

Identifying Key Assumptions for Evaluating Nord Stream 2's Impact on the European Natural Gas Market

Final Report, November 2017
Study commissioned by the Nord Stream 2 AG
www.ewi.research-scenarios.de

ewi Energy Research & Scenarios gGmbH

Alte Wagenfabrik
Vogelsanger Straße 321a
50827 Cologne, Germany

Tel.: +49 (0)221 277 29-100

Fax: +49 (0)221 277 29-400

www.ewi.research-scenarios.de

ewi Energy Research & Scenarios is a non-profit organization that is dedicated to applied research and conducts consulting projects for industry, politics and associations. Scientific services are financed through proceeds from research projects, analyses and reports for private and public clients as well as through contributions from a Society of Benefactors, currently consisting of more than forty members including energy suppliers, industries, banks, consulting firms and organizations. Sponsors and their contributions do not interfere with the scientific work or advisory activities of ewi ER&S.

AUTHORS

Dr. Harald Hecking

Florian Weiser

TABLE OF CONTENTS

1	Introduction	- 2 -
2	Results	- 7 -
2.1	Starting Point: Price Decreasing Effect of Nord Stream 2.....	- 7 -
2.2	Constant Marginal Supply Costs for LNG and Russian Gas	- 8 -
2.3	Unlimited Ukrainian Transit Capacity	- 9 -
2.4	Infrastructure Expansions	- 9 -
2.5	Reduced Ukrainian Transits when Nord Stream 2 is available	- 11 -
3	Assessment of Assumptions & Conclusion	- 13 -
	References.....	- 14 -
	Appendix	- 15 -

1 INTRODUCTION

There are publications concluding that the offshore pipeline project Nord Stream 2 would have a negative welfare effect for gas customers in the European Union (EU) due to increased price spreads between Eastern European and Western European natural gas markets, e.g. REKK (2017). The outcome of this publication is opposed to the results of Hecking & Weiser (2017) who find a positive welfare effect of Nord Stream 2 for consumers in all countries of the EU.

The partly opposing results of both studies can be broken down to two main differences as illustrated in Figure 1 (left hand side: outcome of Hecking & Weiser (2017), right hand side: outcome of REKK (2017)).

1. In REKK (2017), Nord Stream 2 has a neutral gas price effect on countries in North-Eastern, North-Western and South-Western Europe, whereas Hecking & Weiser (2017) find that Nord Stream 2 decreases gas prices in those countries.
2. For the Central and South-Eastern European countries, REKK (2017) concludes that prices increase due to Nord Stream 2, whereas the analysis of Hecking & Weiser (2017) finds that prices decrease.

Apparently, differing assumptions in both studies cause these opposing findings.

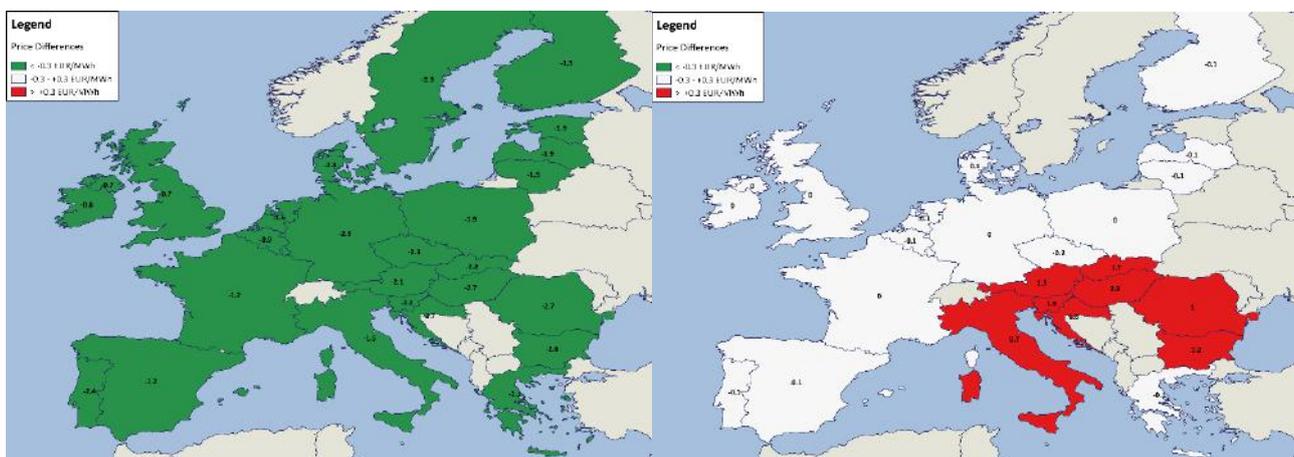


FIGURE 1: GAS PRICE EFFECTS OF NORD STREAM 2 IN HECKING & WEISER (2017) (LEFT) AND REKK (2017) (RIGHT)

