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STRENGTH and WISDOM

THE HOUR OF TRUTH: THE CONFLICT IN UKRAINE–IMPLICATIONS FOR EUROPE'S ENERGY SECURITY AND THE LESSONS FOR THE U.S. ARMY

Ariel Cohen
Ivan Benovic

U.S. ARMY WAR COLLEGE
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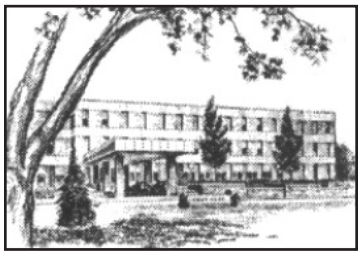

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November 2015

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FOREWORD

A large part of Europe, especially Eastern, Northern, Central, and South-Central Europe including the Balkans, has been dependent on Russian natural gas since the Soviet times. Little changed with the breakup of the Soviet Union as Russia was no longer perceived as a strategic adversary. Moreover, Russia's dependence on gas sales in Europe as a source of important revenue for the state-owned Gazprom was considered a guarantee against the use of gas supply as a strategic tool by Moscow.

However, a dependence on the Russian energy supply resulting from a system of pipelines built back during the Cold War has increasingly proved to be a disrupting, negative factor in European energy security. This dependence already has negatively manifested itself several times throughout the region and has a potential to massively disrupt European military, economic, and humanitarian situations if a substantial and/or prolonged interruption of the gas supply occurs.

The ongoing hostilities in Ukraine demonstrated the adverse effects of the continuing dependence on Russian gas and on the top Russian national leaders who call the shots on the Russian supply. In view of supply interruptions and threats to cut the vital shipments of gas, Russia can no longer be considered a stable and reliable supplier. Moscow has a track record of using its gas monopoly not only as a means to extort disproportionately high prices for Western consumers, but also as a means of exerting political pressure to diminish U.S. influence in Europe and to drive a wedge between North Atlantic Treaty Organization (NATO) allies.

In case Russia turns off its gas supplies to Europe, European countries have limited supplies of stored gas (usually only enough for 1 to 2 months of consumption). Supply interruptions would cause significant losses for national economies. Therefore, to diminish the probability of a conflict in Europe that eventually may require U.S. military intervention, there is a need for European countries to diversify their gas supplies and find more varied, reliable, and predictable gas suppliers. Thus, in the long run, the European Union will have a choice between cheaper but politically unreliable Russian piped gas—and the more expensive but more reliable supplies of liquid natural gas from the United States and from other sources around the globe, as well as piped gas from Europe's neighborhoods.

The U.S. Government has been involved in European energy security for over 20 years, with the Bill Clinton and George Bush administrations' support of the Baku-Tbilisi-Ceyhan Main Oil Export Pipeline and of the Southern Corridor. U.S. forces in Europe, and the U.S. Army in particular, can and should play an important role in promoting energy security, as this monograph demonstrates. The U.S. Army, as a part of the U.S. military and the leading component of NATO, needs to increase its situational awareness with regards to the role of energy in security and the possible future defense of the North Atlantic Alliance. Protection of critical gas facilities and gas transport infrastructure should be an important part of NATO's European strategy.

The U.S. Army has the know-how and capabilities to be an effective and reliable partner for European militaries in developing a system of monitoring threats to critical infrastructure, which will help to

effectively protect energy infrastructure from potential sabotage efforts. Furthermore, the U.S. Army can plan for adverse scenarios, train and equip regular allied armies and irregular friendly forces for energy-related emergencies, and for handling scenarios affecting the economic well-being of the member continent.

Security of the energy supply is a crucial area for U.S. Transatlantic security interests and will remain a top NATO/European Command responsibility for years to come.

DOUGLAS C. LOVELACE, JR.
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SUMMARY

Natural gas disputes between Russia and Ukraine have occurred repeatedly since the breakup of the Soviet Union. However, the 2014-15 wave of these conflicts was also coupled with a Russian-supported war in eastern Ukraine. This warfare, together with Gazprom's shortsighted attitude to its customers' needs and concerns, has made Russia's natural gas supplies unreliable in the eyes of the European Union (EU) members. Given the dependence of the Old Continent on outside sources of natural gas, the unreliable record of Russia as a supplier has boosted regional cooperation and incentivized the EU as a whole to seek solutions to its dangerous dependence. For now, the viable solutions for the EU include a partial diversification of the piped supplies to incorporate gas from the Caspian region and potentially North Africa and Eastern Mediterranean, coupled with increased amounts of gas available as liquified natural gas (LNG) after European interconnectors and the multitude of LNG projects across the world come online.

The U.S. Government has been involved in European energy security for over 20 years, and U.S. forces in Europe, and the U.S. Army in particular, can and should play an important role in promoting energy security, as this monograph demonstrates. The U.S. Armed Forces have played an important role in providing European security since World War II. Today, the U.S. military's role in European energy security can include a comprehensive assessment of the security of European energy imports, including natural gas, coal, uranium, and oil. The United States and its allies should monitor the threats to pipelines and to the natural gas balance through the U.S. intelligence

community and their counterparts in Europe, Turkey, and the Middle East, and share intelligence where possible.

The North Atlantic Treaty Organization (NATO) can develop, in cooperation with European Command and Central Command, a system to monitor threats to critical energy infrastructure, including to the intra-European gas network, especially as interconnectors will be a key component of European gas independence from Russia. In particular, the U.S. Army should develop joint threat assessment and emergency planning and response protocols as they relate to threats to individual gas fields, pipelines, gas processing facilities, storage facilities, pumping stations, and other crucial infrastructure components. NATO, as well as the individual European, Middle Eastern and North African countries, has interoperability standards and joint tactics, techniques, and procedures which would allow them to coordinate and cooperate in case of threats to natural gas infrastructure as recently seen in Algeria.[1]

The U.S. Army should:

- **Cooperate** with NATO, national militaries of NATO members and non-NATO allies, their intelligence services and law enforcement, as well as with energy companies, to ensure security of pipelines and other gas facilities.
- **Prepare** for energy crisis-related disaster relief in Europe in cooperation with European militaries in the NATO framework and the EU and national emergency responders. The U.S. Army should build on its experience in developing infrastructure protection plans to outline similar plans, programs, and procedures in Europe.

- **Train** forces for critical energy infrastructure protection. The United States has developed an effective system of critical infrastructure protection at home and can share its expertise with its European allies.
- **Train and equip** local militaries and other forces for energy infrastructure protection and actively pursue those who are trying to destroy energy infrastructure. Thus, the struggle against violent religious extremists is directly connected to U.S. efforts to keep oil and gas infrastructure, the electricity grids, ports, and airports secure.
- **Temporarily protect** critical energy facilities and infrastructure. While the United States is in the process of training European forces to protect energy infrastructure, it should use its own capabilities to ensure proper protection of the pipelines and facilities until the European forces are capable of performing these tasks on their own.

The U.S. Army deployed in Europe is a crucial component to NATO providing regional security, interacting with NATO and non-NATO allies, and assisting in training these allies' militaries.

ENDNOTE - SUMMARY

1. "Al Qaeda's North African wing claims two Algerian attacks," Reuters, June 8, 2015, available from *www.reuters.com/article/2015/06/08/ozatp-us-algeria-security-idAFKBN0OO0GZ20150608*, accessed June 20, 2015.

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INTRODUCTION

Europe's Dependence on Russian Gas and the War in Ukraine.

The series of gas disputes between Russia and Ukraine since the breakup of the Soviet Union have unveiled the unconditional dependence of Europe on Russian piped gas. The last wave of gas disputes between Russia and Ukraine were also combined with a violent conflict in eastern Ukraine, primarily in the regions of Donetsk and Lugansk. These hostilities in eastern Ukraine began in late-2013, when the then pro-Russian Ukrainian President Viktor Yanukovich refused to sign the Association Agreement with the European Union (EU). This provoked anger among mostly western Ukrainians who held high expectations for the association of their country with the EU and felt betrayed. It led to the so-called Euromaidan revolution, which resulted in the violent ousting of Yanukovich and the transfer of power to an interim pro-EU government. This development of events in turn sparked protests in eastern Ukraine among the predominantly pro-Russian population, who are suspicious of the EU and other western international structures. The hidden but unresolved tensions be-

tween the two nations, peacefully coexisting since the breakup of the Soviet Union, came to the surface. Russia supported the eastern separatist provinces, which has led to a lingering civil war and despair in Ukraine.

Part of the war has been a new wave of gas disputes between the Russian gas giant Gazprom and the Ukrainian national gas company Naftogaz. In the conflict with Ukraine, Russia has quickly switched from trying to use its natural gas supplies to Ukraine as a carrot to attempting to use them as a stick. Russia's behavior since the beginning of the conflict in late-November 2013 has demonstrated how easily Russia can change its gas policies towards its customers, leaving little room for building stable expectations from Moscow as a gas supplier.

In 2014, Europe once again became a hostage of a gas dispute, which left little room for the EU to maneuver. It passively watched the conflict unfold and tried to play the role of mediator and guarantor to secure gas supplies. This conflict has once again shown the EU that its dependence on Russian natural gas, without much ability to influence the Kremlin's behavior, can have dire consequences if it is not solved in time. However, it has also united the EU in its quest for a way to break free of the dependence on Russian natural gas.

History of the Importance of Oil and Gas as Strategic Factors.

Natural gas and oil have played an important role in European history for decades. Oil and its derivatives were used by ancient Babylonians in construction of their walls and towers, as well as for paving their streets.[1] The modern history of oil began in the

middle of the 19th century, when Abraham Gesner developed methods of distilling liquid fuels from oil.[2] Thanks to easy manipulation, oil quickly increased its importance simultaneously with the development of transportation, both civil and military. The internal combustion engine developed by Siegfried Marcus in 1864 has become the principal consumer of petroleum fuels for over a century.[3] The Western Ukrainian region of Boryslav in the Carpathian Mountains became one of the first provinces of oil production in the 1820s, supplying two million tons per year by the beginning of the 20th century.[4]

Several years before the beginning of World War I, Winston Churchill launched a wide process of modernization of the Royal Navy, which included a shift from using coal to using oil to power ships. Aircraft, battle tanks, and trucks, which were used for the first time in large numbers in World War I, also consumed large quantities of gasoline. The importance of oil became especially clear during War II when Nazi Germany did its best to open its way to the Caspian oil fields controlled by the Soviet Union. In 1942, this German effort led to the battle for Stalingrad, which at the time was the last obstacle for the Nazis on their way to the oil fields of Azerbaijan. Most historians consider it the bloodiest battle of World War II, and that, after being won by the Soviet Union at the expense of heavy casualties, became the turning point and precipitated Germany's defeat. The operation resulted in around 1.1 million Red Army soldiers dead, wounded, or missing; and more than 800 thousand dead, wounded, captured, or missing soldiers on the side of the Axis.[5]

The significance of oil was also clear to the Allies. In August 1943, the U.S. Air Force made an unsuccessful attempt to bomb nine oil refineries near the town

of Ploesti, Romania, in an operation known as Operation TIDAL WAVE. The aim of the operation was to curb fuel supplies to the Axis, with which Romania sided during the war. The mission failed, the U.S. Air Force suffered major casualties, and the bombed refineries were put back online in several weeks after the bombing.[6]

Although natural gas, similarly to oil, was first discovered in ancient times, it did not become important until much later. Natural gas acquired wide industrial and domestic usage only after World War II, when the technology became advanced enough for the United States and Europe to develop a complex system of gas pipelines, which in turn gave rise to a multitude of gas-powered electricity generating turbines and appliances, such as water heaters, oven ranges, boilers, etc.[7]

Developed countries began building gas pipelines, which ensured stable transport of natural gas from the fields to individual consumers and industries hundreds of miles away. After World War II, the demand for oil and gas became so high that many countries blessed by these natural resources turned from nomadic or agrarian societies into raw materials suppliers with relatively small effort. The flipside of this rapid influx of money into these countries has been that it discouraged them from becoming competitive in other sectors in the economy. Instead, they developed a phenomenon known as the "resource curse" or "Dutch disease."[8]

Russia, despite a broad-based, autarkic industrial sector, has not escaped the resource curse. The abundance of oil significantly contributed to the Soviet industrialization in the first half of the 20th century, despite the human cost it entailed. Natural gas became

a preferred fuel of the second half of the 20th century, with development of Soyuz and Urengoy–Pomary–Uzhgorod pipelines launched in 1979 and 1984, respectively.[9]

Russia joined the club of countries depending on hydrocarbon exports. The initial advantage of the hydrocarbon export-based cash flow backfired against Moscow in the late-1980s when it contributed in an important way to bringing the Soviet Union to its knees with the sharp decline in oil prices in 1986. This decline was the result of Soviet over-dependence on hydrocarbon hard currency exports and an apparent deal between the United States and Saudi Arabia.[10] As the late Yegor Gaidar conclusively demonstrated, the oil price collapse deprived the ailing Soviet economy of crucial revenues and precipitated its collapse under its own weight.[11]

Russia as an Unreliable Supplier and Ukraine as an Unreliable Transit Country.

The Soviet legacy, shaped by communism which taught people to circumvent and fool the system and kept afloat by the easy hydrocarbon money, left its footprint in the approach of both Russia and Ukraine to international business. When it comes to the supply of natural gas, both Russia and Ukraine have a record of being unpredictable and unreliable partners of the EU. Russia is an unreliable supplier because it uses its monopoly power to extract short-term political concessions from its European partners and has proven to be ready to manipulate the supplies to force its partners to accept its terms. In particular, Russia has several times decreased or cut off gas supplies to Ukraine and to some European countries when Ukraine did not pay the prices for gas dictated by the Kremlin. This

happened as early as March 1994,[12] and then again in 2006 and 2009, as described later. EU countries not as Kremlin-friendly as it would like them to be, such as Estonia and Latvia, are not eligible for gas price discounts.

Ukraine also proved that it might not always be a reliable transit country. It has proven to be willing to sacrifice the EU interests in its disputes with Russia in order to exert price concessions. Taking the EU as a hostage might have worked to deter Russia from cutting off gas supplies or at least lower the chances of such steps from the Kremlin. However, as the recent past shows, the EU has not been a very effective deterrence factor in the gas disputes between Russia and Ukraine.

THE IMPORTANCE OF GAS AS A FUEL FOR EUROPE

Overall Natural Gas Significance as a Bridge Fuel between Fossil Fuels and Renewables.

Natural gas is considered a golden mean between conventional fossil fuels and alternative renewable sources of energy. The disadvantage of renewable sources of energy is that they are economically not yet justifiable and not fully practicable as base-load fuels. Their production and usage needs to be systematically subsidized, although the per-kilowatt costs are coming down over time.

On the other hand, the disadvantage of most fossil fuels is that they place a heavy burden on the environment and contribute to the climate change. Natural gas lays in between. It is cheaper than renewable sources of energy and significantly cleaner than most

other fossil fuels. Therefore, the role of natural gas in advanced economies is likely to grow in the future.

Consumption, Trends, and Usage.

Due to the aftermath of the 2008 economic crisis, characterized by low growth and development of energy-efficient technologies, natural gas consumption in Europe has been stagnant or falling over the past several years. According to Eurostat (the EU statistical agency), in 2013, the EU consumption of natural gas decreased by 0.4 percent in comparison with 2012, when less than 5,000 terawatt hours (TWh) were used. This is roughly equivalent to 450 billion cubic meters (bcm).[13]

Levels of consumption fluctuate. According to Eurostat, the share of Russia in the overall EU imports of natural gas rose drastically from around 17.5 percent of all imports in 2012 to 30.9 percent in 2013.[14] This is an unexpected development after the steady decline in the Russian share in the EU gas imports since 2003. In 2014, Russia remained EU's main gas supplier, but its share in the overall EU gas imports slightly declined from 43 to 42 percent.[15]

According to preliminary data from Eurostat, the overall EU consumption of natural gas fell by around 22 percent annually between the first quarter of 2014 and the same period of 2013.[16] Overall, in 2014, EU gas consumption fell by 10 percent relative to 2013, according to preliminary estimates of the European Commission.[17] Because of that, EU imports of natural gas fell by around 8 percent over the same period. However, this high number may be partly caused by an exceptionally cold winter in early-2013, which caused natural gas consumption to spike. Still, the EU gas consumption has been steadily declining over

the past 5-year period from around 20.8 million TWh in 2010 to around 18 million TWh in 2013.[18] The reason for the drop in the overall EU gas consumption is the fact that electricity consumption in the EU is declining.

Contrary to the previous trends of the past several years when Russian piped gas exports were slightly falling, Russian exports of piped gas to the EU rapidly increased in the last quarter of 2013 and reached historically record numbers of around 11-bcm in December 2013.[19] For the first time, Russian gas imports to the EU exceeded those from Norway. Unlike the gas imports from Norway and North Africa, Russian gas exports to the EU have also been increasing steadily without the characteristic seasonal fluctuations between the winter and the summer months. Over the past 2 years, during winter months, the EU has imported around twice as much gas from Norway and North Africa as in summer.

LNG is another viable source of gas for Europe. LNG imports to the EU have been in decline since 2011 due to high prices in comparison to piped gas. Between 2011 and 2012, LNG imports fell by 28 percent.[20] Between 2012 and 2013, the imports fell by another 29.1 percent.[21] In the first half of 2014, LNG imports were 5 percent below their levels in the same period of 2013. One of the reasons for this decline may be the coincidence of the overall drop in gas consumption, together with Gazprom easing the contractual "take-or-pay" obligations for the EU gas distribution companies, making Russian gas more attractive. In case of an insufficiently high demand for gas, this principle may make it cheaper for the gas distribution companies to import the already contracted gas from Gazprom rather than to pay the penalty for not importing the required amount.

The majority of the drop in LNG imports were accounted for by Greece (-52 percent), Belgium (-35 percent), Spain (-34 percent), the Netherlands (-32 percent), and the United Kingdom (UK -32 percent).[22] By contrast, LNG imports to Asia have been growing over the past couple of years, mainly due to the lucrative price margins in the Asian gas markets, with China experiencing a 23 percent increase and South Korea experiencing an 11 percent increase in volume from 2012 to 2013.[23] Thus, due to the imports decline, the EU share in global LNG trade fell by 13 percentage points: from 29 percent to only 16 percent during 2009-13. In addition, 2 percent of the global LNG market consisted of LNG re-exports, with around 95 percent of those re-exports coming from Europe. In an era of high spot prices, the price differential between the LNG price in Europe and the price in Asia made it profitable for some companies to re-export already–contracted gas back to Asia.

The total LNG regasification capacity in the EU (i.e., the import capacity of the EU LNG terminals) is around 200-bcm per year (as of the end of 2014, excluding small-scale LNG terminals), while by 2022, this capacity is planned to be increased to 275-bcm. This capacity should be sufficient to cover the EU's LNG import needs handily even in case of a substantial decline in imports of the Russian piped gas. The supply constraints remain due to the limitations in Europe's internal pipeline network, especially of Central Europe, as will be explained later in detail.

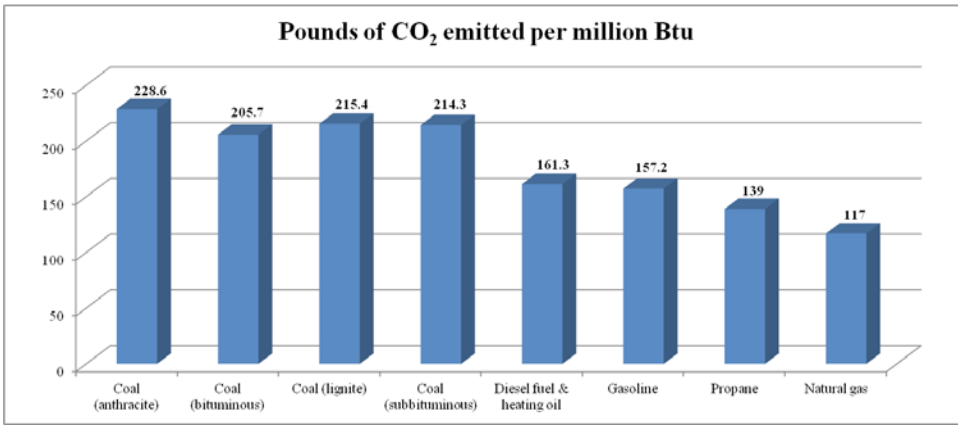
Coal: An Environmentally Problematic Energy Source.

Besides CO_2 emissions, burning coal pollutes the environment with a range of toxic gasses, such as

SO_2 and other toxic substances, such as NO_x and SO_x known as soxes and noxes. Coal, especially "brown" coal (lignite), is the most polluting source of electricity if we take into account the ratio of emissions produced per unit of generated electricity. Black coal (anthracite) emits significantly fewer collateral toxins than brown coal. However, anthracite actually produces 6 percent higher CO_2 emissions than lignite.[24] Burning black coal emits two times as much CO_2 as burning natural gas in order to produce the same amount of energy. In addition to that, unlike natural gas, burning coal also emits the toxic NO_x and SO_x.

In times when the EU is trying to find ways of curbing pollution and improving its environmental standards, other, cleaner sources of energy are and will be preferred over coal. In particular, the Industrial Emissions Directive (IED No. 2010/75/EU), adopted by the EU in 2010, states that industrial installations have to ensure that they cause no significant pollution; that their waste is reduced, recycled, or disposed of in the manner which creates the least pollution; and that they maximize their energy efficiency.[25] The rules are scheduled to go into effect in 2016.

One of the toughest components for coal power plants to meet will be the NO_x limits (200 microgram per cubic meter) because burning coal produces large quantities of such emissions. In addition to that, there is space for a downward revision of the limit, which would put additional burden to any industry burning coal, and incentivize it to shift to natural gas. Figure 1 shows a comparison of the amount of CO_2 emissions from burning different types of fossil fuel.[26]



Source: U.S. Energy Information Administration.

Figure 1. Pounds of $C0_2$ Emitted per Million BTU.

EU energy companies already pay additional costs under the EU emissions trading scheme (ETS), which is designed to motivate the industries to modernize and to pollute as little as possible. The UK came up with an additional measure to curb its CO_2 emissions. It is the so called carbon price floor, which is basically a UK national tax aimed at increasing the existing EU price of carbon in case the price of carbon under the EU ETS falls below a certain target. Such measures put pressure on the energy firms and are likely to encourage them to shift to natural gas.

Vincent de Rivaz, chief executive of the 'Electricite' de France Energy, the UK's largest producer of low-carbon electricity, argues that the carbon price floor and the EU policies aimed at reducing the carbon footprint are generally working.[27] First, these measures are encouraging firms to shift away from coal to low(er)-carbon power generation. Second, they incentivize

investment into renewable sources of power generation, such as wind, biomass, and nuclear. Under these regulations, renewable sources are more economically viable than would be the case if greenhouse gas emissions were not regulated. Given the widespread public suspicion of nuclear energy, especially after the Fukushima accident in March 2011, the strongest effect of these policies is likely to be a continuing shift from coal to natural gas—before shifting to renewables at a larger scale when their economics improve.

However, another tendency is running opposite to the EU efforts and is changing the calculations of European energy companies in favor of burning more coal. The U.S. shale gas revolution sent gas prices in the United States to record lows and freed a large quantity of U.S. coal for exports, which is increasingly being purchased by Europe.[28] In the first 6 months of 2012, European purchases of American coal rose by a third. Nevertheless, according to data from the U.S. Energy Information Administration, this trend changed in 2014, when U.S. exports of coal to Europe declined from 60.8 million tons in 2013 to 52.5 million. France and the UK saw the most significant decline in imports in absolute numbers.[29]

Germany, which is at the forefront of the efforts towards cleaner energy in the EU, continues to burn a lot of coal to generate its electricity. In 2012, the share of coal in the electricity production of Rheinisch-Westfalische Elektrizitatswerke, a German energy giant, increased to 72 percent in the first 9 months of 2012, compared to 66 percent in the same period of 2011. This trend is expected to continue until 2016, when the IED comes into force. However, due to a range of exceptions in the IED, some coal power plants will be able to continue operating for several years beyond

2016 and its provisions will thus be diluted. Nevertheless, tougher EU pollution rules resulting from the IED may push coal power plants out of business by the early-2020s.[30]

High Cost and Other Challenges of Renewables.

Renewable energy has been a focus of the environmentalists mainly due to the contemporary environmental and global climate change concerns. Historically, therefore, governments bought renewable energy paid for by various direct or indirect subsidies. However, renewable sources of energy and the subsidies to make them more sustainable have had a side effect of pushing electricity prices in Germany and some European countries too high for the industry to remain competitive in the long run. Some economists believe that this may result in capital flight to destinations with cheaper energy, including the United States.[31]

In Germany, the so-called "Energiewende," or "energy change," is a large-scale project of the German government to shift from nuclear power and fossil fuels to renewables. The goal of this energy change is to be producing 40 to 45 percent of its electricity from renewables by 2025.[32] However, there are worries that this energy change may undermine the German industrial base and drag down the entire European economy due to the spillover effects. The average electricity prices for companies have risen by around 60 percent over the past 5 years. These increasing electricity prices are considered a major concern for around 75 percent of Germany's small and medium-size industrial businesses.

Another negative consequence of the German efforts to increase the share of renewables in its energy

production is the public protests it sparks. The new sources of energy will also need new transmission lines and other infrastructure that will have to run through new lands. This leads to the traditional NIMBY ("not in my backyard") problem. For instance, people in many German villages have protested against power companies laying transmission cables over their villages. They are afraid of the effect of such transmission lines on health due to low frequency radiation, of the potential negative impact on tourism as the landscapes will not be as picturesque as before, etc. Regardless of whether these fears are justified or not, they are an additional factor that makes overcoming the dependence on fossil fuels even more difficult.

