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Natural gas pipeline politics in and around the European Union
Modelling – based assessment of Russian and European strategies

Thesis Summary

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I. The aim of the work and its background

Pipeline politics is deeply rooted in energy economics, political economy, and geopolitics and is discussed in international and energy law; therefore this topic calls for an interdisciplinary approach. Natural gas pipeline investment decisions in and around the EU between 2000-2020 have been shaped by the drastically changing regulatory environment within the EU, unforeseen changes in the global gas market due to technological developments in shale gas production, and growing geopolitical tensions closely related to large transmission pipelines.

Energy politics in the European Union has three main pillars: competitiveness, security of supply, and sustainability. Building a common European energy market was the goal of the first pillar and therefore the unbundling and liberalization of the sector were dominating the natural gas market-related agenda and legislation set between 1990-2009. In January 2009 the transit shipments of natural gas via Ukraine were stopped for about two weeks creating supply shortages in certain Central European countries, impacting even household consumers for several days in Bulgaria and Serbia. The reason for the supply disruption was political: a transit dispute between Ukraine and Russia. Although European gas natural companies and politics reacted immediately and in two weeks' time redirection of volumes from West to East solved the problems in the short term, the vulnerability of the EU energy system and the network's resilience to outside suppliers was demonstrated (Kaderják & Tóth, 2011; Yafimava, 2011, pp. 183-204). In the next decade (2009-2019), the security of natural gas supply was put high on the agenda. The EU developed a toolbox to address the challenge of this vulnerability by applying already existing market and competition rules against Russian state-owned natural gas giant Gazprom, and by adopting a set of new legislation to strengthen cooperation between EU member states and their respective actors. This toolbox entails building a more robust natural gas network infrastructure (hardware) and a cooperation mechanism to prepare for the security of supply events (software). Parallel to these developments, the Russian energy strategy in 2009 made its main priority to diversify its supply routes to Europe with the final aim to bypass Ukraine and thereby eliminate the transit risk. Sustainability as the third pillar gained new momentum in 2019 with the Green Deal (2019) and the ambitious decarbonization agenda of the von Leyden Commission. In the 2000's gas was regarded as a necessary and useful fuel supporting the energy transition. With the emergence of the green agenda the debate on the role of natural gas turned into calling for "greening of gas". The sustainability goals have a crucial

impact on the future of natural gas, but this will be only considered in this thesis as a constraint on the market size.

This dissertation aims to assess the success and the limits of the EU infrastructure development toolbox against power politics in the upstream and the conflicts with the Russian pipeline strategy. The analytical framework considers the changing global market circumstances between 2009-2020 in the field of natural gas, most prominently the increased supply of liquified natural gas (LNG) from the USA as a new entrant to the market and the growing (geo)political tensions with Russia, the largest pipeline supplier of the EU. The decarbonization agenda of the EU, which since the mid-2010's has shifted the emphasis of policy setting on the sustainability pillar, has been considered in this dissertation only in terms of its impact on future gas demand.

This dissertation focuses on the power politics surrounding the natural gas pipeline projects planned and implemented between 2009-2020.

II. Methodology

Traditional pipeline economics offers a robust and well-developed analytical toolset – financial cost-benefit analysis - on how pipeline investments shall be decided on, but pure economical considerations cannot explain investment into excess capacities of infrastructure that is a common tool to reduce reliance on a single supplier, or on a buyer or on a transit country. International law and studies on governance failures offer a good understanding of power relations and failures or success conditions of cooperation and coalition building. A purely legal analysis would fail to capture the network structure effects of natural gas transportation and interdependencies of the projects. Geopolitics on natural gas also has a broad literature discussing military and power politics and explains the broad economic, political, and power relationship of main state actors which cannot be neglected when discussing European pipeline developments. In this specific case, however, decision-making actors on individual projects are private or state-owned companies. To analyse the interplay of economic, governance, and geopolitical factors related to infrastructure investments, **the dissertation uses market modelling as a preliminary analytical method, where the network infrastructure and the supply sources are sufficiently represented in detail, while the geopolitical factors and political considerations are reflected in the analysed scenarios.** The quantitative results of the modelling can substantially contribute to the evaluation of the political choices designed by the scenarios.

