



# **Final Report** **Options for Gas Supply Diversification for the EU and** **Germany in the next Two Decades**

Cologne and London, October 2016

[www.ewi.research-scenarios.de](http://www.ewi.research-scenarios.de)

[www.eucers.eu](http://www.eucers.eu)

**ewi Energy Research & Scenarios gGmbH  
(ewi ER&S)**

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](http://www.ewi.research-scenarios.de)

**European Centre for Energy and Resource  
Security (EUCERS)**

Department of War Studies  
King's College London  
London WC2R 2LS  
United Kingdom

Tel.: +44 (0)20 7848 1912  
[www.eucers.eu](http://www.eucers.eu)

ewi Energy Research & Scenarios (ewi ER&S) is a non-profit organisation 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 organisations. Sponsors and their contributions do not interfere with the scientific work or advisory activities of ewi ER&S.

The European Centre for Energy and Resource Security (EUCERS) promotes an understanding of how our use of energy and resources affects International Relations, since energy security is not just a matter of economics, supply and technological change. In an era of globalization energy security is more than ever dependent on political conditions and strategies. Economic competition over energy resources, raw materials and water intensifies and an increasing number of questions and problems have to be solved using holistic approaches and wider national and international political frameworks.



**PRINCIPAL AUTHOR EWI**

Dr. Harald Hecking

**AUTHOR EWI**

Simon Schulte

**PRINCIPAL AUTHOR EUCERS**

Dr. Adnan Vatansever

**AUTHOR EUCERS**

Dr. Slawomir Raszewski

## STUDY

Options for Gas Supply Diversification for the EU and Germany in the next Two Decades

## SUBMITTED BY

ewi Energy Research & Scenarios gGmbH (ewi ER&S)  
European Centre for Energy and Resource Security (EUCERS)

## HANDED OVER TO

Federal Foreign Office (Germany)

## TABLE OF CONTENTS

Acknowledgements.....	IV
Executive Summary .....	V
Policy Implications .....	XX
<b>1 Introduction.....</b>	<b>1</b>
<b>2 Part A: Gas Demand and Supply Options for the EU and Germany.....</b>	<b>3</b>
2.1 Current Gas Demand and Supply of the EU and Germany .....	3
2.1.1 Demand.....	3
2.1.2 Supply.....	6
2.2 Future Projections of EU Gas Demand.....	11
2.3 Future Options of EU Gas Supply .....	14
2.3.1 European Gas Production .....	17
2.3.2 Non-European Pipeline Gas .....	23
2.3.3 Liquefied Natural Gas (LNG).....	39
<b>3 Part B: Political Factors and Implications for European Gas.....</b>	<b>46</b>
3.1 Structure, Rationale and Methodology .....	46
3.2 The European Union.....	47
3.2.2 Energy Union.....	48
3.2.3 EU’s Drive towards Decarbonisation.....	49
3.2.4 EU’s Drive for Gas Diversification.....	51
3.3 EU-Russian Energy Relations .....	53
3.3.1 Historical Background .....	53
3.3.2 Key Areas of Tensions in EU-Russian Gas Relations .....	54
3.4 Russia.....	56
3.4.1 Russia’s Resource-driven Economy and Its Economic Challenges .....	56
3.4.2 Russia’s Domestic Political Context and Implications .....	58
3.4.3 Russia’s Foreign Policy and Its Implications .....	60
3.4.4 Russia’s Evolving Approach to the Gas Sector .....	61
3.5 Turkey .....	63
3.5.1 Turkey’s Energy Diplomacy and Its Role in EU’s Gas Diversification .....	63
3.5.2 Turkey’s Domestic Political Context and Implications for EU’s Gas Diversification .....	65
3.5.3 Turkey’s Foreign Policy and Its Implications .....	66
3.5.4 Turkey’s Gas Sector—Opportunities and Constraints.....	71