Other countries have targets that are more modest when it comes to the share of renewables in their energy mix. France's goal is to increase the share of renewables in its gross final energy production by 2020 by around 13 percentage points compared to 2005.[33] This may still prove to be too ambitious. According to the EU Directive 2009/28/EC, 17 percent of Italy's energy consumption has to be covered by renewable sources, compared to 4.92 percent in 2005.[34] Overall, regardless of how successful Germany is with its Energiewende and how successful the other EU countries are in achieving their aforementioned goals, both Germany and the rest of the EU will inevitably need fossil fuels in the foreseeable future. Due to the environmental constraints, the one fossil fuel in highest demand will most likely be natural gas.

Current economic growth forecasts for the EU tend to be moderately positive. Moody's projects economic growth to be 1 and 1.5 percent in 2015 and 2016, respectively.[35] Nevertheless, according to Moody's Investors Service, a number of EU countries, such as Italy, Por-

tugal, and Spain, are not expected to reach even their pre-crisis gross domestic product (GDP) levels by the end of 2016. In the longer run, the EU's real economic growth is projected to be positive, within the range of 2 to 3 percent until 2025, with a tendency to slightly slow down towards the end of the period.[36] Therefore, given the sluggish EU growth projected for the next 10 years and no clear improvement on the horizon, coupled with gradually increasing energy efficiency across the continent, one should not expect a significant rise in gas consumption in the EU.

CURRENT AND POTENTIAL GAS ROUTES FROM RUSSIA TO EUROPE

Ukraine.

Currently, Ukraine is still one of the main transit routes for Russian gas flowing to Europe. Natural gas flows to Ukraine by 22 major gas pipelines (Soyuz, Progress, Urengoy-Pomary-Uzhgorod, etc.) and leaves the country by 15 pipelines. As of July 2014, Ukraine's gas grid looked like Figure 2.[37]

Source: East European Gas Analysis.

Figure 2. Ukraine's Gas Pipeline Network as of July 2014.

The history of the Ukrainian gas pipeline network dates back to the 1910s, when the first gas pipeline was constructed in the region of L'viv/Lemberg/Lvov.[38] In 1945, Ukraine first started exporting natural gas, with its first destination being Poland. In 1948, the Dashava-Kyiv gas pipeline—the largest gas pipeline in Europe at the time—was put into operation, and in 1951, the pipeline reached Moscow. The construction of the pipelines continued, with new pipelines being built in 1960 and 1967. These new pipelines allowed Ukraine to export gas to Belarus and to today's EU countries, such as Austria and the Czech Republic.

The break-up of the Soviet Union plunged the Ukrainian gas pipeline network into a crisis. The Union of Soviet Socialist Republics (USSR) did not

design major pipelines as international gas transit routes; they became a part of an international gas export system years after they were constructed.[39] This has led to the fact that the transit of the gas could not be operated independently of Ukraine's now domestic gas network. In addition, most of the system was built in the Brezhnev era, and, due to the natural life span of the pipelines, maintenance and repair costs have risen since the break-up of the USSR.

Belarus.

Belarus has been an important transit country for the Russian gas since 1999, when the Yamal pipeline was launched. In 2005, the pipeline reached its projected capacity of 33-bcm of gas per year. Before that, Ukraine was the only transit route of the Russian gas to Europe, which put both Russia and Europe at risk of supply cutoffs. While Gazprom owns the section of the pipeline in the territory of the Russian Federation, Beltransgaz owns the Belarusian section. However, Beltransgaz is entirely owned by Gazprom, which allows Gazprom to control the Belarusian section of the pipeline. Belarus pays only around $160 per 1,000 cubic meters of Russian gas—significantly less than the EU countries.

Nord Stream.

The Nord Stream was launched in September 2011 in response to the Russian-Ukrainian gas crisis of 2009. Its second thread was launched in 2012, doubling its capacity. Both threads of the pipeline transfer around 55-bcm of gas per year directly from Russia to Germany. This pipeline allowed Russia to redirect a part

of its gas exports to Europe from their initial route to Ukraine and transfer this gas directly to its end consumers in Europe. This pipeline has faced a great deal of criticism from a wide array of experts and policymakers. For instance, Radoslaw Sikorski, Speaker of the Sejm and Poland's former foreign minister, compared this pipeline to the infamous Ribbentrop-Molotov Pact of 1939, as a result of which Germany and the Soviet Union invaded Poland, thus launching World War II. There are also fears that Russia might use this pipeline for attempts to exert political concessions from the EU.

The Nord Stream project, which German companies would like to expand further, together with Russia's refusal to ratify the Energy Charter Treaty, poses a security risk to Europe. It increases Europe's dependence on Russian gas, facilitating Russia's ability to use its gas supplies as leverage against the EU in order to foster the pro-Kremlin policies. Among other things, Russia's refusal to ratify the Treaty stems from its desire to have less competition among its European gas consumers, which currently allows Gazprom to charge each of its European consumer countries a different price—a practice forbidden by the Treaty. In other words, Gazprom has pursued the "divide and rule" policy, which allowed it to pressure each European country dependent on its gas to exert more favorable terms both economically and politically.

Gazprom's influence could be observed for the past 1 1/2 years when the EU was conducting internal negotiations about imposing sanctions on Russia due to its annexation of the Crimea and support for eastern Ukrainian separatists. Although Russian gas was not the only factor, the Central European countries, such as Hungary, Austria, and Slovakia, as well

as Serbia that depend more on Russian gas, tended to promote a more reserved policy towards imposing sanctions on Russia due to their concerns about their gas supplies.

South Stream and Its Alternatives after the Cancellation of the Project.

The original goal of the South Stream, the construction of which was canceled in December 2014, was to deliver Russian gas directly to the EU, bypassing Ukraine. Russia hoped that by building and launching the South Stream, it would solve the recurring problem of insecure transit through Ukraine and would strengthen its position in its negotiations with Kyiv. The capacity of the South Stream was planned to be 63-bcm per year, which is equivalent to around 12 percent of the EU gas consumption in 2014.

According to the initial plans, the South Stream was expected to be operational by 2018. The pipeline was planned to run from Russia, through the Black Sea, through Bulgaria, Serbia, and Hungary to Austria. However, since the beginning of its construction, the South Stream posed a dilemma for Europe. On the one hand, it would contribute to the independence of Europe from Ukraine as a gas transit country. On the other, it would further increase European dependence on Russian gas and make alternative routes commercially unattractive.

The construction of the pipeline was fraught with problems from its very beginning. In June 2014, the European Commission voiced its concerns about the compliance of the construction of the South Stream in Bulgaria with the EU legislation.[40] The main problems were that, according to the agreements between

Bulgaria and Gazprom, Gazprom was able to circumvent the EU competition rules and that Russian and Bulgarian sub-contractors would be given preference in public procurement for the construction of the pipeline.

In August 2014, Bulgaria announced that it ceased work on the construction of its section of the pipeline.[41] A 541 kilometers (km)-long section of the pipeline was planned to run through the country. Then Bulgarian Prime Minister Plamen Oresharski announced this decision shortly after his meeting with U.S. Senators John McCain, Chris Murphy, and Ron Johnson in Bulgaria, which triggered speculations in the Russian media about the potential U.S. involvement in the decision and that pressure was put on Bulgaria to adopt such a decision. At the same time, Bulgaria says the project is "irreversible and important for both Europe and Bulgaria."[42]

After Bulgaria, the Serbian government, in particular Serbian former transport minister Zorana Mikhajlovic, also announced that Serbia would be suspending work on its part of the South Stream.[43] Presumably, the reason was that Serbia was waiting for the resolution of the dispute between the European Commission and Bulgaria regarding the Bulgarian section of the pipeline. However, later, the Serbian Prime Minister Alexander Vucic denied Mikhajlovic's announcement and said that the work was continuing as planned.[44] According to the Russian media, it was a matter of time until someone in Serbia would take advantage of the fact that Bulgaria suspended work on its part of the pipeline and would push for the same thing in Serbia.[45] Serbia is trying to sit on two chairs at once—to maintain its friendly ties with Moscow and to be a responsible ally of the West. According to the Russian

media, the decision of Bulgaria to suspend the construction of the pipeline, and also the Serbian voices to do the same, seemed to be a result of the pressure from the West to sanction Russia, in addition to the direct sanctions imposed by Brussels and Washington. Serbia, as a country aspiring to join the EU and suffering from a severely diminished geopolitical clout, had to adapt to the changing environment.

On December 2, 2014, Russian President Vladimir Putin announced during his official visit to Turkey that construction of the South Stream project would not continue.[46] On the one hand, this is good news for Ukraine and other transit countries, such as Slovakia, which will continue receiving millions of dollars for transit of gas to Central Europe and further to the West. As long as the EU needs Russian gas, Ukraine will continue to serve as an important gas transit route, because the Nord Stream, which transports gas directly from Russia to Germany, is not able to supply all the Russian gas the EU may need.

On the other, this is a defeat for Russia. Due to the introduction of the EU third energy package and the related compliance issues, and following the EU sanctions against Russia, the completion of this project became virtually impossible. The decision to end the project prematurely also means that Russia suffered a loss of around $9.4 billion, for which they will not be reimbursed. After the announcement of the South Stream closure, Russia proclaimed that it now intends to concentrate on building a hub near the Turkish-Bulgarian border and on supplying gas to Turkey through the new project called Turkstream. Instead of the South Stream, Russia intends to build a new pipeline to Turkey with the projected capacity of 63-bcm per year—same as the South Stream.

Turkey is expected to consume only 16-bcm of that volume.[47] The remaining 40-bcm is to be distributed to the Balkans and to Central Europe. Russia also intends to build a gas hub at the Turkish-Bulgarian border. This gas hub would be open for Bulgaria, Serbia, and other Balkan countries in case the EU reconsiders its previous stance and decides to connect to the southern route of the Russian gas. This seems to be the second best option after the South Stream. In case the EU decides to connect, no matter how unlikely in practice that is, Russia would achieve its original goal to transport gas to the EU through the Balkans, albeit with higher upfront costs for construction of the infrastructure.

The decision to stop construction of the South Stream opens up alternative variants of transporting Russian gas to the Balkans. For instance, Eustream, the Slovak gas pipeline operator, proposed to build a pipeline from Western Europe through Slovakia to Ukraine, Hungary, Romania, Bulgaria, and possibly the Balkans.[48] The project would be called Eastring and should be able to alleviate the strong dependence of some Balkan countries on Russian gas. Serbia and Bulgaria would be able to receive gas even if the transit of gas through Ukraine is cut off. The pipeline that needs to be constructed would be only 570-km long, as it would also take advantage of the already existing pipeline network. This new section of the pipeline would go mainly through Romania and would connect to the main Balkan pipeline running to the shore of the Black Sea. The proposed capacity of this new project is 20-bcm per year. It would be able to supply the Balkans with either Russian or Western gas.

Liquefied Natural Gas.

One of the most viable alternatives to Russian gas is liquefied natural gas (LNG). The EU currently imports LNG mainly from the Middle East, especially Qatar, but supplies from the United States are expected to come online in the next several years. LNG exports from the United States also seem promising if, after the U.S. LNG becomes available in 2018, the cost is price-competitive against Russian pipelined gas. The question is whether U.S. gas can become a perfect substitute in terms of price, reliability, and quantity.[49] First, liquefaction and transportation of the gas adds a significant amount to the cost, which may deprive the U.S. LNG of its initially expected competitive advantage. Second, U.S. LNG exports may raise domestic prices because part of the gas that would normally end up in the United States will then be exported at higher price margins. There are three answers to these arguments. First, the Europeans, including the Lithuanians who have built a floating regasification terminal, would like to add U.S.-produced natural gas to the source mix for security reasons. Second, production efficiencies still keep the gas competitive on price. Finally, the higher domestic price of the U.S. gas is in the interest of the gas industry.

STRATEGIC DEPENDENCE OF EUROPE ON RUSSIAN GAS AND RUSSIA-UKRAINE GAS DISPUTES

Dependence of Western Europe on Russian Gas.

Russia constitutes a relatively small share of the Western Europe gas consumption which varies by country. For now, the UK has its own gas sources and

does not need to rely on gas imports. Spain gets its gas from North Africa, mainly Algeria, which in 2013 supplied 39 percent of Spain's gas needs.[50] France purchased approximately 19 percent of its gas from Russia in 2013.[51] Approximately 48 percent of Germany's gas needs were met by Russian gas imports in 2013, mainly through the Nord Stream pipeline. Italy and Austria depend on Russian gas imports for 39 and 60 percent, respectively. Thus, most countries of Western Europe cover a significant share of their gas consumption by Russian gas imports.

Dependence of Eastern and Central Europe on Russian Gas.

Although the percentages within the region vary, Central and Eastern Europe depend significantly more on Russian gas imports than does Western Europe. The countries that depend most on Russia are the Baltic States, which purchase 100 percent of their gas from Russia.[52] This is about to change: Estonia is planning to build a pipeline to connect it to Finland to receive Norwegian gas. Lithuania has built a floating liquefied natural gas terminal as mentioned previously.[53]

Central Europe imports less percentage-wise, but not significantly. In 2013, the Czech Republic and Slovakia imported 86 and 98 percent of their gas from Russia, respectively. Poland and Hungary imported 57 and 68 percent, respectively. Bulgaria imported 93 percent of its gas from Russia in 2013,[54] and Romania imported around 10 percent.[55] Thus, it is the Baltic States, Central Europe, and the Balkans that depend most on Russian gas, and this is why the EU does not have as much space for maneuver vis-à-vis Russia as

it might if the dependence of several of its members was not as high.

Seasonal Dependence.

European gas consumption varies dramatically between the seasons: summer consumption is as little as 40 percent of the winter consumption. Thus, the dependence of Europe on Russian gas is the lowest in summer and the highest in winter due to heating needs and shorter days, which require more lighting. Therefore, in summer, Europe, on average, depends less on Russian gas and would be able to cover its consumption by exploiting sources of gas other than Russia, especially if Europe builds an efficient network of pipeline interconnectors between the EU countries. Additionally, in summer, gas companies are usually refilling their reservoirs in preparation for the upcoming winter, driving up otherwise sluggish demand.

Disputes in the 1990s.

Strains in the Russian-Ukrainian natural gas relations appeared at the dawn of Ukraine's political independence in the first half of the 1990s. The problems that lay at the core of the disputes were similar to the ones in subsequent gas conflicts between the two countries: Ukraine was unwilling and unable to pay for the gas it was receiving from Russia, while Russia kept lowering its gas supplies to Ukraine in order to force it to improve its payment discipline.

As a result, the amounts of gas transited through Ukraine to Europe kept fluctuating. Even worse for Europe was that, in the 1990s, Ukraine was the only transit route for the Russian gas that Europe received, highlighting the importance of Russian-Ukrainian

and Russian-European relations. A complicating factor was Ukraine's energy inefficiency, which resulted from the Soviet legacy.[56] The USSR functioned without a convertible hard currency—instead, the ruble was a fiat money, with Gosplan central planning, and only with a tenuous accounting system.

This situation has defined the energy sector as well. In 1991, Ukraine's total fossil fuel consumption amounted to 202 million tons of oil equivalent, out of which approximately 50 percent was imported.[57] As for natural gas, Ukraine imported 77 percent of the gas it consumed that year, while producing the rest from its domestic gas wells. Ukraine's industry, which was built on the Soviet cheap energy and was largely energy inefficient, was responsible for the excessive consumption. The high degree of dependence on Russian energy supplies did not allow Ukraine to attain real independence from Russia. By early-1994, Ukraine's debt to Russia was estimated to be around $2 billion, most of which was the Ukrainian debt for Russian gas.[58] In this situation, Russia could either change the supplied volumes of gas or change its price. Moscow already had started using natural gas as a political leverage. It offered discounted gas prices to the other former Soviet Union countries in exchange for political concessions, mainly participating in Russia-led political integration organizations, such as the Commonwealth of Independent States (CIS). This Russian negotiation tactic went the furthest with Belarus, which is now part of a so-called "united state" with Russia. Belarus has lost most of its independence in exchange for cheap oil and gas and the intermediary role in energy trade.

An International Monetary Fund (IMF) paper published in 1997 argues that the main reasons for the

piling up of the Ukrainian debt in the 1990s was the sluggish growth of its economy, government intervention in the energy prices to keep up subsidies for households, and privileged oligarchs. Other government nonprice interventions in the gas market, such as setting regional consumption quotas or the laxity in the enforcement of sanctions towards nonpayers, played a role in the mushrooming debt as well.[59] Thus, the government could not pay Gazprom because the government itself suffered from lack of payments due to its own policies and limitations. Russia used this piling debt as leverage to achieve its geopolitical objectives, including the deployment of the Black Sea Fleet in Crimea, the return of the Soviet nuclear arsenal[60] deployed in Ukraine before the breakup of the Soviet Union, etc. By carefully adjusting the gas price for Ukraine while keeping it below the market level, Russia achieved two objectives simultaneously: It kept Ukraine relatively afloat economically, ensuring at least partial payments, and at the same time achieved its strategic priorities.

The Russian-Ukrainian gas relations in the 1990s reached their bottom in 1993-94, when the first gas crisis erupted between Kyiv and Moscow. The Russian pursuit of ownership and control of Ukrainian gas and oil facilities, instead of merely seeking political concessions from Kyiv, triggered a shift in the policy. If Russia had taken ownership of the Ukrainian gas network, it would have deprived Ukraine of its major leverage, i.e., its ability to keep Europe hostage by stopping the transit of Russian gas. Such a step by Moscow inevitably would outrage Europe, a major source of hard currency revenue for Russia, which was at that time politically and economically much weaker than in the 2000s.

In February 1994, Gazprom started reducing its gas supplies to Ukraine due to the country's piling debt. Moscow reduced the supplies to around 10 percent of their original volume. Russian officials emphasized that they were ready to accept property rights of the Ukrainian gas network as a substitute for Ukraine repaying its $1 billion gas debt in cash. The parties reached an initial preliminary deal in March that Ukraine would repay part of its gas debt, and that Gazprom would acquire a 51 percent share of the Ukrainian gas transit network. However, in the end, the parties did not strike a deal.

Instead, Ukraine passed laws to prevent its gas transit network from being privatized and became more prompt with paying its gas bills, which was facilitated by the help of Western financial institutions. In early-May 2014, Ukraine received the first tranche of $3.19 billion of its $17 billion IMF package, using a part of the amount to pay Ukraine's overdue gas bills to Gazprom.[61] The IMF acknowledged that part of the package would be used to pay off both overdue and future energy bills, while the rest was aimed at supporting the Ukrainian economy. It seemed that Ukraine learned its lesson that the Russian threats of cutting off the gas supplies can be prevented by paying its gas bills on time, which would deprive Russia of most of its economic incentives and political excuses to cut off its gas supplies. However, Ukraine did not learn its lesson and started again piling debt, which resulted in a series of gas disputes in the 21st century (see *infra*). In the meantime, Russia continued behaving as a traditionalist power, backing its diplomacy by force and coercion.[62]

Gas Dispute of 2005-06.

In May 2005, an issue between Gazprom and Ukraine emerged regarding the usability of Gazprom's gas in the reservoirs on the Ukrainian territory for sales to Europe. Gazprom made 40 requests to Ukraine between October 14, 2014, and March 22, 2005, to make the stored gas available.[63] Ukraine did not approve any of these requests. In turn, Gazprom threatened to subtract the volumes from its transit in-kind payments, which would mean a serious shortage of gas for Ukraine. In turn, Ukraine threatened to use part of the gas intended for European sales for its own needs, which could jeopardize the continuity of gas supplies to the EU. This incident was later resolved with an agreement to release the withheld amounts of gas to Russia.

In 2005, the Ukrainian government, led at the time by President Viktor Yushchenko, raised objections to the earlier amount of natural gas debt that Ukraine had agreed to pay to Moscow, calling the amount excessive. As the oil prices skyrocketed in the 2000s, the gas prices, which were indexed to oil, also mushroomed, causing the debt to spike. Russia complained about Ukraine and other CIS countries paying three to four times less than the price the EU countries were paying.

Gazprom demanded Ukraine to either start paying EU-level prices from the beginning of 2006 or allow Gazprom to acquire a share in the Ukrainian gas transit pipeline network (similar to the demand of the mid-1990s). Ukraine responded as it did in the 1990s, saying that it was ready to pay the market price, but under a condition that the transfer to the market price would have to be gradual. The initially hardline stance of Gazprom and the Russian leadership softened. Gaz-

prom announced that it was ready to provide loans to Ukraine, which Ukraine would then use to pay Russia back for its gas.

However, Ukraine rejected this Russian proposal. Gazprom in turn cut off its supplies to Ukraine. Gazprom insisted that it was pumping enough gas intended for Europe, while Ukraine claimed that it did not divert any gas from the system and passed the entire amount through its territory to the EU. The EU countries that were most affected by the cutoff were Hungary, Austria, Slovakia, Romania, France, Poland, and Italy. The crisis lasted only for several days. On January 4, 2006, gas deliveries to the EU were restored to their previous levels, and end consumers in the EU did not experience shortfalls due to national gas reserves and a mild winter at that time.

Although an agreement between Russia's Gazprom and Ukraine's Naftogaz was reached, it resolved largely secondary issues, e.g., the modalities of distributing gas in Ukraine and the transit fee for the gas exported to the EU. The primary issue, which was the long-term price for gas consumed by Ukraine, and Kyiv's inability to sustain its gas "habit," remained unresolved. This dispute was another example of Russia attempting to blackmail Ukraine by using gas prices to pursue its political goals. Belarus and other countries with more Russia-friendly governments than Ukraine were paying a fraction of the price Ukraine was forced to pay. Despite the crisis's short duration, it damaged the trust of the EU members in Russia's reliability as a gas supplier—something Russia further undermined in January 2009 and continues doing to this day. The EU realized that it was not strategically beneficial to be overly dependent on a single gas supplier, especially if that oligopolistic gas supplier was as unpredictable as Russia.

Gas Dispute of 2009.

The gas dispute between Russia and Ukraine in January 2009 has so far been the most serious of its kind. It was not as long as the conflict of 2014, but was more intense and led to direct economic losses for Russia, Ukraine, and the EU countries of Central Europe. Similar to the previous disputes, the core of the 2009 gas conflict was the sale price for the Russian gas. Russia increased the gas price from $130 in 2007 to $179.50 per 1,000 cubic meters in 2008.[64] Information about Ukraine illicitly diverting gas from its transit network for resale started appearing in February 2008. In March 2008, Gazprom lowered the pressure in the Ukrainian transit network, leading to lower volumes. Naftogaz responded by warning that, given the situation, it could not guarantee stability of the gas transit to the EU.

The two countries attempted to resolve the issue, but ran into problems. In October 2008, Putin and the then-Ukrainian Prime Minister Yulia Timoshenko signed a memorandum on the future cooperation between the two countries in the gas sphere. The memorandum provided for a gradual increase in import prices and transit tariffs, recognized the necessity to ensure uninterrupted gas transit through Ukraine, designated Naftogaz as the monopoly importer of Russian gas to Ukraine, and provided for joint Russian-Ukrainian gas exports to Europe.

Two weeks later, the chief executive officers (CEOs) of Gazprom and Naftogaz, Alexey Miller and Oleg Dubyna, signed another agreement. Among other things, it foresaw a gas contract to be signed in November 2008 and specified the guarantee of unin-

terrupted gas transit by Naftogaz at a minimum of 120-bcm per year. However, Gazprom and Naftogaz failed to reach an agreement on the import price from January 2009 onwards. Ukraine was unwilling to agree on a new, higher price as Naftogaz still owed Gazprom considerable sums of money for Gazprom's previous gas deliveries. By the middle of December 2008, Naftogaz had paid only $800 million of an accumulated $2.2 billion debt. Moreover, Naftogaz rejected Gazprom's offer to pay for its transit in advance and thus provide Naftogaz with enough resources to pay its gas debts.

In November 2008, Alexey Miller said that, if the parties do not sign a new supply contract by the end of the year, the price for Ukraine from January 2009 onwards would be $400 per 1,000 cubic meters. Putin added that, if the contract was not signed, supplies to Ukraine would end. The EU did not take an active position at that time. The EU's only response to these warnings was a press release in which it called upon the parties to adhere to the principle of uninterrupted transit. On December 31, 2008, Naftogaz allegedly informed Gazprom that if Gazprom sent transit gas through Ukraine, this gas would be confiscated by Ukraine. On January 1, 2009, Gazprom cut all supplies to Ukraine, while it continued to pump the transit gas for the EU customers into the Ukrainian network. On January 4, 2009, Gazprom accused Ukraine of allegedly having stolen 50 million cubic meters (mcm) of gas, which did not belong to Naftogaz, from the gas stream intended for the EU and from the underground reservoirs.

On January 5, the amount of allegedly syphoned gas rose to 63-mcm. Naftogaz claimed that around 25-mcm was necessary to operate the pipeline network in

the conditions of a lower gas pressure from Russia, and that it was "entitled" to take that volume out of the European transit volumes. On January 5, Putin and Miller decided to cut the gas supplies to Ukraine entirely. On January 6, Gazprom significantly reduced its supplies and on January 7, the company cut off the supplies completely.