Source: left: Hecking & Weiser (2017), right: own illustration based on REKK (2017), Figure 2

The study at hand aims to identify the key assumptions causing the opposing findings concerning Nord Stream 2, compare them and assess how realistic those assumptions are.

As a first step, we analyse different assumptions made between Hecking & Weiser (2017) and REKK (2017) illustrated in following table.

	Hecking & Weiser (2017)	REKK (2017)
Consideration of LNG supplies	LNG supply function approach, i.e. the amount of European LNG imports depends on the competitiveness of LNG	Fixed imports to Europe of 100 bcm of LNG in 2020 at constant prices
Consideration of LNG prices	LNG supply function approach, i.e. European import prices depend on global developments (e.g. global LNG demand) as well as on European LNG demand	Fixed LNG import volumes imply marginal supply costs of 0 EUR/MWh (must run supplies) in a linear programming model
Russian pricing strategy	Orientated at cost of alternative supplies, i.e. hypothetical cost of importing and transporting LNG to markets within Europe	Russian pricing strategy assumed in REKK (2017) unclear, exogenous LTC prices based on oil prices are mentioned in REKK (2017), gas prices in REKK model possibly determined by oil linked LTC prices that are an input to the model
Ukrainian transits	Nord Stream 2 is an additional infrastructure element, 30 bcm/a Ukrainian transits are available irrespective of availability of Nord Stream 2 based on capacity of UPU pipeline (KPMG, 2017)	Exact amount of Ukrainian transit capacity in REKK (2017) unclear, modification of LTC routes assumed by REKK (2017) when Nord Stream 2 is available, LTCs to Bulgaria, Greece, Macedonia, Moldova and Romania still run through Ukraine when Nord Stream 2 is available
Infrastructure assumptions	FID projects from TYNDP 2017, NEP Scenario Framework 2018 and PRISMA auction from March 6th 2017, i.e. infrastructure elements downstream to Nord Stream 2 considered like EUGAL, increased connection between DE and CZ (approximately 1130 GWh/d), and between CZ and SK (505 GWh/d)	Only projects with FID status in 2017 are considered and BACI (connection between CZ and AT) with 195 GWh/d
Development of demand	Flat demand growth between 2015 and 2020 in line with EU Reference Scenario (2016)	7% increase in gas demand between 2015 and 2020 based on TYNDP (unclear from which year the used TYNDP was)
Development of indigenous production	25 bcm decrease in indigenous production between 2015 and 2020 based on EU Reference Scenario and with corrections for UK, Germany, and Netherlands (e.g. cuts in Groningen field production) based on Prognos (2016)	15% decrease (supposedly 20 bcm) in EU indigenous production between 2015 and 2020 (source unclear)
Long Term Contracts	slow phasing out of LTCs according to Neumann et al. (2015), routes of contracts (to contractual delivery points) are chosen by the model based on transport cost minimization	same LTCs in 2020 as in 2015, LTCs are mostly rerouted from Ukrainian corridor to Nord Stream 2 if Nord Stream 2 is available

In order to compare the two sets of results, we aim to replicate the result of REKK (2017) by gradually changing several assumptions from Hecking & Weiser (2017). The starting point of the analysis, which focuses on the year 2020, is the configuration of the TIGER model¹ as used in

¹ TIGER is a European gas infrastructure model. It models gas flows and prices. For more details, cf. Hecking & Weiser (2017).

Hecking & Weiser (2017). In this model configuration, several assumptions are varied and altered step by step in order to test the impact of certain assumptions on the results.

