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Inflated Hopes or a Promising Alternative? Evaluating Impact of LNG on Polish Energy Security

Keywords

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INFLATED HOPE OR A PROMISING ALTERNATIVE?
EVALUATING IMPACT OF LNG ON POLISH ENERGY SECURITY.

By

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An Undergraduate Thesis submitted in partial fulfillment of the requirements for the
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1. Introduction

Over the last 10 years, global energy landscape has been significantly transformed. The natural gas market has experienced one of the most significant metamorphoses. New supply sources and cheaper technology provided conditions necessary to the advent of large scale trade in liquefied natural gas (LNG), and led to less localized market with lower price differentials globally. This change has been particularly consequential in Europe where concerns about over-dependence on Russian energy have been raised repeatedly by countries that have relied on Russian gas either for majority or their entire gas demand. LNG offers an alternative to diversify sources and routes of supply though effectiveness of this solution is yet to be established.

As one of countries dependent on Russia for significant portion of gas supply, Poland has quickly recognized the need to diversify supply sources by introducing LNG as a way to increase its energy security. The country decided to invest in the LNG receiving terminal in Swinoujscie. As one of the first LNG terminals in Central and Eastern Europe, Swinoujscie can provide a useful benchmark for future investments in the LNG sector and has the potential to become a key determinant of the role of LNG in the energy mix of the region.

The terminal has been aimed at increasing energy security by diversifying natural gas supply away from Russia. These goals, together with supplementing “the broader trans-European energy network,” “stimulating regional growth, competitiveness and investment, and reducing CO₂ emissions in Poland” were underlined in justification of investment decision by international financial institutions such as EBRD and financial mechanisms of the European Union including the European Investment Bank, and the

EU's two programs: European Energy Programme for Recovery and Operational Programme Infrastructure and Environment (EBRD 2012).

In this study I aim at assessing whether and/or to what extent these goals were achieved. I analyze legal documents and compare the international definitions of energy security to the definition spelled out in the Polish law: “a state that allows meeting its current and prospective demand in a way that is justified from a technological and economical point of view and complies to environmental standards” (Art. 3 p.16 of Energy Law 1997). Based on these, I identify three main criteria of energy security: diversification, affordability and reliability. In this context, using publicly available data on gas imports, and signed contracts, I analyze the impact of opening of the Swinoujscie terminal on Polish energy security.

2. Literature Review

A Natural Gas

Natural gas has been a vital component of the world's energy mix but its importance is expected to burgeon over the next decades. With 2018 data showing global energy demand growing at its fastest pace in the last decade, natural gas was a primary beneficiary and accounted for almost half of the rise in the consumption (IEA, 2019). Globally, natural gas currently accounts for 22% of the energy mix, as it competes with coal for the position of the second (after oil) most important energy resource. We know that natural gas is destined to win this battle, thanks to its environmental advantage relative to coal. Natural gas is generally associated with better air quality and lower greenhouse gas emissions than other fossil fuels, and can act as a bridge for renewables in the high demand low supply times of the day. As a result, some experts predict that

Europe specifically will enter a golden age of gas within the next 5 years (Bowlus 2019). In the developing world, countries will also turn toward natural gas as increasing energy demand exacerbates the conflict between climate issues and use of fossil fuels. With higher economic development, increasing number of countries led by China will be switching towards cleaner energy sources that have smaller local pollutions and contribute less to smog, including gas. This has become possible thanks to globalization of the natural gas market that has taken place over the last decade and that we expect to deepen going forward.

Historically natural gas market has been highly localized and regional in nature. Unlike oil - a high density liquid that was easy to transport globally, natural gas is much more difficult to store and distribute. The gaseous form and relatively low caloric value requires a system of pipeline infrastructure (Brown and Yucel 2009). Given the amount of investment needed, long-term, oil-indexed contracts have been the norm (Zeniewski 2019). Moreover, most typical clauses included were very rigid and unfavorable for the buyers, such as point-to-point delivery and very high take-or-pay.¹ All this has limited the market both in size and in diversity of suppliers and made it possible for Russian monopoly to in certain European markets to emerge.

However, the paradigm has shifted dramatically in the recent years as new supplies and cheaper technology have led a move towards more global natural gas market. In particular this relates to the Shale Revolution in the United States driven by advancements in horizontal drilling and hydraulic fracturing boosted global supplies significantly above historical expectations (API 2014). Resulting oversupply put

¹ For more information, see Incoterms evolution history: <https://iccwbo.org/resources-for-business/incoterms-rules/incoterms-rules-history/>

downward pressure on gas prices in the United States and arbitrage opportunities abroad (Stevens 2012). Competition to seize this opportunity, coupled by particularly intensive developments in Australia (expected to become biggest LNG exporter by 2020 according to Wisniewski, 2017) later on, led to more investment in technology and aided already growing market of liquefied natural gas (Hartley 2013). Cost efficient liquefaction led to an increase in global export and import capacities and rise in trade - accounting for one third of global gas trade as per 2017 IEA statistics.²

Better prices and contracts have created a competitive environment that promotes LNG usage in different industries and attracts various players. Some of them include “industrial gas consumption, LNG usage in maritime and road transport, as well as small-scale LNG” (Bieliszczuk 2017). The importance and irreversibility of these developments have only been confirmed by the recent investment in LNG infrastructure by Russian government and a case of Novatek. A Russian LNG firm has been supported by the federal government, despite the fact the country historically profited from and tried to discourage LNG trade for traditional pipeline infrastructure to maintain its competitive advantage in the gas market (Kardas 2018).

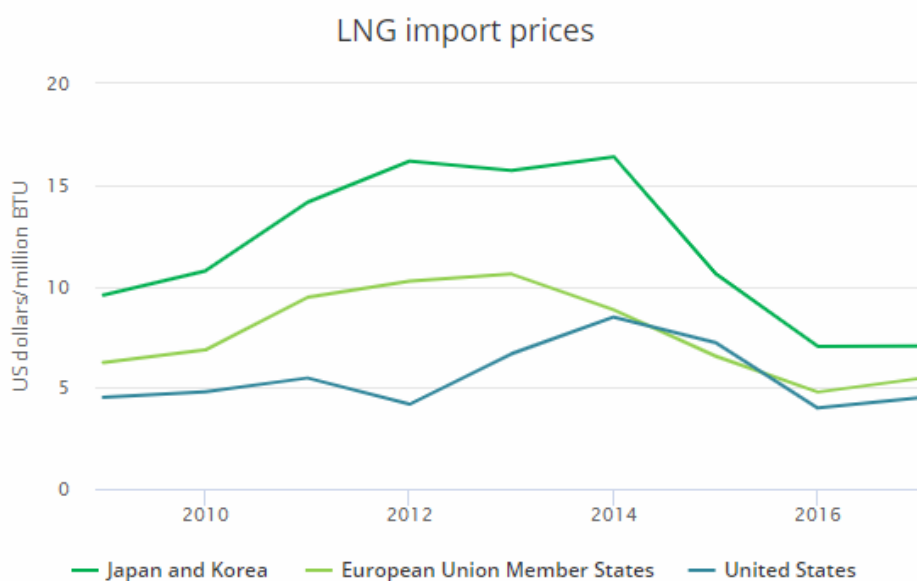
These developments affected types of deals arranged and prices making the LNG market more dynamic. Point-to-point deliveries of gas are being challenged by various intermediaries and destination-flexible contracts that allow reselling (Zeniewski 2019). Moreover, some contract structures like Delivery Ex Ship (DES) directly transfer costs of delivery on the seller. A move away from high values of Annual Contract Quantities (ACQs) in take-or-pay contracts means the revenue stream for seller is no longer

² <https://www.iea.org/statistics/naturalgas/>

guaranteed and buyer and seller now share more of a quantity risk - it is more elastic and responsive to the actual demand. With the development of the market, alternative clauses become more popular too: take-and-pay and take-or-cancel have all different consequences for both sides involved, however more flexibility generally allows for greater specialization in the market.³ Actors in the market now face alternatives to long-term contracts depending on their risk preference: short-, medium-term and those based on the spot market (Zeniewski 2019). As a result, global energy market consists of a deeper, more liquid, and more flexible market than ever before, and while there is still a long way before one price for the LNG market, the price differentials across continents have converged.

LNG Price Differentials

GRAPH 1.



IEA. All rights reserved.

Source: IEA data <https://www.iea.org/statistics/naturalgas/> accessed on 5/6/2019

³ For a more detailed analysis of the consequences for involved partners, see Rogers and Hwang, 2017

More globalized market creates a paradox for energy security. As a result of these changes, non-traditional suppliers of the resource, such as United States can now promote their interests through participating in the market, and importing countries can diversify their providers (Senate 2018). But while access to other supply sources may be the only way to diversify for some countries, generally bigger interdependence of the system make the risk greater for the rest of the world to bear the consequences of shocks previously limited to the local receivers (OECD/IEA 2018).