Only at that point did the EU take action. It put together a monitoring mission composed of representatives of both sides to the dispute, as well as of the EU itself and European gas companies. The monitoring mission was deployed on January 11-12, 2009. Mutual accusations between Russia and Ukraine of being responsible for the gas deliveries cut off continued. Gazprom claimed it was willing to ship gas to Ukraine, but Naftogaz blocked Gazprom's attempts. Naftogaz claimed that no gas was being shipped. European gas companies started pressuring Gazprom for a resolution of the dispute. On January 19, 2009, Gazprom and Naftogaz signed two new contracts—one on the supply and one on the transit of gas. Gazprom resumed its gas shipments on January 20, 2009, and by January 22, the shipments reached their original levels. Russia and Ukraine agreed on a base price of $450 per 1,000 cubic meters, which was subsequently lowered to $360 by a 20 percent discount.[65] This discount was officially explained by the fact that, despite raising the price by Gazprom, the transit price Gazprom was charged by Naftogaz for transiting through Ukraine's territory was left unchanged at its 2008 level—$1.7 per 1,000 cubic meters of gas per 100-km. However, the real reason behind this scheme (a high base price lowered by means of a discount) may have been different. It provided Russia with maneuvering space and allowed it to manipulate the price without breaching

the contract. In particular, Gazprom was not legally tied to the price of $360 per 1,000-m3, and could flexibly and arbitrarily raise it in case the Kremlin saw a need to put the Ukrainian government under more pressure.

This dispute seriously shattered the reliability of Russia as a stable and predictable gas supplier and served as an incentive for the EU countries to look for alternatives. Before the dispute, there were discussions in the EU about potential diversification, but not much had been done in this regard.

Gas Dispute of 2014.

The 2009 gas crisis, which resulted in a gas contract between Russia and Ukraine, created a potential for a new gas conflict to emerge later. The 2009 gas contract foresaw a price for Ukraine of $450 per 1,000 cubic meters, which was comparable to how much the EU countries paid. However, Ukraine, with its obsolete and inefficient gas transit network and retail gas price subsidies, simply could not afford to pay such high prices to Gazprom. Therefore, the country continued accumulating debt and gave Russia a new lever in their uneven relationship. During the Yanukovich rule and even beyond, the greed of the oligarchs who controlled gas purchase and distribution has prevented serious reforms from taking place. Brussels and Berlin, Germany, have not prioritized the reduction of their own Russian gas consumption and would not—or could not—force Kyiv to cut its dependence on this energy source either.

The 2014 gas crisis between Russia and Ukraine began in late-2013 against the background of the popular uprising against the Yanukovich rule, supported

by the oligarchs. Putin went out of his way to convince Yanukovich not to sign the Association Agreement with the EU, which the Ukrainian leader had earlier promised to sign. Moscow also did its best to pave the way for Yanukovich to bring Ukraine into the Russian-led Eurasian Union.

On December 17, 2013, Putin and Yanukovich reached a deal, according to which Russia would provide Ukraine a loan of $15 billion and would offer the country a discount on Russian gas.[66] The meeting between the two presidents took place after the "unexpected" decision by Yanukovich to postpone the integration of Ukraine with the EU and not to sign the Association Agreement and the Deep and Comprehensive Free Trade Agreement (DCFTA) with the EU at the Vilnius Summit in late-November 2013. After this decision led to outrage among pro-Western Ukrainians, who most likely looked to the EU integration as a way to overcome their Soviet past once and for all, Russia tried to soothe the anger by offering Ukraine something the EU could not give Kyiv—easy money and cheap gas.

In December 2013, Gazprom and Naftogaz signed amendments to the 2009 gas contract, where the price of the Russian gas for Ukraine would fall from around $400 per 1,000 cubic meters to $268.5. This step was meant to be a "temporary" solution. A final solution on the price and on the way of ensuring the security of transit of the Russian gas to the EU was to be found later. The high price of $400 per 1,000 cubic meters had been dreaded by Ukraine and was one of the excuses to jail Timoshenko, who signed the original 2009 contract with Putin on behalf of Ukraine. In exchange for Russia lowering the price by almost 33 percent, Ukraine officially did not have to make any conces-

sions. However, the subsequent actions of the Ukrainian government, led by Prime Minister Nikolay Azarov, suggested that Yanukovich's promise to merely "postpone" the European integration process instead of openly reversing it was only an attempt to appease the public, calm down the protesters, and buy time. Although it was never publically announced, there are reasons to believe that, in exchange for cheaper gas, Yanukovich agreed to forego the original Ukrainian plans to sign the Association Agreement with the EU.[67]

A turning point came when Yanukovich was ousted by the EuroMaidan protesters in February 2014. With Yanukovich gone, Russia lost an incentive to subsidize Kyiv's loyalty to the Kremlin with cheap gas. In March 2014, Gazprom started making warning comments that the gas discount might be abolished. The warnings materialized on April 1, 2014, when Gazprom announced that it increased the gas price for Ukraine to $385.5 per 1,000 cubic meters.[68] This was a $117 (or 43.5 percent) increase compared to the 2013 price of $268.50 agreed to by Putin and Yanukovich. The official reason for the price increase was the high debt of Naftogaz to Gazprom. As of early-April 2014, the debt Naftogaz owed to Gazprom was estimated to amount to more than $2.2 billion.[69]

In early-March 2014, Naftogaz announced that it had paid for the Russian gas received in January and promised to pay for the gas received in February in due course.[70] By April 7, 2014, Ukraine was supposed to pay its gas debt of $2.2 billion, which Naftogaz failed to do.[71] The easiest short-term solution would have been for Russia to provide Ukraine with a loan of $2 to $3 billion. However, this was out of the question because Russia did not recognize the then-leadership

of Ukraine (between February and May 2014) as legitimate. Moscow claimed that Prime Minister Arseniy Yatsenyuk and The Verkhovna Rada Speaker Arsen Avakov did not assume power in Kyiv based on any legitimate expression of will of the Ukrainian nation. Trilateral gas talks between the EU, Ukraine, and Russia during the period from April to mid-June 2014 turned out to be fruitless. Russia agreed to lower the initially proposed price for Ukraine to $385 per 1,000 cubic meters by adjusting its federal gas export tariffs, but Ukraine insisted on a price of $320. The gas talks were excruciating. In May 2014, Ukraine and Europe feared that, if Ukraine did not pay its debt as demanded by Gazprom, Russia might turn off gas on June 3.

On May 1, 2014, the retail gas prices for the Ukrainian consumers increased by around 50 percent.[72] The lowest tariff for households rose to $95.5 for 1,000 cubic meters of gas, which is still well below the wholesale prices Ukraine pays Russia, as the retail gas prices for households is heavily subsidized. The maximum retail gas price that gas distribution companies were allowed to charge increased to $414.02 at the then exchange rate, excluding the value-added tax (VAT) and other taxes. On April 1, 2015, the retail prices of natural gas for households went up again by another 285 percent on average.[73] Wholesale gas prices for industrial consumers went up also, although not as sharply. Higher natural gas prices also increased the Ukrainian consumers' bills for electricity and hot water. These price increases were not final. Raising the price of electricity and the phasing out of electricity subsidies are divided into five stages, with the last one ending in March 2017. Another round of talks between Russia, Ukraine, and the EU took place on May 26, 2014.

The payment schedule that emerged as a result of the talks was that Naftogaz would pay Gazprom part of its gas debt. By May 29, 2014, Naftogaz was expected to pay $2 billion and an additional $500 million by June 7, 2014. Gazprom warned Naftogas that, if Ukraine did not pay the June gas bill in advance by 10:00 AM on June 3, Gazprom would cut off gas to the country. On May 30, Ukraine announced that it had sent a payment to Gazprom covering part of the gas debt.[74] However, Naftogaz paid only $786 million, instead of the $1.45 billion demanded by Gazrom. Gazprom then initially postponed the deadline to June 9. This deadline was again postponed to June 10 and subsequently to June 16.[75]

On June 16, 2014, Gazprom introduced a regime of advance payments for gas in its transactions with Ukraine.[76] In addition to that, Gazprom cut gas supplies for Ukrainian consumers and started shipping only the gas intended for transit to Europe via the Ukrainian gas network. However, Ukraine felt relatively confident about its own gas supply situation, because it had accumulated 15-bcm of gas in its underground reservoirs, which was estimated to be enough until October 2014. On October 2, 2014, the Russian Cabinet of Ministers adopted a decision which allowed Gazprom to subtract a sum owed to it by a foreign partner from potential payments Gazprom had to pay to that contractor for gas transit.[77] In particular, this decision applied to Naftogaz. The Russian decision allowed Gazprom not to pay Naftogaz for gas transit to the EU and to lower the debt of Naftogaz by the sum of the required transit payments.

In early-October 2014, Yatsenyuk stated that Ukraine was considering two potential options for its next steps in the gas issue.[78] The first one was to

try to reach a deal on an acceptable price with Russia, together with EU backing. If this strategy did not work, Ukraine planned to demand an interim court decision, which would set the price and other conditions of Russian gas supplies to Ukraine until a final verdict was reached by the Stockholm arbitration court. On October 14, 2014, Naftogaz filed a suit against Gazprom in order to claim compensation for the allegedly insufficient transit volumes, which led to lower transit revenues for Naftogaz than anticipated.[79] Naftogaz demanded in court to either amend or cancel those provisions of its contract with Gazprom that were not being implemented by the latter. In particular, Naftogaz also demanded to change the system of the calculation of transit tariffs paid by Gazprom to Naftogaz, according to European norms.

According to Naftogaz, the minimum volume of transited gas agreed upon in the contract was 110-bcm per year. However, in 2012, the amount of transshipped gas was only 83-bcm, and in 2013, the amount was 86-bcm. Naftogaz proposed to follow the decision of the Ukrainian Cabinet of Ministers on the temporary method of transit tariff calculation adopted in compliance with the EU Directive No. 2009/73/EC on September 3, 2014. The document introduced separate tariffs for separate routes of the Russian gas in the Ukrainian gas grid in the form of both cash payments and extra free gas supplies.[80] Naftogaz also proposed to adopt a new enhanced method as a basis for the calculation from the beginning of 2015.

On October 31, 2014, Russia, Ukraine, and the EU reached a deal on Russian gas supplies to Ukraine for the period until the end of March 2015.[81] It took the parties seven rounds of talks and 5 months of negotiations to reach the deal.[82] Kyiv agreed to the price

of $385 per 1,000 cubic meters of gas, which was the price for winter gas supplies originally proposed by Kyiv in August 2014. Ukraine also agreed to pay for the gas deliveries in advance. In turn, Russia provided Ukraine with a $100 discount per 1,000 cubic meters by cutting Russia's gas export tariffs. The deal provided a discount for Ukraine in exchange for paying off $5.3 billion of its overall gas debt to Gazprom. Russia also agreed not to implement Gazprom's traditional take-or-pay principle banned by EU. Nevertheless, due to Ukraine's financial crisis and cash shortages, the source of financial resources for Ukraine to pay further advance payments was not clear.

This deal seems to have been in the best interest of all three parties. Russia received at least some money from Ukraine, while Ukraine got the gas from Russia it badly needed. The EU, which worried mostly about a potential escalation of the gas conflict between Russia and Ukraine and subsequent disruptions of Russian gas supplies to the EU, got a guarantee of relatively safe gas deliveries, at least for the time being. The EU ended up playing a less important role in the deal than both Russia and Ukraine demanded. Initially, Ukraine requested that the EU keep an eye on the pricing, while Russia demanded that Brussels guarantee advance payments by Ukraine for the Russian gas. The EU accepted neither of these requests, but limited its role to an unspecified "contribution" to the deal itself.

Germany's Angela Merkel and France's Francois Holland have said that the EU would, together with the United States and the G7 (Canada, France, Germany, Italy, Japan, UK, and the United States), do everything it could to facilitate the implementation of the deal.[83] The EU has been keeping that promise. In addition to the overall financial support of 1.61 bil-

lion Euros approved in 2010 and later in April 2014,[84] Brussels approved one more package of aid for Kyiv for 1.82 billion Euros in late March 2015.[85] As part of this approved package, the EU gave Ukraine a low interest rate loan of 250 million Euros in April 2015, aimed at stabilizing the Ukrainian economy and creating conditions for sustainable growth.[86] However, this assistance is unlikely to stave off Ukraine's default on the debt.

According to the October 2014 deal, Naftogaz was expected to pay $1.45 billion of its gas debt immediately after the end of the talks, while, by the end of 2014, it should have paid Gazprom an additional $1.65 billion. Thus, the overall debt repayment was agreed to reach $3.1 billion by the end of 2014. Naftogaz fulfilled its commitments. It paid Gazprom the first $1.45 billion on November 4, 2014, and the remaining $1.65 billion in late-December 2014.[87] The overall size of the debt of $3.1 billion to be paid to Gazprom was based on the price of $268 per 1,000 cubic meters. On November 5, 2014, Ukraine also paid its first advance installment to Russia for $1.5 billion in order to ensure Russian gas supplies for the coming winter.

On November 10, 2014, Naftogaz accused Gazprom of failing to compensate Naftogaz for the gas transit for September and October. In principle, Gazprom was ready to pay for the transit, but wanted to calculate the transit price based on the price of $485 per 1,000 cubic meters for Ukraine, whereas Ukraine wanted Gazprom to pay for the transit based on the price of $268. At first sight, the willingness of Gazprom to pay more than Naftogaz is ready to accept may seem counterintuitive. However, the reason for that is that both parties expect to use the final base price for the transit as an additional argument at the

Stockholm arbitration court. Thus, according to Naftogaz, for September Gazprom was supposed to pay $64 million and for October another $88 million. Back in August 2014, Gazprom paid Naftogaz $10.54 million for transit because the original June 2013 advance payment for transit of $1 billion had run out. Gazprom argued that the original advance payment was based on the price of $400 per 1,000 cubic meters, while in the meantime Gazprom increased the price to $485. Naftogaz insisted that the transit payments should be calculated based on the price of $286 and returned the payment to Gazprom. From April to October 2014, Gazprom wanted to pay $360 million for transit while Naftogaz was willing to accept only $190 million.

On December 6, 2014, Naftogaz paid Gazprom $378 million for the 1-bcm of gas Naftogaz expected to receive in December.[88] On December 8, Gazprom announced that it would restore gas supplies to Ukraine on December 11.[89] Nevertheless, Gazprom renewed its gas supplies to Ukraine 2 days earlier, on December 9.[90] The announced daily volume of the gas supplies to Ukraine was 43.5-mcm.

Ukraine's GDP is several times as energy intensive as the GDPs of advanced Organisation for Economic Co-operation and Development economies on average.[91] Moreover, Ukraine is the most energy intensive country in the world.[92] Energy loss in Ukraine's heating systems is estimated to be around 65 percent, which is several times above the levels in advanced economies. This issue also contributes to the fact that the increase in Ukraine's gas prices to $485.50 would have devastating effects for a range of heavy industries, such as metallurgy, vehicle manufacturing, and chemical industry, and may lead to their halt.

The 2014 gas dispute between the two countries has had several parallel conflicts within it. We will examine those one by one. The first conflict was the price dispute. Russia's interest is to have the price as high as possible, while Ukraine's interest is to have it as low as possible. While Russia lost its incentive to lower the gas price for Ukraine in exchange for the latter's economic integration with the Eurasian Union, Ukraine kept insisting on a price substantially lower than what Gazprom was willing to offer.

The second dispute was about the gas transit price. Here, Russia was interested in paying more, while Ukraine insisted that Russia pay less. This logic, counterintuitive at first sight, is connected to the way of calculating the transit price, which is based on the price of gas for Naftogaz.

The third line conflict was a version of the take-or-pay principle, which in this case, relates to the amount of Russian gas transferred through Ukraine. The transfer contract between Gazprom and Naftogaz foresees a minimum amount of gas (110-bcm per year). Gazprom has to ship that amount to Europe through Ukraine or, if the transferred amount of gas is lower, reimburse Naftogaz for the difference. However, after the Nord Stream came online in 2011, Ukraine's significance as a transit country has declined. Moreover, Gazprom has expressed plans to bypass Ukraine completely in its gas deliveries to Europe starting in 2019.[93] This may lead to additional tensions regarding this minimum contract requirement for gas transfer through Ukraine.

The fourth conflict was about the unpaid debt of Naftogaz to Gazprom. Naftogaz blackmailed Gazprom by not paying its bills. Gazprom had a choice between the bad and the worse—between turning a

blind eye on the debt of Naftogaz or cutting gas supplies to Naftogaz and, at the same time, cutting the supply to the EU. In this dispute, the EU served as Ukraine's hostage, with little formal influence on either of the parties in the dispute. Due to the fighting and the high complexity of gas disputes between Russia and Ukraine, especially their 2014-15 iteration, it seems unlikely that Russian piped gas would become a predictable and reliable source of energy for Europe in the long run. The EU needs to do its best to diversify its sources of natural gas, and minimize the threat of becoming a hostage of a dispute it can barely influence.

Interconnectors for European Gas Transit.

The Ukrainian crisis demonstrated that Europe is in a desperate need to improve security of its gas supply. This can be done through optimizing the natural gas pipelines on the continent and building interconnectors based on strategic demand. Since the 2009 crisis, there has been progress in connecting the Central European countries with gas pipelines that are able to transport gas in both directions. The Central European region, which depends the most on Russian gas, currently lacks a coherent north-south gas pipeline connection, which would run from Poland to Slovakia, Hungary, and Croatia. Such a connection would ensure flexibility of a bidirectional gas flow in case of need. This north-south route would connect the LNG terminals in Poland and Croatia. The Central European countries have made this project one of their priorities, and they plan to seek EU funds for its construction, which increases the likelihood of success.

In the meantime, in November 2014, Croatia renewed the project of construction of an LNG terminal on its island of Krk, which had been on the drawing board for around a decade.[94] The terminal should cost around 600 million Euros and have a capacity of 4 to 6-bcm of gas per year. If built, this LNG terminal will be useful not only for Croatia, which produces around 60 percent of its gas needs domestically, but will also contribute to the energy security of Central Europe after the north-south route is constructed and launched.

The 2009 gas dispute between Russia and Ukraine incentivized Slovakia to ensure its ability to receive gas from Austria and the Czech Republic in case of a similar emergency. Slovakia and the Czech Republic made necessary improvements to the already existing pipeline interconnector between the two countries, which made it possible to supply gas from the Czech Republic to Slovakia. The reversible interconnector is capable of transporting up to 67-mcm/day of gas to Slovakia (24.5-bcm per year). Similarly, Slovakia built a small interconnector with Austria, which is capable of transporting up to 23-mcm/day of gas (8.4-bcm per year).[95] Croatia and Hungary built the Városföld–Slobodnica pipeline, which became operational in August 2011.[96] The pipeline can transport up to 7-bcm per year.

Initially, gas companies resisted such interconnectors, because they meant more choice for consumers and thus lower prices.[97] The impetus for building the interconnectors was the Third Energy Package of the EU, and the growing concerns in the region about the reliability of Russia as a gas supplier. Thus, Poland has been connected with the Czech Republic since 2011. Slovakia is constructing an interconnector with Poland and Hungary. Germany has been intercon-

nected with Italy, Poland, and the Czech Republic. The countries that are still critically lacking similar gas interconnectors are the Baltic States—Estonia, Latvia and Lithuania—which continue to depend on Russia for their gas supplies.

In late-March 2014, Slovakia and Hungary opened a gas interconnector between the two countries near the Hungarian village of Szada.[98] This was an important moment mainly for Hungary, because the interconnector gives Hungary a possibility to receive non-Russian piped gas for the first time in its history. The pipeline cost 170 million Euros, out of which Slovakia paid around 21 million Euros, and was expected to be launched in a test mode on January 1, 2015.[99] However, it did not become operational as planned because of technical problems on the Hungarian side, and the launch of the test phase was initially postponed to February 2015.[100] At the time of this writing (June 2015), the test phase was underway and was planned to be finished by the end of June 2015. The pipeline was planned to be launched commercially on July 1, 2015.[101]

In late-October 2014, the Slovak wholesale gas operator Eustream submitted its first project, the construction of a gas interconnector with Poland.[102] Construction of this interconnector will make it possible for Slovakia to import LNG from the Polish LNG terminal of Świnoujście, located on the coast of the Baltic Sea. The interconnector itself should be around 170-km long and should run from the Polish gas hub in Strachocina (located in the southeastern tip of Poland) to the Slovak gas hub in Veľké Kapušany (located near the Slovak-Ukrainian border). The construction of the interconnector is planned for the years of 2018 and 2019, and the pipeline should be launched in

2020. However, even if these interconnectors were up and running, there is still the issue of where the gas would come from to fill these pipelines. It might actually come from Russia, including through the already operational Nord Stream, as the new EU legislation forbids destination clauses and thus denies Gazprom the ability to discriminate between client countries and companies.

It is unclear whether there is a potential Southern route for the Russian gas after the demise of the South Stream Project. Russia would aspire now to supply Europe via the Turkish Stream project. Bypassing Ukraine would solve one challenge, the problem of Ukraine as a transit country, but would not solve the other problem—the unreliability of Russia as a predictable and transparent gas supplier that plays by EU current and future rules.

Wealth Transfer to Russia and Military Budget Funding.

Oil and gas revenue play a key role in Russian military modernization in general, and in the Ukrainian hostilities in particular. Military operations in the Crimea and Eastern Ukraine/Donbass suggest a higher level of operational competence, modernized weapons systems, better training, a more efficient supply chain, as well as better paid contract personnel and officer corps. This costs money, which comes from energy exports to Europe and elsewhere. Thus, the EU consumers of Russian oil and gas indirectly help finance this long-term and dangerous Russian military modernization, aggression, and annexation.

Russia continues to suffer from low competitiveness of its industrial base and the services sector, which leaves the country exporting mainly natural resources—oil and gas, other raw materials, and semi-finished goods are the top currency earners. Russian exports also include weapons and nuclear reactors, relatively sophisticated items. Revenues from these exports make a significant share of Russia's federal budget, which makes Russia particularly dependent on energy export revenues. The overall share of revenues from hydrocarbon exports in the Russian federal budget was just above 50 percent in 2013.[103] In 2014, the number is expected to be 52 percent.

According to the Russian federal budget forecasts, the share of hydrocarbon revenues are expected to reach 7.7 trillion rubles (around $160 billion according to the November 2014 exchange rate) in 2015, and rise to 8 trillion rubles in 2016, and to 8.2 billion in 2017.[104] The Russian federal budget is expected to receive 51 percent of its revenues from hydrocarbons in 2015, 50.8 percent in 2016, and 49.6 percent in 2017.[105] This revenue is being used to finance the modernization of the Russian military. According to the Russian state program on modernization of the Russian armed forces in 2011–20, the federal government initially planned to spend around 19.6 trillion rubles[106] (at the time, around $700 billion) on modernizing all branches of the Russian military—its strategic nuclear forces, submarines, fleet, air force, and army.

Despite a series of lingering problems in the Russian military, such as poor morale of the conscripts, widespread harassment, and poor health of the soldiers, these investments are already making a difference in the overall strength of the Russian armed forces. Although this modernization of the Russian

military is unlikely to pose a direct threat to the U.S. power projection beyond the Russian periphery, it has led to an increasingly assertive behavior of the Kremlin in the former Soviet Union countries, including the North Atlantic Treaty Organization (NATO) members, the Baltics, and across Western Europe and the Arctic. The crisis in Ukraine, including the Russian annexation of Crimea and the Russian-instigated, supported, and prosecuted war of secession in the Crimea and Eastern Ukraine, demonstrate this new assertiveness. Therefore, it is in U.S. and European interests to find ways of curbing the volume of the hydrocarbon revenues of the Russian federal budget in order to constrain the financing of the military modernization program and the neo-imperialist aspirations.

Politically, the "guns or butter" choice is sensitive: As the Putin political regime is reliant on the so called *byudzhetniki*—people supported by federal budget transfers, such as the military, police, pensioners, teachers, and the vast, state-sector medical personnel—U.S. policymakers hoped the Kremlin might cut military expenses rather than curb social transfers. Russia has to be encouraged to face the unpalatable choice: gun or butter. So far, however, the choice Moscow has made was in favor of guns—with popular support. Alternatively, as they say in Russia, in the battle between the TV set and the refrigerator, the victory is that of the TV set.

Europe's Reluctance to Sanction the Russian Energy Sector.

Although European imports of Russian gas earn Russia around $100 million per day, the EU has not used this Russian dependence on European gas mon-

ey as leverage in the current crisis in Ukraine. The EU sanctions towards Russia did not touch Russian energy exports, although financing and technology transfer to state-owned energy companies are the target of sanctions. The reason for this is the asymmetric mutual dependence of the EU and Russia regarding Russia's gas exports to Europe.

While the EU can exist without Russian gas only for several months, Russia can easily function without the income for the gas paid by the EU for at least 1 year, possibly 2. If the EU decided to sanction Russia's gas exports to Europe, it would hurt itself significantly more than it would hurt Russia in the short term. However, while the EU can find alternative sources of gas and reduce dependence on Russia, Moscow would have a very hard time replacing the vast European gas market for its West Siberian and Arctic supplies. Understanding this dynamic, the EU sanctioned the Russian energy industry, indirectly, through bans on acquiring sophisticated EU drilling technology and access to finance. Those European politicians, who realize the Russian threat to the continent's security, hope that the Kremlin would be responsive to its economic pressure and moderate their policy, or members of the EU would find alternatives to Russian gas. So far, the Russian leadership has indicated that the *Novorossiya* (Russian pseudo-historic name for Eastern and South Ukraine) may be winding down. However, there is scant evidence Russia has changed its policy based on economic pressure alone. More research is necessary to establish the relationship of economic, military, and internal/political factors in the Russian policymaking on the Ukraine conflict.

Price Formation for Different European Consumers as a Function of Their Dependence on Russian Gas.