<b>4</b>	<b>Part C: Scenarios—the Political Context</b>	<b>73</b>
4.1	Main Assumptions and Results	73
4.2	The Gas on Sale Scenario	74
4.2.1	The European Union	74
4.2.2	Russia	75
4.2.3	Turkey	76
4.2.4	Implications for Gas Diversification in the EU	77
4.3	The Nord Dream Scenario	78
4.4	The Southern Setback Scenario	79
<b>5</b>	<b>Part D: Market Simulation of Future EU Gas Supply Scenarios</b>	<b>80</b>
5.1	Design of the Market Simulation	80
5.1.1	Methodology: Economic Analysis with the COLUMBUS Simulation Model	80
5.1.2	Main Data Assumptions	81
5.1.3	Modelling Scenarios of Future EU Gas Supply	83
5.2	Overview of the Scenario Results	84
5.3	Scenario 1 - Gas on Sale	87
5.4	Scenario 2 - Nord Dream	95
5.5	Scenario 3 - Southern Setback	100
5.6	Economics of Nord Stream 2	104
5.7	Risk Analysis	111
5.7.1	Demand Sensitivity	111
5.7.2	Global LNG Market Interdependencies	113
	List of Figures	XXII
	List of Tables	XXIV
	List of Abbreviations	XXV
	Bibliography	XXVII
	Appendix	XLV

## ACKNOWLEDGEMENTS

The authors would like to thank the German Federal Foreign Office for the generous grant supporting this study. Special thanks go to Professor Dr. Marc Oliver Bettzüge, Director of the Institute of Energy Economics at the University of Cologne (EWI) and Professor Dr. Friedbert Pflüger, the Director of the European Centre for Energy and Resource Security (EUCERS), for their insights and support. The authors would also like to thank the participants at the roundtable discussion organized in January 2016 at King's College, and Carola Gegenbauer from EUCERS for her coordination of the event. Furthermore, the authors would like to thank Alice Galenkamp from ewi ER&S for her excellent and substantial work on drafting and researching part A and D. As well, we would like to thank Anna-Sophia Fuss from ewi ER&S for her excellent support of the authors concerning facts and data research.

## EXECUTIVE SUMMARY

The study assesses future options for gas supply diversification of the EU and Germany until 2035. It provides comprehensive research on the economic and political fundamentals that are likely to shape Europe’s gas future. These fundamentals allow developing several potential scenarios, which could shed light on the key directions European supply may take in the next two decades.

Based on a set of assumptions, the study presents three scenarios: “Gas on Sale” (GoS) which is the reference scenario, “Nord Dream” (NoD), and “Southern Setback” (SoS). The scenarios are distinguished by two principal factors. One factor is the pricing strategy adopted by Gazprom and its competitors in Europe. The pricing strategy could be “competitive”, whereby dominant gas suppliers compete for market share via undercutting their price, or “oligopolistic”, where the principal priority is ensuring higher prices for natural gas rather than maintaining a market share. In case of a competitive pricing strategy, competition keeps prices relatively lower – hence the “Gas on Sale” title for the scenario. Due to the current market developments in the global but also the European gas market the competitive pricing scenario will be the reference scenario of the study at hand.

The second factor is the sum outcome of political factors that have proven to be consequential for natural gas supplies in the past, and are likely to remain so in the future. Accordingly political developments, both domestic and external, determine how two major supply options for Europe materialise. These two options are the construction of the Nord Stream 2 and the expansion of the Southern Gas Corridor. Accordingly, the “Nord Dream” scenario reflects the failure to build the Nord Stream 2 pipeline, whereas the “Southern Setback” is characterised by a range of political developments that obstruct the further expansion of the Southern Gas Corridor.

		Scenario		
		Gas on Sale	Nord Dream	Southern Setback
Characteristics	Pricing strategy	Competitive	Oligopolistic	Oligopolistic
	Southern gas corridor expansion	Possible	Possible	Not possible
	Nord Stream 2 expansion	Possible	Not possible	Possible

FIGURE S1: OVERVIEW OF THE MODELLED SCENARIOS

As illustrated in Figure S1, the Gas on Sale Scenario assumes competitive pricing by Gazprom and its main competitors, along with a political context that does not prevent the realisation of the Nord Stream 2 pipeline project and the expansion of the Southern Gas Corridor. The “Nord Dream” Scenario is based on the assumption of oligopolistic pricing by suppliers coupled with a political context that obstructs the development of the Nord Stream 2 project. In the “Southern Setback” Scenario, the major variable influencing the political context is the EU’s hope and ability to rely more on the Southern Gas Corridor as an alternative source to diversify its natural gas supplies.

The economic analysis is conducted by applying the global gas market model COLUMBUS, which is an economic equilibrium model of gas supply with the possibility to simulate oligopolistic and competitive strategies, as well as endogenous investment in gas infrastructure. The political analysis is founded on comprehensive research on the relevance of politics in energy policy decisions. Future projections on political developments are based on established scenario writing literature underlining a process of formulating scenario building blocks. The political scenarios are cognizant of a wide array of uncertainties, but also benefit from a range of constraints and predetermined elements that allow narrowing down future projections.

