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Cover Page Footnote

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The People's Republic of China-European Union-Russian Energy Security Triangle

Given its relatively low greenhouse gas emissions profile, some have coined natural gas a “blue fuel,” as it is seen as a more environmentally-consciousness option than coal or oil. When compared to coal or oil, the Energy Information Agency (EIA) claims natural gas is only 55 percent of the carbon intensity of coal and 75 percent that of petroleum.¹ The International Energy Agency (IEA) estimates that global natural gas consumption will account for more than a quarter of total energy demand by 2035.² As of 2014, the IEA estimates that natural gas comprises 21 percent of the global primary energy mix at 3,500 billion cubic meters (BCM).³ To obtain natural gas producers drill it from subterranean reservoirs, treat it onsite or nearby to remove impurities and differentiate types of gases, and then transport it to a consumption market. Large diameter trunk pipelines remain ubiquitous, yet in some instances, natural gas producers transport it through its liquefaction. Natural gas is liquefied by lowering the temperature to below -260 Fahrenheit and it can then be transported in bulk liquid form, which is then regasified at the destination market by bringing it above the aforementioned temperature for pipeline transportation.

Much of the demand for natural gas is satisfied from individual domestic production, yet Russia remains the largest exporter, a factor that influences marginal demand reliance. While total reserves change over time as fields are exhausted and new fields are discovered, Russia consistently ranks as having the largest reserve levels, with nearly a quarter of known global reserves.⁴ This translates into Russia remaining a key player in cleaner energy production.

Russia faces a host of geopolitical and security conflicts because of direct and indirect military action in Ukraine and Syria. Yet, despite these ongoing geopolitical and security conflicts, it remains a dominant player in the world's natural gas markets. However, Russian cheap natural gas supply is finite and decreasing, while their customers' demand is

increasing, shockingly, without a distinctly correlative price increase. The European Union (EU) demand for Russian natural gas presents a complicated picture. Individually, an increasing number of European countries are reducing their absolute and relative import volumes of Russian natural gas. However, due to a select group of countries rapidly increasing their import volumes, on average Europe has more Russian natural gas competing in their markets.⁵ China, too, is seeking to increase their import quantities of Russian natural gas through the construction of multiple pipelines and joint ventures in Liquefied Natural Gas (LNG). China has lent over 12 billion USD to companies in Russia through the Yamal LNG project, ran by privately owned, yet government-friendly, Novatek. Chinese leaders accurately believe this is essential in their efforts to reduce energy costs in their manufacturing sector. Furthermore, Russian natural gas will play a key role in China's efforts to curb greenhouse gas (GHG) emissions by transitioning from coal to natural gas. This creates an intriguing energy security triangle, as EU and Chinese demand-side competition for Russian natural gas are a factor impacting the EU's price elasticity of demand for Chinese manufactured goods.

This paper will seek to explain the energy security dynamics between three major actors in the global energy trade. Often times, studies and articles discuss only the bilateral aspect, whether it is the EU-China trade dynamics, Russia-China or Russia-EU supply dynamics. However, by viewing this as a triangle, this paper will seek to explain how these three dynamics influence one another.

Supply-side Factors

Gazprom is Russia's state owned energy company with the vast majority of the country's reserves, production, and preferential rights to explore potential new fields. Gazprom production in 2014 experienced the largest decrease in post-Soviet history, nearly 9 percent, and mostly from their Urals fields. Indeed, much of this is due to a 34.75 BCM drop in consumption from the previous year. Of this, 84.3 percent was from the combined drop in