One of the characteristic features of Russia as an energy supplier is the continuing use of the gas sales as a political lever. As noted earlier, Russia uses its gas monopoly power in parts of Europe in two ways: economic and political. The economic side is understandable—maximizing profits. However, Russia also often chooses to "reward" and "punish" its neighboring countries by setting a price that does not necessarily lead to the highest economic profits of Gazprom, but instead aims at reaching the political goals of the Kremlin in the respective countries. Thus, more Kremlin-friendly regimes, including those in Eastern and Central Europe, are rewarded with discounted gas prices, while those that want to distance themselves from Moscow pay as much as they can bear. The most notable example on the lower end is Belarus, which pays around $160 per 1,000 cubic meters. On the other side are the Baltic States, namely Estonia and Lithuania, which pay the highest wholesale gas prices in the EU (31.29 and 36.73 Euros per MWh respectively, which approximately corresponds to 330 Euros per 1,000 cubic meters in the case of Estonia and 390 Euros in the case of Lithuania),[107] negatively impacting the international competitiveness of these countries.

Moscow's "Eastern Export Policy" to China and Its Limitations.

Russia is not just passively watching Europe trying to eliminate its role in supplying Europe with gas. It is actively looking for new markets. One of the few pos-

sibilities it seems to have is China. Russia has adopted a so-called "Eastern Export Policy." In May 2014, Russia and China signed a deal which will bring gas from Eastern Siberia to China, supposedly by 2024, which was dubbed the "deal of the century."[108] Under the deal, Russia will supply 38-bcm of gas to China annually through the Power of Siberia pipeline. According to unofficial sources, the agreed price is about $350 per 1,000 cubic meters, which was less that the EU countries were paying at the time. In addition, Russia will bear the costs of developing the fields and building the pipelines to the Chinese border, and the price for the gas for the 30-year contract period will be fixed. While many details of the deal are secret, many experts suggested that this policy would not lead to an increase of Gazprom's profits. Instead, it is viewed more as a kind of market diversification and an insurance against European attempts to shatter the Russian gas yoke. Nevertheless, the diversification will not happen until the beginning of the next decade due to the need to develop the gas fields that Russia is planning to use as a source of the gas pipelined to China.

Russia and China are now considering adding the Western export route capacity to 100-mcm per annum (the Altay pipeline from Western Siberia). However, the China market does not seem to be a lucrative alternative to European consumers due to the lower premiums Gazprom will be able to charge. Increasing the share of gas in its energy mix would undoubtedly benefit China, which now uses mostly coal for its industries, heavily polluting its environment. In addition, China revised its potential for shale gas production downwards,[109] which will most likely give Beijing additional incentives to be more willing to strike a gas deal with Russia. Pipelined gas would most likely be

cheaper than the LNG Asia imported until late-2014 for significantly higher prices than the rest of the world. However, one of the key aspects of the Altay pipeline—the price—is not yet agreed upon, and, in view of the natural gas price collapse, is likely to continue to be negotiated between Moscow and Beijing.

In addition, Kazakhstan came up with an initiative to build a pipeline from Russia's Western Siberia to China through its territory.[110] If built, this new route could become an alternative to the Altay pipeline, which was a target of objections from the United Nations Educational, Scientific, and Cultural Organization. Alexander Sobyanin, Head of the Strategic Planning Service of the Association of Trans-border Cooperation, said that Kazakhstan is a natural route for such a pipeline from Western Siberia. Russia and Kazakhstan are de facto allies as members of the Eurasian Economic Union (EEU), CIS, and Collective Security Treaty Organization.

In the 1990s, Kazakhstan pursued a multivector foreign policy, which caused a certain degree of suspicion from Moscow. That has changed, and for the past couple of years, Kazakhstan has been firmly participating in the Moscow-dominated Customs Union and the EEU. The challenge for Russia can be in the fact that Kazakhstan wants its gas fields to contribute to the pipeline as well, which means that Russia may end up selling less gas and getting less cash for the gas transported through the pipeline than it would if the pipeline transferred only Russian gas. If Russia blocks sales of Kazakhstani gas to China, Astana might decide to sell it to Europe, further weakening Europe's dependence on Russian gas.

IMPACT OF THE UKRAINIAN CONFLICT AND THE EUROPEAN RESPONSE

Emergency Gas Plan Drafted by the EU Commission.

Russian gas dependence may threaten Europe if Moscow decides to temporarily or permanently cut the supply to its customers. The EU temporarily could pursue several policies in case a shortage of Russian gas develops.[111] Limitations on consumption can only go so far and have a high economic cost. For instance, EU could ban gas exports beyond its borders and limit the amount of gas intended for industrial use as part of emergency measures to protect household energy supplies in the winter months.

One of the measures may thus be banning a so-called reselling of imported gas to third countries. In 2010, the EU passed a regulation (994/2010) adopted after the 2009 gas dispute between Russia and Ukraine that protects European gas supplies.[112] The regulation obliges the EU member states to establish a Preventive Action Plan and an Emergency Plan. The Preventive Action Plan contains the identified risks of each member state's gas supply and proposed measures to mitigate those risks. While such measures would inevitably hurt the European economy, they would make sure that households do not freeze in the winter months. Second, as large enterprises do not have supply priority, these would get disconnected in order to make enough gas available for households.

The Emergency Plan contains the measures aimed at mitigating the impact of a disruption in supply after it occurs. The regulation also provides for deadlines and rules of building reversible, bidirectional

interconnectors between the member states, which is being done at the time of this writing. It also defines households as "protected customers" and obliges the member states to ensure gas supplies to these customers as a priority in case of gas supply disruptions. In practice, this regulation means that it is a part of a so-called "Plan B," prepared by the European Commission. In addition, the EU countries have been preparing for a possible disruption by pumping more gas into their underground reservoirs. In August 2014, Europe had 16.52-bcm (31.2 percent) more gas in its reservoirs compared to the same month of 2013.

In August 2014, both Ukraine and Russia added tension to the issue of the security of the Russian gas supply for the near term. In late August, Ukrainian Prime Minister Yatsenyuk said he knew about Russian plans to cut off gas to the EU during the 2014-15 winter.[113] Alexander Novak, Russia's energy minister, who called Yatsenyuk's comment a "groundless attempt to intentionally mislead or misinform European consumers of Russian gas," promptly denied these claims. As further developments demonstrated, Russia has not stopped the flow of gas.

Problems of the Reverse Flow of Gas from the EU to Ukraine.

In the summer of 2014, Ukraine was unwilling to bow to Russian demands to pay billions of U.S. dollars for gas it owed to Gazprom, and Moscow clearly warned Kyiv that it would cut off its supplies to Ukraine in case it does not pay back its debt. To find a way out, Ukraine approached the EU with the proposal to organize "reverse" gas flows from the EU to Ukraine. The reverse flow of gas would use the

existing pipelines, while the direction of the gas flow would be reversed: Russian gas would flow from the EU to Ukraine. Three EU countries bordering Ukraine became the main partners of Ukraine in this project—Poland, Slovakia and Hungary. All three of them successfully organized the reverse flow, but in none of these three countries was the reverse flow without issues.

Poland.

Poland is capable of generating a reverse gas flow to Ukraine of up to four million cubic meters per day. However, on September 10, 2014, Poland stopped supplying gas to Ukraine. The reason was that Russia lowered its own supplies of gas to Poland through Belarus and Ukraine, which in turn forced the Polish gas operator, Polish Petroleum and Gas Mining (PGNiG), to cut off its exports of gas to Ukraine. The decrease of Russian supplies was gradual, initially going down by 20 percent and dropping to a level 45 percent below the usual volume.[114] However, 2 days later, on September 12, 2014, Poland restored the original level of its gas supplies to Ukraine due to the fact that it found alternative sources of gas, namely Germany and the Czech Republic, which were able to compensate the decrease in Russian gas supplies.

Slovakia.

Before the beginning of the reverse flow of gas from Slovakia to Ukraine, there were two options: a so-called "small reverse" (supplies of around 8 to 10-bcm per year) or a so-called "big reverse" (supplies of around 30-bcm per year). The "big reverse" would

have used one of the pipelines Gazprom uses to pump gas to Slovakia from Ukraine. The "small reverse" was expected to take advantage of an unused small pipeline between the Slovak Village of Vojany on the Slovak-Ukraine border and the Ukrainian town of Uzhhorod on the other side of the border.

Initially, Ukraine pushed for the "big reverse," which would be able to supply the country with much more gas, while Slovakia wanted the "small reverse."[115] The option considered for the "big reverse" was a so-called virtual reverse flow of gas, which would mean that the Russian gas intended for Slovakia physically would remain in Ukraine, but Slovakia would pay Gazprom as if the gas was delivered physically to the Slovak gas network. The Slovak government refused this idea, because, according to the legal opinion it received, Slovakia might breach its agreements with Gazprom. According to the contract, the gas was Gazprom's property until it crossed the Slovak-Ukrainian border. In addition to that, this option would be technically difficult to implement. Therefore, Slovakia insisted on the "small reverse."

However, in order to make the "small reverse" flow realizable, a special measuring facility had to be constructed in the village of Vojany. Disputes over who would pay for the construction of the facility emerged. The Ukrainian side demanded the Slovak government build and finance the facility entirely. Slovakia agreed to finance the construction of the necessary facility in Vojany in full, which cost around 20 million Euros. The Slovak government agreed to build the measuring facility, even though there were no guarantees that they would ever profit from this investment. Brussels refused to guarantee to compensate the Slovak government in case of losses.[116] Nevertheless, on

April 28, 2014, the Ukrainian and the Slovak governments signed a memorandum.[117] Despite the required investment to build the necessary infrastructure in the eastern part of the country on its own, the reverse flow of gas from Slovakia to Ukraine is also in the Slovak economic interest, as the gas suppliers now are paid for the reverse transit, which is expected to compensate the Slovak suppliers for their initial investment into the infrastructure.

Initially, Gazprom tried to prevent the reverse flow of gas from Slovakia to Ukraine from happening. Gazprom's CEO Alexey Miller said that those countries which agreed to supply Ukraine with the reverse flow of gas, would face lower supplies from Russia. Although it indeed happened later, allegedly for technical reasons, this threat did not prevent Slovakia and its neighbors from going ahead with the reverse flow. The real reasons for the temporary decrease of Russian gas supplies to Slovakia, as well as to Poland, are not fully known. It might have been an attempt of Gazprom to exploit the potential sense of vulnerability in Slovakia and Poland to gas cut-offs. It might have been a warning signal to Europe that Gazprom indeed was prepared to use the mutual "asymmetric" gas dependency of Europe and Russia to its own advantage,[118] but chose not to do so.

On September 2, 2014, the Slovak gas operator Eustream started supplying Ukraine with gas through the Vojany–Uzhhorod pipeline.[119] According to Yatsenyuk, the reverse flow of gas from Slovakia should compensate around 40 percent of the gas Ukraine used to get from Russia. According to the deal between the Slovak and the Ukrainian governments, Slovakia committed to supply Ukraine with gas until 2019.[120] On September 10, 2014, Slovak gas distributor

Slovensky Plynarensky Priemysel (SPP) announced a decrease in the volume of gas supplies to Slovakia from Russia through Ukraine by 10 percent. However, this disruption was only temporary. It did not cause much tension and did not influence the reverse gas flow to Ukraine. Initially, the agreed volume of the reverse flow of gas from Slovakia to Ukraine was 27-mcm per day (10-bcm per year).[121] However, by March 2015, this volume was increased to 40-mcm per day (14.6-bcm per year), which is the largest volume of gas supplied to Ukraine from the West.[122]

Hungary.

Initially, Hungary was among the three countries that allowed the reversed flow of natural gas from the EU to Ukraine. On April 8, 2014, Hungary stated that, in the event excess supplies were available, it was ready to ship up to 6-bcm of gas to Ukraine per year. The maximum capacity of the pipeline through which the reverse flow was to be implemented determined this limitation. However, the reverse gas flow from Hungary did not last for long. In July 2014, Hungary lowered the amounts it was pumping to Ukraine within the reverse flow of gas due to its need to fill its own underground gas reservoirs in order to prepare for winter.[123] The daily amount of gas pumped to these reservoirs amounted to around 20-mcm per day, compared to around 10 million per day in June. At that time, Hungary was the least prepared for winter among the countries in the region.

On September 25, 2014, Hungarian gas operator Foldgazszallito (FGSZ) announced that it fully stopped the reverse flow of gas from Hungary to Ukraine.[124] Although FGSZ announced that cutting off

gas supplies from Hungary to Ukraine was necessary due to an increased domestic gas demand, this step was made only several days after Gazprom's CEO Miller visited Hungary. Therefore, Naftogaz believes that the decision was political, instead of technical.[125]

EUROPE'S ALTERNATIVES TO RUSSIAN GAS AND THEIR ISSUES

Shale Gas and the Issues Associated with It.

*General Shale Gas Considerations in the EU and Fear of Hydraulic Fracturing***.**

The main problems for the EU when it comes to developing its own shale gas resources are the lack of natural resources legislation which would provide ownership of the mineral rights to land owners who lease the land to hydrocarbon exploration and production companies. In addition, Europe has higher population density, which results in heightened environmental sensitivity and limitations in comparison with the United States. Furthermore, it suffers from the lack of public understanding of and education about shale gas production and hydraulic fracturing safety, from a scarcity of energy firms with proper expertise, and from a shortage of drilling equipment and trained personnel.[126] Current estimates also show that the EU shale gas, if it is developed commercially, will likely be more expensive than in the United States.

A major concern in the EU is the potential influence of the shale gas development on the safety and quality of underground freshwater reservoirs. The shale gas development is feared to result in freshwater shortages in the areas of its development, and to cause

freshwater, soil, and other environmental contamination and pollution. Hydraulic fracturing (fracking) is alleged to produce aromatic compounds such as benzene and xylene, which allegedly has been the case in Texas.[127] Fracking requires large amounts of water in order to lubricate the drilling heads, remove the drilling mud, and to create the cracks in the shale in order for the gas to flow out. Oil and gas exploration and production—not just fracking—reportedly caused water contamination by methane and other substances; from spills of drilling mud, flowback, and brine; and through either natural geological cracks or man-made pathways caused by inadequate handling, old equipment, and inadequate cementing of the wells.

The third set of issues are those related to nonmaterial aspects: visual landscape disturbance, impact on biodiversity, increased noise levels, and seismic concerns. While these factors are difficult to measure, they lead to opposition towards building shale gas wells by the locals—the NIMBY approach. In particular, a 2011 report published by the European Commission[128] identifies the following risks of fracking, which is the key part of the entire process of extracting shale gas: consumption of landscape, air and noise pollution, contamination of water with chemicals, earthquakes, mobilization of radioactive particles from the underground geological strata, and the impact on biodiversity. The paper further argues that it might be more efficient to build a solar power plant instead, because this solar power plant would be able to generate more electricity than the gas extracted from the same area would be able to generate. The conclusion of this report looks dubious, as the solar-sourced electricity is still riddled with problems of cost and intermittency that are too numerous to address here. This may change in the future when the technology matures.

France: Nuclear Lobby Opposes Shale Gas.

In France, the shale gas faces a relatively strong opposition from environmental organizations and the general public opinion.[129] One of the problems in France is that the shale gas reserves are located close to the populated areas.[130] There were mass protests all across France to prohibit fracking after it became clear that the French government gave its consent for fracking to energy companies. This was a failure of public education, which responsible governments as well as energy companies need to undertake when dealing with disruptive technologies.

On May 11, 2011, the French parliament voted for a ban on producing shale gas in France. The ban entered into force on July 1, 2011, and included fracking for research purposes. However, this law does not prohibit the production of shale gas itself. It only prohibits fracking operations. Since fracking is the key component of shale gas production, this ban de facto prevents shale gas extraction. On October 23, 2011, France revoked the license for Total, which had been granted the right to explore the area of Montelimar (southern France) with an area of 4,327 square km.[131]

Clearly, shale gas production would endanger the already-embattled French nuclear power industry. It is not clear in what way the powerful nuclear lobby has intervened to stop fracking, yet conversations with French experts and lobbyists have suggested that this is likely the case.

Poland: Shale Mismanagement.

Initially, Poland went through euphoria when reports appeared that there are shale gas reserves in its territory, which would significantly reduce the country's dependence on Russian gas.[132] In 2011, the U.S. Energy Information Administration estimated the volume of recoverable Polish shale gas at 5.3 trillion cubic meters (tcm), which would be enough to satisfy the domestic Polish consumption for around 300 years, given the then consumption rate of gas in Poland. However, according to a more conservative estimate of the Polish Geological Institute, the amount of shale gas in the Baltic-Podlasie-Lublin Basin is estimated to be only between 346.1 and 767.9-bcm.[133] This euphoria was later cooled down due to two reasons: geology and politics. First, the geology of the shale gas areas turned out to be more difficult than previously anticipated. Second, the Polish government mismanaged the exploration and production process for shale. Foreign energy companies considered the government's demands for control over the revenues, exploration, and production excessive.[134] The Polish government granted exploration licenses with too short of a term to allow for profitable development of shale gas fields. The government also proposed a 40 percent tax on the profits of Polish shale gas operators and producers. This complex geology and overly tight regulatory framework of the Polish government, plus the threat of high taxes and lower profits for the foreign energy companies, was the main reason foreign energy companies abandoned exploration and production of shale gas in Poland.

The Polish government gave lesser weight to the environmental concerns about the shale gas pro-

duction in comparison with its Western European counterparts. To the contrary, the Polish government hoped that shale gas would help the country reduce its greenhouse emissions by replacing its environmentally problematic coal-fired power plants with electric power stations run on shale gas, especially under the pressure from Brussels to reduce its high greenhouse emissions. However, the exploration did not go as planned. Companies such as ExxonMobil quit Poland in 2012 after exploratory drilling wells produced unsatisfactory results,[135] followed by Talisman and Marathon Oil exiting the country in 2013.[136] On February 9, 2011, the Polish Geological Institute (PGI) reacted to the news reports on the unprofitability of shale gas production in Poland by simply stating that the future probability of shale gas production could not be predicted.[137] There was no economic analysis of the profitability of unconventional gas exploration. Therefore, according to the PGI, as the geological parameters of shale gas deposits were still unknown, it was premature to draw any conclusion about the unprofitability of such production.

Most of the Polish public opinion supports its government's strong desire to develop Polish shale gas resources. According to an opinion poll conducted in late-2011, 73 percent of Poles supported developing shale gas, while only 4 percent opposed it. One of the main reasons behind such a strong Polish support for shale gas seems to be the weak position of anti-shale gas environmentalists in Central Europe.[138] This contrasts with Western Europe, where environmental activists were able to convince the population about their cause. Since 2011, Poland's ambitious desire to develop its own shale gas fields in order to break free from its gas dependence on Russia, combined with

low transparency in its public sector, has involved the country in two disputes with the EU authorities. First, in 2013, Poland got into a dispute with the EU about the legality of the shale gas exploration concessions granted to energy firms without a transparent bidding process. In June 2013, the European Court of Justice ruled that Poland violated the EU's Hydrocarbon Directive. This decision forced Poland to amend its laws, which in turn made the process of granting licenses more transparent and fair on one hand, but less flexible on the other.

In June 2014, Poland got into another dispute with the European Commission about the compliance with the EU Environmental Impact Assessment (EIA) Directive.[139] The European Commission sent a formal notice to Warsaw that it was opening a case against it for infringing the EIA Directive. Poland infringed the directive by adopting a law that allowed shale gas development from fields up to 5-km below the surface. The Poles did not require reports assessing possible environmental impact.[140]

As of December 1, 2014, the Polish government had issued 56 licenses to energy companies for shale gas exploration, including Chevron Corporation (four licenses), PGNiG S.A. (12 licenses), and Polski Koncern Naftowy Orlen S.A. (nine licenses).[141] However, the Polish minister of environment said that it might take Poland several years to assess the economic viability of its shale gas reserves properly.[142] The gas is there, but its profitability remains in question. As of now, it is unclear whether the initial Polish euphoria about its shale gas will materialize into developing meaningful and commercially viable amounts of gas, which would be able to influence the Polish-Russian gas relations materially.

Romania: Unexplored Potential.

Romania has relatively large domestic supplies of gas, which it used during the 2009 supply crisis to make up for the decline in the Russian gas flow. Romania has the second highest amount of conventional gas reserves in the EU (around 630-bcm), after the Netherlands.[143] It is the fourth largest gas producer in the EU after the UK, the Netherlands, and Germany. Romania might even export its gas from its Black Sea continental shelf through Hungary to Austria by the end of the decade.[144] This would require construction of a large east-west pipeline from Romania through Hungary, by Hungarian national gas operator FGSZ. According to FGSZ, the volumes of the gas supplied by Romania would range between 1.5-bcm per year to as much as 10-bcm per year—an optimistic expectation. The pipeline would provide better energy security for western Hungary, which is the main priority of the pipeline, as well as diversify European gas supply.

When it comes to shale gas production, the stance of the Romanian government over the past several years has evolved. In 2012, the center-right government took a rather favorable position towards this issue. The left-wing opposition rejected the idea and in May 2012, introduced a ban on any future shale gas exploration after the left took power. In November 2014, Romanian Prime Minister Viktor Ponta said that Romania does not have shale gas it could produce.[145] This statement is baffling, as companies have not undertaken proper exploration, and raises questions about Ponta's real agenda.

Ukraine: The War Derails the Unrealized Gas Potential.

Ukraine currently produces around 20-bcm of gas per year. After Ukraine lost Crimea in March 2014 to Russian invasion, occupation, and annexation, no increase in production of gas is expected in Ukraine for 2014-15.[146] In the first half of 2014, Ukraine produced 9.8-bcm, while the demand for gas was 24.6-bcm.

In the past, there was much optimism concerning gas production. According to statements made by Yanukovich in 2013, by 2020 Ukraine should become completely independent in terms of gas, and, according to the optimistic scenario, it should become a gas exporting country.[147] The Ukrainian leadership, however, has so far failed to diversify sources of natural gas for their country. In May 2013, the Yanukovich presidency announced that the country should receive the first shipment of LNG as early as the last quarter of 2014.[148] This was unrealistic, as the administration of Ukrainian President Petro Poroshenko and Prime Minister Yatsenyuk discovered in 2014-15. Turkey's resistance to shipping LNG via Bosporus killed that project, due to safety concerns and Russian opposition to the shipments.

Many government officials and experts in Ukraine believe that shale gas in Ukraine is abundant, but exploration and production has been limited so far. Back in late-2013, local Ukrainian environmentalists were accused of playing into the hands of Russia in the local council of the Ivano-Frankovsk district. In addition, the radical nationalist Svoboda (Freedom) party organized street protests against the shale gas production. Nevertheless, the Ukrainian government approved the shale gas contract with Chevron in late October 2013.

The treatment of the would-be natural gas developers by the Ukrainian government is unfavorable. It mainly relates to the tax regime imposed by the government on energy producing firms, both domestic and foreign. In August 2014, Yatsenyuk's cabinet introduced a 55 percent royalty tax on revenues of most gas producers.[149] Initially described as a temporary measure, the Ukrainian parliament made the taxes permanent in December 2014.[150] In particular, the 55-percent royalty tax applies to gas from sources up to 5-km below the surface, while gas drilled from fields deeper than 5-km (and, thus, with higher production costs) is taxed 20 percent. At the time of this writing (July 2015) a lower tax package is considered, however, the taxation targets production volume, not corporate profit, which is ill-advised.

Thus, while the Poroshenko administration should be creating incentives for foreign energy firms to come to Ukraine, explore the opportunities, and drill for gas, the government is doing the exact opposite. The consequences may turn out to be disastrous. Without a significant capital investment in the gas sector in the near future, Ukraine will not only be unlikely to achieve energy independence from Russia anytime soon, but may even deepen its dependence and worsen its position vis-à-vis Gazprom.

Overall, more steps need to be taken to eliminate the deep-rooted Soviet legacy in Ukraine's public service, including endemic corruption and incompetence of the government apparatus across the board, from the presidential administration to regular employees of the ministries and regional administrations. It appears far from certain whether Ukraine will be able to react swiftly to the mounting economic crisis. Ukraine currently needs liberalization, together with an anti-

crisis monetary policy; and a level, stable, and predictable playing ground for both domestic and foreign investors. Without such reforms, Ukraine is unlikely to be able to break free from its dependence on Russian gas and from the political diktat from Moscow.[151]

The policy of introducing high taxes for industries whose development is vital for the future well-being of the country is exactly the opposite of what should be taking place. Given the recent exodus of some foreign experts from high public service posts,[152] the Ukrainian government ultimately is going against the country's national interests. In fact, some compared Yatsenyuk's current policies in the energy sector to Joseph Stalin's steps to overturn the New Economic Policy in the early-1920s.[153] Stalin's tax and industrial policies threw the country into decades of agony, from which it has still not recovered, even after more than 2 decades after the fall of communism in Eastern Europe.

Geopolitics is taking its toll as well. To increase or at least maintain the current gas production levels prior to the war with Russia, Ukraine has relied mostly on the Black Sea and Azov Sea offshore areas for future gas production.[154] These are the areas now controlled by the Russian military and populated predominantly by pro-Russian separatists.

Some of the conventional and shale gas fields are close to the Donetsk region—the heart of the pro-Russian separatist movement in eastern Ukraine. The Crimea itself produces between 1 and 2-bcm of gas per year, with additional off-shore fields planned to come online between 2016 and 2020, which now may be in doubt due to the occupation. When it comes to shale gas, Ukraine has the third largest gas reserves in Europe, behind France and Norway, amounting to 1.2-

tcm.[155] Commercial shale gas production in Ukraine is expected to start in 2017. Ukraine's partners for exploring and producing shale gas were Royal Dutch Shell and Chevron Corporation.