- The EU gas supply mix is about to change substantially over the next 20 years. As gas production in the EU and Norway is about to decline, Russia will strengthen its position as the EU's number one gas supply country.

In the EU gas supply mix of 2035 as simulated in the Gas on Sale scenario and assuming a constant development of gas demand, EU and Norwegian gas production makes up for only 32 percent compared to 57 percent in 2014. Russia increases its market share from 27 percent in 2014 to 33 percent in 2035. But the biggest growth is in the role of LNG in meeting EU gas demand – LNG imports account for 25 percent of EU gas supply in 2035, which is 16 percentage points higher than in 2014.

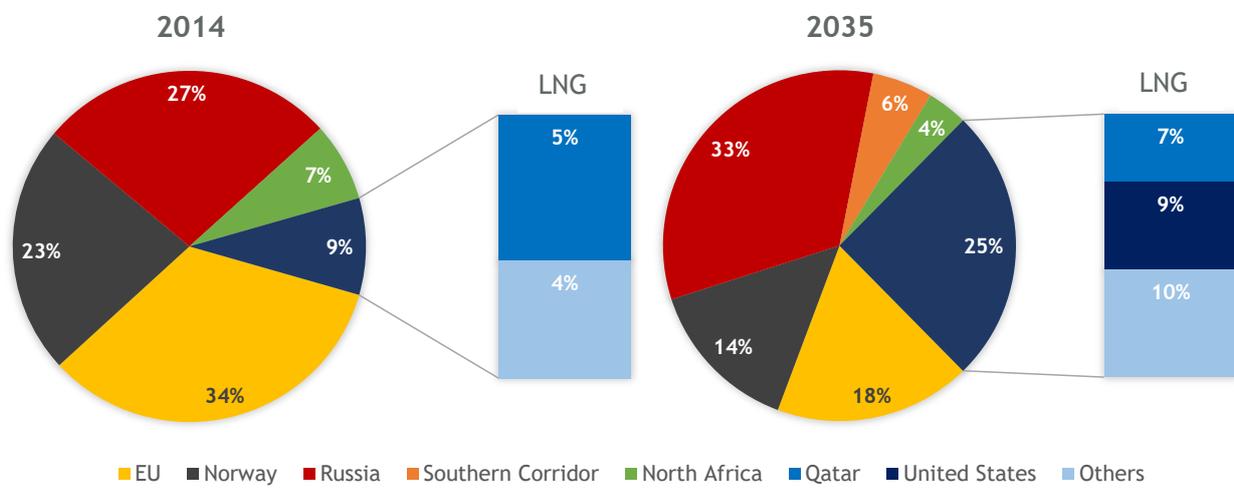


FIGURE S2: EU NATURAL GAS SUPPLY MIX IN THE GAS ON SALE SCENARIO IN 2014 (LEFT) AND 2035 (RIGHT)

- Russian pricing strategy proves to be crucial for the future EU gas supply mix. If Russia wants to fill the European supply gap, it has to pursue a competitive pricing strategy. In contrast, a Russian oligopoly strategy leads to strong competition in LNG and the Southern Gas Corridor. Political factors, however, are also effective in reaching this outcome.

In the competitive pricing Gas on Sale (GoS) scenario, Russia will be the EU’s main supplier, accounting for 156 bcm in 2035. This scenario assumes that the political context makes it possible for Russia to build the Nord Stream 2 pipeline, while the Southern Gas Corridor also finds conducive grounds for some expansions. Overall, Russia’s share in European gas supply grows, however this trend is counterbalanced by the growth of gas flows from potential alternative supply sources. Accordingly, LNG imports grow substantially, amounting to 120 bcm in 2035, as gas volumes coming from the Southern Gas Corridor also increase moderately, reaching 26 bcm.