demand from the domestic market, the Czech Republic, and the Ukraine.⁶ The drop in demand from the latter two countries was due to geopolitical conflict, as Russia attempted to control their respective abilities to counter Russia in Europe. Ukraine, specifically, has experienced both direct (Crimean invasion) and indirect (proxy groups in Eastern Ukraine) military aggression. Yet, the drop in the domestic electricity market may have been a market reaction to rumors circulating about rate increases by the Federal Tariff Service. This leaves approximately a 7-10 BCM decline, attributable to field decline rates in the Urals in 2014, with later years not likely to differ. This decline revealed Russia's inability to shift sales to new countries, due to the inflexibility of pipelines to supply countries with which they are not connected. These supply relationships were established decades ago and have continued uninterrupted for the majority of their time in operation. New relationships have typically been initiated by the interested purchasers, but as traditional demand markets dry up this may force Russia to approach potential buyers. To some extent, this has already happened as Gazprom has begun auctioning small volumes of their natural gas on the open markets in Europe.⁷ Such efforts are more likely designed to achieve a minimum perceived standard of fair market competition to alleviate European Commission pressures against further utilization of the Nord Stream route. Such inflexibility to put more natural gas on the open markets is likely due to their emphasis on complicated long-term supply contracts and limited liquefaction capacity. Despite this, Gazprom has been emphasizing investment in the East Siberian fields of Chayandinskoye and Kovyktinskoye, preparing for Chinese investment. Declining field rates in the Urals are likely due not only to aging gas producing infrastructure but also underinvestment. Gazprom's absolute decline is similarly due to underinvestment in exploration and production of greenfields.⁸

Due to sudden shifts in export market demand, as of 2015 Russia may have had in excess of 40 BCM of swing production if Ukraine was cut off entirely from the Russian supply. This swing capacity is likely to further delay investment into new fields. In the near term, Gazprom is likely to reorganize their production portfolio to take offline high-cost

wells until they can bring online new investment to supply new pipelines and new contracted volumes.

Russia's access to midstream transportation assets is yet another obstacle to increasing their supply capacity. Russia boasts the world's largest transmission system, with a total length of Gazprom's trunk pipelines being 161,700 km long (approx. 100,500 miles). Although the Russians only built many of their gas pipelines in the 1980s, most fell into vast disrepair during the 1990s.⁹ In their 2013 strategic investment plan, Gazprom specifically mentioned expanding parts of the SRTO-Torzhok pipeline in Northwest Russia. This was likely done in order to provide greater capacities to the Nord Stream and the Yamal-Europe Pipeline that crosses Belarus. Furthermore, the Turkish Stream¹⁰ pipeline will play a dominant role in supplanting volumes that transit across Ukraine. With that being said, most major new investments will be related to their eastern regions. Specifically Gazprom has been increasing emphasis on the Eastern Gas Program¹¹ to improve regional infrastructure. This is probably a move to optimize near-term export potential to East Asia. Russia and China have also reinitiated talks over the Altai Pipeline (Eastern Route), in which Mongolia has also expressed an interest. It is likely that Russia provided discounted prices to China for the natural gas to transit the Power of Siberia pipeline (estimates around \$10/mmbtu) to gain market access in order to push the Altai route as a diversification measure as well as investment in the pipeline construction itself.¹² Similarly, China has been investing in LNG joint ventures in Russia's Arctic; most notably with Novatek.

Arguably, Russia's challenges as a stable natural gas supplier have caused both China and the EU to seek alternative supply sources. China has been rapidly constructing LNG import terminals to accommodate new contracts, beyond that which they would ever likely import from Russia. Singaporean-based energy consultants Facts Global Energy forecast an 87mT capacity by 2020.¹³ Yet, their regasification terminals only averaged a 55.1 percent utilization rate in 2014.¹⁴ Taking into account a global glut in LNG carriers it seems clear this underutilization is more a function of supply than demand or transportation.¹⁵ Research by