B Energy Security in Europe

EU's own supplies are unsatisfactory to meet the energy demand. Based on the European Commission estimates, domestic energy production, including natural gas production, is expected to drop over time, in 2040 reaching 50% of 2020 volumes and only 25% of 2000 volumes. Simultaneously, demand should stabilize around 1500 ktoe (EC, 2016) Shale gas extraction is much more challenging than in the United States. European countries with significant shale gas supplies faces a whole array of barriers to entry. Biggest European countries like France and Germany have significant shale resources yet decided to ban extraction. Other policy challenge faces firms in Romania, characterized by weaker institutions and legal frameworks that do not provide similar incentives to extracting corporations as the American legal system does. Companies in Poland face complex geological conditions and hence costly devilment prospects discouraging international capital.⁴

⁴ Among geological conditions, experts distinguish much deeper shale location, thinner shale plays, low permeability and lower share of organic carbon that as a result increase costs. Subsequently, business composition of firms granted concessions comprised of a few large international and state-owned conglomerates quite a different story than drilling led by independent small operators drilling on small areas in the US. Moreover, other barriers included very bureaucratic concession application process,

Most diversification efforts concern anti-monopolistic legislation and financial resources aimed at strengthening the internal market. So-called energy packages with the most recent from 2011, introduced legal reforms to promote unbundling of transmission assets (ownership) and certification of transmission system operators (TSO). The goal of the directive is to promote internal market and cooperation between the operators. In doing so the regulation aims at achieving the following results: efficiency gains, competitive prices, higher standard of service and contribute to security of supply and sustainability (EP 2009). In the same line, most of the funding capabilities offered through the Connecting Europe Facility (CEF) provide financial support to the “projects of common interest” entailing mostly reverse flow projects. It is worth noting however, that according to some experts, the CEF is severely underfunded relatively to the EU’s energy infrastructure investment needs (Collins and Mikulska 2018).

Geographical and economic conditions make some European countries especially prone to the Russian influence - the biggest energy exporter to the EU.⁵ As noted by experts from the Polish Institute of International Affairs and Norwegian Institute of International Affairs, “historically, the first economic problem recognized as potentially undermining state security— following the oil crises of the 1970s—was disruption of access to energy resources” (PIIA and NIIA 2018). The energy security issue is of great importance within the European Union as many of its members have relied on Gazprom - a state-owned Russian company, to satisfy majority if not entirety of their natural gas

short duration of concessions, and state ownership of mineral rights, (based on A. Mikulska’s presentation at International Law Section conference in Mexico City, April 3-6, 2019)

⁵ Second biggest exporter to the EU is Norway. While it is seen by many a stable source of supply of gas that can be delivered through the pipeline infrastructure, it cannot possibly deliver all gas that is needed not only in Western Europe and there is also the concern that Norwegian supplies are waning (OIES 2018, compare with NPD’s production forecasts available here:

<https://www.norsktopetroleum.no/en/production-and-exports/production-forecasts/>)

demand. Gazprom has a particularly strong position in the Central Eastern Europe (CEE). As a result of geography of these countries, there is not enough domestic resources to satisfy their energy needs, so the Russian infrastructure has for many years been the only viable supply option. Historically, countries of the former Soviet bloc were either connected to “the Soviet Union’s internal gas system (Lithuania, Latvia, Estonia) or hooked up to shipments of Soviet raw materials (Poland)” (PIIA and NIIA 2018). Strong economic growth experienced by the countries of the region suggest increase in energy demands. The reliance has hence been growing. Between the early 1990s and 2017, Russia’s overall volume of gas sales to the area rose by more than 50% (based on Gazprom data quoted in PIIA and NIIA 2018). Currently, 6 out of top 10 countries with the highest Gazprom dependency coming from this region. Given an official document of Russian Federation explicitly states that one of the strategic goals of natural gas development is “securing Russian political interests in Europe” this could pose potential threats (“Energy Strategy of Russian Federation until 2020” cited in PIIA and NIIA 2018). According to an analysis by PIIA and NIIA (2018), Russia has a vested interest in the region, and the Federation’s goal is “to effectively limit (...) freedom of choice (...), strategic cooperation with selected partners (especially the U.S.), and structural, market-oriented reform of the economy, especially in the energy sector.” An expert’s conservative approach identifies 15 “discrete instances where Russian entities used price and physical volume manipulation of crude oil or natural gas supplies—often amid political tensions—to pressure consumers located in Central and Eastern Europe and the former Soviet countries ” since the dissolution of the Soviet Union (Collins 2017).

As a result, a compelling argument for diversification can be and is often made by political leaders in these countries. Hinchey (2018) cites three main reasons for the

diversification away from the Russian gas: one purely economic and two more geopolitical. First, the CEE countries generally have to pay higher more for Russian gas than other Western European countries. Second, there is a widespread anxiety against Russia using its hegemonic position as a “weapon” to achieve its geopolitical goals, as it was the case in Ukraine in 2006 and 2009 (Collins 2017). Third, according to Hinchey (2018), CEE countries watch very closely developments such as Nord Stream 2 pipeline to Germany and expect closer ties between Western Europe and Russia to result in a weakened “willingness to stand up to Russian interference” in the region.

On its part, Russia does not give up its strong position as a gas supplier to Europe. It has already lowered prices in the region - wherever alternative supplies are accessible- and has pushed new infrastructural projects such as Nord Stream 2 and Turkish Stream that are advertised as diversifying infrastructure in terms of diversification of supply route that contributes to energy security.

It seems logical that under such conditions the CEE countries would be the most interested in diversifying their supply through importing LNG. However, as Hinchey and Mikulska (2017) point out, such a solution, while addressing geopolitical reasons, does not have to lead to lower prices for the region. Cost of importing LNG comprises of gas price, liquefaction, transportation and regasification, and makes it less competitive than Russian gas supplied through pipes.

A literature review on this topic reveals that the mere notion of competition, introduced by LNG import capabilities, is enough to lead to lower prices. As such “credible threat”, investment in LNG import facilities is sufficient to “incentivize Russia to cut prices long-term” (Hinchey and Mikulska 2017). Neumann and von Hirschhausen (2004)

go furthest in their conclusion, stating that presence of import terminals could change the nature of Russian supply contracts.

To the author's best knowledge and intentions, there appears to be only one study that measures the impact of a particular receiving facility and hence increased access to alternative sources of natural gas on European gas prices - Hinchey's study on the Lithuanian Floating Storage Regasification Unit (FSRU) "Independence". Her model found that the price of Russian gas is inversely related to a ratio of non-Russian to Russian sources and the empirical data confirmed decreasing Russian gas prices (Hinchey, 2018).

C Energy Security in Poland

Poland is probably the one representative of the CEE region with the strongest resolve to increase its energy security by diversifying its gas supplies away from Russian gas. Poland's geology offers only limited domestic supplies of natural gas, insufficient to meet the energy demand. Economically, Poland has been experiencing remarkable progress, compared by some to the best epoch of more than a thousand year old country.⁶ As Polish society has gotten richer, energy demand has also risen and is expected to continue to do so (Fitch 2018).

Historically, Poland has relied on the network of pipelines inherited from the era Soviet Union era that, until recently, facilitated Russia's dominant position as the only supplier of natural gas. This has geopolitical implications given Polish-Russian difficult history, including during and after the World War 2 and recent experiences of Russia using its gas capabilities to exercise its political interests through supply disruptions in 2007 and 2014. The situation became exacerbated even more after 2014 Russian

⁶ Cf. Piatkowski 2013

aggression against Ukraine with concerns about further geopolitically motivated incidents similar to those frequently experienced by other countries in the CEE region.⁷ It should not come as a surprise, that according to the experts Poland “has long perceived dependence on Russian gas as not only been an economic but also a security threat (PIIA and NIIA 2018). The list of anti-competitive practices and political activity between 1990–2017 includes: “re-export ban, non-market pricing, <conditional> gas shipments, threats to cut supplies in the event of gas sales to Ukraine” (PIIA and NIIA 2018).

As a result of the effort to bring in more energy security to the region, Poland decided to build and open an LNG-receiving terminal with the access to the Baltic Sea the Polish terminal was opened in Swinoujscie in 2015. Notably, as of 2019, the Terminal has had the highest-level utilization level in the entire EU (Central Europe Energy Partners 2019). But is it enough?

3. Research Question

⁷ For a full account see Collins 2017

What was the impact of the LNG receiving terminal in Swinoujscie on Polish energy security?

4. Hypothesis

As a result of opening the LNG receiving terminal in Swinoujscie Polish energy security increased.

5. Methodology

In the paper I look at legal documents that define energy security in the international realm, according to the European Union framework, and in the light of Polish legal system. Based on these, I identify three main criteria of energy security: diversification, affordability and reliability. I follow with analysis of the impact of Swinoujscie terminal on each of the three aspects.

To assess the diversification criterion, I use PGNiG publicly available data on gas imports and exports and directions of the imports to determine whether Poland has met its legally binding diversification requirements. I further analyze this data to determine whether diversification has occurred and how dependence on imports has changed.

Because of unavailability of actual contracts' details, to assess the affordability criterion, I look at publicly available data for gas prices in the Henry Hub and gas prices on Gazprom contracts. I compare them to different estimates of how much Poland has and is paying for its gas contracts and then to official speeches by members of the ministry of energy to get a sense of what could the potential impact on affordability be.

To assess the reliability criterion, I look at historical developments of deals signed by PGNiG on gas shipments to the Swinoujscie terminal. This section culminates in RSE

index calculations to determine whether the Swinoujscie terminal made Polish energy more reliable.

6. Energy security: definition and legal terms

The International Energy Agency understanding of energy security as “the uninterrupted availability of energy sources at an affordable price” is a cornerstone for more complex national and pannational definitions across the world. Similarly, the US and other actors, including World Economic Forum present the energy security as ability of “households and businesses to accommodate disruptions of supply in energy markets.” (CBO 2012). More sophisticated definitions go beyond meeting strictly physical needs to encompassing technological, economic, political, and environmental, impacts of disruptions. In the recent years especially the need to accommodate the latter consequences has been a particularly growing trend. While the EU treats this issue as an important part of the energy policy, its European Energy Security Strategy from 2014 lacks a clear definition. The European Commission uses three adjectives to refer to it: diverse, affordable, and reliable. According to the EU Institute for Security Studies, actions should be taken to lower the internal and external risks to energy systems, as well as making the systems more resilient (Dreyer and Stang 2013).