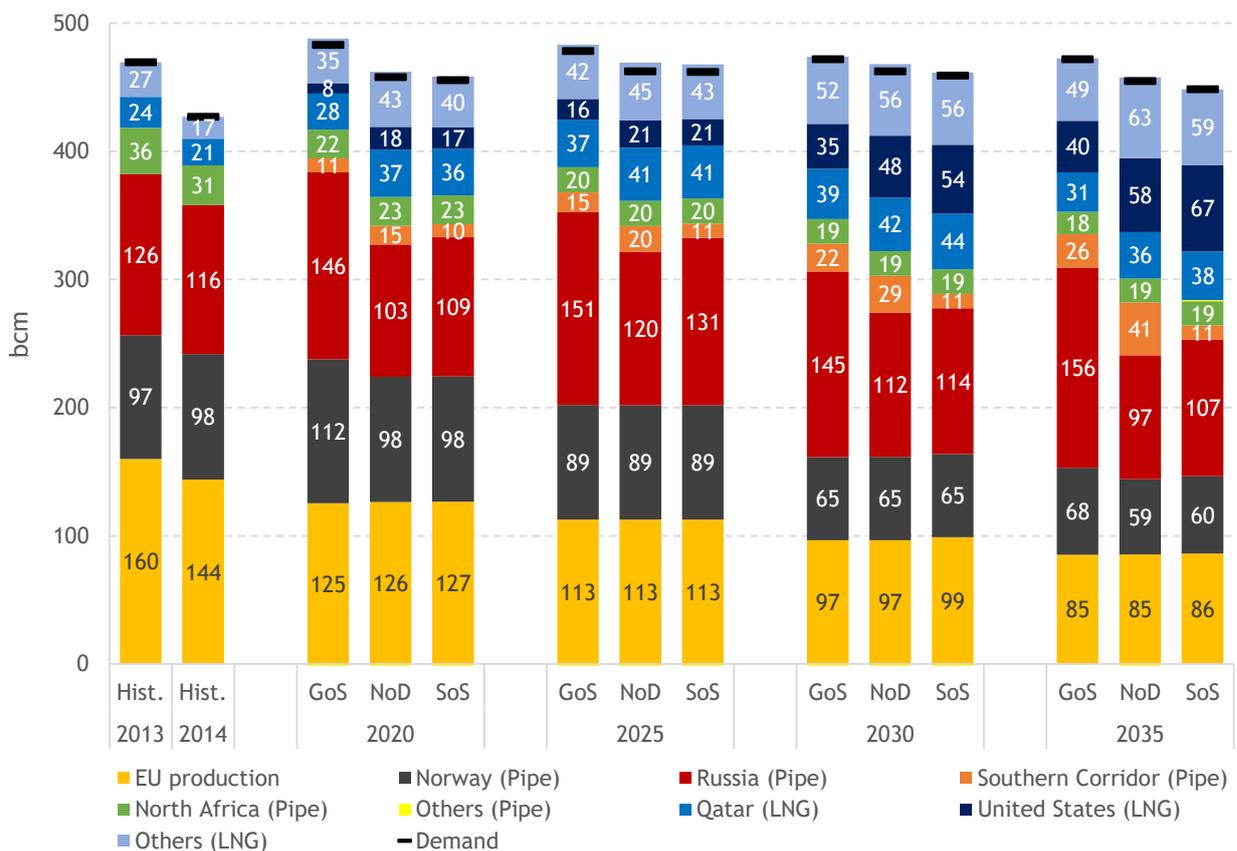


FIGURE S3: EU GAS SUPPLY IN THREE SCENARIOS FROM 2020 TO 2035

The study’s simulation on the role of pricing strategy reveals major implications for gas supplies, particularly for Russia as the principal supplier to the EU-28. Thus, the Nord Dream (NoD) scenario assumes major suppliers, including Russia, adopt an oligopolistic strategy amidst a political context that obstructs the construction of Nord Stream 2 while encouraging the further expansion of the Southern Gas Corridor. In this scenario, Russian gas faces stiff competition from the Southern Gas Corridor and LNG. Russia remains the most

important supply country of the EU, but contributes only 97 bcm or 21 percent to the EU gas supply mix in 2035. With an oligopoly strategy, Russia withholds large volumes to secure relatively high gas prices. At the same time, higher prices attract LNG imports amounting to 157 bcm. Such higher prices also facilitate the expansion of the Southern Gas Corridor, which brings 41 bcm.