The main finding of this study, as illustrated in Figure 2, is that the following 4 assumptions are crucial to explain the differences between Hecking & Weiser (2017) and REKK (2017):

1. **Demand sensitive LNG import prices:** A situation in which Nord Stream 2 has no effect on gas prices in North-Eastern, North-Western and South-Western Europe can be modelled by assuming that LNG imports have constant prices which are lower than the constant marginal supply costs for non-contracted Russian gas volumes. REKK (2017) assume that a fixed amount of LNG is imported to Europe irrespective of Nord Stream 2's availability. This means from a modelling perspective that the marginal cost of importing LNG is 0. However, assuming a fixed amount of imports is a strongly simplified approach compared to the supply function approach used by Hecking & Weiser (2017), since it is unlikely that global LNG volumes and prices would be unaffected by Nord Stream 2 and its impact on European demand for LNG. Additionally, the marginal supply costs of LNG are usually considered to be higher than the marginal supply costs of Russian pipeline gas (Henderson & Mitrova, 2015).
2. **No limitation on Ukrainian transit capacity:** Assuming an unlimited Ukrainian transit capacity irrespective of the availability of Nord Stream 2 results in a lower price decreasing effect of Nord Stream 2.
3. **Capacity expansion at the interconnection point Lanžhot (Czech Republic > Slovakia):** If one assumes that the infrastructure expansion downstream to Nord Stream 2 (EUGAL, connections between Germany and Czech Republic, connection between Czech Republic and Slovakia) is not fully realized in the scenario with Nord Stream 2, there is a small impact of this restricted interconnection when unlimited Ukrainian transit capacity is available.
4. **Reduced Ukrainian transits in the scenario with Nord Stream 2:** A situation in which South Eastern European countries suffer higher gas prices from Nord Stream 2 can be reconstructed when the Ukrainian transit capacity is modified, i.e. the use of capacity of the Ukrainian transit system is reduced when Nord Stream 2 is available compared to a situation in which Nord Stream 2 is not available. Alternatively to reducing the use of Ukrainian transit capacity, it is possible to reduce the Ukrainian transits by assuming modified routes of long term contracts (LTCs) when Nord Stream 2 is available, i.e. LTCs are transported through Nord Stream 2 instead of through Ukraine.

Source	Hecking & Weiser (2017) Section 2.1	Section 2.2	Section 2.3	Section 2.4	Section 2.5 (Option 1)	Section 2.5 (Option 2)	REKK (2017)
Assumptions							
LNG prices	Demand-elastic LNG supply function	Constant, low LNG prices	Constant, low LNG prices				
Ukrainian transits	With NSP2: <30 bcm/a W/o NSP2: <30 bcm/a	With NSP2: <30 bcm/a W/o NSP2: <30 bcm/a	With NSP2: unlimited W/o NSP2: unlimited	With NSP2: unlimited W/o NSP2: unlimited	With NSP2: <15 bcm/a W/o NSP2: unlimited	With NSP2: unlimited W/o NSP2: unlimited	Exact assumption unknown
Capacity expansions	Expansion of IP CZ->SK (Lanzhot)	Expansion of IP CZ->SK (Lanzhot)	Expansion of IP CZ->SK (Lanzhot)	No Expansion of IP CZ->SK (Lanzhot)	No Expansion of IP CZ->SK (Lanzhot)	No Expansion of IP CZ->SK (Lanzhot)	No Expansion of IP CZ->SK (Lanzhot)
Modeling of LTCs	LTC routed endogenously	With NSP2: Most LTC rerouted via NSP2 W/o NSP2: Most LTC routed via Ukraine	With NSP2: Most LTC rerouted via NSP2 W/o NSP2: Most LTC routed via Ukraine				

FIGURE 2: GAS PRICE EFFECTS OF NORD STREAM 2 IN HECKING & WEISER (2017) (LEFT) AND REKK (2017) (RIGHT)
 Source: left: Hecking & Weiser (2017), middle: ewi ER&S - TIGER model, right: own illustration based on REKK (2017), Figure 2

Figure 3 shows the difference of the EU-28 weighted average gas price between the scenario with Nord Stream 2 and the scenario without Nord Stream 2 under different assumptions.² It can be seen that the most crucial element for a price decreasing impact of Nord Stream 2 in the EU is the consideration of demand sensitive LNG import prices instead of assuming constant LNG imports and hence effectively no costs for the LNG imports.