Tools to increase the resilience.

TABLE 1.

Tool	Mechanism
Markets	Forces of demand and supply are allowed to correspond

Infrastructure	Adequate production and transportation can occur
Risk Management Systems	Options for reserves, emergency planning and alternative supply routes are expanded
Energy Suppliers	“Diverse portfolio of energy suppliers” is maintained
Energy Efficiency	Demand is kept “under control”

Source: Dreyer and Stang 2013

The main document defining Polish energy policy is the Energy Law Bill from April 1997. Additionally, the Council of Ministers sets the long term goals through “Polish Energy Policy Until...” (PEP) roadmaps: in 2005 it published PEP2025, in 2009 PEP2030, and in 2019 a project of PEP2040.

“Programs” or “Policies” serving auxiliary role to PEP2025 outlining policy directions for particular subsectors were published between 2006–2007. While this approach provides detailed instructions to each subsector, an attachment to PEP2030 “Assessment of the energy policy from 2005” criticizes this structure as too decentralized. The document notes that as a result of “some tasks planned within the energy policy were not fully implemented and enforcement of others did not follow accepted specifications” (Ministry of Economy 2009b).

Goals for the energy policy and definition of energy security in Polish legislature correspond closely with its international analogues. The goal of the energy policy as defined by Polish law is provision of the energy security, the growth of economic competitiveness and energy efficiency, as well as environmental protection (Art. 3 p.16 Energy Bill 1997). Specifically, following the energy security definition presented in Polish law, energy security is a state that allows meeting its current and prospective demand in

a way that is justified from a technological and economical point of view and complies to environmental standards.

Further chapters of the same document introduce the notion of diversification of sources as one of the possible mechanisms in the toolkit. According to the Article 32 P 2 concessions allowing for gas exchange with international actors are allowed only with “consideration to diversification and energy security. Any energy company dealing with natural gas international turnover is required to diversify foreign natural gas supply” (Energy Bill 1997).

Over time, changes have been made to the law, so that it currently obliges the Council of Ministers to specify a minimum level of natural gas diversification and a detailed mechanism for measurement thereof for a period of at least 10 years. However, the Council can designate exceptions from the diversification requirement given existing infrastructure.

So far, the minimum levels of diversification understood as maximum share of natural gas imported from one source have been announced twice (see the Table 2,3, and 4). Moreover, the 2017 resolution updated the diversification measurement with a more specifically defined formula.

Minimum Levels of Diversification

TABLE 2.

Year/ Minimum diversification specifications	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
2000 specification	88%	88%	78%	78%	72%	72%	72%	72%	72%	70%

2017 specification	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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Source: Based on: Council of Ministers, 2000; 2017

Minimum Levels of Diversification, cd.

TABLE 3.

Year/ Minimum diversification specifications	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
2000 specification	70%	70%	70%	70%	59%	59%	59%	59%	49%	49%
2017 specification	N/A	N/A	N/A	N/A	N/A	N/A	70%	70%	70%	70%

Source: Based on: Council of Ministers, 2000; 2017

Minimum Levels of Diversification, cd. II

TABLE 4.

Year/ Minimum diversification specifications	2021	2022	2023	2024	2025	2026
2000 specifications	N/A	N/A	N/A	N/A	N/A	N/A
2017 specification	70%	70%	33%	33%	33%	33%

Source: Based on: Council of Ministers, 2000; 2017

Additionally, Policy for the Natural Gas Industry [PNGI] from 2007 defines the energy security in the gas sector as “provision of continuous natural gas supply to consumers at possibly low prices” (Ministry of Economy 2007). The document also identifies general factors that should characterize a successful policy of energy security including:

- “Gas supply diversification
- Storage capabilities
- Technical state and functionality of distribution and transmission systems
- Domestic natural gas extraction growth rate
- State governance of key transmission infrastructure
- Quality of legal regulations in respect to infrastructure investments

- Quality of legal regulations in respect to the whole gas sector, especially in respect to activities concerning trade and storage, transmission and distribution of natural gas
- Quality of legal regulations in respect to energy security, including anti-crisis mechanisms and procedures
- Policies of European countries and European Commission in respect to energy security” (Ministry of Economy 2007).

7. Overview of the Polish gas sector structure

A Main actors

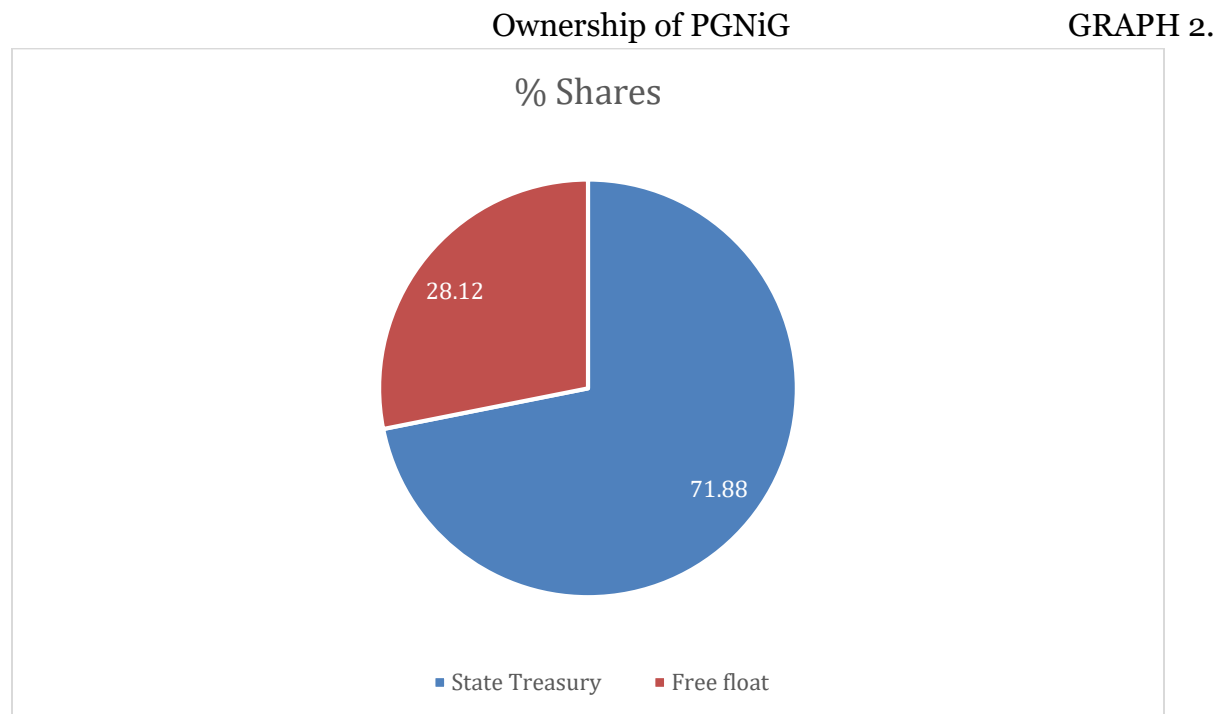
After joining the EU in 2004, Poland undertook a series of structural transformations within the natural gas sector to fully comply with the new regulatory framework and additional Council of Ministers-led initiatives, specifically Program Restrukturyzacji i Prywatyzacji Polskiego Górnictwa Naftowego i Gazownictwa S.A. z 5 października 2004 r [Program for restructuring and privatisation of PGNiG from October 5, 2004]. The 2003/55/WE Directive of the European Parliament and of the Council outlined the end goal of changes happening between 2005–2007. The competitiveness of the internal gas market, was also supported by non-discriminatory access to the network of the transmission and distribution system operators. As a result of this process, Polish government unbundled, among others, transmission and distribution system operators from PGNiG and designated newly created GAZ-SYSTEM to be the transmission operator with the Treasury owning 100% shares. Despite the Council-accepted “Program for restructuring...” called for exploration and production segment of PGNiG to be unbundled

too, later the Council of Ministers' rejected such possibility. PGNiG hold its IPO and debuted on the Warsaw Stock Exchange on October 20, 2005, with the Treasury keeping the majority shares (Ministry of Economy 2007).

However, according to the Ministry of Economy documentation the Treasury did not act diligently enough to secure its important interests before the IPO (Ministry of Economy 2007). As a result, it lost its indirect control over shares of PGNiG's 48%-owned daughter company, SGT EuRoPol Gaz SA - owner of the part of Yamal Pipeline located in Poland. Moreover, the ownership of strategic assets needed for GAZ-SYSTEM to operate effectively in the transmission business did not take place. As a result, GAZ-SYSTEM leases the assets from PGNiG based on a 17-year long deal, which generates additional costs. According to the argument, while economic gain was transferred into higher share prices of PGNiG and dividends, because GAZ-SYSTEM is not publicly traded and as aforementioned the Treasury enjoys 100% ownership in it the state was the ultimate net-payee. Moreover, each future investment activity in the transmission system had to be negotiated between GAZ-SYSTEM and PGNiG, hindering the investment process. PNGI recommended in-kind dividends to the Treasury and effective transfer of ownership of the most important assets to the GAZ-SYSTEM to accommodate these mistakes.