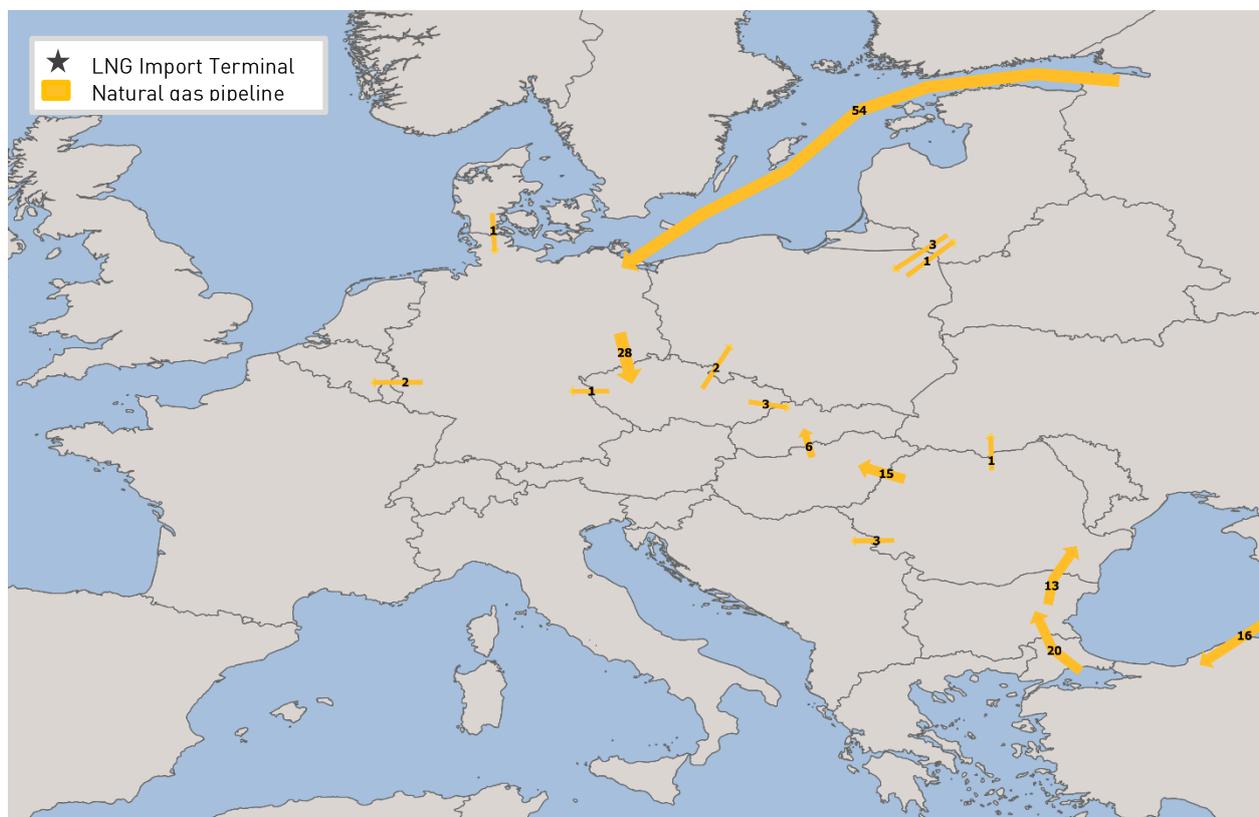
The Southern Setback (SoS) scenario, maintaining the assumption of oligopolistic pricing, looks at the possibility of a major disappointment with respect to EU hopes to diversify its gas resources through the Southern Gas Corridor. Assuming that the regional political context, namely in Turkey and its neighbourhood, lead to this setback, this has major repercussions for Russian gas and LNG. Under this scenario, which also assumes an improvement in political relations with Russia that helps to remove obstacles for building Nord Stream 2, supplies from Russia remain at 107 bcm - significantly lower than in the Gas on Sale scenario. LNG suppliers therefore achieve the biggest gains in European gas market. Driven by higher prices - the result of the main suppliers' oligopolistic pricing strategy - LNG imports amount to 164 bcm, with 67 bcm coming from the US.

**3. The Gas on Sale scenario exhibits a need for investment in two new major pipeline routes supplying the EU: Nord Stream 2 and the Southern Gas Corridor. The political context is conducive to the implementation of both of these major routes.**

Assuming Russia plays a competitive pricing strategy, this triggers a need for investment of 54 bcm/a of additional Nord Stream capacity. Ukrainian transit fees can be avoided, making Russian gas more competitive in the EU gas market. The Nord Stream expansion would imply a build-up of new interconnection capacity linking Germany, Czech Republic and Slovakia, thereby enabling supplies to Eastern European countries.

The other major pipeline project for future EU gas supply, as derived in the Gas on Sale scenario, is a pipeline via Turkey, Bulgaria, Romania, Hungary and Slovakia, connecting gas supply from the Southern Corridor with the EU, in addition to the TAP project already under construction. Besides Nord Stream 2 and the Southern Gas Corridor, some smaller interconnector projects are built for strengthening market integration in South Eastern Europe.