The contract between Ukraine and Chevron has never been published. That has led to speculations about the real content of the contract. For instance, Yury Romanyuk, deputy of the local Ivano-Frankovsk district council, claimed that the contract contained a series of controversial clauses. One of them allegedly gave Chevron permission to produce any hydrocarbons it finds in the depth of up to 10-km during its explorations of the area. The contract also allegedly gave Chevron a right to claim water in case there was a scarcity in a gas production area—an allegation that has not been proven. In December 2014, Chevron announced it was pulling out of its $10 billion shale gas exploration project.[156] The Ukrainian State Geological Service estimates the Olesska region to contain between 0.8 and 1.5-tcm of shale gas, while the Yuzivska region is estimated to contain 2-tcm.[157] The U.S. Energy Information Administration is less optimistic and estimates Ukraine's total shale gas reserves at 1.2-tcm.[158] In August 2014, Royal Dutch Shell froze its shale gas exploration in Ukraine due to security concerns arising from the conflict in the eastern section of the country.[159] However, in September 2014, the company reassured Ukraine that it would continue developing shale gas fields in eastern Ukraine despite the unfavorable situation due to the conflict between Russia and Ukraine.[160]

Before its decision to pull out, Chevron was planning to develop a field in the Olesska area near Lviv in western Ukraine and was ready to invest $10 billion into production of hydrocarbons in that area.[161]

Even though this part of Ukraine is not engulfed in a war, there are claims that the company is having issues with the regional government. The local population has strongly opposed the production, claiming that the hydraulic fracturing would cause irreversible damage to the local environment. After several closed-door meetings between the representatives of the energy companies and the deputies of the local councils, however, they reconsidered and supported the drilling operations.[162]

According to estimates, Ukraine possesses around 5.5-tcm of shale gas, from which around 1.2-tcm should be recoverable.[163] Thanks to these reserves, Ukraine hopes to become self-sufficient in terms of natural gas by 2020. However, after the decision of Chevron to cease its exploration activities in Ukraine, the drop in gas prices, as well as the uncertain future of the development of the gas fields in the war-torn Donbass region, Ukraine's prospects of becoming self-sufficient in terms of gas look grimmer than ever before.

Imports from the United States.

Due to the expansion of shale gas production in the United States, it is expected to become a net gas exporter by 2017.[164] The reasons behind this shift is not only the boom of the U.S. shale gas industry, but also improvements in the Mexican pipeline capacity and a drop in the U.S. domestic demand for Canadian gas.

Central European countries are eager to diversify their sources of gas and include the United States as one of those sources. In March 2014, ambassadors of Hungary, Poland, the Czech Republic, and Slovakia sent a joint letter to Speaker of the U.S. House of Representatives John Boehner in which they urged his

support in overcoming the U.S. domestic bureaucratic hurdles preventing U.S. gas companies from exporting LNG to the rest of the world, including Europe.[165] In response to the letter, Boehner called upon the Barack Obama administration to approve the then pending natural gas export requests. As of November 14, 2014, nine approvals for LNG exports to non- Free Trade Agreement (FTA) countries were issued.[166] Although the approvals for LNG exports to non-FTA countries are slowly being issued, the question that remains is the actual physical ability of the United States to contribute substantially to the global LNG market and thus provide Europe with a realistic, albeit expensive, alternative. Bernstein Research claims that, while the U.S. Government approved LNG export projects for 10 billion cubic feet (bcf) per day as of May 2014, there is only room for around 6 to 7-bcf per day of U.S. LNG exports in the next 5 years.[167] The reason for that is the slow approval process, which delays the start of construction of these facilities.

As of May 2015, the U.S. Department of Energy (DOE) approved 10 LNG export projects,[168] with most of the export terminals in Texas and Louisiana.[169] Pending DOE review are 33 other projects. The first export terminal that received final approval from the U.S. Government is the Cheniere Energy's Sabine Pass Liquefaction terminal in Cameron Parish, with a capacity of 4-bcf per day (around 41-bcm per year).[170] [171] It should be finished in late-2015.[172] Four other export terminals are under construction as of June 2015. Experts expect the global LNG trade to reach 450-bcm in 2019.[173]

European LNG Imports from Outside the United States.

U.S. LNG exports may benefit European energy security. According to Gas Infrastructure Europe, the EU gets approximately 46 percent of its annual LNG imports from Qatar, which exported 17.23-bcm of LNG to Europe in 2013.[174] The second country after Qatar was Algeria, which in 2013 supplied 9.73-bcm. The main European LNG importers are Spain, the UK, France, and Italy.

In 2013, due to the large price differential between the gas prices in Europe and East Asia, European LNG imports collapsed and represented only 14 percent of the global LNG trade.[175] Instead, Asia has imported three-quarters of the global LNG volume, which amounted to 332-bcm in 2013. However, the price differential essentially disappeared in early-2015. For instance, the Japan Korea Marker (JKM) spot price fell to $6.725 per Million Metric British thermal unit (MMBtu) in January 2015,[176] down from almost $20 per MMBtu in early-2014.[177] In March 2015 (i.e., for April 2015 deliveries), the JKM LNG spot price slightly rose to $7.279 per MMBtu. Most of the drop in the price level occurred in the first half of 2014. The main reason for such a sharp decline has been a decrease in demand due to a regional economic slowdown, a mild 2014-15 winter in the region, and a lower demand for gas than expected.[178] In addition, in late-2014, Japan restarted its nuclear reactors. In November 2014, two reactors at Sendai in the Kagoshima province were approved to be restarted—the first reactors since the 2011 Fukushima Daiichi accident.[179] The actual restart is planned for the summer of 2015.[180] The restart of nuclear reactors will limit Japan's massive LNG imports and will contribute to a lower LNG spot price.

Algeria, Nigeria, Angola, and Mozambique.

Africa holds large volumes of natural gas and has great potential, especially off-shore. However, political instability stemming from inadequately developed institutions, the lack of the rule of law, and corruption may hinder the future progress of Africa becoming a major global supplier of LNG.

Algeria is an important source of piped gas for Europe, mainly France. However, it has been a victim of Islamic radicals who repeatedly target its energy companies and have even kidnapped employees of these companies. For instance, in early-2013, Islamist militants killed three people and kidnapped more than 40 foreigners working at a gas field.[181] In early June 2016, the Algerian wing of al-Qaeda perpetrated two attacks on the Algerian military and security forces, killing an army colonel and four members of a watch brigade.[182]

Nigerian total estimated gas reserves amount to over 180-tcf.[183] In June 2014, Nigeria voiced readiness to help the EU with meeting EU long-term gas demands. Currently, Nigeria operates one LNG export terminal on Bonny Island, owned by Nigeria LNG Ltd., with a capacity of 22 million metric tons (around 30.5-bcm) per year.[184] There is another LNG project in Nigeria—a so-called Brass LNG Project, which should be able to produce 10 million metric tons (around 14-bcm) of LNG per year.[185] The French energy company Total owns 17 percent of the equity of the project. The other shareholders are Nigerian National Petroleum Corporation (holding 49 percent), ConocoPhillips (17 percent of shares), and ENI (also 17 percent of shares). However, this project is still only in its early stage of engineering work, and the year of its launch is not yet determined.

Chevron is the largest shareholder in the construction of an LNG export terminal in Angola.[186] Other shareholders are Sonangol, Total, British Petroleum (BP), and ENI. Its projected capacity is 6.8-bcm per year. The construction of the terminal has been accompanied by numerous accidents, including multiple electrical fires, pipeline leaks, and a collapse of a rig.[187] The project was originally expected to be fully launched in 2011, but the series of construction accidents delayed this target by several years. As of May 2015, Chevron expected the terminal to become operational again by the end of 2015.[188]

Mozambique will be the third sub-Saharan African country to host an LNG plant after Nigeria and Angola. Mozambique has between 45 and 70-tcf (1.35 to 2-tcm) of estimated recoverable natural gas reserves in its offshore area.[189] The offshore system is expected to produce up to 4-bcf of gas per day (around 41-bcm per year). After its launch, the onshore LNG infrastructure is expected to produce around 10 million tons (around 14-bcm) per year. U.S. oil company Anadarko Petroleum is building the first two of the 10 planned LNG plants in Mozambique. The initial plan of Mozambique was to have the LNG facility ready by 2018. However, meeting this deadline is not certain.[190] Another, more realistic plan is that production should start in 2021. As of October 2014, work on the LNG terminal had not started and was in the stage of governmental approval. Nevertheless, gas companies from around the world are already concluding deals on LNG imports from the country.[191] The largest deals so far have been those to ship LNG to China, Japan, the United Arab Emirates, Thailand, and India.

These LNG projects in review and under construction in sub-Saharan Africa are a positive signal for the EU. As new suppliers fill the lucrative global LNG

market and as the oil prices continue to plunge, the global LNG prices will be pushed downwards. If that remains the case in the coming years, the EU will be able to import LNG at lower prices than it is now. That will provide the Old Continent with a more affordable alternative to Russian piped gas in case of supply disruptions from Russia.

Eastern Mediterranean.

Europe may not need to reach as far as Africa to get its fill of gas. Eastern Mediterranean is in the European neighborhood. The main potential gas fields in the Eastern Mediterranean are in the territorial waters of Cyprus and Israel. The main gas fields are Tamar, Leviathan (both Israel), and Aphrodite (Cyprus). The Tamar field contains approximately 250-bcm of gas reserves and the larger Leviathan field contains 476-bcm. The Aphrodite field contains only 141-bcm of gas. However, the development of these fields seems to be problematic due to a range of internal regulatory disputes (Israel), interstate disputes (Turkey/Cyprus and Turkey/Israel), and technical difficulties such as the depth of the sea between Cyprus and Crete.

Offshore gas was found in Israel in 2009.[192] Both Israel and Cyprus have aspired to tap the subsea gas fields and become suppliers of gas for Europe. However, the potential problems with exploiting these gas fields are that it is too risky in terms of geography and politics.

The Eastern Mediterranean is an area with high seismic activity. The costs of building a pipeline that would be able to transport gas from these fields to Europe via Crete and Greece would be too expensive. According to estimates, its construction would cost

around $20 billion. Instead, it is more economically feasible to send the gas from the area to the neighbors, including Jordan and Egypt,[193] and/or to build a pipeline sending the gas from Cyprus and Israel up to Turkey and Europe. However, Turkey's President Recep Tayyip Erdogan refuses to cooperate on a pipeline from Cyprus to Turkey until the Cyprus dispute is resolved.

Development of these gas fields is also risky politically because of the unresolved issue of the Turkish Northern Cyprus. Turkey does not recognize EU member Cyprus as an independent country and strongly opposes drilling activities in the area, including deploying its geophysics research vessel in Cypriot territorial waters. Ankara has threatened to use military force to disrupt Cypriot exploration and production.[194]

In the meantime, Israel supports Cypriot exploration of the area.[195] Tensions escalated in October 2014, when Turkey sent an exploration ship, accompanied by two military vessels, into the disputed waters with Cyprus.[196] This led to a suspension of the peace talks with Turkey by Cyprus President Nicos Anastasiades. The United States and the EU also condemned the Turkish move. Given that the development of these gas fields may lead to great benefits for Europe, Turkey should reduce tensions with Cyprus and Israel that jeopardize exploration and production of the offshore gas reserves. A potential problem with building a pipeline from Israel and Cyprus to Turkey is the tense political situation between the two countries and Ankara, especially after the Israeli raid on the *Mevi Marmara,* a Turkish vessel carrying pro-Palestinian Islamist activists of the terrorist-connected charity The Foundation for Human Rights and Freedoms (IHH) in 2010.[197]

Another problem with the area is the delimitation of maritime boundaries between the countries of the region. This is the case between Israel and Lebanon, where the absence of an internationally recognized land border prevents the countries from delimiting their maritime border. Similar problem exists between Cyprus and Turkey in the Mediterranean.[198] In October 2014, the tensions between the two countries reached another spike when Turkey sent navy ships into disputed waters south of Cyprus after the Cypriot government granted permission to Eni SpA to test drill in the area.[199] It remains to be seen if the setback Erdogan's Justice and Development Party (JDP or AK Party) suffered in the June 2015 parliamentary elections may improve the energy security climate in the Eastern Mediterranean.

TURKMENISTAN, TRANS-ANATOLIAN NATURAL GAS PIPELINE, AND TRANS ADRIATIC PIPELINE

The Trans-Anatolian Natural Gas Pipeline (TANAP) and the Trans Adriatic Pipeline (TAP) are part of a so-called Southern Gas Corridor. TANAP and TAP represent a pipeline project that will transport Caspian natural gas from Azerbaijan through Georgia and Turkey and further into Europe through Greece and Albania. The construction of TANAP and TAP began in 2015, and the corridor should become operational in 2018. Azerbaijan will become the principal supplier of gas to what will be the longest pipeline project in Europe. Its Shah Deniz I and Shah Deniz II fields in the Caspian Sea will be the primary sources of gas for the corridor. The Shah Deniz I started producing gas in 2006 and has a production capac-

ity of around 10-bcm per year.[200] Shah Deniz II, which should come online in 2018, should supply another 16-bcm of gas per year into the system.[201] Turkmenistan has also recently re-emerged as a potential additional source of gas for this project. After the cancellation of the Russia-dominated South Stream project, the significance of the Southern Gas Corridor has increased. Nevertheless, the projected capacity of the entire corridor, which is expected to carry mainly Caspian gas through Turkey to Southern Europe, is 16 to 20-bcm per year, with options for an upgrade.

Azerbaijan, which should be the primary source of gas for the corridor, has supplies from the Shah Deniz II offshore gas field in the Caspian Sea. The project will supply 16-bcm annually, 6-bcm of which will be consumed by Turkey.[202] There are plans for the third stage (Shah Deniz III) after 2025, which could supply up to an additional 25-bcm per year.[203] Other sources of gas for TANAP potentially could be countries like Turkmenistan, Iran, or Iraq, all of which have tremendous resources. However, each of these countries has its own political risk factors that make their supplying of TANAP uncertain.

Turkmenistan can play a significant role in developing the Southern Gas Corridor, but many observers are skeptical. In early May 2015, Turkmenistan reaffirmed its commitment to join TANAP, which is to form a part of the Southern Corridor.[204] In particular, Turkmenistan is interested in connecting its western gas fields to TANAP, which eventually would allow it to expand its gas exports to Europe.[205] Turkmenistan has the fourth largest gas reserves in the world. However, Turkmenistan is unlikely to pursue policies which might jeopardize its relations with Russia—Turkmenistan's gas importer and trade partner.[206]

Moreover, China, the main Turkmenistan's gas customer, is likely to object as it invested billions of dollars in the Central Asia-China pipeline, and Beijing would like to keep the reserves.

Thus, the long-proposed Trans-Caspian Pipeline continues to be in question. The maximum existing gas export capacity from Turkmenistan is now close to 100-bcm per year,[207] significantly exceeding that of Azerbaijan. Most of Turkmenistan's gas production currently goes to China.[208] Gas is exported through the Central Asia-China pipeline, the longest gas pipeline built by China National Petroleum Corporation (CNPC) which transports 55-bcm annually.[209] However, Turkmenistan does not have an independent route by which it could transport the gas to Europe, bypassing Russia. By resisting the demarcation of maritime borders in the Caspian Sea and especially by refusing to design a regime for natural resources and mineral right exploitation, Russia and Iran prevent Turkmenistan and Azerbaijan from building a submarine gas pipeline between the two countries. Such an interconnector could carry Turkmen gas to the Azerbaijani Main Export Pipeline and further to Turkey and to Southern Europe via the Southern Gas Corridor and its TANAP/TAP pipelines.

Russia therefore secures its own position as a buyer and re-exporter of Turkmen gas, or at least blocks its exports, which contributes to maintaining its oligopolistic position in the European gas market. In the meantime, Turkmenistan is focusing on selling its gas to the East and South, most importantly to China and to Iran.[210] While Iran continues to be a market and a potential transit country for Turkmen gas (Iran now buys approximately 10 percent of Turkmen gas exports to supply its northern provinces), it is commit-

ted to increase domestic production and end imports from its northern neighbor.[211] Turkmenistan could become an important alternative source of gas for Europe, as Norway and Algeria already are.

Norway.

Russia and Eurasia are not the sole suppliers of gas to Europe. Norway, a NATO member, is also a significant source of gas. According to the EIA, Norway supplies more than 20 percent of Europe's gas demand.[212] In 2013, Norway supplied 21 percent of Europe's gas needs. After Russia and Qatar, Norway is the world's third largest exporter of gas. In 2013, most of Norway's gas exports reached the UK, Germany, and France.

Norway has little potential to boost its exports to the EU in case of need, however.[213] In the wintertime, the capacity of Norway's gas system is almost fully utilized, as European demand increases seasonally. There is a limited capacity for an increase in production and export from Norway's continental shelf. For a short time in season, Norway is able to provide up to 130 million cubic meters of gas for exports daily.[214] However, countries like Bulgaria, Slovakia, or Hungary, which depend more on Russian gas than does Western Europe, have enough gas stored in their underground reservoirs for around 3 months. Therefore, Norway cannot be counted upon to be able to replace shortfalls in Russian gas supplies in the short run, but switching the Baltic States to Norwegian gas makes sense.

In the long run, Norway does not look like a promising source of gas for the EU. According to the Norwegian Petroleum Directorate, in the first half of 2014, despite an increase in demand, Norway's overall gas

production slightly decreased by 2.5 percent compared to the same period of 2013.[215] Forecasts predicting a meaningful increase in Norway's gas output in the future are unavailable. Yet, there are additional and massive sources of natural gas for Europe, such as Iran.

Iran.

Iran has the second largest gas reserves in the world, after Russia. In early May 2014, Iran proposed the EU compensate potential cutoffs of Russian gas due to the war of sanctions between Russia and the West.[216] However, this Iranian initiative was unrealistic due to the sanctions regime, which the United Nations (UN) imposed on Iran in order to stop its nuclear program. Until the Joint Comprehensive Plan of Action was signed in Vienna, Austria, by China, France, Russia, the UK, the United States, Germany (the P5 + 1), and the Islamic Republic on July 14, 2015,[217] gaining hydrocarbon supplies from Iran was unrealistic. Today, however, the situation is changing rapidly. Companies such as ENI, Shell, Total, and others have already beaten a track to Teheran's energy decision-makers' doors.[218] While Iran is not ready to supply gas to Europe either through pipelines or in the LNG form, an all-out effort to change this will take place.

The pipeline through Turkey is available, and can currently supply up to 20-bcm a year, with Turkey buying about 10-bcm. With upgrades, that pipeline can supply up to 25 to 30-bcm annually in as little as 2 years. An additional pipeline is feasible, but funding and construction may take 5 years or more. Reserves are not the issue—financing, negotiating the right deal, and supplying technology is. Furthermore, Iran is undoubtedly willing to enter the LNG market, and

will be able to supply Europe via LNG tankers. However, even if the Western sanctions on Iran were lifted immediately, it would take years for Iran to be able to export meaningful amounts of gas to Europe due to lacking appropriate gas production and transport infrastructure.

First, Iran has no LNG liquefaction terminal, and therefore Iran does not export any LNG. The Iranian government launched a project called Iran LNG, which foresees construction of an LNG terminal in the city of Tombak in the Busher region, which also is hosting the first Iranian commercial nuclear reactor.[219] Nevertheless, the lack of Iran's access to modern LNG technologies because of the sanctions, which prohibit Western firms from exporting technology for Iran's oil and gas industry, has constrained the project. Shortage of capital is another militating factor. Thus, Iran needs to rely on pipelines for exports of gas. However, the Iranian pipeline's gas export is problematic due to the country's insufficient and obsolete infrastructure. Currently, the only country to which Iran exports meaningful amounts of gas is Turkey. In 2011, the amount of trade with natural gas between the two countries was 8.4-bcm through the Tabriz-Ankara Pipeline. In 2015, the amount of projected trade in gas increased to around 10-bcm.[220] However, the export of the gas to Europe is impractical due to the lack of infrastructure and the current war in Iraq.

The annual capacity of the Tabriz-Ankara Pipeline is only 14-bcm.[221] Besides this pipeline, there is also a project of the so-called Persian Pipeline, started in 2009.[222] The pipeline would run from Iran through Turkey and further to Europe. The Iranian part should be 1,740-km long, with a projected capacity of up to 40-bcm per year. This pipeline was planned to become operational by 2014, which did not happen due to

sanctions. Even if these pipelines were built, reliability of the supply from Iran would be questionable. Since its launch in 2002, the Tabriz-Ankara Pipeline has experienced disruption due to attacks by Kurdish separatists in the north of Iran and in southeast Turkey. In late-2012, Kurdish violent separatist and the terrorist group the Kurdistan Workers Party (PKK) bombed the pipeline, wounding 28 Turkish soldiers.[223] The security in this area has also deteriorated because of the civil war in Syria and Iraq, which affected southern Turkey as well. In addition to these attacks, Iran itself also has a dubious record of ensuring stable gas supplies to Turkey, as it has repeatedly reduced or cut off exports to Turkey as needed to satisfy its domestic supply.

Another factor that jeopardizes the prospects of Iranian gas exports to Turkey and to Europe are the Western sanctions imposed on Iran. These sanctions forced Turkey to lower its imports of Iranian gas, which in turn makes Turkey more dependent on Russia. In particular, the EU imposed sanctions on Iran's gas sector already under sanctions in October 2012, which precludes Iranian gas exports to the EU. Two other of Iran's LNG projects—Pars LNG and Persian LNG—were canceled due to the sanctions.[224] Even if this pipeline allowed higher export capacity, there is currently no pipeline that would be able to transport the gas further west from Turkey to Europe. The Nabucco pipeline project, which was proposed back in 2002 and expected to carry gas from the Caspian Sea and possibly Iran to Europe, bypassing Russia and Ukraine, has been abandoned.[225]

Thus, Iran's capabilities to become a source of gas for Europe are limited for now, but may improve in the future. Were its rulers to pursue a rational state

interest, they should be making an supreme effort not just to lift the sanctions, but address the root causes which triggered these measures: a dangerous nuclear build-up program, including the full cycle of uranium enrichment; the expansion of the medium range ballistic missile arsenal; and support of terrorism.

With the deal announced, Russia needs to start viewing Iran as a major gas exporter. Europe is likely to diversify its supply by buying 20-40-bcm a year from Teheran.

Northern Iraq/Kurdistan: U.S. Assistance Needed.

An alternative source of gas for Europe may be northern Iraq, known as Iraqi Kurdistan and administered by the Kurdish Regional Government (KRG).[226] The overall Iraqi estimated gas resources are around 1.7 percent of the total estimated world's supplies.[227] According to the KRG, in the north of Iraq the estimated conventional gas reserves of the region alone are 165-tcf (4.95-tcm) of gas, out of which 38-tcf (1.14-tcm) of gas is recoverable.[228] However, unlike the existing oil pipelines, there are currently no gas pipelines from Northern Iraq to Turkey, which could transport this gas to Turkey and further to Europe if the gas reserves were tapped. Therefore, Turkey is looking at two basic options: ensuring exports from northern Iraq itself or transforming northern Iraq into a transit corridor for the gas from the rest of the country and possibly from Iran.

However, Northern Iraq remains a problematic supplier of gas even if its gas fields do become connected to the Turkish gas grid and the future hub for Europe. For now, Northern Iraq, together with the rest of the country, continues to suffer from a high level of

volatility due to the Islamic State (IS)/Daesh operations and the unresolved issue of Kurdish autonomy. U.S. and Turkish military assistance is needed, including training and equipment, to make the Kurds capable of managing security risks to their energy infrastructure, as mentioned in the next section.

Another project would be the connection of the Turkish and Iraqi gas networks to the Arab Gas Pipeline. The Arab Gas Pipeline runs from Egypt, bypasses Israel, runs north through Jordan and Syria, and ends in the Syrian city of Homs. From the security standpoint, this pipeline is hopeless as Syria is in the midst of a civil war, and it is currently not connected to the Turkish territory. Moreover, as with Egyptian gas, production is falling, and, as Cairo is planning to buy gas from the offshore Israeli fields, the value of the Arab pipeline is in doubt. In fact, one day it can be reversed to ship Iraqi gas to Syria, Jordan, and Egypt.

Libya: A Country in Search of a State.

In addition to the Middle East, Libya also remains an important potential source of gas for Europe. However, Libya faces systemic instability, which prevents its gas potential from adequate development.

Libya has massive resources of natural gas. Its proven natural gas reserves reach 1.5-tcm,[229] however, the Libyan conflict has drastically affected its gas production. While in 2010 the country produced 30.3-bcm of gas in total, in 2011 the number fell more than threefold—to just 9.9-bcm.[230] In 2012 and 2013, the production partially recovered, reaching 23.4 and 22.9-bcm in 2012 and 2013, respectively. Thus, Libya has enough potential to increase its exports to Europe by around 10-bcm per year.[231] Libya's natural gas is

exported to Europe through the Greenstream (part of the Western Libya Gas Project) underwater pipeline to Sicily. The pipeline has a capacity of 11-bcm per year. Libya has not been able to build a significant LNG capacity due to the technical limitations resulting from Western sanctions against the late Colonel Muammar Qaddafi's regime in the 2000s and from the turmoil after his removal from power in late-2011. With the collapse of the Libyan statehood post-2011 Western intervention, the chances to expand Libyan gas production and exports remain grim.

If the political risk environment improves in the future, and a stable regime or regimes are in place, Libya is likely to return to be an important gas supplier for Europe. The U.S. Army can provide training and equipment to the future Libyan military when a stable national government is reinstated, or if the country is permanently divided.