When discussing motivations for the reorganization, a later document assessing these policies added "preclusion of hostile takeover of strategic companies" to the introduction of competitive markets and alignment with the EU law (Ministry of Economy 2009b). The document however, does not describe how effectively a split of a previously one fully state-owned consortium into two smaller companies and IPO of one of them could potentially minimize the risk of a hostile takeover. With that in mind it should be stated that despite PGNiG's participation in the WSE, a possibility of a hostile takeover is

marginal nonetheless. Both PGNiG and GAZ-SYSTEM were recognized as “strategic” because of their impact on energy security, and were additionally considered as “significant” for public order public security based on a regulation of the Council of Ministers from December, 13 2005 Dz. U. Nr 260, poz. 2174. Hence it seems very unlikely that the Treasury would look forward to disposing more of its controlling shares.



Source: PGNiG website as of 12/31/2018

The relatively newest participant of the market is Polskie LNG, which was founded as a daughter company of PGNiG in 2007. Ownership transformations followed to ensure compliance with the European law: in December 2008 100% of shares were acquired by GAZ-SYSTEM, and then in 2010 Polskie LNG became a public limited company (PLC). The company is the owner and operator of the President Lech Kaczynski's LNG Terminal in Swinoujscie. Its concession awarded by a national regulator Energy Regulatory Office

(URE) in 2016 for the liquefaction of natural gas and regasification of LNG in the facility will expire with the last day of 2030.⁸

Polskie LNG is responsible for the following processes:

- LNG unloading from the vessel at the unloading berth
- LNG process storage in tanks
- LNG regasification and send-out to the National Transmission System
- LNG loading into road tankers and ISO tank containers

B Security of supply and the need for the terminal

I Domestic production able to satisfy only a piece of demand

Historically, domestic extraction averaged 30% of the market or around 4 billion cubic meters (bcm). Majority of documented Polish sources of gas are concentrated in Niż Polski and tectonic foreland of Karpaty mountains (Kaliski et al. 2010). According to the “Assessment...” maintaining this ratio was the energy security goal for the natural gas (Ministry of Energy 2009b). As a result, exploration segment has been playing an important role for PGNiG strategy. The firm set its goal to renew its resources at 10% faster rate when compared to extraction increases. Moreover, it has been heavily involved internationally, including Norway, Denmark, but also Libya, Egypt, India and Pakistan with concession in just Libya exceeding Polish proven resources (Kaliski et al. 2010). Moreover, Baltic Pipe initiative connecting Norway and Denmark with Poland was

⁸ Based on <https://en.polskielng.pl/the-company/polskie-lng-sa-information-about-the-company/>

resumed in 2007, and is currently in the late phase of planning and has just received significant funding from the EU (EC 2019b).

II Limited infrastructural capabilities led to dependence on Russia

2007 PNGI is divided into 3 parts. The last section includes a program of action for improving the energy security” (Ministry of Economy 2007). It is particularly informative, because it analyzes the state of the Polish gas sector and puts it into an international perspective. The document compares the state of transmission network infrastructure in Poland with its counterparts in Belgium, France, Spain, Netherlands, UK and Italy. The picture is rather grim. The amount of annual natural gas sent per 1 km of a pipeline and gas consumption per 1 km of a pipeline is the lowest in Poland due to “lack of capacity reserves especially in North-Western Poland and lack of network development in the North-Eastern Poland”, according to the document. While it is important to keep in mind that additional result of developments in gasification infrastructure would be in compliance with the EU requirements for more competitive internal market and cleaner fuels, the documents specifically mention security of supply as the motivation for these actions.

Similarly, a comparison between existing and undertaken physical infrastructure to receive international gas exemplifies Polish limited capabilities. While other countries have access to fairly diversified sources, Poland is bounded to the Eastern source, according to the document. Polish connectors with Belarus and Ukraine that deliver “Russian gas and Asian gas transiting through Russia,” and a connector with Germany represent a bleak picture in respect to other countries’ variety of choice. Moreover, the German connector does not offer significant promise given most of the suppliers provide

Russian gas (Ministry of Economy 2007). As a result, the Ministry estimates that as of 2006 “92% of the imported natural gas enters the system through the Eastern connectors and Yamal Pipeline, and the whole transmission network is oriented towards transferring gas from the East to the West” (Ministry of Economy 2007).

III Over-reliance on Russia poses a possible threat

Russian Federation indeed has had many advantages that positioned it well as the main supplier of gas for Poland. Its own massive reserves, geographical access, institutional conditions of the long history of reliability on gas from Russia, state of existing infrastructure with massive pipelines from the East all meant Poland will be dependent on Russia for quite a long time. An analysis of available data shows that while early diversification requirements were met, the existing preconditions did not provide much optimism towards maintaining the limit in the future. Similarly, the Ministry of Economy reports that the prospects were not sufficient to maintain energy security given “unfavorable structure of supply contracts” (Ministry of Economy 2007).

Additionally, possible over-reliance on Russian gas raised if not red, than at least orange flags for policy makers given contemporary international developments. A government document “Energy Strategy of Russian Federation until 2020” from August 28, 2003 states that one of the strategic interests of natural gas sector development is “securing Russian political interests in Europe and in the neighboring countries” (quoted in Ministry of Economy 2007). PNGI identifies state monopoly OAO Gazprom as the leading entity responsible for obtaining Russian goals, and suggests in the search of consumer markets the company could choose to omit transit countries like Poland, a strategy later materialized in Nord Stream 2 initiative (Ministry of Economy 2007).

The risks of over-relying on Russian gas materialized the fastest in supply disruptions, as exemplified by disputes with Ukraine in 2006, 2009 or issues with Belarus.⁹ Poland, as a recipient of gas from both of these directions suffered indirectly on multiple occasions (Collins 2017).

IV Legislative response to the danger to Poland's energy security

Legislative changes that followed to address emergency situations only strengthened the salience of energy security. The Energy Emergency Action Board [Zespół ds. Działań w Sytuacjach Kryzysowych w Energetyce] was created in 2006, and following the EU directives: 73/238/EWG, and 2006/67/WE, Polish government prepared and passed a bill on inventory of crude oil, petroleum products and natural gas and procedures in emergency situations and disruption in the markets on February 16, 2007 (Bill on Oil Supplies... 2007).

The legal framework created enabled government to intervene in the markets in case of a supply crisis. One of the most important instruments were obligatory intervention inventories under the government disposal. Poland finished building up levels of its petroleum inventories a year earlier than EU procedures required. Similarly, obligatory intervention inventories of natural gas, together with emergency procedures, were created. A target amount of inventories were supposed to be an equivalent of 30 days of daily import (Ministry of Economy 2009b).

Moreover, introduction of the bill meant Poland met International Energy Agency criteria and could participate in coordinated support system between member countries in case of emergency managed by the IEA (Ministry of Economy 2009b).

⁹ For rich literature on this see for instance Stern et al. 2009

V Evaluating alternatives to Russia on a pursuit to diversify

As evidenced by introducing a series of laws on energy emergencies, policy makers demonstrated their awareness of consequences of insufficient energy security. PEP2030 states that it is an “imperative” to increase capacities of gas transmission and storage systems. Moreover, increased extraction efforts are suggested as a way to satisfy current demand and increase long-term security (Ministry of Economy 2009a). How could those be achieved? According to the document through diversification of sources and channels of natural gas.

According to Kaliski et al. (2010), from multiple projects considered as potential methods of diversification discusses since the 90s, only Lasow connector was delivered. It is a piece of infrastructure providing connection with Germany, and in the past also a point of entry for the gas from Norway. PEP 2030 first underscores the importance of economic feasibility of each single alternative, and then lists a whole array of possible projects:

- “Adequate tariff policy encouraging investments in transmission and distribution infrastructure
- Construction of LNG receiving terminal
- Contracting at market prices diversified gas sources for the LNG terminal and from the northern direction
- Creation of sustainable management policy of domestic gas supplies enabling expansion of natural gas reserves on the Polish territory

- Completion of investment projects enabling increased natural gas extraction on the Polish territory
- Diversification of supply through creation of a transmission system accessible to North, West and South channels and creation of intersystemic connections fulfilling the diversification postulate in the first place
- Obtaining access to foreign natural gas reserves by Polish companies
- Support of the infrastructure investments with the EU funds
- Improvement of crisis management mechanisms
- Protection of national interest in strategic companies in the gas sector
- Incentivizing storage magazine capacities investment (through an appropriate construction of tariffs and assurance of return on engaged capital)
- Legislative actions targeting investment barriers, especially in respect to big infrastructure investments (storage magazines, LNG infrastructure, gas compression stations, etc. and pipeline investments)
- Continuation of pilot program of sharing methane from coal” (Ministry of Economy, 2009a).

Interestingly enough, documents from the time do not mention pricing considerations. With that in mind, a possible additional research question would deal with the role of affordability in the terminal operating process, and the impact of global gas market transformations. One of the question that comes to mind is whether Poland would build the terminal and use if the shale revolution did not happen? With a limited global supply of LNG, and the demand factors in place, Poland would face a difficult time if competing financially for LNG with developing East Asia countries. Supposedly,

terminal would be built anyway but affordability criteria has to be met in order for the terminal to operate on a significant scale.

The process that ultimately led to construction of an LNG receiving terminal in Poland was started in 2006. The unpublished resolution 3/2006 of the Council of Ministers aimed at diversification of Polish energy sources, and according to it, diversification of natural gas supply required specifically building an LNG terminal (SAO 2013, Ministry of Economy 2009a). According to a Polish Press Agency release from the time, the terminal, together with securing supply from non-Russian sources, increased domestic production, and increased storage facilities were postulates neglected by the previous post-communist government. A 2001 deal with 5 Norwegian companies to supply 74 bcm of natural gas over 2008-2024 period was in fact cancelled in 2003. Mr. Marcinkiewicz, prime minister in 2006 called the inaction “scandalous and endangering Polish energy security” (PAP 2006). Asked about potential alternatives to Russian gas he mentioned potential northern direction, eastern direction, and south direction, citing Iraq as one of the possibilities.