Market modelling was applied in the last two decades to study the impacts of large pipelines on the European gas market – most prominently of Nord Stream 2¹ indicated by a sharply growing number of studies. The number of models and their geographical representation is also growing as the necessary input datasets are becoming publicly available. Most of the models applied to impact analysis of new sources via pipeline or LNG are partial equilibrium models and used to describe the market forces within the gas market. One of the early models is the EGMM that has been used in this dissertation (Kiss, et al. 2016). In the modelling-based chapters of this thesis that rely on EGMM, my contribution was to conceptualize the geopolitical changes in the gas market, to verify the baselines and to formulate the main assumptions used for the model calibration to reflect the market position of key players. I designed the analytical framework

¹ Nord Stream 2 is a 55 bcm/yr capacity transmission project directly connecting Russia and Germany under the Baltic Sea. The project was proposed in 2014 to double the capacity of the already existing Nord Stream 1 (that already had 55 bcm/yr capacity).

and formulated the scenarios to address the research questions and selected the key output variables. Finally, I analysed and interpreted the modelling results. I drafted the first text for the academic articles and worked as a corresponding author for two out of the three publications that form the basis of the dissertation: Takácsné Tóth et al. (2020) and Kotek et al. (2016). Actual model runs and visualization of the results were mainly done by Péter Kotek and Adrienn Selei, who are my excellent co-authors in most of my publications.

The modelling literature on natural gas pipelines focuses mainly on the security of supply risks and welfare change, that Russian pipelines might cause in different European countries, and on the flows. Most of them conclude that abandoning the Ukrainian route via Nord Stream 2 does not pose security of supply threat to Europe. Depending on the demand assumptions and pipeline setups they use, most of them claim that Nord Stream 2 would benefit Germany and Western Europe but would result in a price increase in Central Eastern Europe (Mitrova, et al., 2016). There is a consensus in these studies that economics alone does not explain the investment of Gazprom into the large pipelines, rather political considerations mainly related to transit risks are the main drivers (Paltsev, 2014). The dissertation will contribute to this modelling literature with the assessment of three distinct modelling case studies connected by the narrative that Russian and European Union pipeline strategies do conflict. *The first one*, which has been published in Energy Policy in 2020, puts the Russian marketing strategy in the focus with a novel approach to the pricing of short-term Russian sales in a profit-maximizing manner. With this addition, the Russian marketing strategies on different pipeline setups can be tested (Takácsné Tóth, et al., 2020). *The second case* shifts the focus from the Russian pipeline investments to the European Union's Projects of Common Interest (PCIs) using socio-economic cost-benefit analysis to quantify the combined impact of the existing and planned PCIs on the European welfare, quantifying market integration, security of supply, and sustainability benefits (Selei & Takácsné Tóth, 2022). The modelling of PCIs' is complemented by the analysis of the geographical distribution of the Connecting Europe Facility (CEF) funds for gas projects between 2014-2020. *The third modelling-based analysis*, which was first published in Hungarian (Kotek, et al., 2016) and later in English in Competition and Regulation (Kotek, et al., 2020), describes the change in modelled socio-economic results of selected PCI projects driven by the Russian pipeline strategy. The narrative supported by these modelling case studies helps explain the divisive nature of Russian pipelines, most prominently Nord Stream 2 within Europe; contributing to understanding the importance of certain PCI projects despite their low utilization.

The dissertation aims to answer the following questions:

Question 1.: How would Russian Gazprom use the Ukrainian infrastructure under different combinations of availability of the new routes, if it were a profit maximizing actor?

Question 2.: How successful was the EU's pipeline strategy in infrastructure planning, in selecting and implementing the right projects of common interests between 2013-2020 to improve the resilience of the EU gas markets to supply shocks and growing market power of upstream supplies?

Question 3.: How did the European and the Russian pipeline strategies influence each other under a worsening geopolitical EU-Russia relationship between 2009-2020?

Timeframe and geographical coverage:

The **timeframe of the dissertation is 2009-2020**, which is the era when the security of supply-related legislation forming was dominating the EU legislative agenda in the natural gas sector.

The **geographical coverage** of the analysis is the territory of the European Union plus the Energy Community Contracting Parties, Russia, and Turkey.

III. Main findings and results

Question 1: How would Gazprom use the Ukrainian infrastructure under different combinations of availability of new routes (Nord Stream2, TurkStream 1-2 and Balkan Stream), if it were a profit-maximizing actor?