Algeria is the third most important supplier of natural gas to Europe, after Norway and Russia. It may also become a transit area for gas from Nigeria. The planned Trans-Saharan natural gas pipeline would have a capacity of 30-bcm per year and should run from Nigerian gas fields through Niger to Algeria, from where the gas would continue to flow further north to Italy and Spain. The deal for the construction of the pipeline was signed in Nigeria in 2009.[232] However, security concerns due to the volatile situation along the entire pipeline route, as well as the ongoing regulatory and political uncertainty in Nigeria, have continued to delay this project. In 2014, Nigeria's then-president, Goodluck Jonathan, said that he expects to have the Nigerian segment of the pipeline completed by 2018.[233] However, even if the Nigerian section of the pipeline gets built, it is far from certain whether

this pipeline will become operational in the foreseeable future. The Nigeria-Algeria-Europe pipeline remains a long shot.

U.S. INTERESTS, THE U.S. MILITARY, THE U.S. ARMY, AND EUROPEAN ENERGY SECURITY

General.

The United States is interested in the economic stability and growth of Europe, as the EU is the principal and the largest trade partner of the United States. The United States and the EU have the largest trade and investment relationship in the world.[234] This relationship has persevered through the 2007-08 financial crisis. In 2014 alone, the American economy exported goods and services totaling $276.7 billion to Europe.[235] This transatlantic economic interconnectedness means that the U.S. economic growth and stability partly depends on the economic developments in Europe, and vice versa. As the United States is now and is likely to continue to be interested in a strong and stable European market, the European energy security indirectly contributes to U.S. economic stability. Moreover, this mutual economic integration and dependence between the United States and the EU may be further deepened when the Transatlantic Trade and Investment Partnership agreement (TTIP) is successfully concluded and enters into force. Finalizing this agreement seems to be no easy task, and TTIP has already failed one congressional vote.[236]

Europe's energy security is not something that can be improved overnight. Therefore, it is in the U.S. interest to support Europe's efforts at achieving better

energy security now and in the years to come. European electricity production and heat for households are inconceivable without a steady supply of natural gas, most of it imported to Europe from neighbors, near and far. Thus, the United States, as an ally and a security partner of Europe, is interested in the continent's energy security and an uninterrupted inflow of natural gas by pipe in the form of LNG, and in local development of natural gas production in Europe, including from shale.

Europe's energy independence is not only in the economic interest of America, but also in its political and security interests. Europe's dependence on Russian natural gas undermines European unity and weakens the primary U.S. allies in their relations with Russia. The involvement, increased deployment, and enhanced training activities of the U.S. military in Central and Eastern Europe will send a clear message to Russia: "pull in your horns" and stop the escalation. If this signal is received in Moscow, it will also make the flow of energy resources from Russia to Europe more stable and will put a disincentive on Putin's use of energy as a weapon. With Europe independent of Russian pressure, it may become a more valuable U.S. ally in pursing Western interests around the globe, including fighting terror in the Middle East, balancing the rising China, etc.

While the United States has rapidly improved its energy independence in the past decade and has great potential to continue doing so, Europe is in a far more complex situation, encircled by the volatile Middle East and North Africa region to the south and Russia to the east. Any turmoil in Europe's energy situation may adversely affect American exporters selling their goods and services in Europe. Thus, the time to act for both the United States and Europe is now.

Energy Policy Recommendations.

The principal recommendation to the U.S. Government is to impose as few restrictions as possible in the way of future U.S. LNG exports to Europe. The pace of construction of the LNG terminals in the United States capable of exporting meaningful amounts of LNG to Europe is falling behind the more rapidly developing terminals in Canada and Australia.[237] Not far behind are large-scale developments in offshore Africa.[238] Lifting the restrictions would be a major signal to potential American LNG exporters that the future cash flow from their large investments in constructing LNG terminals will not be hindered by restrictions imposed by the U.S. Government. Before the West imposed its sanctions on Russia, Gazprom was also ahead of the game regarding natural gas exports to Europe. Therefore, while Europe builds the new LNG terminals, its alternative is to continue importing relatively cheap Russian piped gas, and at the same time expand its non-Russian piped supplies, such as the Southern Gas Corridor from the Caspian region, together with importing LNG.

The United States can also advocate and champion the construction of the intra-European gas interconnector network, which is in dire need of massive funding. Currently, EU funding, including financing under the so-called "Juncker package," is considered as one of the alternatives.[239] However, U.S. capacities and expertise in this regard may bring great value to the construction of the interconnector network and, most importantly, to the finalization of the reversible north-south gas pipeline route through Central Europe from the Baltic to the Adriatic, in the shortest time possible.

Recommendations for the U.S. Military.

The U.S. Armed Forces play an important role in providing European security since World War II. Today, the U.S. military's role in European energy security can be summarized as follows:

- **Conduct** a comprehensive assessment of the security of European energy imports, including natural gas, coal, uranium, and oil. Monitor the threats to pipelines and to the natural gas balance through the U.S. intelligence community and their counterparts in Europe, Turkey, and the Middle East. Share intelligence where possible. Additionally, conduct open sources analysis of the security of Europe's energy supply through the available, high quality, nongovernment expertise in think tanks and the private sector.
- **Develop** in cooperation with NATO, European Command, and Central Command, a system to monitor threats to critical energy infrastructure. The EU also needs a system of monitoring threats to the intra-European gas network. Interconnectors will become the key component of European gas independence from Russia and need to be monitored properly. In particular, the U.S. Army should develop joint threat assessment and emergency planning and response protocols for threats to individual gas fields, pipelines, gas processing facilities, storage facilities, pumping stations, and other crucial infrastructure components.
- **Ensure** that NATO and individual European and Middle Eastern-North African countries

have interoperability standards and joint tactics, techniques, and procedures which would allow them to coordinate and interact in case of the threats to the natural gas infrastructure as recently seen in Algeria.[240]

Recommendations for the U.S. Army.

The U.S. Army deployed in Europe is a crucial component providing NATO and regional security, interacting with NATO and non-NATO allies, and assisting in training these allies' militaries. The U.S. Army should:

- **Cooperate** with NATO, national militaries of NATO members and non-NATO allies, their intelligence services and law enforcement, as well as with energy companies to ensure security of pipelines and other gas facilities. The crucial infrastructure components of the EU natural gas energy security are the Main Export Pipelines coming from Russia/Ukraine and North Africa, the system of gas hubs (such as Baumgarten in Austria), and pipeline interconnectors between the European countries, as well as LNG import terminals.
- **Use** its expertise and capacity to help the allies in Central Europe protect the interconnectors, as one cannot exclude an attempt of Russia to sabotage this crucial infrastructure. In particular, the emphasis needs to be put on training and equipping our Central and Eastern European NATO allies, as well as Ukraine and Moldova. To properly identify weak spots and ensure the security of pipelines and other gas facilities, the U.S. Army needs to ensure it con-

ducts an accurate assessment/security audit of each interconnector security challenge and potential threat.

- **Prepare** for energy crisis-related disaster relief in Europe in cooperation with European militaries in the NATO framework and the EU and national emergency responders, and build on its experience in developing infrastructure protection plans in the United States and around the world to outline similar plans, programs, and procedures in Europe. In case of a future disruption of Russian gas supplies to Europe, Europe would be able to weather the crisis better if it had a joint plan with the United States instead of trying to find an ad hoc solution.
- **Train** forces for critical energy infrastructure protection. The United States has developed an effective system of critical infrastructure protection at home and can share its expertise with its European allies.
- **Train and equip** local militaries and other forces for energy infrastructure protection and actively pursue those who are trying to destroy energy infrastructure. Thus, the struggle against violent religious extremists is directly connected to U.S. efforts to keep oil and gas infrastructure, the electricity grids, ports, and airports secure. The U.S. Army can and should cooperate in the design of local military and security components and units, as well as the strategy and tactics necessary to ensure both intelligence gathering and the hard security aspects of critical energy infrastructure protection. In particular, this should apply to the energy-rich countries of North Africa and Sahel,

including Nigeria, Chad, Algeria, Libya, and Tunisia. The United States should also evaluate the needs and capabilities of the Kurdish forces, which already are cooperating with the United States in fighting the IS/Dasesh. A clear distinction between the operational requirements of the war against the IS and long-term infrastructure protection needs to be made by evaluators.

- **Temporarily protect** critical energy facilities and infrastructure. When the United States is in the process of training the European forces to protect the intra-European gas infrastructure, the United States should use its own capabilities to ensure proper protection of the infrastructure until European forces are capable to perform these tasks on their own.

CONCLUSIONS: DIMINISHING EUROPE'S DEPENDENCE ON RUSSIAN GAS — A U.S.-EUROPEAN POLICY GOAL WHOSE TIME HAS ARRIVED

Due to the lack of new viable gas pipeline routes from alternative geographic sources and a generally negative attitude in Europe towards shale gas production, the only viable alternative for Europe is to speed up pipeline construction from the continent's periphery. Europe should also substitute some of the Russian gas with LNG imports from North America, while developing Eastern Mediterranean and sub-Saharan Africa as sources of gas. These goals should be achieved in the 2019-25 timeframe.

Unfortunately, Russia has proven to be an unreliable gas supplier because it merges business with pol-

itics. Unlike in the West, where international energy companies pursue profits and as a rule refrain from pressure on particular countries, Russia's Gazprom is majority state-owned and is a tool in the hands of the Kremlin. Beyond this ostensible strength, Russia's weakness in the international arena is its unpredictability. The Kremlin has a record of making shortsighted decisions aimed at maximizing its short-term geopolitical gains at the expense of maximizing the long-term economic ones. Natural gas cannot be used as a weapon and a commodity at the same time just like oil eventually lost the might it enjoyed throughout the 1970s.

Gas discounts may have worked as carrots for certain countries and swayed political decisions in Russia's favor. Gazprom charges the Baltic States the highest prices because, for a while, they have the weakest alternative sources. Deliberate gas disruptions to Ukraine may have forced the latter to pay at least part of its bills. However, Russia and Gazprom seem not to have taken into account that the world is not a static place. The fact that some countries had to provide foreign policy concessions to the Kremlin to restore gas supplies at one time does not mean that it will be the case forever. The fact that some countries are charged more than others merely for political reasons will not last forever, either. This shortsighted Russian behavior incentivizes Europe to seek alternative sources of gas other than Russia, which in the long run will economically hurt both sides. It will hurt Europe, which has to invest into interconnectors, new LNG facilities, and other infrastructure that would not be necessary should Russia be a liberalized country with competitive gas supplies. It hurts Russia, which is in the process of losing the European markets.

In the world of international commerce, predictability comes from the transparency of legislative and regulatory bodies, the rule of law, and business-friendly regulation, which together contribute to the efficiency of the business and economic system. Free market competition based on the rule of law allows one to expect that, if there is a demand, someone would supply a commodity to the customers. Russia has been demonstrating that this principle is not valid in the case of Gazprom. Through the 1990s, 2006, 2009, and as recently as 2014, Russia proved repeatedly that its partners cannot count on Gazprom, even when it cuts prices and accommodates other demands.

Europe cannot afford to be Gazprom's hostage—or become a pawn in Russian-Ukrainian hostilities when Ukraine cannot pay Gazprom for the gas it delivered. In such circumstances, if Gazprom were to be a reliable supplier, it would have to manage Ukrainian debt and work on its resolution together with the EU. The best way for Europe to deal with this lack of predictability is to secure alternative supplies of natural gas. Given the lack of readily available sources of additional piped gas, the alternative for Europe is LNG, especially after the collapse of the Asian prices. The EU does not need to invest heavily in building new LNG terminals to use this option, as the excess capacity in Spain and elsewhere is vast. All it has to do is to expand the intra-European gas pipeline network, pay higher prices, and wait for the export LNG terminals under construction in North America and offshore West and East Africa to come online. The shale gas revolution that took place in the United States in the last decade will allow the United States to support its European allies by ensuring them with a safe and predictable alternative, even if it is more expensive than the gas Europe gets from Russia: American LNG

exporters will mainly seek profit and are likely to prioritize on Asian markets.

Nevertheless, both the LNG and the future alternative pipelines will offset Russia's advantage in the gas price and regulatory negotiations between the EU and Gazprom. Russia can go without the gas revenues from the EU for significantly longer than the EU can survive without Russian gas, but until Russia finds new gas markets, and Europe new gas sources, they are locked in a symbiotic embrace. With U.S. and African LNG as alternatives, and a step towards a permanent solution, this asymmetry might virtually go away. That would strengthen Europe's energy security and put the EU countries' relations vis-à-vis Russia on a more equal playing field. The U.S. military, and especially the U.S. Army, should be there to make it happen.

ENDNOTES

1. "Bitumen basics," *British Petroleum*, October 2007, available from *www.bp.com/content/dam/bp-country/en_au/products-services/bp-bitumen/all-pages/Bitumen-basics.pdf*, p. 2, accessed May 3, 2015.

2. James H. Gary, Glenn E. Handwerk, Mark J. Kaiser, *Petroleum Refining: Technology and Economics*, Fifth Ed., Boca Raton, FL: CRC Press, 2014, p. 1.

3. "Siegfried Marcus," *Encyclopedia Britannica*, Last Updated April 13, 2014, available from *global.britannica.com/EBchecked/topic/364327/Siegfried-Marcus*, accessed May 3, 2015.

4. "History of oil and gas industry," *Official Website of Naftogaz*, 2012, available from *www.naftogaz.com/www/3/nakweben.nsf/0/69CDD708EEFC16B4C22570D8003432CC*, accessed May 3, 2015.

5. "Battle of Stalingrad," *Encyclopedia Britannica*, July 24, 2014, available from *www.britannica.com/EBchecked/topic/562720/Battle-of-Stalingrad*, accessed May 3, 2015.

6. Roger Miller, "Operation Tidalwave, the Low-Level Bombing of the Ploesti Oil Refineries, 1 August 1943," *U.S. Air Force*, September 17, 2014, available from *www.afhso.af.mil/topics/factsheets/factsheet.asp?id=17993*, accessed May 3, 2015.

7. "A Brief History of Natural Gas," *Official Website of the American Public Gas Association*, 2012, available from *www.apga.org/apgamainsite/aboutus/facts/history-of-natural-gas,* accessed May 3, 2015.

8. "What Dutch disease is, and why it's bad," *The Economist*, November 5, 2014, available from *www.economist.com/blogs/economist-explains/2014/11/economist-explains-2*, accessed May 3, 2015.

9. "Biografia" ("Biography"), *Official website of Gazprom*, No Date, available from *www.gazprom.ru/press/reports/2012/orudzhev/biography/*, accessed May 3, 2015; "ES dal Ukraine kredit na 'Urengoj-Pomary-Uzhgorod'" ("The EU Gave Ukraine a Credit for 'Urengoy–Pomary–Uzhgorod'"), *Vesti Finance*, December 1, 2014, available from *www.vestifinance.ru/articles/50084*, accessed May 3, 2015.

10. "Oil Bust of 1986 Reminds U.S. Drillers of Price War Risks," *Bloomberg*, November 26, 2014, available from *www.bloomberg.com/news/articles/2014-11-26/oil-bust-of-1986-reminds-u-s-drillers-of-price-war-risks*, accessed May 3, 2015.

11. Yegor Gaidar, "Collapse of an Empire: Lessons for Modern Russia," Washington, DC: Brookings Institution, 2007, pp. 64-67, 105-110, 122-132, available from *www.amazon.com/Collapse-Empire-Lessons-Modern-Russia/dp/0815731140*, accessed July 18, 2015. The original version "Gibel imperii" ("Collapse of an Empire"), Chap. 4, 2006, available from *www.e-reading.club/bookreader.php/13096/Gaiidar_-_Gibel%27_imperii.html*, accessed May 3, 2015.

12. Yelena Ivanova, "Gazovaya promyshlennost" ("Gas Industry"), *Kommersant*, November 21, 2001, available from *www.kommersant.ru/doc/295883*, accessed May 3, 2015.

13. "Natural gas consumption statistics," *Eurostat*, November 17, 2014, available from *ec.europa.eu/eurostat/statistics-explained/index.php/Natural_gas_consumption_statistics,* accessed May 3, 2015.

14. Statistics of the EU gas consumption, *Eurostat*, available from *epp.eurostat.ec.europa.eu/statistics_explained/index.php/File:EU-28_imports_of_natural_gas_-_percentage_of_extra-EU_imports_by_country_of_origin.png*, accessed December 13, 2014.

15. "Quarterly Report Energy on European Gas Markets: fourth quarter of 2014," European Commission, 2014, p. 8, available from *https://ec.europa.eu/energy/sites/ener/files/documents/quarterly_report_on_european_gas_markets_2014_q4.pdf*, accessed May 2, 2015.

16. "Quarterly Report on European Gas Markets," European Commission, 2014, available from *ec.europa.eu/energy/observatory/gas/doc/201410_q3-4_quaterly_report_gas_market.pdf*, accessed December 13, 2014.

17. "Quarterly Report Energy on European Gas Markets: fourth quarter of 2014."

18. "Supply, transformation and consumption of gas - annual data," *Eurostat*, Last Updated April 27, 2015, available from *appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do*, accessed May 3, 2015.

19. "Quarterly Report Energy on European Gas Markets: fourth quarter of 2014."

20. "Statistical Report 2013," *Eurogas*, December 2013, p. 7, available from *www.eurogas.org/uploads/media/Eurogas_Statistical_Report_2013.pdf*, accessed May 3, 2015.

21. "Statistical Report 2014," *Eurogas*, December 2014, p. 7, available from *www.eurogas.org/uploads/media/Eurogas_Statistical_Report_2014.pdf*, accessed May 3, 2015.

22. *Ibid*.

23. "BP Statistical Review of World Energy: June 2014," *British Petroleum*, June 2014, p. 4, available from *www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-full-report.pdf*, accessed May 3, 2015.

24. "How much carbon dioxide is produced when different fuels are burned?" *U.S. Energy Information Administration*, available from *www.eia.gov/tools/faqs/faq.cfm?id=73&t=11*, accessed May 3, 2015.

25. "Industrial emissions," *Official Website of the European Union*, March 3, 2011, available from *europa.eu/legislation_summaries/environment/soil_protection/ev0027_en.htm*, accessed December 13, 2014.

26. "How much carbon dioxide is produced when different fuels are burned?"

27. Vincent de Rivaz, "Britain has the right energy policies in place, it just needs to keep the costs down," *The Telegraph*, March 16, 2014, available from *www.telegraph.co.uk/finance/comment/10701663/Britain-has-the-right-energy-policies-in-place-it-just-needs-to-keep-the-costs-down.html?utm_source=Daily+Carbon+Briefing&utm_campaign=e3838e080d-DAILY_BRIEFING&utm_medium=email&utm_term=0_876aab4fd7-e3838e080d-303421281*, accessed December 13, 2014.

28. "The unwelcome renaissance," *The Economist*, January 5, 2013, available from *www.economist.com/news/briefing/21569039-europes-energy-policy-delivers-worst-all-possible-worlds-unwelcome-renaissance*, accessed December 13, 2014.

29. "U.S. Coal Exports," *U.S. Energy Information Administration*, available from *www.eia.gov/coal/production/quarterly/pdf/t7p01p1.pdf*, accessed May 3, 2015.

30. Sarah Arnott, "EU gives power stations until 2020 to meet emissions rules," *The Independent*, July 8, 2010, available from *www.independent.co.uk/news/business/news/eu-gives-power-stations-until-2020-to-meet-emissions-rules-2021093.html*, accessed May 3, 2015.

31. "Germany's Expensive Gamble on Renewable Energy," *The Wall Street Journal*, August 26, 2014, available from *online.wsj.com/articles/germanys-expensive-gamble-on-renewable-energy-1409106602*, accessed December 13, 2014.

32. *Ibid*.

33. "National action plan for the promotion of renewable energies—2009-2020," European Commission, available from *ec.europa.eu/energy/renewables/transparency_platform/doc/dir_2009_0028_action_plan_france.zip*, accessed December 13, 2014.

34. "Italian National Renewable Energy Action Plan," European Commission, June 30, 2010, available from *ec.europa.eu/energy/renewables/transparency_platform/doc/dir_2009_0028_action_plan_italy.zip*, accessed December 13, 2014.

35. Moody's 2015 European Credit Trends Conference Vienna, May 12, 2015, available from *https://www.moodys.com/newsandevents/events/detail_/4400000009179/ed*.

36. Lionel Fontagné, "The world economy in 2025: Macro-Economic Projections and the Role of Asia," European Commission, No Date, p. 33, available from *ec.europa.eu/research/social-sciences/pdf/event-71-presentation-fontagne-lionel_en.pdf*, accessed May 3, 2015.

37. "Ukrainian Gas Pipelines," *East European Gas Analysis*, July 12, 2014, available from *www.eegas.com/ukraine.htm*, accessed May 3, 2015.

38. "Remarkable events in Ukraine's oil-gas industry," *Official website of Naftogaz*, No Date, available from *naftogaz-europe.com/subcategory/en/NaftogazHistory*, accessed May 3, 2015.

39. "Russian Gas, Ukrainian Pipelines, and European Supply Security," Berlin, Germany: German Institute for International and Security Affairs, September 2009, p. 12, available from *www.swp-berlin.org/fileadmin/contents/products/research_papers/2009_RP11_wep_ks.pdf*, accessed May 3, 2015.

40. "EU Tells Bulgaria to Stop Work on Gazprom's South Stream Project," *The Wall Street Journal*, June 3, 2014, available from *online.wsj.com/articles/eu-tells-bulgaria-to-stop-work-on-gazproms-south-stream-project-1401811829*, accessed December 13, 2014.

41. "Bulgaria suspends South Stream gas pipeline project," BBC News, August 19, 2014, available from *www.bbc.com/news/business-28854089*, accessed December 13, 2014.

42. "Serbia Says It Will Be Forced to Suspend South Stream Construction," Radio Free Europe, June 09, 2014, available from *www.rferl.org/content/serbia-says-it-will-be-forced-to-suspend-south-stream-construction/25415286.html*, accessed December 13, 2014.

43. "Serbiya vsled za Bolgariyey priostanovila raboty po 'Yuzhnomu potoku'" ("After Bulgaria, Serbia Also Stopped Works on the 'South Stream'"), *KM.Ru*, June 9, 2014, available from *slon.ru/fast/economics/serbiya-vsled-za-bolgariey-priostanovila-raboty-po-yuzhnomu-potoku-1110769.xhtml,* accessed December 13, 2014.

44. "Idut protiv 'Potoka'" ("They Are Going against the 'Stream'"), *Vzglyad.Ru*, June 9, 2014, available from *vz.ru/politics/2014/6/9/690588.html*, accessed December 13, 2014.

45. *Ibid*.

46. "Putin Scraps South Stream Gas Pipeline after EU Pressure," *Bloomberg*, December 2, 2014, available from *www.bloomberg.com/news/2014-12-01/putin-halts-south-stream-gas-pipeline-after-pressure-from-eu.html*, accessed December 13, 2014.

47. "Turkey still interested in Turkish Stream pipeline, but timeframe unrealistic: official," *Platts*, March 19, 2015, available from *www.platts.com/latest-news/natural-gas/ankara/turkey-still-interested-in-turkish-stream-pipeline-26043126*, accessed May 3, 2015.

48. "Eustream chce plynovod zo Západu cez Slovensko na Ukrajinu a Balkán" ("Eustream Wants a Gas Pipeline from the West through Slovakia to the Balkans"), *Trend*, November 29, 2014, available from *www.etrend.sk/ekonomika/eustream-chce-plynovod-zo-zapadu-cez-slovensko-na-ukrajinu-a-balkan.html*, accessed December 13, 2014.

49. "Why Russian Natural Gas Will Dominate European Markets," *Brookings*, February 24, 2014, available from *www.brookings.edu/research/opinions/2014/02/24-russian-natural-gas-european-markets-boersma-greving*, accessed December 13, 2014.

50. "Spain," U.S. Energy Information Administration, July 2014, available from *www.eia.gov/countries/country-data.cfm?fips=sp*, accessed December 13, 2014.

51. "BP Statistical Review of World Energy June 2014," *BP*, p. 28, available from *https://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-full-report.pdf*, accessed December 13, 2014, author's calculations.

52. "Russia's hold on the Baltics loosens," *Delfi*, October 24, 2014, available from *en.delfi.lt/lithuania/energy/russias-hold-on-the-baltics-loosens.d?id=66207076*, accessed December 13, 2014.

53. "Lithuania Grabs LNG in Effort to Curb Russian Dominance," *Bloomberg*, October 27, 2014, available from *www.bloomberg.com/news/articles/2014-10-27/lithuania-grabs-lng-in-effort-to-curb-russian-dominance*, accessed May 3, 2015.

54. "Delivery statistics," *Official website of Gazprom*, No Date, available from *www.gazpromexport.ru/en/statistics/*, accessed May 3, 2015.

55. *Ibid*.

56. "In-Depth Review of the Energy Efficiency Policy of Ukraine," *Energy Charter Secretariat*, 2013, p. 62, available from *www.energycharter.org/what-we-do/energy-efficiency/energy-efficiency-country-reviews/in-depth-review-of-energy-efficiency-policies-and-programmes/in-depth-energy-efficiency-review-of-ukraine-2013/*, accessed May 3, 2015.

57. Paul J. D'Anieri, *Economic Interdependence in Ukrainian-Russian Relations: Descartes to Kant*, Albany, NY: SUNY Press, 1999, p. 73.

58. *Ibid*., p. 74.

59. Hrant Bagratian and Emine Gurgen, "Payments Arrears in the Gas and Electric Power Sectors of the Russian Federation and Ukraine," *International Monetary Fund*, December 1997, available from *www.imf.org/external/pubs/ft/wp/wp97162.pdf*, accessed December 13, 2014.