However, it needs to be noted that this analysis somewhat simplifies the modelling of infrastructure needs since it focuses on cross-border trade, and its temporal and spatial granularity is rather low. Therefore, in reality, infrastructure needs may be higher, like for security of supply or gas transport within a country.

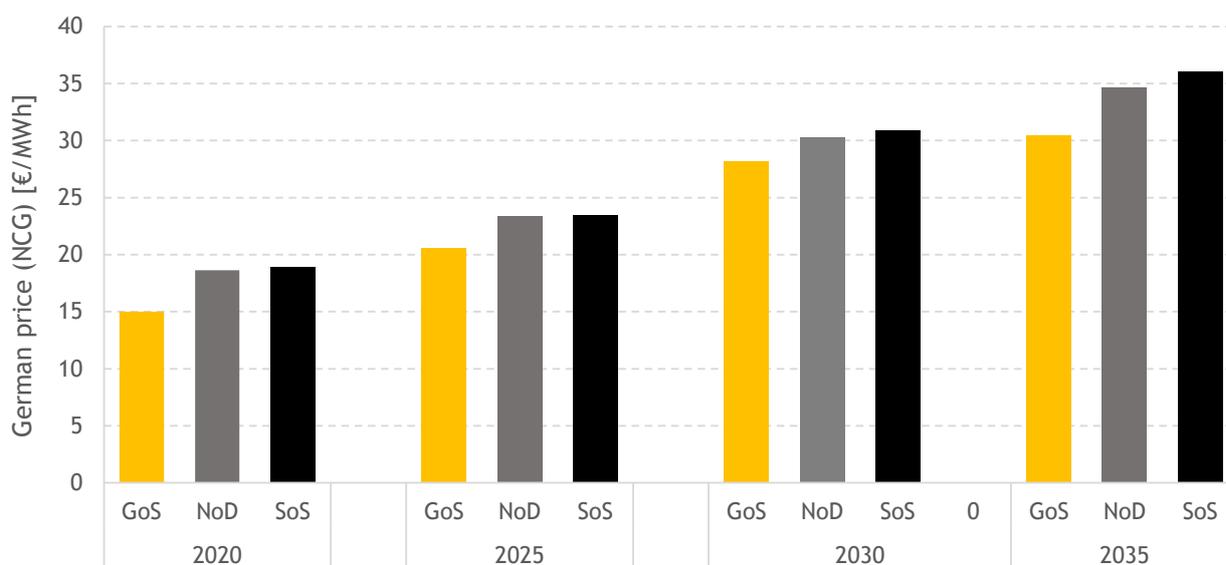


**FIGURE S4: DEMAND FOR INFRASTRUCTURE INVESTMENT (BCM/A) BETWEEN 2020 AND 2035 IN THE GAS ON SALE SCENARIO**



**5. Europe benefits from lower gas prices if Russia opts for a competitive pricing strategy instead of oligopolistic pricing.**

In the Gas on Sale scenario, wholesale import prices to Europe, here illustrated by using Germany, are projected to reach 15 EUR/MWh in 2020, increasing to 30 EUR/MWh in 2035. European gas prices are lowest in the Gas on Sale scenario assuming competitive pricing. In such a scenario, prices are 3.6 to 4.0 EUR/MWh (2020) and 4.2 to 5.6 EUR/MWh (2035) lower than in the alternative scenarios. Even though Russia has a higher market share in the Gas on Sale scenario, prices are lower. This result underlines again that a high market share does not necessarily imply a high dependency from a supplier, as actual and potential competition has to be accounted for. The outcome is also preconditioned on assumptions on the political context, particularly with respect to the presence of a good environment to expand the Southern Gas Corridor. Gas from this “corridor” enhances competition in the EU, notably in its eastern members. Without the additional gas from the Southern Corridor (see Southern Setback scenario), gas prices will be higher.



Note: Prices are in real terms based on EUR<sub>2016</sub>.

**FIGURE S6: GERMAN WHOLESAL GAS PRICE PROJECTIONS 2020-35 IN THREE SCENARIOS**

- 6. In the Gas on Sale scenario, when Russia opts for a competitive pricing strategy, a full expansion of Nord Stream 2 is economical. In the Nord Dream scenario the pipeline is not built for political reasons. In the Southern Setback scenario assuming Russia’s oligopolistic pricing strategy, the simulation suggests that even one string of Nord Stream 2 capacity may not be fully utilised, which makes construction of the pipeline at its projected capacity not economically sound.