Despite the project’s branding as a key investment for the energy security, enabling imports from any country in the world, the legislative process did not gain much traction. Another unpublished resolution (77/2006) in May 2006 approved PGNiG SA preliminary actions to construct the terminal and transferred supervision to the Minister of the Economy (SAO 2013). An SPV Polskie LNG Sp z o.o. was created by PGNiG SA in 2007 to build and operate the terminal.

The new government under the leadership of Donald Tusk, in an unpublished resolution from August 2008 moved the long-term supervisory authority to the Minister of the Treasury through transferring of 100% ownership of Polskie LNG to GAZ-SYSTEM

SA, occurring on December, 8 2008. In January the Ministry of Treasury approached the new owner and its subsidiary Polskie LNG to identify legislative solutions to speed up the process. According to the results of the Supreme Audit Office [Najwyższa Izba Kontroli, NIK] control, no efficient legislative procedures were adopted until 2009. Change of a ruling coalition, focus on managing the reasonably healthy economy amid the Great Recession could be identified as leading to insufficient institutional design slowing the pace of developments. Among the institutional barriers, NIK highlights:

- delays in realization of investment tasks by GAZ-SYSTEM and Polskie LNG, especially for two projects (Terminal LNG and Świnoujście-Szczecin pipeline),
- conflict of interest by the Transport Technology Oversight Agency [Transportowy Dozor Techniczny],
- Insufficient exercise of due diligence by a respective overseeing Minister of the Treasury
- Ineffective coordination efforts by investment coordinator GAZ-SYSTEM, lacking necessary execution instruments (Based on SAO 2013)

The reasons for delay require further inquiry. One of the hypothesis could refer back to the affordability issue, with no potential sources of affordable supply, political will was not sufficient to justify next steps of the project.

The delays increased financial risks. PGNiG could not accept LNG gas from Qatargas Operating Company Ltd. in early 2015 as it previously agreed to in contract terms, and given the Take-or-Pay clause negative financial consequences could not be mitigated. Moreover, prolonged delays increased the risk of losing the EU funds used to co-finance the investment (SAO 2013).

A bill “On investments in respect to Liquified Natural Gas Regasification Terminal” passed in the parliament on April 24, 2009, established the rules on preparation, realization and financing procedures of the investment and further contracts followed (Bill on Investments... 2009).

C The terminal

I Description of the investment

The actual investment involved building the LNG receiving terminal and additional infrastructure: a new breakwater installation and expansion of the port basin system to allow for more space for LNG shipments, new wharf infrastructure to allow ships transporting LNG to dock, and lastly a high-pressure 80km-long transmission pipeline. Responsibilities were divided in the following way: Polskie LNG S.A. was responsible for the terminal part, The Szczecin and Swinoujscie Seaports Authority was handling the breakwater infrastructure, the Maritime Office in Szczecin was responsible for the wharf and docking improvements and Gaz System was put in charge of the new pipeline (EY 2013).

II Financing

Each actor was responsible for financing of their respective parts. The whole investment was estimated to cost 4.3 Bn PLN, and costs of the actual terminal were the highest, and were expected to amount to 2.8 Bn PLN. More detailed information is summarized in the table below:

Funding of the Investment

Table 5.

Investment component	Estimate of the funding required	Source of funding
Terminal	2.76 Bn PLN	Gaz System recapitalization – 1 Bn PLN
		EU (Infrastructure and Environment Operational Program as part of the EU Cohesion Fund and European Energy Program for Recovery) – .77 Bn PLN
		Debt instruments – around 1 Bn PLN including: EBRD – .3 Bn PLN loan EIB – up to .6 Bn PLN investment loan Consortium of 11 commercial banks – 1 Bn EUR bond purchase program
Breakwater and port basin	1.02 Bn PLN	Governmental funding – undisclosed
		EU (Infrastructure and Environment Operational Program as part of the EU Cohesion Fund) – undisclosed
Wharf	.17 Bn PLN	Maritime Office in Szczecin – undisclosed
		EU (European Energy Program for Recovery) – undisclosed
Pipeline	.32 Bn PLN	Gaz System own funds – .16 Bn PLN
		EU (European Energy Program for Recovery) – .16 Bn PLN

Source: Based on: EY 2013

These amounts were later adjusted to reflect the increased cost that in terms of the Terminal amounted to 3.64 Bn PLN, including .89 Bn PLN from the EU funds (according to Ministry of Development's database accessible here: <http://www.mapadotacji.gov.pl/projekt/1214687>)

III Construction

After signing a contract with an Italian-French-Canadian-Polish consortium in July 2010, the cornerstone was laid on March 23, 2011 in an official ceremony and construction started. As mentioned above in the legislative section, a series of delay took place.¹⁰ In June 2012 three companies – members of the consortium bankrupted.¹¹ While the first shipment was received in December 2015, the investment was officially finished and received operating permit in 2016, two years after the original date.

8. Results

A Diversification

Analysis of diversification in respect to the country of import requires us to make a distinction between the direction and the country of origin. Natural gas comes to Poland through pipelines from Belarus, Ukraine, Czechia, and Germany. Overconcentration

¹⁰ For more detailed information see SAO, 2013

¹¹ Oddly enough, the history of the investment section on the Polskie LNG website ends in 2011, and English version has accidentally a wrong date for one of the supervisory contracts: <https://en.polskielng.pl/pl/lng-terminal/lng-terminal-in-swinoujscie/history-of-the-investment/> last accessed on 5/6/2019

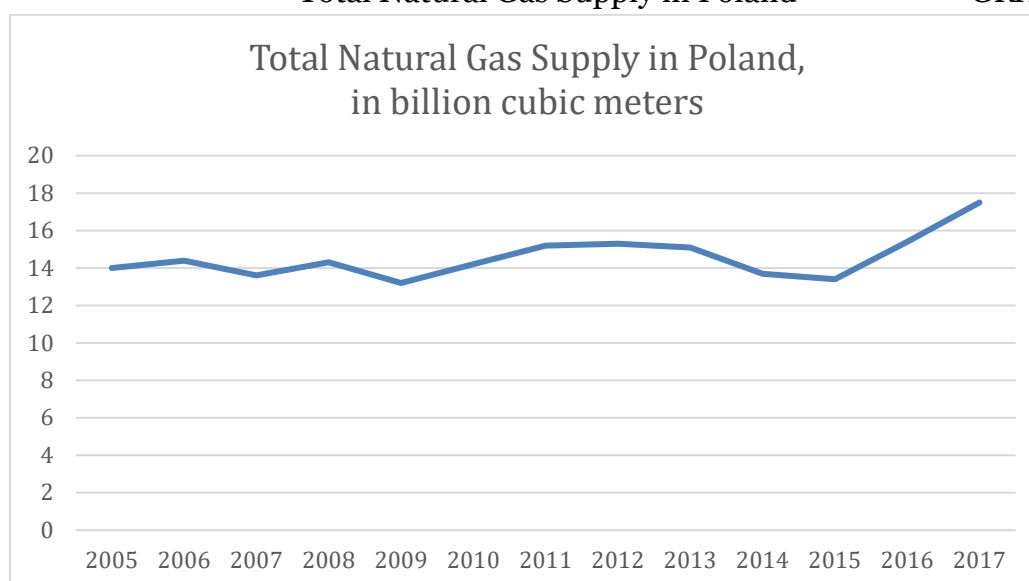
poses the biggest threat: “import from one direction from one provider of gas from one country is the least diverse and the most dangerous threat to energy security” (Zawisza 2011).

While reporting imports, PGNiG specifies directions, however not the country of origin of gas. Based on current contracts however, it is with high probability that we say that gas coming from the southern and western directions is also Gazprom gas. This fact is also accounted for in the diversification requirements outlined in the Energy Law (1997). The bill contains a fascinating caveat. While the requirements include LNG and reverse flows from other EU countries in total natural gas calculations, these two sources are exempt from the diversification requirement, in fact seemingly decreasing “formal” dependence on Russian gas as long as it is provided by an EU country in the form of a reverse flow.

Analysis of the data is very informative for the impact of LNG. First, let us delve into overall gas supply. Altogether, gas supply rose in line with the projections presented in PEP2030 (Ministry of Economy 2009). While 2014 and 2015 showed lower demand than expected, 2016 results were almost equal to 2015 prognosis. Reaching 2020 target in 2017 may be a result of income effect of lower gas prices.

Total Natural Gas Supply in Poland

GRAPH 3.



