with associated rules for use, storage levels, and sharing of costs—although a careful analysis of costs and benefits is required. In the meantime, the EU regulation passed in 2010 (Regulation 994/2010) on security of gas supply required Member states to ensure that by end-2014 they could withstand a cut off from their single largest supplier. When the Commission checked in May 2013, only 16 of the EU-28 countries had met this standard. Meeting this standard should be a priority for Member countries.

INCREASE EUROPEAN GAS DEVELOPMENT

Europe has significant shale gas resources, although the estimates still vary greatly. According to the US Energy Information Administration in 2013, Europe has 470 tcf (13.3 tcm) of technically recoverable shale gas reserves, compared to 567 tcf (16 tcm) in the United States. A literature review of 50 sources by the EU Joint Research Centre in 2012 found that high, best, and low estimates of technically recoverable shale gas in the EU were 621 tcf, 561 tcf, and 81 tcf (17.6 tcm, 15.9 tcm, and 2.3 tcm), respectively. Ukraine has the third-largest technically recoverable shale gas resources in Europe, behind Poland and France. Exploration activity has been minimal, however, and significant legal, regulatory, and technical challenges exist. Compared to the United States, shale resources in Europe are challenged by many factors, including:

Less favorable geologic conditions: Typically, resources in Europe are trapped in shale layers that are much deeper than in the United States, raising the cost of extraction. Test drilling operations in Poland, for example, showed geologic conditions there not as favorable as in the United States.

Greater population density: The most extensive shale developments are taking place in sparsely populated parts of the United States. The efficient development of so-called sweet spots in shale plays require the drilling of a large num-
ber of wells in relatively tight spacing. This type of development is less feasible in Europe, where population density is more than three times greater than in the United States.

More restricted access to infrastructure: In Eastern Europe in particular significant investments in infrastructure are needed to consume and import gas. Moreover, Europe lacks the rules in place in the United States that ensure shared access to pipelines at tariff rates set by regulators, thus preventing the owner of the pipeline from also owning and controlling the commodity flowing through it.

Weaker public support: The public debate in Europe has raised far more public concern about shale development than in the United States. Countries like Germany have moved slowly and called for further study. Others like France have banned shale outright. The United Kingdom has been among the most supportive, but even there the pace of potential development is slow due to public opposition.

Lack of private mineral rights ownership: The United States is unique in that the landowner often owns the mineral subsurface rights as well. That means that communities see tangible benefits from shale development that they would not in many other places in the world. European policymakers must ensure that communities in which development occurs also benefit from the revenue and royalties collected.

More concentrated oil and gas industry: Independent producers, not the large majors, led the US shale revolution. These smaller companies were willing to take on the high risk, high reward potential of the US unconventional resource base, while the larger, more risk averse energy majors were largely on the sidelines, at least in the early stages of the shale boom. The oil and gas industries in European countries are dominated by a few larger integrated players and a number of national champions, and lack the large number of independent exploration and production companies found in the United States, and to a lesser extent, Canada and Australia.

Less developed service industry: North America has by far the most developed and vibrant oilfield service sector in the world. In early 2012, it was estimated that over 2,000 rigs were available to the US industry for onshore development versus 72 in Europe. It will take some time for the service sector to ramp up production in Europe, even if all other challenges are eventually overcome.

Through regulations that give producers both the necessary incentives to develop and build public confidence by requiring the highest standards of safety and enforcement, EU countries can begin to create the conditions that will allow shale production to occur. But it is important to be realistic that the scope is likely to be more limited and take much longer than in the United States.

The United States can help in these efforts by providing technical support and expertise to European regulators on how to develop shale safely and economically—something it has been doing already, for example, through a State Department program. US officials can also support countries by working to expand access for American firms with experience and expertise in developing shale resources.

Although beyond the scope of this paper, promoting the development of a wide range of indigenous renewable fuels and nuclear power can also increase diversity of supply and resilience to supply shocks as well as help the EU meet its aggressive climate change goals.

CREATE INCENTIVES TO BOOST ENERGY EFFICIENCY AND CUT GAS DEMAND

Improving energy efficiency can play a significant role in reducing European natural gas demand and imports in the medium- to long-term. The EU Commission’s latest energy efficiency plan, which was released in July 2014, proposes a 30% reduction in primary energy consumption compared to 2007 baseline projections by implementing a set of energy efficiency measures. The accompanying impact assessment suggests that such a reduction would result in 26% lower natural gas imports in the EU in 2030 relative to the baseline, which is equivalent to an 8 bcf/d (82 bcm) decline in net imports relative to the reference scenario. The annual net cost of implementing the 30% target at the energy system level would average about $27 billion through 2030, as the majority of energy efficiency investments would be offset by fuel cost savings. Energy savings would primarily occur in the residential and commercial sector, as much of the industrial sector in Europe is already highly energy efficient. Note these targets are not mandatory, but indicative of what can be achieved on energy efficiency at modest cost.
Energy efficiency measures would be especially important for Eastern European member states. The share of natural gas in residential and commercial heating is especially high in Hungary, Slovakia, and the Czech Republic, about 52%, 49% and 39%, respectively in 2012, versus 35% for the EU as a whole.\textsuperscript{136} In addition, for the reasons previously mentioned, the share of Russian gas in natural gas imports is vastly higher in the Eastern part of the EU than in the older member states. Therefore, cutting energy demand in Eastern member states’ residential and commercial sectors, where the greatest potential lies, may be among the most cost-efficient way to reduce Russian gas imports.

The Ukrainian economy is particularly inefficient in its energy use, and has the potential to reduce energy demand considerably. Generating a million dollars of PPP-adjusted GDP requires 3.5 times more energy in Ukraine than the average EU member state, and more than two times as much as in the most energy-intensive Eastern EU member states, Bulgaria and the Czech Republic (Figure 22). The IEA noted in a 2012 assessment of Ukraine’s energy policies that huge energy efficiency potential remains in the country’s residential and industrial sectors, that district heating systems are in “dire need of refurbishment”, and that the building stock is poorly insulated.\textsuperscript{137} Heavily subsidized gas, heat, and electricity prices remain a considerable burden on the economy, accounting for an estimated 7.5% of GDP in 2012, and are a major obstacle to more efficient energy use.\textsuperscript{138} The IMF has recently set the gradual reduction of natural gas subsidies in Ukraine as one of the main conditions for a $17 billion loan package for the country.\textsuperscript{139} Similar incentives should be provided to further financial assistance programs targeting Ukraine. The removal of subsidies and reduction of energy intensity in Ukraine could yield triple dividends, resulting in fuel cost savings, curtailing dependence on imported Russian gas, and making the country’s energy companies, particularly state-owned Naftogaz, economically viable entities over time.

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure22.png}
\caption{Energy Intensity in Selected Economies in the EU and FSU Regions}
\end{figure}

\textit{Toe per million $ of GDP (PPP)}