Thesis related to Q1:

1. The impact of **the Russian route diversification strategy influences the Central Eastern European (CEE) countries negatively**, as in most scenarios the wholesale prices increase slightly whereas in Western Europe prices stagnate or somewhat even decrease. Germany is the main beneficiary of the Nord Stream2 project as significant flows are diverted from the historical route via Eastern and Central Europe to Germany. According to the modelling results Germany always gains in terms of socio-economic welfare change when Nord Stream 2 is implemented: consumers benefit from the price decrease in Germany, while the German the pipeline operator benefits from the increased transit flows.
2. **The reason for the price increase in the CEE countries is the congestion on the west to east pipelines** in case the Ukrainian system is not used for Russian gas shipments. The actual booking patterns observed at the first coordinated capacity auction on the European system in 2017 support the modelling results.
3. **Investing into the pipelines to bypass Ukraine was a political decision of Russia, but rational for transit risk mitigation.** Modelling in the scenarios, which assumed the continuation of the use of the Ukrainian system could not confirm the economic rationale for the project. When we assumed that Russia builds Nord Stream 2, Turk Stream 2 and the Balkan Stream, the Russian profit could not grow in parallel with the volumes sold. This means that Russia can only gain market share when it is selling gas at lower prices. With the new infrastructure in place Russian share of the EU's gas import could grow from the current 35-38% to 50% by 2030.

Question 2: How successful was the EU its pipeline strategy in infrastructure planning (2013-2020), in selecting and implementing the right projects of common interests to improve the resilience of the EU gas markets to supply shocks and growing market power of upstream supplies?

Thesis related to Q2:

1. **The liberalization model to build a single European market has been a successful strategy against upstream market concentration.** Market can react most efficiently to the changing supply and demand patterns. The regulatory framework in the EU has set the scene for competition in the wholesale segment especially by providing the two prerequisites to a functioning market: (1) due to the price signals of the hubs and to their liquidity, wholesale trading can rely on volumes available under transparent price conditions, (2) the infrastructure has sufficient capacity and is accessible under transparent conditions in a non-discriminatory manner. Consistently applied scrutiny through the competition policy supported the change of long – term contract terms by abolishing restrictions on destination, pipeline and LNG contracts alike. Despite the growing share in EU's imports Gazprom's ability to abuse this market position has not grown by time, on contrary: it never really existed in Western Europe and diminished in the 2010s also in the Central-Eastern European region.
2. **Legislative efforts to create obstacles to building Nord Stream 2 were partially successful,** as the Gas Directive amendment was successfully passed in 2019. The decision-making power on infrastructure building is still national, remains in the hands of German institutions and politics. Regulatory obstacles applied by other member states however delayed the project beyond 2020, resulting in a new Russian – Ukrainian transit contract for 2020-24. In the domestic politics of Germany perceptions about Russia as an illiberal actor grew, opposition against the pipeline increased by time especially after poisoning of Navalny. During geopolitical developments in 2021 the German government first delayed the licencing of the Nord Stream 2 project later when Russia attacked Ukraine in February 2022 it suspended the procedure.
3. **Security of supply related infrastructure investment supported by the EU has contributed to security of supply, market integration and increased competition.** The network structure as developed by 2020 was a resilient and robust one, which could serve the consumers from multiple sources in a flexible way, thereby contributed not only to the security of supply but also to competitive prices for the benefit of EU consumers.
4. **Two third of the gas infrastructure work funds of the Connecting Europe facility were related to priority projects in CEE countries,** especially to those of Poland and Hungary.

Modelling results of the commissioned and under construction PCIs shows that the European funding was allocated to the projects that served best the European interest.

Question 3: How did the European and the Russian pipeline strategies influence each other under a worsening geopolitical EU-Russia relationship 2009-2020?