Source: Based on PGNiG annual reports

Actual Natural Gas Supply vs PEP2030 projections

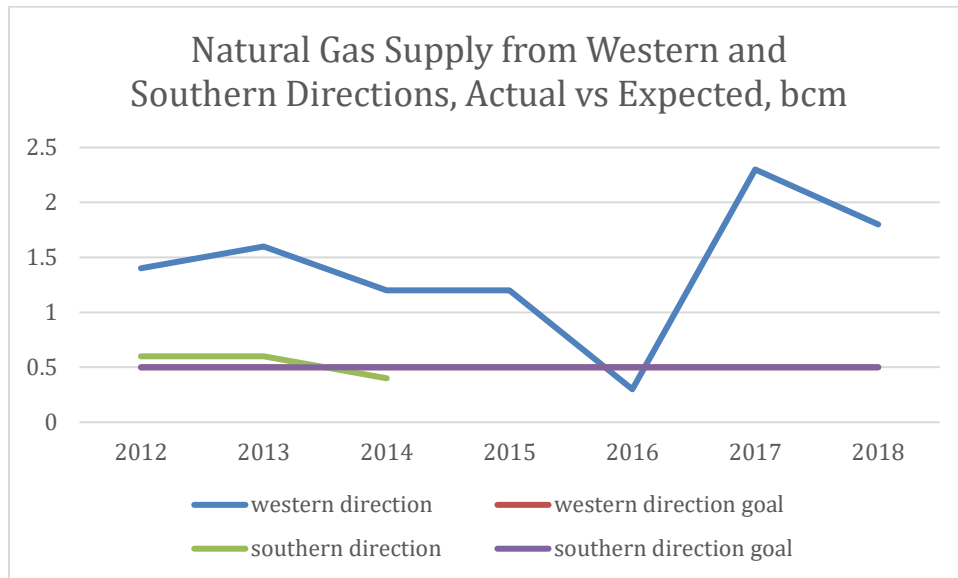
TABLE 6.

	2010	2015	2018	2020	2025	2030
Actual Natural Gas Supply	14.2	13.4	17.3	N/A	N/A	N/A
PEP 2030 projection	14.1	15.4	N/A	17.1	19	20.2

Source: Based on: PGNiG annual reports and Ministry of Energy 2009c

PEP assumed meeting specific policy objections to meet the rising demand (Kaliski et al. 2010). Some of these policies were not fulfilled. The supply from western direction exceeded the goal of 0.5 bcm per year from 2012 on, however the same cannot be said about the southern direction that met 0.5 bcm per year goal only in 2012 and 2013. Additionally, LNG supplies started with a 2 year delay in 2016.

Natural Gas Supply from Western and Southern Directions, Actual vs Expected
GRAPH 4.

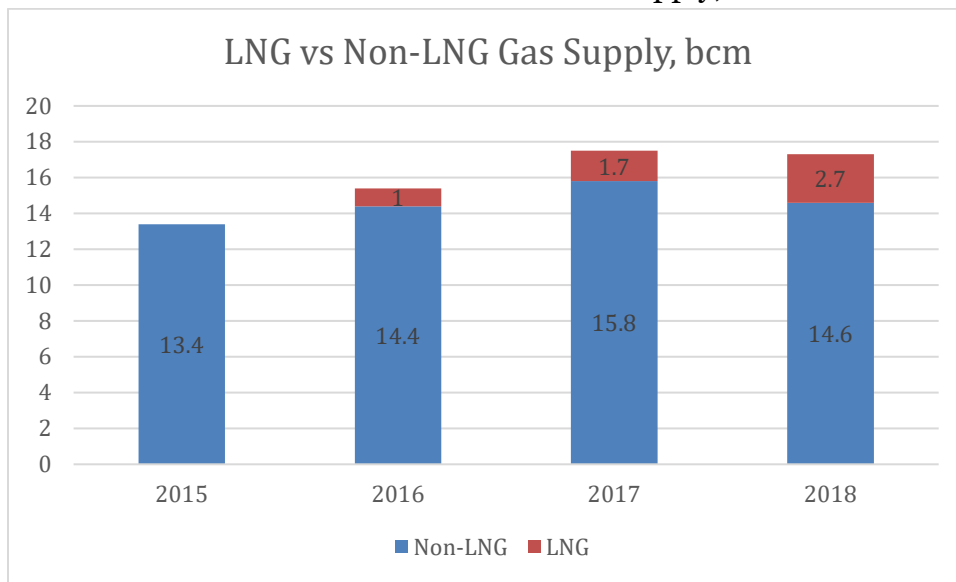


Source: Based on: PGNIG annual reports, Ministry of Economy 2009, Ministry of Economy 2009c, Kaliski et al. 2010

Overall LNG supplies have been increasing steadily. Since the first transport arrived in 2016, with the full year data available until the end of 2018, Polish LNG import experienced 64% yoy CAGR growth. LNG's role in total gas supply constituted 15.6%, a significant rise from 6.5% in total gas supply mix 2 years earlier.

LNG vs Non-LNG Gas Supply, bcm

GRAPH 5.

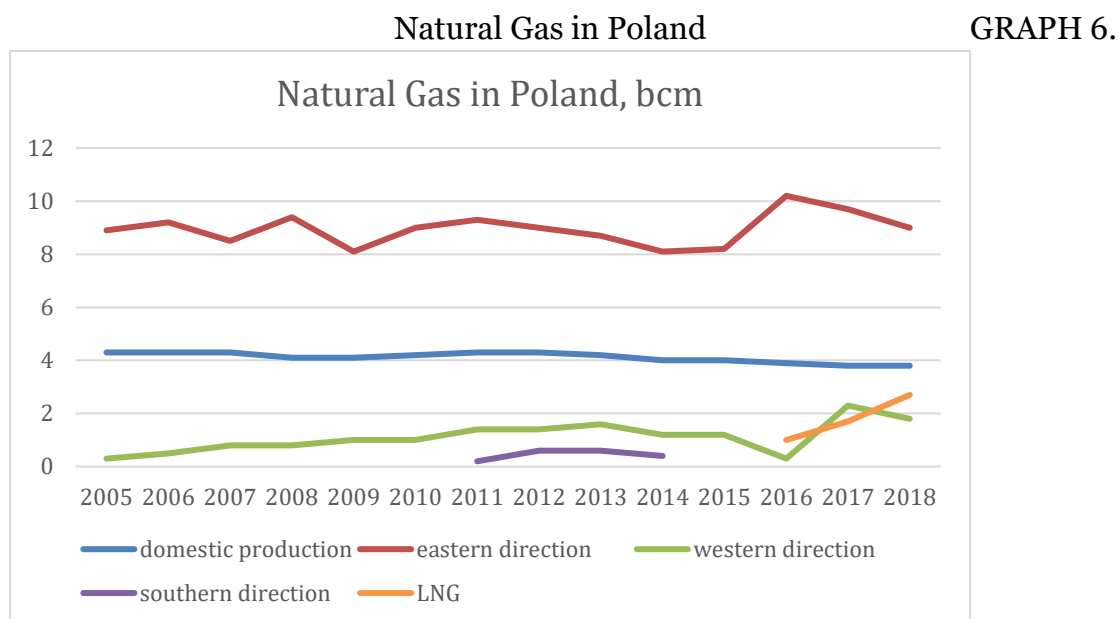


Source: Based on: PGNiG annual reports

Accounting for the definition based on the direction, not country of origin, Poland was not able to meet its diversification requirement from 2000 for any of the analyzed year. Moreover, it was not able to meet its updated and less strict diversification requirement from 2017 for any of the analyzed year until 2018, although it barely missed the target in 2017. These facts prove on one side that the minima were binding, on the other the inability to meet the goal. The 2018 change in trend is optimistic, and a question that should be posed is: is it a result of the LNG terminal? Redoing the calculation without LNG in the mix gives us the share of gas from the eastern direction at a level of 83.3% in the year 2018, pointing out that LNG terminal played a crucial role in increasing diversification as understood by Polish law.¹² While there is a still long way to go to comply with the more ambitious requirements, the LNG terminal fulfilled its function and its rate of growth is a source of optimism towards meeting stricter minima in the future.

¹² This method is based on a very conservative assumption that in the absence of LNG, Polish private and business consumers would simply limit their energy demand rather than increase the amount imported from Russia.

Given political announcements of not entering talks with Russia on new gas contract after 2022, the decision to expand the terminal's capacity by 50% from 5 bcm to 7.5 bcm, should not come as a surprise.¹³

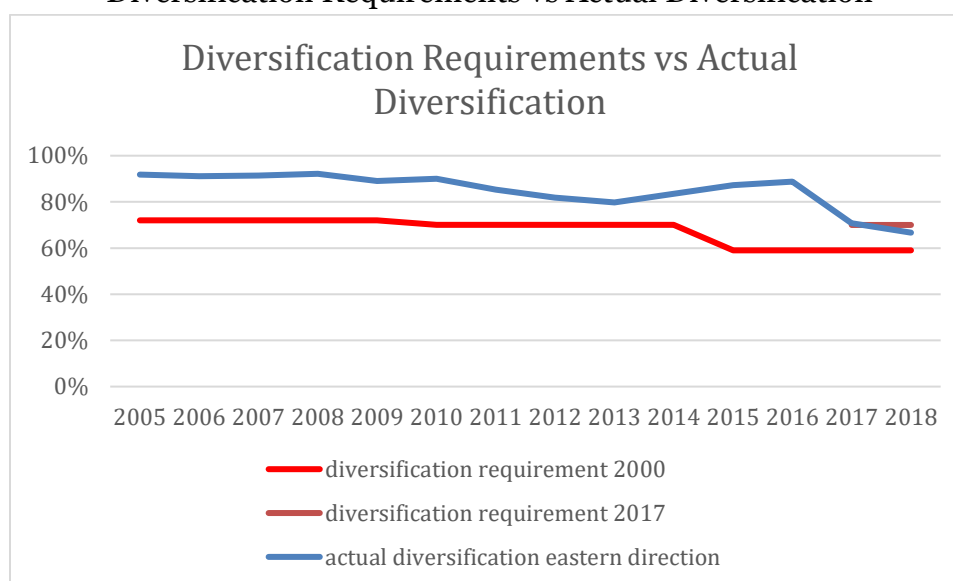


Source: Based on: PGNiG annual reports

¹³ Moreover, other diversification initiatives are currently discussed, including the Baltic Pipe and possibly an FSRU unit in Gdansk, although the plans on the second one are still in an early phase and some concepts suggest using it for transportation purposes.