Teekay LNG Partners LP in 2014 revealed that Russia, the United States, and Australia will be the largest sources of new liquefaction facilities in the coming decade.¹⁶ Europe already has a substantial excess regasification capacity, but low market prices likely deter suppliers. As such, Europe is likely to rely on new pipelines from Africa and Central Eurasia. The Trans-Saharan Gas Pipeline (TSGP) and the Southern Gas Corridor (SGC) are both capable of replacing a large proportion of Russian-sourced natural gas. The TSGP, due to regional conflicts in sub-Saharan Africa has experienced some setbacks, yet remains an ongoing project. The project will source its natural gas from Nigeria and possibly Algeria in the event that this pipeline stimulates their shale sector. Along similar lines, the Economic Community of West African States (ECOWAS) continues to emphasize the importance of increasing regional interconnectivity.¹⁷ This would not only alleviate an issue that has long plagued many West African offshore producers from reaching potential markets regionally, but also aid in linking into larger international export nodes in North Africa and Nigeria. The SGC, the EU's most avidly supported pipeline diversification project, will likely be supplied by Azerbaijan, and potentially Turkmenistan. The Turkmenistan supply, previously monopolized by Russia, is increasingly being sold to China through the Central Asia-China Gas Pipeline, which also set to expand within a year.

Demand-side Factors

The European Union and China have vastly different economies, societies, and demographic profiles, and yet they have a very similar outlook for demand-side natural gas consumption growth. Despite forecasts for low EU economic and demographic growth, natural gas usage will likely increase its current relative level within the overarching energy portfolio. In all likelihood, Europe will indeed turn to natural gas as a means of achieving near- to medium-term greenhouse gas reduction targets, thus replacing coal consumption with natural gas. This is particularly relevant in the wake of the December 2015 United Nations Climate Change Conference in Paris. China, despite projected demographic stability in the 2020s, is also likely to increase their total primary energy consumption (TPEC) as well

as natural gas' role therein. China's stated goals to achieve a carbonless economy may be excessive, yet any movement in this direction will necessitate the replacement of coal with other energies; natural gas being the quickest, largest scale option if and until new nuclear builds are put online. Compounding this will be the aforementioned demographic trends that, if even modest per capita gains in access to energy are achieved, will greatly increase their demand for energy resources. Russia's role in supplying these demand side factors is notable due to their low overall and marginal extraction and transportation expenditures to produce gas from current fields, thus allowing Gazprom greater leeway in final price negotiations.¹⁸

European Demand

Overall TPEC is likely to remain stable in the long term, as supported by research done by the IEA and European Commission. However, total natural gas consumption is set to increase to a small degree in the long term.¹⁹ Most important for the demand side, Europe will require a substantial increase in imported natural gas.²⁰ This is largely due to limited replacement volumes of natural gas production capacity on the European continent.²¹ Europe's increased import requirements will be particularly dire in the event that the European Energy Union is successful in creating policy measures to deter importing Russian natural gas. From an import capacity perspective, the EU is pursuing sufficient alternative pipeline options as well as using only 21.7 percent of total LNG import capacity (7.1659 Tcf, or 203 BCM) in 2014.²² Europe's future natural gas demand does depend upon several uncertain variables, such as renewable subsidy policies in order to achieve certain GHG targets. Yet a more important [and likely] component of their GHG reductions program will revolve around carbon pricing that pushes electricity producers away from coal and towards natural gas. As it pertains to long-term energy demand and despite Europe's reputation for low fertility rates, the increase in immigrant communities has substantially boosted this figure in countries such as France.²³ Although long-term TPEC may increase due to increased

fertility amongst high consumption countries, even without an increased consumer market Europe is set to drastically increase their required natural gas import levels.