Based on assumptions about transit fees through Ukraine (see below), the Gas on Sale scenario indicates that investment in Nord Stream 2 to circumvent Ukraine is economically rational from the Russian perspective. However, the demand for additional transport capacity on the Nord Stream route largely depends on the pricing strategy of Russia (competitive vs. oligopoly). In the Gas on Sale scenario (competitive) a full expansion of Nord Stream 2, such as an additional 54 bcm/a, is economical. In the Southern Setback scenario (oligopoly), the simulation reveals demand for capacity expansion of only an additional 15 bcm/a, which is less than the capacity of one string of the pipeline. Transits through Ukraine would decline significantly in both cases given that the study assumes constant Ukrainian transit tariffs based on their current level. Namely, Ukraine’s tariffs relative to gas transportation costs through Nord Stream 2 remain high – somewhat at the level of 2016 in real terms. Thus, Russia has an incentive to circumvent Ukraine via new infrastructure in order to be more competitive in the EU gas market.

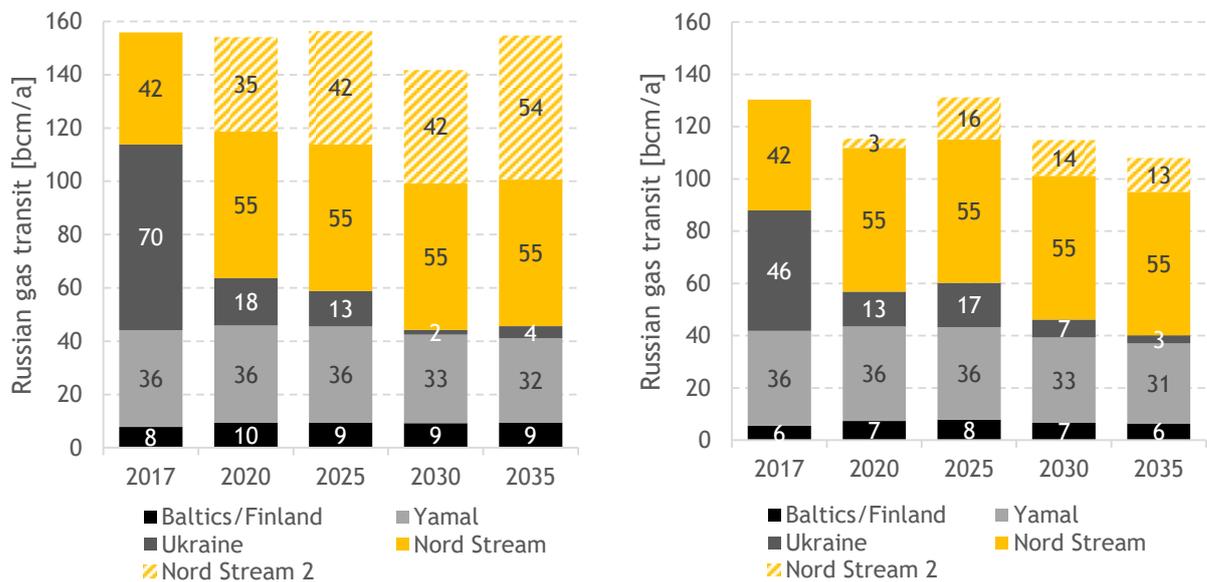
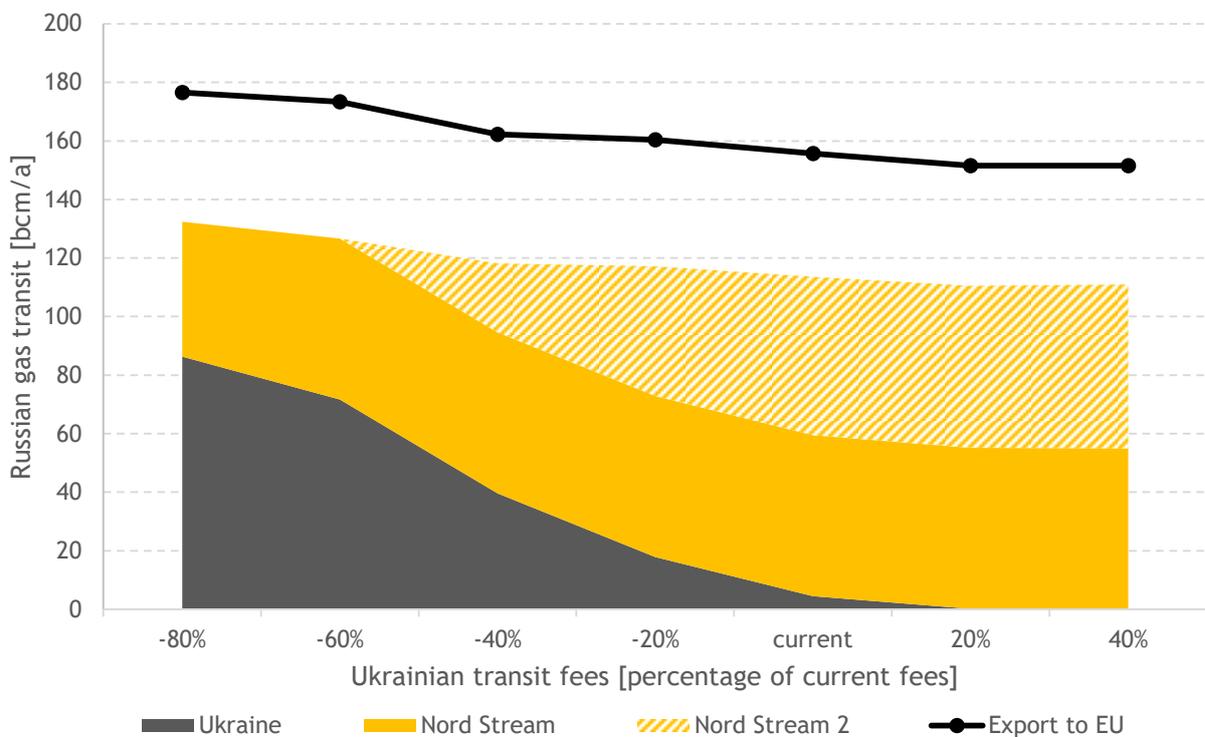