Diversification Requirements vs Actual Diversification

GRAPH 7.



Source: Based on: PGNiG annual reports, Council of Ministers, 2000; 2017

Diversification Requirements vs Actual Diversification vs Diversification without LNG in the mix

TABLE 7.

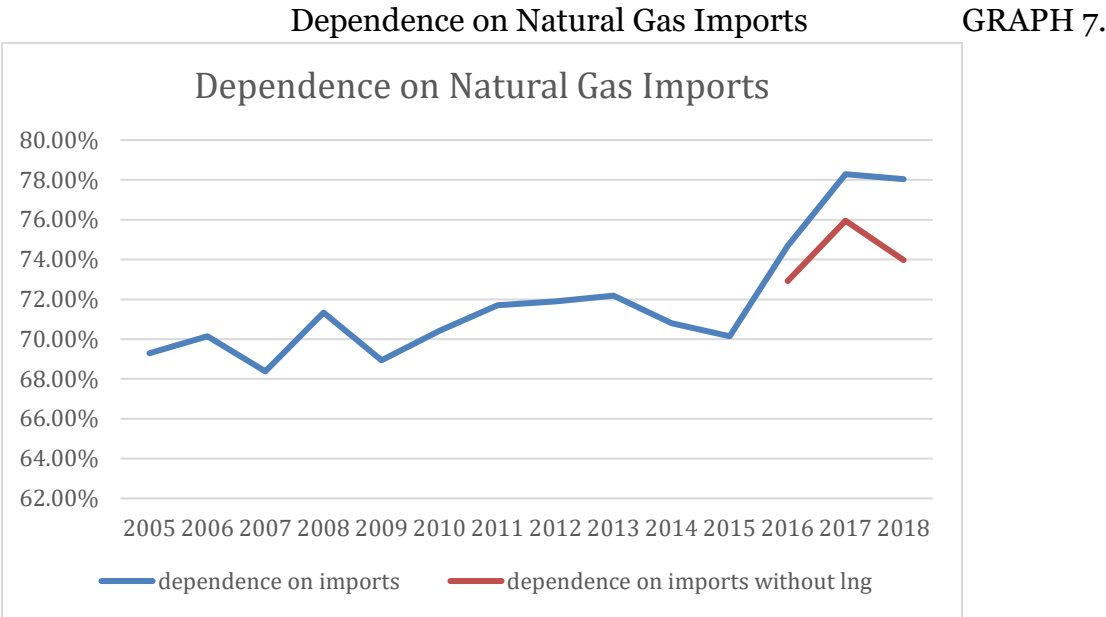
	2016	2017	2018
2000 Requirement	59%	59%	59%
2017 Requirement	N/A	70%	70%
Actual Diversification	88.7%	70.8%	66.67%
Diversification w/o LNG	97.14%	80.83%	83.33%

Source: Based on PGNiG annual reports, Council of Ministers, 2000; 2017

Lastly, additionally to analyzing the dependence on the biggest importer, it is worth looking at the overall dependence on imports of gas supplies. While the total share of imports in the gas mix was historically fluid depending on a variety of factor, it tended to fluctuate around the stable 70% line. Since 2015 however, the dependence on imports significantly increased. Again, a question that should be posed is following: is it a result of the LNG terminal? When redoing the calculation without including the LNG in the mix we see that dependence on imports grew anyway, however to a lesser extent.¹⁴ It could

¹⁴ The same hypothetical conservative scenario based on an assumption from the previous paragraph.

possibly be explained by the income effect with energy being cheaper overall and the effect further strengthened by potentially cheaper than other sources LNG, however this hypothesis needs a further academic inquiry.



Source: Based on PGNiG annual reports

To summarize, the LNG terminal has helped achieving the diversification requirements as specified by Polish law, something unseen since the introduction of diversification minima in 2000. However, it is worth noting that overall dependence on imports has increased and LNG supplies, potentially through the income effect mechanism, have contributed to this phenomenon. With developing Polish economy and growing energy and specifically natural gas demand, it is highly unlikely that the trend of import dependence will turn, and hence affordability and reliability will become increasingly important to ensure the long-term energy security.

B Affordability

An informative assessment of the impact of LNG terminal in Swinoujscie on affordability of Polish gas supplies is a challenging task. The most important reference point - gas prices paid for Russian gas is difficult to estimate. Particular clauses of the Yamal Contract for Russian gas delivery from 1996 until 2022 were never made public. While the general formula was standardized and, as for other countries, indexed to crude oil prices, there is a consensus that price conditions were unfavorable for Poland, despite its relatively big market potentially suggesting discounts like in the German case. Another factor was also significant overestimation of the actual Polish gas consumption, expected to reach 27-35 bcm by 2010, whereas the actual consumption amounted to 14.4 bcm. Moreover, the contract also included 85% take-or-pay clause and the ban on reexport of the gas Poland committed to buy (Zawisza 2011). Additionally, based on a NIK report, there was no negotiating instruction prepared for the Polish side.¹⁵ The European Commission antitrust investigation found that Poland was one of the 5 EU member states where Gazprom successfully managed to “partition gas markets along national borders” and as a result charge higher gas prices (EC 2018).

Based on Russian agencies’ releases and estimations, experts tried to arrive at as close to the actual prices paid by Poland for the Russian gas. When contrasted with the main reference gas price in the US: Henry Hub, there is a significant premium charged by Gazprom. According to Mikulska, 2018 “Even if the price at HH rises to the upper bond of EIA predicted levels (approx. \$5 per million Btu), U.S. LNG could still compete with prices that Gazprom charged Poland through most of the 2010s (see Table 8.).”

¹⁵ For more information on procedural flaws and discussion on potential loss of transit fees see SAO, 2004

Gazprom vs Henry Hub price differentials

TABLE 8.

Year(s)	2002-2009	2010	2012	2013	2014	2017
Gazprom: Average annual price per 1000 cubic meters (in USD)	250	336	500	429	379	199
Gazprom: average annual price per million Btu (in USD)	13.6	9.2	13.6	11.7	10.3	5.43
Henry Hub average annual price per million Btu (in USD)	6.24*	4.37*	2.75*	3.73*	4.37*	2.99

Table 1. Average Prices of Natural Gas Delivered to Poland under the Yamal Contract & at Henry Hub. Sources: Gazprom: wPolityce.pl, BiznesAlert.pl, Instytut Sobieskiego; Henry Hub: EIA

* Henry Hub prices are provided for informational purposes. Competition potential between Russian gas and HH prices between 2002 and 2014 is only hypothetical since the U.S. did not start exporting LNG until 2016 and Poland had no infrastructure to accept LNG until 2015, when the LNG terminal in Swinoujscie began operating. AM

Source: Mikulska, 2018

Similarly, the new LNG contracts do not provide full public information on contract structures and prices. First of all it is worth noting that in terms of regasification price, it is already borne by PGNiG anyways. Given the company reserved 100% of the terminal's capabilities, the more contracts it delivers the lower per Btu cost of regasification. There have been attempts to estimate other price components. Some contracts arouse more attention and estimations from the market experts, and these divagations can be nonetheless informative. Experts wrote excessively about new for Poland spot-based pricing structure in the Centrica agreements, achieved mostly as a result of opening the effective PGNiG's London trading office headed Ireneusz Łazor (Jakobik, 2017b). According to some estimates, Centrica's contract for the American gas should cost around \$150 per 1000 cm that needs to be adjusted for transport and liquefaction cost. It remains unclear who bears the aforementioned types of costs, potentially increasing the price from around \$4.10-\$4.26 per mmBtu (or \$151.29-\$157.19

per 1000cm) to \$7.47 per mmBtu (\$275.64 per 1000cm).¹⁶ However, other authors point out to subsequent fall in Centrica's share price and reports that the price formula may be indexed do one of the European exchanges instead, the fact praised as a Copernicus break-through for the Polish gas market (Jakobik, 2017a). Moreover, to get rid of supply glut, there is a possibility that the company did not include liquefaction cost to make the oversupplied resource more attractive, leaning to a final price of around \$150 per 1000cm. As Jakobik (2017b) points out, this price is lower than average Gazprom price presented, and given the unfairness of treatment of the Polish buyer that led to case before the arbitrage court, the expected difference between American and Russian gas can be even bigger in favor of the LNG."

Improving the negotiating position is happening through yet another channel. More recent contracts have been signed for receiving gas from terminals that are not even under construction, like Port Arthur LNG or Venture Global LNG. To account for more risk they carry, including possible delays and lack of approval from the regulatory site, such deals possibly offer better price conditions and enable PGNiG to enjoy exercising anchor pricing strategy.¹⁷

More recent data shows that this beneficial relationship between Russian and American prices have been maintained and was not just a result of the PR importance of the first transaction as Sikora and Sikora (2017) expected. The EIA data on exports to Poland provides us with stable price differential in favor of the gas exported to Poland from the US when compared to average Gazprom price.

¹⁶ As a result of adding around \$3.5 per 1000mmBtu for liquefaction costs and standard Chenierie formula including 115% of Henry Hub price - see Sikora and Sikora, 2017 and Maciazek, 2017

¹⁷ For more on the strategy see Mikulska 2019, PGNiG commentary on the regulatory approval of Port Arthur LNG project available here: PGNiG 2019 <http://en.pgnig.pl/news/-/news-list/id/federal-permit-for-port-arthur-lng/newsGroupId/1910852>

USA (based on LNG exports to Poland) vs Russian Gas Prices TABLE 9.