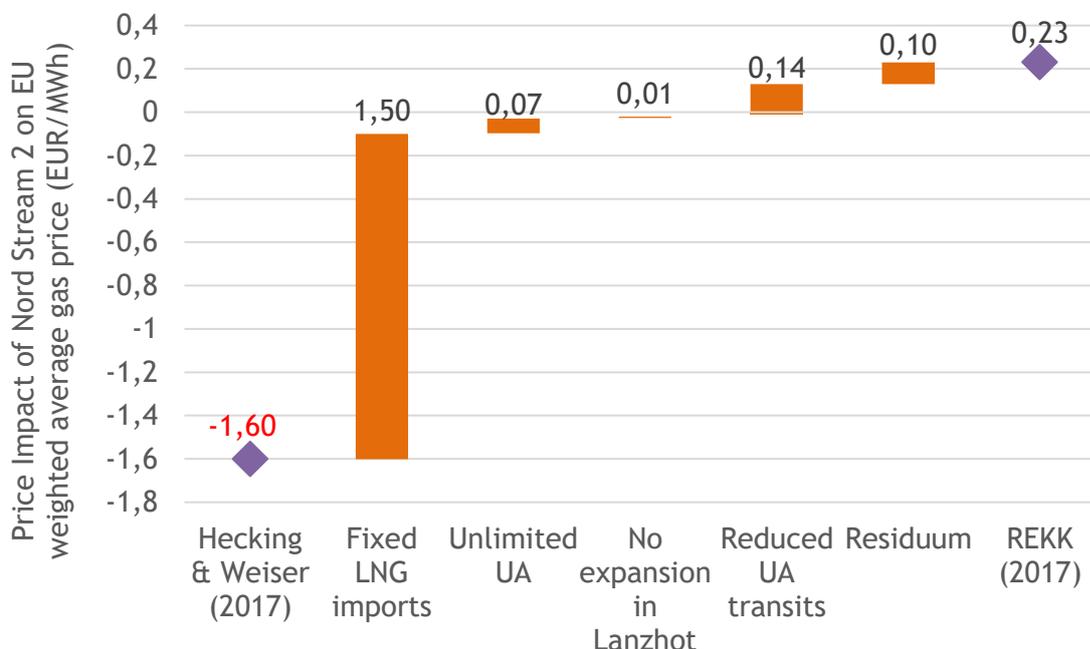


FIGURE 3: DIFFERENCE IN WEIGHTED AVERAGE EU GAS PRICE BETWEEN SCENARIO WITH NORD STREAM 2 AND WITHOUT NORD STREAM 2 UNDER DIFFERENT ASSUMPTIONS
 Source: ewi ER&S - TIGER model

² The weighted average EU gas price of REKK (2017) was calculated by weighting the prices of REKK (2017) with the demand used in Hecking & Weiser (2017), since the demand assumptions of REKK (2017) are unclear.

2 RESULTS

2.1 Starting Point: Price Decreasing Effect of Nord Stream 2

Hecking & Weiser (2017) use supply functions for LNG derived from the global gas market model COLUMBUS, i.e. the price for LNG imports increases as the quantity of LNG import increase because of the impact of this on global LNG supply demand balance. The price of Russian gas is determined by the price of LNG plus transportation costs from the closest LNG terminal if higher than the cost of bringing Russian gas to this point. The supply function approach takes into account the reaction of global LNG markets to a change in European LNG import demand, i.e. the import price for LNG decreases when less LNG is imported in the scenario with availability of Nord Stream 2 compared to the case without Nord Stream 2. The result of such an assumption is a price decreasing effect of Nord Stream 2 in all countries of the EU, as can be seen in Figure 4. Scenario A1 is the scenario with Nord Stream 2, whereas Nord Stream 2 is not available in Scenario A2. In both scenarios, a moderately low global LNG demand is considered. In a world with high global LNG demand, in which it is expensive for the EU to import LNG, the price decreasing effect of Nord Stream 2 is even larger.