Chinese Demand

In conjunction with an expected population plateau, Chief Economist from the IEA Dr. Faith Birol claims China is increasingly focused on reducing GHGs and efficiency efforts as a solution to their energy cost issues. China's demographic situation, according to World Bank statistics for 2015, is set to plateau in the coming years, with only slight increases in life expectancy and fertility at replacement level, and with infant mortality rates not decreasing until the 2030s.²⁴ These statistics combined present a high probability plateauing demographic forecast with an increasing elderly welfare burden on the national economy. Long-term Chinese planning has seemingly accounted for this expectation by pursuing policies not only for cheaper resources from Russia but through efficiency standards as well. Despite this, the IEA still expects Chinese TPEC to increase through the mid-2020s with less and less emphasis on coal utilization. Coal, as part of TPEC, places an overwhelming burden on reducing GHG emissions, without switching to another energy source such as natural gas.²⁵ Taking these factors into account, it appears obvious that China will demand greater quantities of natural gas, most of which is likely to be sourced from imports given sub-par growth in the domestic conventional and unconventional natural gas sector. Natural gas, as opposed to other energy forms, is a likely replacement also due to the ability to retrofit old coal plants to instead utilize natural gas; much cheaper than new construction of nuclear or large-scale renewable facilities. China's domestic production sector is rife with setbacks, including: limited onshore opportunities, reduced offshore investment forecasts by CNOOC (China National Offshore Oil Corporation), and the Chinese government cutting their own shale production targets in half. Reuters cites multiple government officials claiming excessive costs and difficult geology in their shale basins.²⁶

The Edges of the Energy Security Triangle

Not only are there impending increased import requirements from Europe and China, but also the distinct possibility that Russia may not be able to competitively supply both markets in the face of a growing global LNG sector. In the near term, Russia is likely seeking to balance their energy relations with the European Union against their new export relations with China. If successful, this will likely diversify Gazprom's export portfolio, possibly at the cost of bargaining power from both sides. Accepting that, it is worthwhile to note that strong economic ties between China and the EU may indicate a future propensity for purchaser collusion. Whether this collusion is active or passive, it is likely that it will allow the respective countries to successfully pursue their individual, yet complementary, energy security goals. Before this is discussed however, it is best to explore tertiary impacts of the bilateral Russo-Chinese and Russo-European relations.

Russia-China

Two prominent externalities exist in the Russia-China relationship: America and Mongolia. China is facing competition from American manufacturers given high-energy costs due to low cost natural gas and electricity in the American market despite higher labor costs.²⁷ In order to cut these costs, China is likely relying upon the favorable terms negotiated for Russian natural gas. Although the specific terms of the agreement remain confidential, it is likely that Gazprom made significant discounts in order to access not only China's market but other Northeast Asian markets. Without Chinese investment, it is unlikely that Russia could substantially increase their exports to the rest of East Asia. This segues into the implications for non-Chinese interest in Russian natural gas within East Asia. There are a multitude of other major consumers such as the Republic of Korea, Japan, and Mongolia. Of these, Mongolia presents a distinct geopolitical issue.

When Russia and China signed an agreement for the Power of Siberia Pipeline, and began discussing the older Altai Pipeline, Mongolia immediately offered to act as a transit

country. For Russia, this option holds minimal attraction, yet it may cut 1000km from China's portion of the pipeline. Mongolia is ardently seeking natural gas connections in order to reduce the overdependence of their electricity and heating sector on coal resources. This would afford Russia the opportunity to have another export destination, while cutting capital expenditure costs for China. Mongolia, being landlocked, would be a fairly reliable partner, given its limited access to other pipeline options and China's already strong influence within the country. Ultimately, this relationship would depend on China's interest, as Russia could just as easily create a spur from the Power of Siberia or Altai Pipeline to supply the Mongolian Market.

Russia-European

Specialists have researched and analyzed the externalities in the Russo-European energy relationship, yet a few aspects of the Ukraine situation are still relatively untouched.²⁸ Despite Russian interests in avoiding Ukraine as a transit country, even optimistic timelines show several years before the Turkish Stream or Nord Stream can supplant it. Russia may be able to mitigate some of this through LNG exports, yet they have little experience in constructing large-scale liquefaction facilities, restricted access to financial resources, and a history of mismanaging megaprojects.²⁹ Russia, seeking to salvage what it might of its reputation with European buyers, might instead seek to limit production and transportation through Ukraine. The inability of Ukraine to reliably pay for Russian natural gas creates a substantial operational risk to Gazprom by limiting their ability to enforce payment while continuing natural gas sales to Europe. Belarus, another transit country, is far less likely to impact transportation relations and Gazprom has enacted investment programs to increase the throughput of natural gas via Belarusian territory. Regardless, it is unlikely that Russia will find it acceptable to place too much influence in the hands of a country already heavily incentivized by Russian energy and manufacturing subsidies.