60. "Ukraine Agrees to Allow Russians to Buy Fleet and Destroy Arsenal," *The New York Times*, September 4, 1993, available from *www.nytimes.com/1993/09/04/world/ukraine-agrees-to-allow-russians-to-buy-fleet-and-destroy-arsenal.html*, accessed December 13, 2014.

61. Alexander Kolyandr, "Ukraine Gets First Tranche of IMF Rescue Package," *The Wall Street Journal*, May 7, 2014, available from *www.wsj.com/articles/SB10001424052702304655304579547323209409150*, accessed May 3, 2015.

62. Dominique Finon and Catherine Locatelli, "Russian and European gas interdependence. Can market forces balance out geopolitics?" *Département Energie et Politiques de l'Environnement (EPE)*, p. 8, available from *https://hal.archives-ouvertes.fr/file/index/docid/178429/filename/Cahier41bis.pdf*, accessed December 13, 2014.

63. Jonathan Stern, "The Russian-Ukrainian gas crisis of January 2006," *Oxford Institute for Energy Studies*, Oxford, UK: Oxford Institute for Energy, available from *www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/Jan2006-RussiaUkraineGasCrisis-JonathanStern.pdf*, accessed December 13, 2014.

64. Simon Pirani, Jonathan Stern, and Katja Yafimava, "The Russo-Ukrainian gas dispute of January 2009: A comprehensive assessment," *Oxford Institute for Energy Studies*, Oxford, UK: Oxford Institute for Energy, 2009, p. 12, available from *www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG27-TheRussoUkrainianGasDisputeofJanuary2009AComprehensiveAssessment-JonathanSternSimonPiraniKatjaYafimava-2009.pdf*, accessed December 13, 2014.

65. "Malenkoye chornoye platye" ("A Small Black Dress"), *Lenta.Ru*, January 19, 2009, available from *lenta.ru/articles/2009/01/19/gas/*, accessed December 13, 2014.

66. "Sredstvo ot yevrointegratsii: Rossiya vkladyvayet v Ukrainu $15 mlrd i snizhaet tsenu na gaz" ("A Medicine against the European Integration: Russia to Invest $15 Billion in Ukraine and to Lower the Gas Price"), *Forbes*, December 17, 2013, available from *www.forbes.ru/sobytiya/vlast/248855-sredstvo-ot-evrointegratsii-rossiya-vkladyvaet-v-ukrainu-15-mlrd-i-snizhaet-ts*, accessed December 13, 2014.

67. "Ukraine suspends talks on EU trade pact as Putin wins tug of war," *The Guardian*, November 21, 2013, available from *www.theguardian.com/world/2013/nov/21/ukraine-suspends-preparations-eu-trade-pact*, accessed May 3, 2015.

68. "Gazprom povysil cenu na gaz dlya Ukrainy na 43.5%" ("Gazprom Increased the Gas Price for Ukraine by 43.5 Percent"), BBC, April 1, 2014, available from *www.bbc.co.uk/russian/business/2014/04/140401_gazprom_ukraine_gas_price_rise*, accessed December 13, 2014.

69. "Naftogaz of Ukraine should take urgent action to settle accumulated debt," *Official website of Gazprom*, April 3, 2014, available from *www.gazprom.com/press/news/2014/april/article187689/*, accessed May 3, 2015.

70. "Natsionalnaya aktsionernaya kompaniya 'Naftogaz Ukrainy' rasschitalas s OAO 'Gazprom' za importirovannyy v yanvare 2014 goda prirodnyy gaz" ("The National Joint Stock Company 'Naftogaz Ukrainy' Has Paid 'Gazprom' for the Natural Gas Imported in January 2014"), *Official Website of Naftogaz*, March 6, 2014, available from *www.naftogaz.com/www/3/nakwebru.nsf/0/08CEFD148E4BE899C2257C930045FC6A?OpenDocument&year=2014&month=03&nt=%D0%9D%D0%BE%D0%B2%D0%BE%D1%81%D1%82%D0%B8&*, accessed December 13, 2014.

71. "Ukraina ne priznayot rossiyskoy tseny na gaz i grozit Yevrope problemami s postavkami" ("Ukraine Does Not Recognize the Russian Gas Price and Threatens Europe with Problems with Gas Supplies"), *Vedomosti*, March 9, 2014, available from *www.vedomosti.ru/companies/news/25086201/rossiya-ne-poluchaet-deneg-evropa-mozhet-ne-poluchit-gaz*, accessed December 13, 2014.

72. "Na Ukraine gaz dlya naseleniya podorozhal boleye chem v 1,5 raza" ("Gas for the Ukrainian Population Got More Than 1.5 Times As Expensive"), *ITAR-TASS*, May 1, 2014, available from *itar-tass.com/ekonomika/1161012*, accessed December 13, 2014.

73. "V Ukraine rezko vyrosli tarify ZhKKh: gaz podorozhal vtroye, a elektrichestvo teper bez kompensatsiy" ("Prices for Utilities Went Up Sharply in Ukraine: Gas Went Up by Three Times and Electricity Is No Longer Subsidized"), *Segodnya.ua*, April 1,

2015, available from *www.segodnya.ua/economics/gkh/v-ukraine-rezko-vyrosli-tarify-zhkh-gaz-podorozhal-vtroe-a-elektrichestvo-teper-bez-kompensaciy-604436.html*, accessed May 3, 2015.

74. "Ukraina soobshchaet, chto zaplatila chast dolga za gaz, zayavil Medvedev" ("Ukraine Says to Have Paid Part of the Gas Debt, Medvedev Said"), *RIA Novosti*, May 30, 2014, available from *ria.ru/economy/20140530/1010051559.html*, accessed December 13, 2014.

75. "Ukraina na poroge otklyucheniya gaza: "Gazprom" gotovit rezhim predoplaty" ("Ukraine on the Verge of a Gas Cutoff: Gazprom Is Preparing a Regime of Advance Payments"), *RIA Novosti*, June 16, 2014, available from *ria.ru/economy/20140616/1012135887.html*, accessed December 13, 2014.

76. "'Gazprom' vvyol rezhim predoplaty za gaz dlya Ukrainy" ("'Gazprom' Has Introduced a Regime of Advance Payments for Ukraine"), *RIA Novosti*, June 16, 2014, available from *ria.ru/economy/20140616/1012154846.html*, accessed December 13, 2014.

77. "'Gazpromu' razreshat vzaimozachet s 'Naftogazom'" ("'Gazprom' to Be Allowed to Mutual Clearing with 'Naftogaz'"), *INTERFAX*, October 2, 2014, available from *www.interfax.ru/business/399947*, accessed December 13, 2014.

78. "Kyiv nameren prosit arbitrazh v Stokgolme o vremennoy cene na gaz RF" ("Kyiv to File an Arbitrage on the Interim Russian Gas Price"), *RIA Novosti*, October 8, 2014, available from *ria.ru/economy/20141008/1027408207.html*, accessed December 13, 2014.

79. "'Naftogaz' podal isk k 'Gazpromu' po tranzitnomu kontraktu" ("'Naftogaz' Filed a Lawsuit against 'Gazprom' regarding the Transit Contract"), *INTERFAX*, October 14, 2014, available from *www.interfax.ru/business/401808*, accessed December 13, 2014.

80. "Kabmin rekomendoval 'Naftogazu' provesti peregovory s 'Gazpromom' o peresmotre tarifov na tranzit—postanovleniye" ("The Cabinet of Ministers Recommended 'Naftogaz' to Conduct Talks with 'Gazprom' on Reviewing the Transit Tariffs—Resolu-

tion"), *Interfax Ukraine*, October 9, 2014, available from *interfax.com.ua/news/economic/227872.html*, accessed May 3, 2015.

81. "Rossiya i Ukraina dogovorilis ob usloviyakh postavok gaza do marta 2015g," ("Russia and Ukraine Agreed on the Conditions of Gas Supplies until March 2015"), *RBK*, October 31, 2014, available from *top.rbc.ru/economics/31/10/2014/5452b09dcbb20f22f24607a5*, accessed December 13, 2014.

82. "Protokol lebedya, raka i shchuki" ("A Protocol of a Swan, a Crawfish and a Pike"), *Kommersant*, October 31, 2014, available from *www.kommersant.ru/Doc/2602592*, accessed December 13, 2014.

83. "Entretien téléphonique du président et de la chancelière Angela Merkel avec les présidents russe et ukrainien" ("A Telephone Meeting of the President and the Chancellor with the Presidents of Russia and Ukraine"), *Official Website of the French President*, October 30, 2014, available from *www.elysee.fr/communiques-de-presse/article/entretien-telephonique-du-president-et-de-la-chanceliere-angela-merkel-avec-les-presidents-russe-et-ukrainien/*, accessed December 13, 2014.

84. "Memorandum of Understanding on Macro-Financial Assistance Programme for Ukraine signed," European Commission, April 28, 2014, available from *europa.eu/rapid/press-release_IP-14-488_en.htm*, accessed May 3, 2015.

85. Adrian Croft, "EU governments back 1.8 billion euro Ukraine loan," Reuters, March 31, 2015, available from *www.reuters.com/article/2015/03/31/us-ukraine-crisis-eu-loans-idusbn0mr24s20150331*, accessed May 3, 2015.

86. "EU Gives Ukraine $267 Million in Low Interest Loans," *The New York Times*, April 21, 2015, available from *www.nytimes.com/aponline/2015/04/21/world/europe/ap-eu-europe-ukraine.html*, accessed May 3, 2015.

87. "'Naftogaz Ukrainy' perechislil Gazpromu vtoruyu chast dolga v $1,65 mlrd" ("'Ukraine's Naftogaz' Sent Gazprom the Second Part of the Debt in the Amount of $1.65 Billion"), *Russia Today*, December 24, 2014, available from *russian.rt.com/article/66090*, accessed May 3, 2015.

88. "Naftogaz pererakhuvav Gazpromu 378 mln. dol. peredoplaty za gaz" ("Naftogaz Sent Gazprom an Advance Payment of $378 Million for Gas"), *Official Website of Naftogaz*, December 5, 2014, available from *www.naftogaz.com/www/3/nakweb.nsf/0/56C2F85FA08CE077C2257DA50074AC29?OpenDocument&year=2014&month=12&nt=%D0%9D%D0%BE%D0%B2%D0%B8%D0%BD%D0%B8&*, accessed December 13, 2014.

89. "Ukraina zhdet vozobnovleniya postavok rossiyskogo gaza 11 dekabrya" ("Ukraine Is Expecting Russian Gas Supplies to Resume on December 11"), *Vedomosti*, December 8, 2014, available from *www.vedomosti.ru/companies/news/37004141/gazprom-zhdet-zayavki-ot-naftogaza-dlya-vozobnovleniya*, accessed December 13, 2014.

90. "Ukraina vozobnovila import rossiyskogo gaza" ("Ukraine Resumed Russian Gas Imports"), *Forbes*, December 9, 2014, available from *www.forbes.ru/news/275253-ukraina-vozobnovila-import-rossiiskogo-gaza*, accessed December 13, 2014.

91. Robin Wigglesworth and Roman Olearchyk, "Ukraine's economy: Broken down," *Financial Times*, August 20, 2014, available from *www.ft.com/intl/cms/s/63e0a202-26fb-11e4-a46a-00144feabdc0,Authorised=false.html*, accessed May 3, 2015.

92. "Ukraina - mirovoy lider po energoyomkosti VVP" ("Ukraine Is the World Leader in the Energy Intensity of Its GDP"), *Finance.ua*, December 11, 2014, available from *news.finance.ua/ru/news/-/340429/ukraina-mirovoj-lider-po-energoemkosti-vvp*, accessed May 3, 2015.

93. "Zubkov: u ES malo vremeni na podgotovku infrastruktury dlya polucheniya gaza v obkhod Ukrainy" ("Zubkov: the EU Has Little Time to Get Its Infrastructure Ready for Receiving Gas Bypassing Ukraine"), *ITAR-TASS*, January 28, 2015, available from *tass.ru/ekonomika/1727345*, accessed May 3, 2015.

94. Igor Ilic, "Croatia restarts preparations for LNG terminal at Krk," Reuters, November 4, 2014, available from *www.reuters.com/article/2014/11/04/croatia-lng-idAFL6N-0SU2PS20141104*, accessed December 13, 2014.

95. "Slovensko je na odstávku plynu pripravené lepšie ako v roku 2009" ("Slovakia Is Better Prepared for a Gas Cut-off than in 2009"), *Hospodárske noviny*, September 5, 2014, available from *hn.hnonline.sk/ekonomika-a-firmy-117/slovensko-je-na-odstavku-plynu-pripravene-lepsie-ako-v-roku-2009-629151*, accessed December 13, 2014.

96. "Transmission has started on Hungarian-Croatian interconnector pipeline," *The Official Website of FGSZ*, August 8, 2011, available from *fgsz.hu/en/news/transmission-has-started-hungarian-croatian-interconnector-pipeline-0*, accessed December 13, 2014.

97. "Conscious uncoupling," *The Economist*, April 3, 2014, available from *www.economist.com/news/briefing/21600111-reducing-europes-dependence-russian-gas-possiblebut-it-will-take-time-money-and-sustained*, accessed December 13, 2014.

98. "Prepojením slovenských a maďarských plynovodov sa podstatne zvýši energetická bezpečnosť našich krajín" ("The Interconnection of the Slovak and Hungarian Gas Pipelines Will Substantially Increase the Energy Security of Our Countries"), *The Official Website of the Slovak Government*, March 27, 2014, available from *www.vlada.gov.sk/prepojenim-slovenskych-a-madarskych-plynovodov-sa-podstatne-zvysi-energeticka-bezpecnost-nasich-krajin/*, accessed December 13, 2014.

99. "Plynovod s Maďarskom spustia v budúcom roku" ("The Gas Interconnection with Hungary to Be Launched Next Year"), *SME*, November 24, 2014, available from *ekonomika.sme.sk/c/7511210/plynovod-s-madarskom-spustia-v-buducom-roku.html*, accessed December 13, 2014.

100. "Plynovod z Maďarska na Slovensko by mohol začať fungovať v januári" ("The Gas Pipeline from Hungary to Slovakia Should Be Launched in January"), *Pravda*, January 8, 2015, available from *spravy.pravda.sk/ekonomika/clanok/341716-plynovod-z-madarska-na-slovensko-by-mohol-zacat-fungovat-v-januari/*, accessed May 3, 2015.

101. "Plynovod s Maďarskom spustia v budúcom rokuTest slovensko-maďarského plynovodu sa môže predĺžiť" ("The Test Phase of the Slovak-Hungarian Gas Interconnection with

Hungary to Pipeline May Be Launched Next Year Extended"), *SME*, November 24, 2014, April 20, 2015, available from *ekonomika.sme.sk/c/7511210/plynovod-s-madarskom-spustia-v-buducomroku7761992/test-slovensko-madarskeho-plynovodu-sa-moze-predlzit.html*, accessed May 3, 2015.

102. Ivan Haluza, "Nové detaily: Slovensko už má projekt napojenia na zemný plyn z Poľska" ("New Details: Slovakia Already Has a Project of Connecting to Natural Gas from Poland"), *Trend*, October 28, 2014, available from *www.etrend.sk/ekonomika/slovensko-uz-ma-projekt-napojenia-na-zemny-plyn-z-polska.html*, accessed December 13, 2014.

103. "Sovfed rassmotrit ispolnenie federalnogo byudzheta za 2013 god" ("The Council of the Federation to Review the Implementation of the 2013 Budget"), *RIA Novosti*, October 1, 2014, available from *ria.ru/economy/20141001/1026335373.html*, accessed December 13, 2014.

104. "Neftegazovye dokhody byudzheta RF v 2015 godu prevysyat 7 trln rubley" ("Oil and Gas Revenues of the Russian State Budget to Exceed 7 Trillion Rubles in 2015"), *Rossiyskaya Gazeta*, October 1, 2014, available from *www.rg.ru/2014/10/01/dohodi-siteanons.html*, accessed December 13, 2014.

105. "Minfin RF rasschityvayet vyyti na bezdeficitnyy byudzhet v 2014 godu" ("The Russian Finance Ministry Is Planning to Achieve a Balanced Budget in 2014"), *RIA Novosti*, September 14, 2014, available from *ria.ru/economy/20140914/1024044334.html*, accessed December 13, 2014.

106. Konstantin Bogdanov, "Eshhe 30 trillionov etomu stoliku!" ("30 More Trillions to This Little Desk!"), *Lenta.Ru*, December 23, 2014, available from *lenta.ru/articles/2014/12/23/needmoar/*, accessed May 3, 2015.

107. "Quarterly Report Energy on European Gas Markets: fourth quarter of 2014."

108. "Kazakhstan vyigrayet ot «gazovoy» sdelki Rossii i KNR" ("Kazakhstan to Benefit from the Russia-China Gas Deal"), *Zakon.Kz*, May 26, 2014, available from *fin.zakon.kz/4627070-kazakhstan-vyigraet-ot-gazovojj-sdelki.html*, accessed December 13, 2014.

109. "China's Shale Production Falls Short, but Goals Remain in Place," *Forbes*, August 19, 2014, available from *www.forbes.com/sites/stratfor/2014/08/19/chinas-shale-production-falls-short-but-goals-remain-in-place/*, accessed May 3, 2015.

110. "Gaz iz RF poydet v Kitaj cherez Kazakhstan" ("Gas from Russia to Go to China through Kazakhstan"), *Nezavisimaya Gazeta*, August 29, 2014, available from *www.ng.ru/cis/2014-08-29/1_gas.html*, accessed December 13, 2014.

111. Henning Gloystein, "Europe drafts emergency energy plan with eye on Russia gas shut-down," Reuters, September 1, 2014, available from *uk.reuters.com/article/2014/09/01/uk-ukraine-crisis-russia-gas-idUKKBN0GW2DX20140901*, accessed December 13, 2014.

112. REGULATION (EU) No 994/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of October 20, 2010, available from *eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:295:0001:0022:EN:PDF*, accessed December 13, 2014.

113. Natalia Zinets, "Ukraine warns Europe of Russian gas cut-off, Moscow denies," Reuters, August 27, 2014, available from *www.reuters.com/article/2014/08/27/us-ukraine-crisis-gas-idUSKBN0GR0W120140827*, accessed December 13, 2014.

114. "Polsha vozobnovila revers gaza na Ukrainu" ("Poland Has Renewed the Reverse Gas Flow to Ukraine"), BBC, September 12, 2014, available from *www.bbc.co.uk/russian/international/2014/09/140912_poland_gas_ukraine*, accessed December 13, 2014.

115. "Fico: Ukrajina tlačí Slovensko do veľkého reverzného toku" ("Fico: Ukraine Is Pushing Slovakia into the Big Reverse Flow"), *SME*, April 25, 2014, available from *ekonomika.sme.sk/c/7182105/fico-ukrajina-tlaci-slovensko-do-velkeho-reverzneho-toku.html*, accessed May 3, 2015.

116. Michal Holeš, "Rokovania o plyne pre Ukrajinu pokračujú aj v sobotu" ("Negotiations on the Gas for Ukraine to Continue on Saturday"), *Pravda*, April 26, 2014, available from *spravy.pravda.sk/ekonomika/clanok/315866-rokovania-o-plyne-pre-ukrajinu-pokracuju-aj-v-sobotu/*, accessed December 13, 2014.

117. Michal Holeš, "Plyn po 47 rokoch otočíme na východ" ("We Will Redirect the Gas to the East after 47 Years"), *Pravda*, April 28, 2014, available from *spravy.pravda.sk/ekonomika/clanok/316044-slovensko-podpisalo-memorandum-s-ukrajinou-o-dodavkach-plynu/*, accessed December 13, 2014.

118. "Poland resumes gas supplies to Ukraine," *Daily Mail*, September 12, 2014, available from *www.dailymail.co.uk/wires/reuters/article-2753591/Poland-resumes-gas-supplies-Ukraine.html*, accessed May 3, 2015.

119. "Slovakiya nachala revers gaza na Ukrainu" ("Slovakia Has Launched a Reverse Flow of Gas to Ukraine"), *RBK*, September 2, 2014, available from *top.rbc.ru/economics/02/09/2014/946553.shtml*, accessed December 13, 2014.

120. "Spätný tok na Ukrajinu pôjde na maximum" ("The Reverse Flow to Ukraine to Go at Its Maximum Capacity"), *Hospodárske noviny*, July 9, 2014, available from *hn.hnonline.sk/ekonomika-a-firmy-117/spatny-tok-na-ukrajinu-pojde-na-maximum-623421*, accessed December 13, 2014.

121. "Cez reverz na Ukrajinu pretiekli už milióny kubíkov plynu" ("Millions of Cubic Meters of Gas Have Already Flown to Ukraine"), *Pravda*, September 9, 2014, available from *spravy.pravda.sk/ekonomika/clanok/329352-cez-reverz-na-ukrajinu-pretekli-uz-miliony-kubikov-plynu/*, accessed May 3, 2015.

122. Linda Nagyová, "Slovensko dáva Ukrajine viac plynu, Rusi menej" ("Slovakia Is Giving Ukraine More Gas, While Russia Is Giving Less"), *Pravda*, March 3, 2015, available from *spravy.pravda.sk/ekonomika/clanok/347455-slovensko-dava-ukrajine-viac-plynu-rusi-menej/*, accessed May 3, 2015.

123. "Revers gaza na Ukrainu iz YeS upal iz-za zakachki v PKhG Vengrii" ("The Reverse Flow of Gas to Ukraine from the EU Fell Due to Hungary Refilling of Its Underground Gas Reservoirs"), *RIA Novosti*, July 23, 2014, available from *ria.ru/economy/20140723/1017251189.html*, accessed December 13, 2014.

124. "Vengriya ostanovila revers gaza na Ukrainu" ("Hungary Stopped Its Reverse Gas Flow to Ukraine"), *Vesti*, Septem-

ber 26, 2014, available from *www.vestifinance.ru/articles/47472*, accessed December 13, 2014.

125. Krisztina Than, "Hungary to import more gas from Gazprom, says PM Orban," Reuters, September 26, 2014, available from *www.reuters.com/article/2014/09/26/hungary-gas-orban-idUSL6N0RR1S020140926*, accessed May 3, 2015.

126. Boyan Kavalov and Nathan Pelletier, "Shale Gas for Europe–Main Environmental and Social Considerations," The European Commission, 2012, p. 4, available from *publications.jrc.ec.europa.eu/repository/bitstream/111111111/26691/1/lbna25498enn.pdf,* accessed December 13, 2014.

127. Charles W. Schmidt, "Blind Rush? Shale Gas Boom Proceeds Amid Human Health Questions," Bethesda, MD: U.S. National Institute of Health, August 1, 2011, U.S. National Institute of Health, *ehp.niehs.nih.gov/119-a348/*, accessed May 3, 2015.

128. "Impacts of shale oil extraction on the environment and on human health," *European Parliament Directorate-General for Internal Policies*, 2011, p. 19, U.S. National Institute of Health, *www.europarl.europa.eu/document/activities/cont/201107/20110715ATT24183/20110715ATT24183EN.pdf*, accessed December 13, 2014.

129. Sophie Pilgrim, "French lawmakers ban controversial shale gas drilling," *France 24*, May 11, 2011, available from *www.france24.com/en/20110511-france-votes-ban-shale-gas-drilling-fracking-ump-sarkozy/*, accessed December 13, 2014.

130. "Shale Gas—A Global Perspective," *KPMG Global Energy Institute*, 2011, available from *www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/shale-gas-global-perspective.pdf*, accessed December 13, 2014.

131. "In Europe: Denmark, France and the United Kingdom," *The Official Website of Total*, No Date, available from *www.total.com/en/energies-savoir-faire/petrole-gaz/exploration-production/secteurs-strategiques/gaz-non-conventionnels/focus-gaz-de-schiste/total-un-deploiement-international/europe-denmark-france-and-united-kingdom?%FFbw=kludge1%FF*, accessed December 13, 2014.

132. Anna Koper, "Poland cuts estimate for shale gas exploration wells," Reuters, July 31, 2014, available from *www.reuters.com/article/2014/07/31/poland-shalegas-minister-idUKL6N0Q438P20140731*, accessed December 13, 2014.

133. "Assessment of Shale Gas and Shale Oil Resources of the Lower Paleozoic Baltic-Podlasie-Lublin Basin in Poland," Warsaw, Poland: Polish Geological Institute, March 2012, p. 25, available from *www.pgi.gov.pl/pl/dokumenty-in-edycja/doc_view/769-raport-en.html*, accessed May 3, 2015.

134. "Mad and messy regulation," *The Economist*, July 10, 2013, available from *www.economist.com/blogs/easternapproaches/2013/07/shale-gas-poland*, accessed December 13, 2014.

135. "ExxonMobil Leaves Poland Guessing," *Natural Gas Europe*, June 20, 2012, available from *www.naturalgaseurope.com/exxonmobil-leaves-poland-shale-gas*, accessed May 3, 2015.

136. "North American firms quit shale gas fracking in Poland," BBC News, May 8, 2013, available from *www.bbc.com/news/business-22459629*, accessed May 3, 2015.

137. "The position of the Polish Geological Institute on shale gas production profitability," Warsaw, Poland: The Polish Geological Institute, February 9, 2011, available from *www.pgi.gov.pl/en/all-events/3553-the-position-of-the-polish-geological-institute-on-shale-gas-production-profitability*, accessed December 13, 2014.