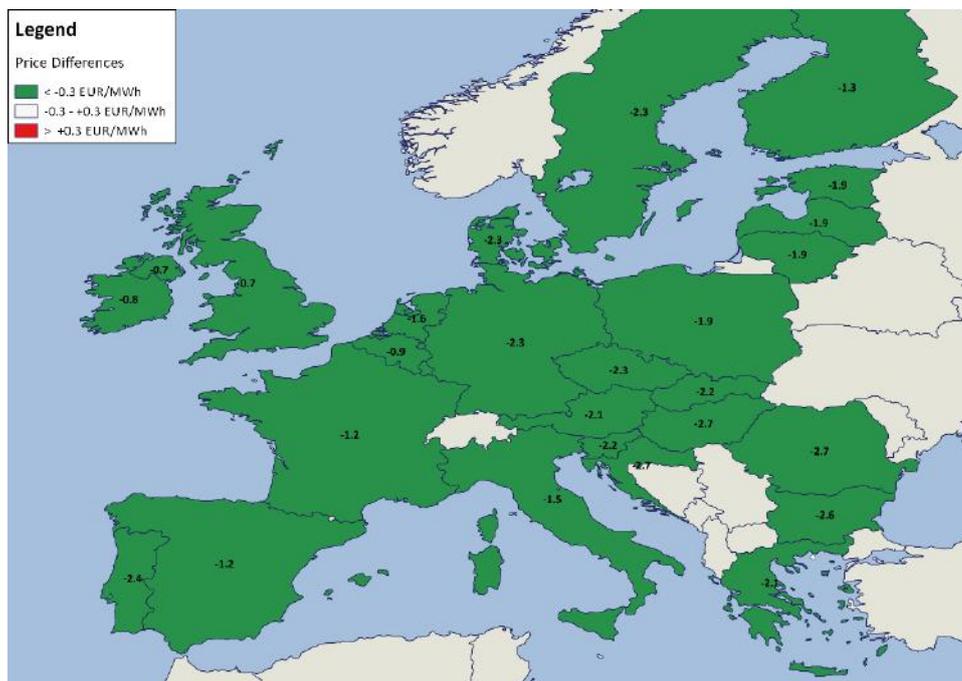


FIGURE 4: PRICE IMPACT OF NORD STREAM 2 EXPANSION IN HECKING & WEISER (2017) IN 2020 (SCENARIO A1 - SCENARIO A2)

Source: ewi ER&S - TIGER model

2.2 Constant Marginal Supply Costs for LNG and Russian Gas

Instead of the supply function approach, constant marginal costs for all gas supplies to the EU are considered in the TIGER model in this section. REKK (2017) assumes that 100 bcm of LNG imports take place in 2020 irrespective of if Nord Stream 2 is utilized or not. From a modelling perspective, assuming such a must-run volume implies that the costs of importing LNG are 0. Therefore, it is assumed in this section that the constant marginal supply costs for LNG are below the constant marginal supply costs of non-contracted Russian pipeline gas.