Theses related to question 3:

1. **The dissertation found that growing political tensions and lack of coordination between Russia and the EU led to additional investment need on both sides and resulted in building infrastructure that will most probably be a future stranded asset.** Building surplus capacity is however not entirely useless. For Russia the alternative pipeline routes mitigated the transit risk and helped to negotiate better terms with Ukraine and with Turkey. The strong links on the Russian side between Gazprom and the Kremlin shaped the investment decisions often leaving business considerations behind political ones. The southern route was a secondary priority for Gazprom, confirmed by the economic analysis of the route from Russian perspective. Building Turk Stream 2 did not reduce Russian profits, but additional investments on EU side are needed to decrease internal bottleneck in the Balkans. It has been the struggle around the Nord Stream 2 that has pushed Russia (again on political level) to speed up investments on the southern route. **Having Turk Stream1-2 in place in 2021 but not Nord Stream2 is a very unfortunate outcome of the original Russian plans. From the EU perspective surplus capacity also makes economic sense: Russian gas has a growing share in the EU gas supply as domestic production is falling.**
2. The competition of alternative sources - LNG and pipeline from other sources - on the easily accessible internal EU market is a key factor to prevent monopolistic pricing of Gazprom. This, by definition, can only be achieved by surplus capacities, which will not be highly utilized during their lifetime. The competitive pricing of the commodity has to be paid for throughout the infrastructure tariffs. The amount of surplus capacity seemed to be though oversized for both the EU and for Russia if we consider on both sides not only the existing projects but also those where investment decisions were already taken in the low price environment of 2019. **Sensitivity analysis showed, that the additional LNG terminals are necessary in case of a high price environment to ensure that LNG can reach the EU gas markets.**

3. **Lack of communication between the European institutions and Gazprom / Russia was partly the reason for the escalation of the problems.** Gazprom did not consider the need to coordinate on EU level the pipeline strategy, instead counted on the strength of a German–Russian bilateral cooperation that was supposed to implement an “economic” project against the will of opponents that are negatively impacted. Germany has lost on its diplomatic credibility when it has pursued its national interest against a common European standpoint.

Policy conclusions based on the results

European institutions' efforts to apply strategically the market surveillance tools jeopardize the image of the institutions as an impartial watchdog on fair trade and competition. The geopolitical challenges should therefore be addressed politically by strengthening the foreign policy powers of the EU. Conflicting interest within the EU reduce the EU's ability to manage challenges arising from external actors. Security concerns motivate national governments to empower the EU on energy issues, while local or federal economic interest might undermine these efforts. In the light of the recent energy crisis / energy war, it is of utmost importance to strengthen the foreign policy and energy diplomacy on EU level.

Russian strategy to strongly connect natural gas export to foreign policy has failed to produce a long-term vision of mutually beneficial cooperation with its core EU market. **Emphasizing bilateral relations instead of intergovernmental level coordination led to a *divide et impera* policy, which divided Europe and prevented the de-politization of the Russian pipeline policy.** Nord Stream 2 became a symbolic project of Russian geopolitics. The continuous tensions around natural gas and the Nord Stream 2 project especially have ruined the trust in Russia as a reliable supplier and increased negative sentiments in consumers against natural gas.

The US entrance to the global natural gas arena via LNG has brought new trading strategy. This relies on market-based decisions of private companies' contrary to the Russian model of strong connection between Gazprom and the Kremlin. The impacts are already visible in the change of contract pricing and spot cargoes worldwide. The decisions of the US private companies on where to ship their gas will depend on market signals in the future as well. **The use of natural gas as a political weapon did not work for Russia. The US sanctions policy applied against Nord Stream 2 has been a successful tool to stop the pipeline building.** Taking a not geopolitical, neutral and market-oriented standpoint for the EU was particularly difficult when two powerful external actors (Russia and the USA) both took the issue of the Nord Stream 2 pipeline to a symbolic level and the EU as an actor could not take a standpoint. US Pressure on NATO allies in Europe did burden the relationship on highest levels. The narrative became widely spread, that the sanctions were making space in Europe for the uncompetitive US LNG gas. The EU's ability to act as a global player was and is limited by the constraints that some member states contest the EU authority in formulating joint positions in energy politics.

Utilization of the dissertation – reflections on recent developments

The novelty of the dissertation is the advanced use of gas market modelling on geopolitical scenarios with the intention to inform policy makers of the cost and the socio-economic benefits of certain policy decisions. The dissertation was based on three modelling chapters connected by the analytical framework of Russian and European natural gas pipeline investment developments between 2009-2020. The scenarios applied reflected the latest state of play at the time of the respective analysis. The analytical framework and the methodology applied proved to be a useful tool to address high level questions on pipeline politics. The changing environment can be reflected in changing input data and scenario definition when applied to new questions in the future.