China-European

The final leg of the EU-Russia-China triangle is that of European-Chinese relations. This aspect of the triangular energy relationship is not based on bilateral energy import or exports but “coopetition.” To expand on an idea explained by Paul deLespinasse in 1981, parties in conflict can also cooperate in creating mutual value due to their common conflicting interests.³⁰ In this case, both Europe and China have an interest in cooperatively competing for Russian natural gas supply. Until Europe can complete new pipelines or attract greater LNG imports despite low spot market prices, they will likely need to continue importing some Russian natural gas. However, Europe also has an interest in ensuring China has sufficient quantities of natural gas, even though they are effectively competing for the same good. This cooperative competition is beneficial given total trade turnover between China and the EU, and the latter’s reliance on China’s comparative advantage in low cost manufactures. For instance, in 2014 the European Union had a negative 137.8B euro trade deficit in goods alone, despite their 8.1B euro surplus in the trade in services sector.³¹ China has a similar interest in lowering their costs through reduced energy prices in order to deter manufacturing firms returning to lower energy costs in America. Furthermore, China is likely eager to deter foreign direct investment shifting from China to other Asian low-cost countries such as Indonesia, Burma, or Bangladesh. If the EU is able to supplant Russian natural gas sales, then Russia will likely increase exports to China through a western-route pipeline. This action would thus lower Chinese industrial energy costs, possibly resulting in price reductions to the European market. Indeed, this is a rather long chain of causation, and yet it is one that is distinctly viable due to the variety of compatible policy measures already discussed.

Conclusion

Although Europe’s overall TPEC is forecasted to remain stable, increased fertility rates in high-energy import countries may increase past projected natural gas import

requirements. Furthermore, Europe's own natural gas production sector is lagging, with only a few rays of hope in offshore Black Sea and British shale ventures, although neither has yet proven viable. The strengthening of Europe's Energy Union goals is likely to deter many countries from increasing their imports of Russian natural gas. Until other pipeline options come online, Europe may indeed need to rely upon LNG imports through artificially raising spot market prices through incentives such as subsidies or regulatory influence stipulating mandatory import quotas. China may impact Europe's spot market prices by removing available Russian pipeline natural gas, thus increasing LNG demand. Although China's population is set to stabilize in the coming decade, per capita access to energy is still very low yet could raise as the Chinese middle-class increases demand. While maintaining GHG reduction targets, China will need to replace greater quantities of coal with natural gas even under a regime of increased nuclear and renewable electricity generation. At the same time, China will likely rely upon Russian sourced natural gas in an effort to reduce domestic energy prices in order to bolster the competitive advantage of their industrial sector. In this regard, it is probable that China and the EU will seek to collude in managing their energy relations with Russia so as to provide incentives to reduce European dependence on Russian natural gas while satisfying China's need for cheaper energy. This may result in explicit collusion, though is equally likely to arise from passive collusion. Russia's own interests in this triangle revolve around the necessity to establish a diversified export portfolio that can be used to balance instability in one market with stability in another. This may impact future pricing negotiations and instigate an active collusion event between China and the European Union. The Russian government is interested in maintaining geopolitical influence through energy relations, yet Gazprom as a firm will push to mitigate the utilization of price discounts in order to better self-finance investment programs within a sustained sanctions environment. By balancing these two markets, Gazprom may be better situated to increase cash flows for investing in the Eastern Gas Program or enhanced production at Siberian natural gas fields that in 2014 likely saw at least a 7 BCM natural field decline.

ENDNOTES

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