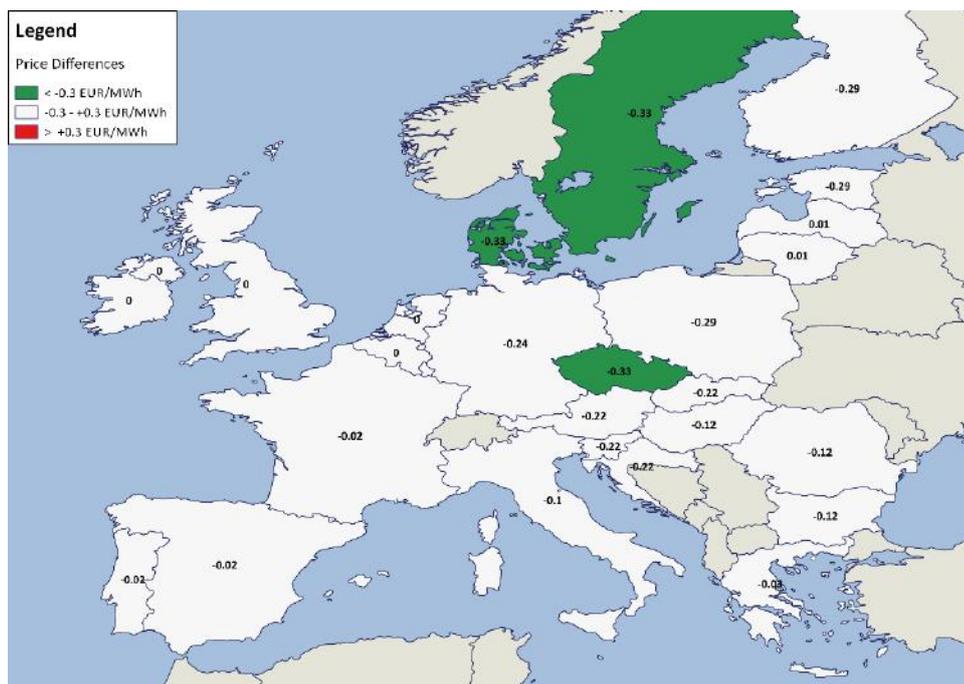


FIGURE 5: PRICE IMPACT OF NORD STREAM 2 EXPANSION IN 2020 ASSUMING CONSTANT AND LOW LNG PRICES
(PRICES WITH NORD STREAM 2 MINUS PRICES WITHOUT NORD STREAM 2)

Source: ewi ER&S - TIGER model

Figure 5 shows a situation in which the marginal supply costs of LNG to European harbors is 10% lower than the marginal supply cost of non-contracted Russian gas at the Russian border. In this setup, only the Russian contracted volumes are delivered to Europe, whereas large LNG imports occur which determine the gas price in the EU. In such a setup, the benefit of additional Russian import capacities like Nord Stream 2 is small for Europe. The European price is always set by LNG irrespective of the availability of Nord Stream 2. LNG, however, is modelled at a constant, i.e. demand-inelastic price. Hence, a situation in which there is a neutral price effect of Nord Stream 2 in North-Eastern, North-Western and South-Western European gas markets can be constructed by assuming low and demand-inelastic LNG import prices.

2.3 Unlimited Ukrainian Transit Capacity

Hecking & Weiser (2017) calculate their results based on the assumption that the Ukrainian Urengoy-Pomary-Uzhgorod (UPU) pipeline with a capacity of 30 bcm/a is maintained and can be relied on in 2020 (KPMG, 2017). Hence, 30 bcm/a can still be transited through Ukraine irrespective of Nord Stream 2 being available or not. In this section, an unlimited Ukrainian transit capacity is assumed. As in the previous section, constant and low marginal supply costs of LNG are considered.



FIGURE 6: PRICE IMPACT OF NORD STREAM 2 EXPANSION IN 2020 WITH UNLIMITED UKRAINIAN TRANSIT CAPACITY IN 2020 (PRICES WITH NORD STREAM 2 MINUS PRICES WITHOUT NORD STREAM 2)

Source: ewi ER&S - TIGER model

As can be seen in Figure 6, the price decreasing effect of Nord Stream 2 is further reduced by assuming a higher Ukrainian transit capacity compared to Figure 5. It is important to stress the point that this almost neutral price effect already includes the assumption of low and constant LNG prices. In a situation where the LNG market would react to the utilization of Nord Stream 2 such as in Hecking/Weiser (2017), the price reaction of European gas prices would be different, i.e. a price decreasing effect of Nord Stream 2 would be observed.

2.4 Infrastructure Expansions

So far, it has been assumed in line with Hecking & Weiser (2017) that the new infrastructure downstream to Nord Stream 2 is realized, i.e. EUGAL and the connections between Gaspool and the Netherlands, Gaspool and Czech Republic and Czech Republic and Slovakia (cross border

capacities based on the results of the PRISMA auction from March 6th 2017). In this section, the same model assumptions are used as in the previous section (Low constant marginal supply costs for LNG and unlimited Ukrainian transit capacity), but without the capacity expansion in Lanžhot between Czech Republic and Slovakia(505 GWh/d).³ Instead of the capacity addition in Lanžhot, an extension between Czech Republic and Austria (BACI project) of approximately 195 GWh/d is considered. In sum, this implies about 10 bcm/a reduced interconnection capacity between Central European markets and the markets in South Eastern Europe.



FIGURE 7: PRICE IMPACT OF NORD STREAM 2 EXPANSION WITH REDUCED INFRASTRUCTURE EXPANSION BETWEEN CENTRAL EUROPE AND SOUTH EASTERN EUROPE IN 2020 (PRICES WITH NORD STREAM 2 MINUS PRICES WITHOUT NORD STREAM 2)

Source: ewi ER&S - TIGER model

As can be seen in Figure 7, the reduction in connecting infrastructure leads to a similar outcome as in the previous section. However, compared to Figure 6, there is a slight price increasing effect by Nord Stream 2 in Bulgaria, Romania and Hungary. Whereas those countries benefited from Nord Stream 2 in the previous section, their prices increase by 0.05 EUR/MWh in this section if the offshore pipeline is available. This minor price increase can be explained by seasonal changes in flows.