	November 2018	January 2019
USA, Cove Point (3,231 mmBTUs provided) (in USD)	7.12	
USA, Sabine Pass (9,762 mmBTUs provided) (in USD)		7.00
Russian Natural Gas Average Monthly Price (in USD)	8.27	7.29

Source: Based on: EIA data and WorldBank data available here: https://www.eia.gov/dnav/ng/hist/ngm_epgo_png_nus-npl_dmcfm.htm and here: <https://www.indexmundi.com/commodities/?commodity=russian-natural-gas&months=12>

Interestingly enough, Polish and international media have witnessed waves of articles against the new directions right around signing the new contracts, especially before recent shift of Russia towards developing its own LNG infrastructure. Most prominent lines of reasoning in those articles pointed out to higher prices, mainly political motives, US inability to export its gas and instead reexporting Russian gas to Poland by American companies. They quoted experts who cannot be seen as independent: like Klaus Schefer, a CEO of German Uniper involved in Nord Stream 2 negotiations. Some thought leaders in the field saw it as evidence of Russian disinformation campaign and a case in point proving price competitiveness of new agreements.¹⁸

Additionally, Mikulska makes an argument according to which - given increasing energy security in other areas (namely, diversification and reliability) is strategic from the geopolitical point of view - a premium price can be paid for it. In other words, gas can be more expensive as long as it comes from another source than Russia. And Polish society, used to paying high gas prices, is ready to accept it (Mikulska 2018).

¹⁸ For examples see for instance: New Cold War 2015

Given lack of information, it is impossible to give a full and fair assessment of impact on LNG Terminal in Swinoujście on affordability of Polish natural gas. Statements like those of PGNiG leadership or Ministry of Energy representatives that “LNG supplies are cheaper than Gazprom deal by about 20-30%” have to be taken at face value, and it is impossible to verify whether the actual cost of dependence on Russian gas between 2001-2018 was closer to 50 or 100 Bn PLN (Wozniak 2019 and Naimski 2019). Hence the most important conclusion is the need for transparency in the market, and the United States’ Department of energy may provide a valuable benchmark. Secrecy problem aside, available pieces of information and estimates from the market experts hint at possible positive price effect. Moreover, Poland seems to act in a way to secure an advantageous negotiating position, further implying the affordability should be happening. Potentially, intense information campaign against new LNG contracts from Russian sources could also confirm this direction of thought. Lastly, it is worth noting that if other energy security conditions are fulfilled, Polish society may be willing to pay a “security premium” for non-Russian gas.

C Reliability

According to PGNiG (2019) the only long-term existing contract on pipeline natural gas is Yamal, supplying 10.2 bcm annually, with 85% Take-or-Pay clause. So far the Swinoujście LNG terminal has received LNG from Qatar, Norway and the US. They are based on long-term contracts with Qatargas, long-term contract with Cheniere, medium-term contract with a British firm Centrica, and spot contracts. Moreover, two more contracts are currently signed for non-operating US-based liquefaction facilities.

- “Contract for LNG with Qatargas until 2034:

1.3 bcm annually, 100% Take-or-Pay. Deliveries since June 2016 side agreement (the total volume will increase to 2.7 bcm per annum, in 2018-2020 volume will be increased to 2.9 bcm)

- Contract for LNG with Cheniere until 2042:

0.73 bcm in the period of 2019-2022

1.95 bcm annually in the period of 2023-2042

- Contracts for LNG with Venture Global and Port Arthur:

2.7bcm annually each. Deliveries since 2022 (at the earliest) until 2043” (all cited from PGNiG, 2019)

Such diverse structure of suppliers and types of contracts naturally contributes to reliability. While currently the great majority of them is based on DES clause, PGNiG has already secured greater diversity in this field when the already signed contracts with new companies will be implemented. As Mikulska points out, diversification of suppliers, contract arrangements and flexibility of these contracts strengthens Polish energy security and is beneficial from the economic point of view (Mikulska 2019).

The mix of countries provides increased reliability from political perspective. While Qatar, US, and Norway do not necessarily align every strategic priority with each other and with Polish geopolitical interest, having different partners, with none of them being as potentially willing to engage energy policy to exercise their political interest in CEE to a level comparable to the Russian Federation is a great advantage. LNG could be seen as a way to strengthen the bonds between economies and countries, idea especially

present in the current context of the US-EU relationship.¹⁹ However, as pointed out by some experts, US companies in the field are independent private companies that follow economic motives more than any governmental purpose, and are as such very different than their Russian counterpart or even a State-owned PGNiG (Mikulska 2019)

To assess reliability, further, I follow the Agency for the Cooperation of Energy Regulators (ACER) two main Market Health metrics (ACER 2018). The first criterion is whether the member state has at least three geographical-supply sources of origin (Heiskala and Aro 2018). Poland passes this test, even without including the reverse flows, with supply of gas from Russia, Qatar, US and Norway.

The second metric is Residual Supply Index. The RSI must be over 110% - after excluding your biggest supplier (Russia in that case) a country must ensure it can provide 110% of its actual demand. Apart from an intellectual exercise, the RSI can actually be informative regarding the feasibility of a potential non-renewal option when the current contract with Russia expires in 2022. For the most recent 2018 values no matter whether we include the reverse flows or not, after excluding Russia supplies and adding 2017 gas storage facilities of 3.2 mm BTU, Poland is not able to meet the 110% RSI requirement, its RSI values equals to 66% with reverse flows and 56% without reverse flows. In the case when Polish energy needs remain unchanged, but LNG capabilities raise to 7.5 mm BTU, the RSI values are respectively 94% and 84%. Adding assumption that as a result of development of Gdansk FSRU all LNG contracted capabilities from 2024 are available and are supplied to the Polish transmission system rather than being reexported, the new RSI values are: 109% and 99%. While the last assumption seems the most unrealistic, and

¹⁹ President Trump and EC President Juncker agreed to facilitate more US exports of LNG to the EU, see EC 2019a

based on current PGNiG projections it will not be fulfilled until at least 2024, LNG cannot by itself replace Russian gas.

If Poland wants to make sure its supply sources are reliable, the Baltic Pipe project seems the most fitting. This could provide up to 10 mmBTU of natural gas from Norway, and as such would mean RSI of 152% and 142% for 7.5 mmBTU of LNG and fixed 2018 demand.

Additionally, the original ACER recommendation is actual assessment of RSI at a regional rather than a country level. While it includes an assumption that the regional gas markets are interconnected, energy union has long been discussed in the European decision making centers and it remains to be seen whether these discussion will materialize in increased investment after 2019 European Parliament elections. Apart from necessary investment, one of the challenges ahead of the interconnected markets is a phenomenon present in the Polish market system. Despite unbundling, the market is still dominated by state-owned enterprises that often like in case of PGNiG may fully appropriate the new infrastructure: contract for 100% of the Swinoujscie terminal capacities. As Mikulska points out “liberalizing access to countries’ natural gas infrastructure could benefit efforts to enhance market integration” (Mikulska, working paper).

Moreover, while thinking about reliability of supplies, a move away from Russia may lead to an unexpected impact of Poland’s policy of diversification. While Poland could simply limit its exposure to Russia and benefit from its current, LNG-enhanced competitive negotiating position, and demand competitive prices as Lithuania did, current Polish government seems strongly opposed to the idea of letting Russian economy benefit. Interestingly enough, as Mikulska points out, such a move would decrease the

whole region's dependence on Russia: "if Poland wants to achieve security supply and contribute to the security within the Baltic region, its move away from Russian gas can help. In addition, given Germany's affinity for Russian gas, Poland may become a crucial element of balancing the region's dependence" (Mikulska, working paper).

In summary, LNG terminal increased reliability through introducing Polish gas market to diversity of contract lengths and type and supplies from more countries with all of them less willing to exercise political pressure in the CEE region than Russia and especially USA and Norway generally more strategically aligned with Polish interests. Following ACER market Health metrics provides deepens the quality of reliability analysis, showing that Poland meets a 3-country criterion yet is able to meet RCI index only under a set of unrealistic assumptions. In order to fully become independent from Russian supplies, Baltic Pipe initiative should be pursued.

9. Conclusion

As a result of changes in the global gas market, LNG became a viable option for many. Poland is one of the beneficiary of this transformation. A country long realizing the urgent calling to diversify, it was not able to do so in an economically competitive way. With the shale gas revolution and technological transformation, and aided by the EU funding, Poland pursued an LNG receiving terminal project. Operating since 2016, the Swinoujscie terminal led to partial diversification of gas supplies: reliance on Russian gas decreased while the reliance on imports increased slightly as a result of the terminal. While the affordability aspect cannot be confirmed fully, it seems safe to assume that contracts signed so far have not been worse than contemporary deal with Gazprom, and

based on various estimates from different sources it seems possible that 20-30% savings on new contracts when compared to the cost of Yamal gas can be trusted more than a typical political promise. Lastly, as a result of increased diversity in types, duration and countries of suppliers of the contracts, reliability of gas has also increased. Overall, despite short time since starting operations, creation of the LNG terminal in Swinoujscie has already increased Polish energy security. But to more fully meet international recommendations on energy security, more integrated pannational gas markets should be promoted and conscious liberalization in energy markets should be encouraged. In addition, other energy security oriented-projects should be carefully evaluated and pursued if they indeed facilitate market integration and energy security objectives.