Since the closing of the draft dissertation (March 2021) the world has changed dramatically.

On the 24th of February 2022 Russia started a war against Ukraine with extraordinarily little or no hope to have peace in the near future. Tensions started in the gas market, sadly confirming that the selected topic of the dissertation was very timely. Starting in September 2021, Russia discovered that in the “perfect storm” conditions on the global and European gas market, it has gained market power that it did not have before. In this new global setup, **with low LNG supply, Russian supply withholding could directly impact the European wholesale gas exchange prices**. By December 2021 for the first time in history, the European traded gas prices surpassed the Asian ones.

Since the European traders filled the storages by August 2022, the threat of Russian full cut does not impose an immediate danger to the European consumers. The Russian gas weapon seems to be – at least temporarily neutralized – and prices started to drop. **On 26 September 2022, sabotage attack on Nord Stream 1-2** damaged three out of the four pipelines of Nord Stream 1-2 in Swedish territorial waters.

Do these developments change the main conclusions of the dissertation?

Additional thesis related to Question 1:

The first research question was to find the most beneficial strategy for Russia for marketing its gas. Modelling results clearly show that Russian pipeline strategy to bypass Ukraine was economically more rational (additional profit increase compared to the baseline) in a complete halt of deliveries via Ukraine scenario. Therefore, it was a strong indication that Russia wanted

to stop using the Ukrainian system. Eliminating the transit risk is a justified reason for additional investment. For a rational trader, it is certainly not the most beneficial action to completely halt supplies. **Selling no gas can only deliver zero revenue to Russia. Selling no gas at all also would annul the leverage in negotiations.** It was clearly not the intention of Russia to arrive so close at this point.

Ukrainian gas experts often argued in closed door meetings before 2020, that keeping transit flows in Ukraine is a security tool to prevent military invasion of Russia. According to their narrative as soon as Nord Stream 2 becomes operational and Europe can be supplied by Russian gas without the Ukrainian route, Russia will attack the country assuming, that Europe will not intervene as the Russian gas deliveries are irreplaceable. If this narrative was indeed the Russian geopolitical strategy, then it certainly failed.

Additional thesis related to Question 2:

The second research question assessed the success of the EU in its pipeline strategy if it could improve the resilience of the EU gas markets to supply shocks and growing market power of upstream supplies? **Europe tested to be vulnerable to Russian withholding of supply on the short run.** The European market was not deep and liquid enough to withstand the Russian manipulation of prices. **However, the price signal worked both towards the suppliers and the consumers. LNG has been delivered to Europe up to close to the maximum capacity of the LNG regasification terminals.** The PCIs that were long delayed, suddenly enter the market in 2022 and will contribute to the supply in the 2022/23 winter. There is no reason to change the conclusion that they **were worth to invest in.** Results of the modelling of the 4th PCI list in the high gas price scenario seem to apply now: under the current circumstances the LNG projects are gaining momentum and are invested in in an accelerated manner.

Additional thesis related to Question 3:

The third question on the interplay of European and Russian pipeline strategies pointed to the lack of communication and coordination during the years that were analysed (2009-2020). The war means that power politics overruled diplomacy. A failure, which cannot be discussed on pipeline policy grounds only, despite that the natural gas sector has been the battle ground. **The institutional governance on EU level has not been set up after the Cold war properly to help eliminate problems that escalated.** The destructive geopolitical climate speeds up decarbonization efforts in Europe and with the war in 2022 the gas phase out and especially a **Russian gas phase out became a European goal.** The European natural gas strategy has been

explicitly formulated in the REPowerEU strategy in May 2022, which is to reduce Russian gas supply with 2/3 by the end of 2022. Interplay of European and Russian pipeline strategies call for new scenarios when a reduced or completely halted Russian supply is modelled and the impact of this reduction is tested on European prices and welfare. Our latest publication (Kotek, Selei, Takácsné Tóth, & Felsmann, 2023) looks into the options that the EU can do to address the high natural gas prices, and another upcoming piece models the REPowerEU strategy and how it affects the natural gas market power of Russia (Kotek, Selei, & Takácsné Tóth, 2023). For the short and mid-term the problem to substitute Russian gas will provide plenty of room for research and analysis where scenario based gas market modelling can certainly add to the understanding.

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