³ Since a bottleneck between Czech Republic and Slovakia at the interconnection point in Lanžhot is observed in the TIGER simulations in Hecking & Weiser (2017), this congestion is further increased without a capacity expansion at this interconnection point.

2.5 Reduced Ukrainian Transits when Nord Stream 2 is available

In the previous sections, the same Ukrainian transit capacity was assumed irrespective of the availability of Nord Stream 2. In this section, this assumption is modified, i.e. a reduced transit capacity of 15 bcm/a is assumed when Nord Stream 2 is available while still unlimited Ukrainian transit capacity can be used if Nord Stream 2 is not available.⁴ Such an assumption is in line with an interpretation of Nord Stream 2 as a replacement for Ukrainian transits instead of an additional infrastructure element. Apart from this, all the other assumptions of the previous section are still valid (low constant marginal supply costs for LNG, unlimited Ukrainian transit capacity in the scenario without Nord Stream 2, reduced infrastructure extensions from Central Europe to South Eastern Europe).

As can be seen in Figure 8, such a setup leads to a price increasing effect of Nord Stream 2 in South Eastern Europe while the prices are unaffected in North-Eastern, North-Western and South-Western Europe, similar to the result in REKK (2017).

In the TIGER model, the routes of LTCs are modelled endogenously, i.e. they are determined based on transportation costs within the model. Another approach to modelling LTCs would be to define selected routes per contract. Instead of limiting the Ukrainian transit capacity to 15 bcm/a, it is possible to modify the routes of LTCs, i.e. rerouting them from the Ukrainian corridor to Nord Stream 2, while keeping the contractual delivery points. Such an assumption leads also to reduced transits through Ukraine when Nord Stream 2 can be utilized and has therefore similar implications as restricting the Ukrainian transit capacity.

⁴ At least 15 bcm/a of Ukrainian transits are necessary to avoid a security of supply situation in South Eastern Europe.



FIGURE 8: PRICE IMPACT OF NORD STREAM 2 EXPANSION WITH REDUCED UKRAINIAN TRANSIT CAPACITY WHEN NORD STREAM 2 IS AVAILABLE IN 2020 (PRICES WITH NORD STREAM 2 MINUS PRICES WITHOUT NORD STREAM 2)

Source: ewi ER&S - TIGER model

However, it is important to note that the price increasing effect of Nord Stream 2 in South Eastern Europe is purely based on transportation costs and congestion in the natural gas grid, e.g. at the interconnection point between Czech Republic and Slovakia in Lanžhot. The total amount of Russian gas sold to the EU is unchanged whether or not the Ukrainian transits are modified, whereas certain European transmission system operators (e.g. in Gaspool and Czech Republic) have increased revenues when Ukraine is avoided. Hence, the modification of Ukrainian transits only reroutes gas flows but has only limited impacts on Gazprom's sales revenues.⁵

⁵ In the case of elastic demand, a negative effect for Russia would even be possible, i.e. the total amount of gas could be reduced due to transport cost related increase in gas prices.

3 ASSESSMENT OF ASSUMPTIONS & CONCLUSION

Constant marginal supply costs of LNG and Russian gas (or correspondingly fixed supply volumes) irrespective of Nord Stream 2 being available is a strong and simplifying assumption. Naturally, one would expect that more LNG is imported into Europe, if Nord Stream 2 is not available. This increased demand for LNG in Europe would have an impact on the global LNG markets leading consequently to increased LNG import prices. Neglecting this repercussion underestimates the potential price decreasing effect of Nord Stream 2 in Central Europe and all of EU. The approach of Hecking & Weiser (2017) based on global supply functions can be considered a more realistic representation of the global gas market behavior and appropriate methodology compared to assuming constant low marginal supply costs for LNG.

A situation in which South Eastern European countries observe increasing gas prices when Nord Stream 2 is available can be constructed by assuming lower Ukrainian transits in the case with Nord Stream 2 than in a case without Nord Stream 2. However, Gazprom would not have a commercial interest in avoiding Ukraine, since the observed price increases in South Eastern Europe are due to increased transportation costs. European transmission system operators would increase their revenues if Ukrainian transits would be restricted due to the rerouting of Russian gas. Gazprom's sales revenues, however, would not be increased.