138. Michael Kahn, Gabriela Baczynska, Braden Reddall, Melissa Akin, and Vladimir Soldatkin, "Insight: Poland's shale gas play takes on Russian power," Reuters, February 9, 2012, available from *www.reuters.com/article/2012/02/09/us-poland-shalegas-idUSTRE8180PM20120209*, accessed May 3, 2015.

139. "Poland on road to EU Court over shale gas defiance," *Euractiv*, July 30, 2014, available from *www.euractiv.com/sections/energy/poland-road-eu-court-over-shale-gas-defiance-303798*, accessed May 3, 2015.

140. *Ibid*.

141. "Zestawienie podmiotów posiadających koncesje dotyczące gazu z łupków" ("List of Entities Holding Licenses for Shale Gas"), *Official Website of the Ministry of the Environment of the Republic of Poland*, December 1, 2014, available from *lupki.mos.gov.pl/pliki/201412/12-14-podmioty.pdf*, accessed May 3, 2015.

142. "Poland Needs Four Years to Know Shale Gas Profitability, Says Minister," *Natural Gas Europe*, December 6, 2013, available from *www.naturalgaseurope.com/poland-shale-gas-profitability-minister*, accessed May 3, 2015.

143. "Europe's energy position: present & future," *European Commission Market Observatory for Energy*, 2008, p. 30, available from *ec.europa.eu/energy/publications/doc/2008_moe_maquette.pdf*, accessed December 13, 2014.

144. "Hungarian gas TSO FGSZ to push ahead with east-west link," *Platts*, November 7, 2014, available from *www.platts.com/latest-news/natural-gas/budapest/hungarian-gas-tso-fgsz-to-push-ahead-with-east-21517944*, accessed December 13, 2014.

145. Luiza Ilie, "Romania does not have shale gas, PM Ponta says," Reuters, November 9, 2014, available from *www.reuters.com/article/2014/11/10/romania-shalegas-idUSL6N0SZ1A720141110*, accessed December 13, 2014.

146. "Ukraine Says Gas Output Growth Limited After Crimea Loss," *Bloomberg*, September 10, 2014, available from *www.bloomberg.com/news/2014-09-10/ukraine-says-gas-output-growth-limited-after-crimea-loss.html*, accessed December 13, 2014.

147. "Yanukovich: K 2020 godu Ukraina smozhet polnostyu obespechit' sebya gazom" ("Yanukovich: Ukraine Will Be Self Sufficient in Terms of Gas by 2020"), *Pravda*, November 5, 2013, available from *www.pravda.com.ua/rus/news/2013/11/5/7001433/*, accessed December 13, 2014.

148. "Zhivi, Ukraino!" ("Live, Ukraine!"), *Journal of Gazprom*, No. 1–2, 2014, p. 7, available from *www.gazprom.ru/f/posts/39/568209/gazprom-magazine-2014-1-2.pdf*, accessed December 13, 2014.

149. Christopher Glover, "Christopher Glover: Yatsenyuk's kamikaze energy policy," *Kyiv Post*, February 17, 2015, available from *www.kyivpost.com/opinion/op-ed/c-hristopher-glover-yatsenyuks-kamikaze-energy-policy-380965.html*, accessed May 3, 2015.

150. Robert Bensh, "Robert Bensh: How new tax increases will kill Ukraine's chance to gain energy independence," *Kyiv Post*, January 15, 2015, available from *www.kyivpost.com/opinion/op-ed/robert-bensh-how-new-tax-increases-will-kill-ukraines-chance-to-gain-energy-independence-377515.html*, accessed May 3, 2015.

151. Marina Zvonareva, "'For Better Relations with Russia, Ukraine Needs Independence'—Ariel Cohen," *Natural Gas Europe*, March 16, 2015, *www.naturalgaseurope.com/ariel-cohen-ukraine-enery-future-22574*, accessed May 3, 2015.

152. "Zamministra ekonomiki Sasha Borovik uvolnyaetsya iz-za Yatsenyuka" ("Sasha Borovik, Deputy Minister of the Economy, leaves because of Yatsenyuk"), *Podrobnosti*, May 14, 2015, available from *podrobnosti.ua/2034203-zamministra-ekonomiki-sasha-borovik-uvolnjaetsja-iz-za-jatsenjuka.html*, accessed May 16, 2015.

153. Ariel Cohen, "Ukraine's Tax Hike Will Strangle the Domestic Oil and Gas Sector," *Natural Gas Europe*, March 10, 2015, available from *www.naturalgaseurope.com/ukraines-tax-hike-will-strangle-domestic-oil-and-gas-sector-22596*, accessed May 3, 2015.

154. Daryna Krasnolutska and Anna Shiryaevskaya, "Ukraine Says Gas Output Growth Limited After Crimea Loss," *Bloomberg*, September 10, 2014, available from *www.bloomberg.com/news/articles/2014-09-10/ukraine-says-gas-output-growth-limited-after-crimea-loss*, accessed May 3, 2015.

155. Pavel Polityuk, "Ukraine sees 2017 for commercial shale gas output," Reuters, May 16, 2012, available from *www.reuters.com/article/2012/05/16/ukraine-gas-shale-idUSL5E8GGAJY20120516*, accessed December 13, 2014.

156. Roman Olearchyk, "Chevron pulls out of shale gas project in Ukraine," *Financial Times*, December 15, 2014, available from *www.ft.com/intl/cms/s/0/76b41d9c-847e-11e4-ba4f-00144feabdc0.html*, accessed May 3, 2015.

157. "Ukraine picks Shell, Chevron to develop shale gas fields," Reuters, May 11, 2012, available from *www.reuters.com/article/2012/05/11/shell-chevron-ukraine-idUSL5E8GBAE020120511*, accessed May 3, 2015.

158. *Ibid*.

159. "Shell beryot pauzu v vypolnenii nekotorykh obyazatelstv na Ukraine" ("Shell Is Taking a Break in Fulfilling Some of its Obligations in Ukraine"), *RIA Novosti*, August 20, 2014, available from *ria.ru/economy/20140820/1020729705.html*, accessed May 3, 2015.

160. "Kompaniya Shell ne sobiraetsya prekrashhat' dobychu gaza na Ukraine" ("Shell Not To Stop Its Gas Exploitation in Ukraine"), *RIA Novosti*, September 12, 2014, available from *ria.ru/world/20140912/1023866551.html*, accessed May 3, 2015.

161. "UNIAN: kompaniya Chevron nachnet dobychu slantsevogo gaza na Ukraine" ("UNIAN: Chevron to Launch Shale Gas Production in Ukraine"), *RIA Novosti*, October 7, 2014, available from *ria.ru/world/20141007/1027343699.html*, accessed December 13, 2014.

162. Maxim Shaligyn, "Za slantsy Ukrainy" ("For Ukraine's Shale Gas"), *IAREX*, July 9, 2014, available from *www.iarex.ru/articles/49090.html*, accessed December 13, 2014.

163. "Central and Eastern European Shale Gas Outlook: Country Profiles," *KPMG*, 2012, p. 19, available from *www.kpmg.com/CEE/en/IssuesAndInsights/ArticlesPublications/Documents/cee-shale-gas-outlook-section-03.pdf*, accessed May 3, 2015.

164. "Projections show U.S. becoming a net exporter of natural gas," *U.S. Energy Information Administration*, April 28, 2015, available from *www.eia.gov/todayinenergy/detail.cfm?id=20992*, accessed May 3, 2015.

165. "In Response to Russian Aggression, Key Central European Nations Plead for U.S. Natural Gas," *Official Website of the Speaker of the U.S. House of Representatives*, Washington, DC, March 8, 2014, available from *www.speaker.gov/press-release/response-rus-*

sian-aggression-key-central-european-nations-plead-us-natural-gas-exports, accessed December 13, 2014.

166. "Long Term Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States (as of November 14, 2014)," Washington, DC: The U.S. Department of Energy, available from *energy.gov/sites/prod/files/2014/11/f19/Long%20Term%20LNG%20Export%20Concise%20Summary%20Table%2011-14-14.pdf*, accessed December 13, 2014.

167. "Bernstein Research sees room for only 6-7 Bcf/d of US LNG exports," *Platts*, May 1, 2014, available from *www.platts.com/latest-news/shipping/washington/bernstein-research-sees-room-for-only-6-7-bcfd-21564587*, accessed December 13, 2014.

168. "Long Term Applications Received by DOE/FE to Export," Washington, DC: U.S. Department of Energy, May 13, 2015, available from *energy.gov/sites/prod/files/2015/05/f22/Summary%20of%20LNG%20Export%20Applications.pdf*, accessed June 20, 2015.

169. "North American LNG Import /Export Terminals," Washington, DC: U.S. Federal Energy Regulatory Commission, June 18, 2015, available from *www.ferc.gov/industries/gas/indus-act/lng/lng-approved.pdf*, accessed June 20, 2015.

170. See *www.usatoday.com/story/news/nation/2014/04/07/us-natural-gas-exports-to-begin/7204925/*, accessed December 13, 2014.

171. "Sabine Pass LNG Terminal," *Official Website of Cheniere*, available from *www.cheniere.com/terminals/sabine-pass/*.

172. Zain Shauk, "U.S. Natural Gas Exports Will Fire Up in 2015," *Businessweek*, November 06, 2014, available from *www.businessweek.com/articles/2014-11-06/u-dot-s-dot-natural-gas-exports-will-fire-up-in-2015*, accessed December 13, 2014.

173. Anne-Sophie Corbeau, "Gas Medium-Term Market Report 2014," Paris, France: International Energy Agency, p. 17, available from *csis.org/files/attachments/140708_Corbeau.pdf*, accessed December 13, 2014.

174. Thierry Deschuyteneer, "LNG import potential to Europe," *IFRI*, April 29, 2014, available from *www.ifri.org/downloads/comptes_rendu/fichiers/150/deschuyteneer28414final.pdf*, accessed December 13, 2014.

175. "Medium-term Gas Market Report 2014—Executive Summary," Paris, France: International Energy Agency, 2014, available from *www.iea.org/Textbase/npsum/MTGMR2014SUM.pdf*, accessed December 13, 2014.

176. "Platts JKM™ for April-delivered LNG fell 59.8% year over year on weak demand," *Platts*, March 17, 2015, available from *www.platts.com/pressreleases/2015/031715*, accessed May 3, 2015.

177. Max Gostelow "Platts June Japan Korea Marker (JKM) edges up to $7.175/MMBtu in shorter trading week," *Platts*, April 30, 2015, available from *www.platts.com/latest-news/natural-gas/singapore/platts-june-japan-korea-marker-jkm-edges-up-to-26078040*, accessed May 3, 2015.

178. Eric Yep, "Oil-Price Slide Hits LNG Markets," *The Wall Street Journal*, January 30, 2015, available from *www.wsj.com/articles/oil-price-slide-hits-lng-markets-1422592823*, accessed May 3, 2015.

179. "First Japanese nuclear power plant since Fukushima to resume operations," *The Guardian*, November 7, 2014, available from *www.theguardian.com/world/2014/nov/07/japanese-nuclear-power-plant-fukushima-restart*, accessed May 3, 2015.

180. Osamu Tsukimori, "Japan's Kyushu hopes to restart reactor in July: company official," Reuters, March 19, 2015, available from *www.reuters.com/article/2015/03/19/us-japan-nuclear-restarts-idUSKBN0MF0TP20150319*, accessed May 3, 2015.

181. Lamine Chikhi, "Dozens held after Islamists attack Algerian gas field," Reuters, January 16, 2013, available from *www.reuters.com/article/2013/01/16/uk-algeria-kidnap-idUKBRE90F0IN20130116*, accessed December 13, 2014.

182. "Al Qaeda's North African wing claims two Algerian attacks," Reuters, June 8, 2015, available from *www.reuters.com/article/2015/06/08/ozatp-us-algeria-security-idAFKBN0OO0GZ20150608*, accessed June 20, 2015.

183. "Platts: Nigeria promises to meet EU's long term gas supply needs," *Natural Gas Europe*, June 25, 2014, available from *www.naturalgaseurope.com/nigeria-gas-supply-to-eu*, accessed December 13, 2014.

184. "Our LNG," *Official Website of Nigeria LNG Limited*, available from *www.nigerialng.com/PageEngine.aspx?&id=37*, accessed December 13, 2014.

185. "The Brass LNG Project (Nigeria)," *Official Website of Total*, No Date, available from *www.total.com/en/energies-expertise/oil-gas/exploration-production/projects-achievements/lng/brass-lng?%FFbw=kludge1%FF*, accessed December 13, 2014.

186. "About Us," *Official Website of Angola LNG*, available from *www.angolalng.com/project/aboutLNG.htm*, accessed December 13, 2014.

187. Ernest Scheyder, "Chevron vows to use 'lessons learned' after Angola LNG missteps," Reuters, September 18, 2014, available from *www.reuters.com/article/2014/09/18/us-chevron-angola-idUSKBN0HD11P20140918*, accessed December 13, 2014.

188. "Chevron still sees Angola LNG startup by year-end," *LNG World News*, May 5, 2015, available from *www.lngworldnews.com/chevron-still-sees-angola-lng-startup-by-year-end/*, accessed May 3, 2015.

189. "Mozambique Gas Development Project—Project Description," *Official Website of the Mozambique Gas Development Project*, p. 5, available from *www.mzlng.com/docs/ProjectDescriptionEnglishbrochure.pdf*, accessed December 13, 2014.

190. "Mozambique Gas Bonanza Hinges on State Finishing LNG Laws," *Bloomberg*, October 15, 2014, available from *www.bloomberg.com/news/2014-10-14/mozambique-s-gas-bonanza-hinges-on-government-finishing-lng-law.html*, accessed December 13, 2014.

191. Oleg Vukmanovic and Jacob Gronholt-Pedersen, "Exclusive: Asian buyers line up for Mozambican LNG with new deals," Reuters, October 30, 2014, available from *www.reuters.com/article/2014/10/31/us-mozambique-lng-anadarko-petrol-exclus-idUSKBN0IJ1V320141031*, accessed December 13, 2014.

192. Allison Good, "A False Hope: Eastern Mediterranean Gas through Greece and Cyprus," *The National Interest*, June 2, 2014, available from *nationalinterest.org/feature/false-hope-eastern-mediterranean-gas-through-greece-cyprus-10577*, accessed December 13, 2014.

193. *Ibid*.

194. Alkman Granitsas, "Cyprus, Turkey Braced For New Fight Over Gas Reserves," *The Wall Street Journal*, October 10, 2014, available from *www.wsj.com/articles/cyprus-turkey-braced-for-new-row-over-gas-reserves-1412957632*, accessed May 3, 2015.

195. Michele Kambas, "Israel says backs Cyprus gas exploration in east Med," Reuters, November 5, 2014, available from *www.reuters.com/article/2014/11/05/cyprus-israel-natgas-idUSL6N0SV3NZ20141105*, accessed December 13, 2014.

196. Alkman Granitsas, "Cyprus, Turkey Braced For New Fight Over Gas Reserves," *The Wall Street Journal*, October 10, 2014, available from *online.wsj.com/articles/cyprus-turkey-braced-for-new-row-over-gas-reserves-1412957632*, accessed December 13, 2014.

197. "IHH's Deep, Longstanding Terror Ties," *The Investigative Project on Terrorism*, June 9, 2010, available from *www.investigativeproject.org/1998/ihhs-deep-longstanding-terror-ties*, accessed May 3, 2015.

198 . "Drill, or quarrel?" *The Economist*, January 12, 2013, available from *www.economist.com/news/business/21569452-politics-could-choke-supplies-big-new-offshore-gasfields-drill-or-quarrel*, accessed May 3, 2015.

199. Granitsas.

200. "Shah Deniz Stage 1," *Official website of British Petroleum*, No Date, available from *www.bp.com/en_az/caspian/operationsprojects/Shahdeniz/SDstage1.html*, accessed June 20, 2015.

201. "Shah Deniz Stage 2," *Official website of British Petroleum*, No Date, available from *www.bp.com/en_az/caspian/operationsprojects/Shahdeniz/SDstage2.html*, accessed June 20, 2015.

202. David Koranyi, "Southern Gas Corridor: Godot Finally Comes?" *The Huffington Post*, April 6, 2013, available from *www.huffingtonpost.com/david-koranyi/southern-gas-corridor_b_3383805.html*, accessed December 13, 2014.

203. "Azerbaijan planning third stage of Shah Deniz project after 2025," Reuters, March 12, 2014, available from *www.reuters.com/article/2014/03/12/azerbaijan-energy-idAFL6N0M93O620140312*, accessed December 13, 2014.

204. "European Commission reaffirms joint commitment to have Turkmenistan engaged in Southern Gas Corridor," *APA Economics*, May 2, 2015, available from *en.apa.az/xeber_european_commission_reaffirms_joint_comm_226554.html*, accessed May 3, 2015.

205. Huseyn Hasanov, "Turkmenistan interested in TANAP gas pipeline project," *Trend.az*, April 22, 2015, available from *en.trend.az/casia/turkmenistan/2386542.html*, accessed May 3, 2015.

206. Zaur Shiriyev, "Turkmenistan, Turkey and Azerbaijan: A Trilateral Energy Strategy?" *Jamestown*, March 11, 2015, available from *www.jamestown.org/single/?tx_ttnews[tt_news]=43646&tx_ttnews[backPid]=7&cHash=a79ddb4bdb31ed4e48c3832c0a85ced8#.VWoaekYvzh4*, accessed May 3, 2015.

207. Turkmenistan," Washington, DC: U.S. Energy Information Administration, January 2012, p. 7, available from *www.eia.gov/countries/analysisbriefs/cabs/Turkmenistan/pdf.pdf*.

208. Ariel Cohen, "Will Greece–Russia Gas Deal Threaten EU Energy Security?" *Natural Gas Europe*, May 4, 2015, available from *www.naturalgaseurope.com/greece-russia-gas-deal-threaten-eu-energy-security-23487*, accessed May 30, 2015.

209. Song Yen Ling, "Third link of Central Asia-China gas pipeline to be fully operational by end-2015," *Platts*, June 3, 2014, available from *www.platts.com/latest-news/natural-gas/singapore/third-link-of-central-asia-china-gas-pipeline-26803256*, accessed May 3, 2015. "Turkmeniya otkryla gazoprovod v Kitay v obkhod Rossii" ("Turkmenistan Opened a Gas Pipeline to China, bypassing Russia"), *Lenta.Ru*, December 14, 2009, available from *lenta.ru/news/2009/12/14/open/*, accessed December 13, 2014.

210. "Iran's oil, gas, power transit proposal for Turkmenistan," *Trend.az*, March 13, 2015, available from *en.trend.az/business/energy/2373766.html*, accessed May 3, 2015.

211. Jacopo Dettoni, "Turkmenistan faces competition from Russia as China's largest supplier," *Nikkei*, January 14, 2015, available from *asia.nikkei.com/Politics-Economy/International-Relations/Turkmenistan-faces-competition-from-Russia-as-China-s-largest-supplier*, accessed May 3, 2015.

212. "Norway supplies more than 20% of Europe's natural gas needs," *U.S. Energy Information Administration*, May 16, 2014, available from *www.eia.gov/todayinenergy/detail.cfm?id=16311*, accessed August 8, 2015.

213. Gwladys Fouche and Henning Gloystein, "Norway could provide little help if Russia cuts flows to Ukraine," Reuters, March 12, 2014, available from *www.reuters.com/article/2014/03/12/ukraine-crisis-gas-norway-idUKL6N0M93T520140312*, accessed August 8, 2015.

214. *Ibid.,* accessed December 13, 2014.

215. "Production figures December 2014," Oslo, Norway: Norwegian Petroleum Directorate, January 16, 2015, available from *www.npd.no/Global/Norsk/1-Aktuelt/Produksjonstall/P2014/Des2014/Data-des-2014.xlsx*, accessed August 8, 2015.

216. "Iran ready to supply Europe with natural gas: Official," *Press TV*, May 8, 2014, available from *www.presstv.ir/detail/2014/05/08/361803/iran-ready-to-export-gas-to-europe/*, accessed August 8, 2015.

217. Joint statement by EU High Representative Federica Mogherini and Iranian Foreign Minister Javad Zarif, Vienna, Austria, July 14, 2015, available from *eeas.europa.eu/statements-eeas/2015/150714_01_en.htm*, accessed July 18, 2015.

218. Christopher Adams, Najmeh Bozorgmehr, and Ed Crooks, "Iran: The oil and gas multibillion-dollar 'candy store'," *The Financial Times*, July 16, 2015, available from *www.ft.com/cms/s/2/92402244-2975-11e5-8613-e7aedbb7bdb7.html#slide0*, accessed July 18, 2015.

219. "Location of the Facility," *The Official Website of Iran Liquefied Natural Gas co.*, December 13, 2014, available from *www.iranlng.ir/en/our-project/location-of-the-facility*, accessed December 13, 2014.

220. Merve Erdil, "Turkey rejects Iran's gas export proposal," *Hurriyet*, April 17, 2015, available from *www.hurriyetdailynews.com/turkey-rejects-irans-gas-export-proposal.aspx?pageID=238&nID=81214&NewsCatID=348*, accessed May 3, 2015.

221. "Turkey's role as a mega energy hub," *Natural Gas Europe*, December 22, 2014, available from *www.naturalgaseurope.com/turkey-energy-mega-hub*, accessed August 8, 2015. The capacity of the pipeline is only 14 bcm per year, not 20 bcm per year.

222. "Iran starts Persian gas pipeline construction," *Press TV*, May 30, 2009, available from *edition.presstv.ir/detail/96451.html*, accessed August 8, 2015.

223. "Kurdish rebels blow up Iranian gas pipeline in Turkey," BBC News, October 19, 2012, available from *www.bbc.co.uk/news/world-europe-20002779*, accessed August 8, 2015.

224. Benoît Faucon and Spencer Swartz, "Iran Curbs LNG-Export Ambitions," *The Wall Street Journal*, August 12, 2010, available from *www.wsj.com/articles/SB10001424052748704216804575423212231718960*, accessed August 8, 2015.

225. Georgina Prodhan and Karolin Schaps, "TAP to carry Azeri gas via Greece as Austria loses out," Reuters, June 26, 2013, available from *www.reuters.com/article/2013/06/26/gas-pipeline-nabucco-idUSL5N0F226A20130626*, accessed May 3, 2015.

226. Nicholas Borroz, "Turkey's Energy Strategy: Kurdistan Over Iraq," *Natural Gas Europe*, November 11, 2014, available from *www.naturalgaseurope.com/turkey-energy-strategy-kurdistan-iraq*, accessed May 3, 2015.

227. "The Geopolitics of Natural Gas: Natural Gas in the Republic of Iraq," Cambridge, MA: Harvard University, Belfer Center for Science and International Affairs, November 18, 2013, p. 8, available from *belfercenter.ksg.harvard.edu/files/CES-pub-GeoGasIraq-111813.pdf*, accessed August 8, 2015.

228. *Ibid*., p 10.

229. "OPEC Annual Statistical Bulletin," *Official website of OPEC*, 2014, p. 23, available from *www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2014.pdf*, accessed May 3, 2015.

230. *Ibid*., p. 30.

231. Anna Shiryaevskaya and Isis Almeida, "Enel Sees North Africa as Key Natural Gas Supplier to Europe," *Bloomberg*, October 30, 2014, available from *www.bloomberg.com/news/articles/2014-10-30/enel-sees-north-africa-as-key-natural-gas-supplier-to-europe*, accessed May 3, 2015.

232. "African Nations Sign Deal for Trans-Saharan Gas Pipeline," *The Wall Street Journal*, July 19, 2009, available from *www.wsj.com/articles/SB124663481393592621*, accessed May 3, 2015.

233. "Jonathan: Nigeria Mobilises $700m for Trans-Sahara Gas Project," *This Day Live*, January 30, 2014, available from *www.thisdaylive.com/articles/jonathan-nigeria-mobilises-700m-for-trans-sahara-gas-project/170114/*, accessed May 3, 2015.

234. Derek E. Mix, "The United States and Europe: Current Issues," Washington, DC: Congressional Research Service, February 3, 2015, p. 2, available from *https://www.fas.org/sgp/crs/row/RS22163.pdf*, accessed May 3, 2015.

235. "Trade in Goods with European Union," Suitland, MD: U.S. Census Bureau, No Date, available from *https://www.census.gov/foreign-trade/balance/c0003.html*, accessed May 3, 2015.

236. Andrew Hill, Gillian Tett, Shawn Donnan, and Sarah Gordon, "Davos 2015: Businesses rally support for transatlantic trade deal," *Financial Times*, January 23, 2015, available from *www.ft.com/intl/cms/s/0/f40a72ba-a309-11e4-ac1c-00144feab7de.html#axzz3axi4xgAX*, accessed May 3, 2015.

237. Erica Alini, "More U.S. LNG exports mean B.C. is in a race against the clock: Erica Alini," *Canadian Business*, May 31, 2013, available from *www.canadianbusiness.com/blogs-and-comment/lng/*, accessed May 3, 2015.

238. Nadja Kogdenko, "East Africa: the newest LNG frontier," *LNG Industry*, March 10, 2013, available from *www.lngindustry.com/liquefaction/10032014/East_Africa_as_the_newest_LNG_exporting_frontier/*, accessed May 3, 2015.

239. Henry Foy, "EU's eastern members plot joint raid on €315bn Juncker fund," *Financial Times*, December 8, 2014, available from *www.ft.com/intl/cms/s/0/70e1089a-7ba9-11e4-b6ab-00144feabdc0.html*, accessed May 3, 2015.

240. "Al Qaeda's North African wing claims two Algerian attacks," Reuters, June 8, 2015, available from *www.reuters.com/article/2015/06/08/ozatp-us-algeria-security-idAFKBN0OO0GZ20150608*, accessed June 20, 2015.

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