Concluding, the most important price decreasing effect of Nord Stream 2 is due to the reaction of global LNG markets, i.e. less LNG needs to be imported if Nord Stream 2 is available. Whereas reduced European LNG import prices increase the consumer welfare of each European Union's member state, the open questions regarding Ukrainian transits, however, results in a differentiation of consumer welfare effects in between countries.

REFERENCES

Hecking, Weiser (2017), Impacts of the Realization of Nord Stream 2 on European Natural Gas Markets.

KPMG (2017), Situation of the Ukrainian natural gas market and transit system, Market Study.

Henderson, Mitrova (2015), The Political and Commercial Dynamics of Russia's Gas Export Strategy, OIES Paper NG 102.

Neumann, Rüster and von Hirschhausen (2015), Long Term Contracts in the Natural Gas Industry - Literature Survey and Data on 426 contracts (1965-2014), DIW Data Documentation 77.

REKK (2017), The Impact of the Construction of the Nord Stream 2 Gas Pipeline on Gas Prices and Competition.

APPENDIX

The following table gives an overview of the assumptions underlying the Figures 4 - 8:

	Scenario with Nord Stream 2 available	Scenario without Nord Stream 2 available
	scenario A1 from Hecking & Weiser (2017):	scenario A2 from Hecking & Weiser (2017)
Fig. 4	<ul style="list-style-type: none"> supply functions for Russia and LNG Ukrainian transit capacity: 30 bcm/a Infrastructure downstream to Nord Stream 2 completely built 	<ul style="list-style-type: none"> supply functions for Russia and LNG Ukrainian transit capacity: 30 bcm/a Infrastructure downstream to Nord Stream 2 completely built
Fig. 5	<ul style="list-style-type: none"> Constant marginal supply costs for all European gas suppliers Marginal supply costs of LNG below marginal supply costs for Russian non-contracted gas Ukrainian transit capacity: 30 bcm/a Infrastructure downstream to Nord Stream 2 completely built 	<ul style="list-style-type: none"> Constant marginal supply costs for all European gas suppliers Marginal supply costs of LNG below marginal supply costs for Russian non-contracted gas Ukrainian transit capacity: 30 bcm/a Infrastructure downstream to Nord Stream 2 completely built
Fig. 6	<ul style="list-style-type: none"> Constant marginal supply costs for all European gas suppliers Marginal supply costs of LNG below marginal supply costs for Russian non-contracted gas Unlimited Ukrainian transit capacity Infrastructure downstream to Nord Stream 2 completely built 	<ul style="list-style-type: none"> Constant marginal supply costs for all European gas suppliers Marginal supply costs of LNG below marginal supply costs for Russian non-contracted gas Unlimited Ukrainian transit capacity Infrastructure downstream to Nord Stream 2 completely built
Fig. 7	<ul style="list-style-type: none"> Constant marginal supply costs for all European gas suppliers Marginal supply costs of LNG below marginal supply costs for Russian non-contracted gas Unlimited Ukrainian transit capacity BACI (connection between CZ and AT) built instead of infrastructure extension in Lanžhot leading to reduced transmission capacities between Central Europe and South Eastern Europe 	<ul style="list-style-type: none"> Constant marginal supply costs for all European gas suppliers Marginal supply costs of LNG below marginal supply costs for Russian non-contracted gas Unlimited Ukrainian transit capacity BACI (connection between CZ and AT) built instead of infrastructure extension in Lanžhot leading to reduced transmission capacities between Central Europe and South Eastern Europe

Fig. 8

-
- Constant marginal supply costs for all European gas suppliers
 - Marginal supply costs of LNG below marginal supply costs for Russian non-contracted gas
 - Ukrainian transit capacity: 15 bcm/a
 - BACI (connection between CZ and AT) built instead of infrastructure extension in Lanžhot leading to reduced transmission capacities between Central Europe and South Eastern Europe
- Constant marginal supply costs for all European gas suppliers
 - Marginal supply costs of LNG below marginal supply costs for Russian non-contracted gas
 - Unlimited Ukrainian transit capacity
 - BACI (connection between CZ and AT) built instead of infrastructure extension in Lanžhot leading to reduced transmission capacities between Central Europe and South Eastern Europe
-