FIGURE S7: RUSSIAN TRANSPORT ROUTE UTILISATION IN THE GAS ON SALE SCENARIO (LEFT) AND IN THE SOUTHERN SETBACK SCENARIO (RIGHT)

- 7. The profitability of Nord Stream 2 is highly dependent on Ukrainian transit fees. By lowering its transit tariffs, Ukraine could decrease the profitability of Nord Stream 2, and attract more transit volumes. However, such an outcome is not certain, as political factors also play a role in Ukraine’s potential to serve as a transit country.

Ukraine could decrease the profitability of the Nord Stream 2 by lowering its transit tariffs, which would also allow increasing its own transit volumes. If, in 2035, Ukraine would charge the same transit tariffs as in 2016 (in real terms), Ukrainian transits would almost vanish, triggering substantial flows in Nord Stream 2. By decreasing its tariffs, for instance by 60 percent, Nord Stream 2 would not be needed anymore and Ukraine would transit more than 70 bcm to the EU.



Note: For a better comparability of results, it is assumed that OPAL can be used at 100 percent

**FIGURE S8: UTILISATION OF RUSSIAN TRANSIT ROUTES WITH RESPECT TO DIFFERENT UKRAINIAN TRANSIT FEES IN 2035**

However, the study recognises that Russia’s policy of reducing dependence on transit countries has a long history and economic considerations have not been the only or probably the main determinant in Moscow’s choice of gas routes. In all scenarios, despite differences in Moscow’s relations with Kyiv, Russia is assumed to strive to implement its strategy of reducing dependence on transit countries. As a result, maintaining this policy would also ensure a decline in gas transit volumes through Ukraine. The simulation that incorporates economic parameters provides an additional reason to think that gas volumes crossing Ukraine are likely to decline drastically.

- 8. Without an expansion of Nord Stream 2, Ukraine benefits from higher transit volumes. However, this enables Ukraine to increase transit revenues by charging higher tariffs at the disadvantage of Russia and Europe.

To underscore the potential implications of Ukraine’s transit tariff policy, the study simulates a further possibility when the Nord Stream 2 pipeline is not built (as well as any new pipeline under the Black Sea) under the Gas on Sale (competitive) scenario. Under such a scenario, if Ukraine maintains today’s transit fees, it still secures the transit of 56 bcm of gas in 2035 (vs. 63 bcm in 2015—substantially higher compared to a case when Nord Stream 2 is built).

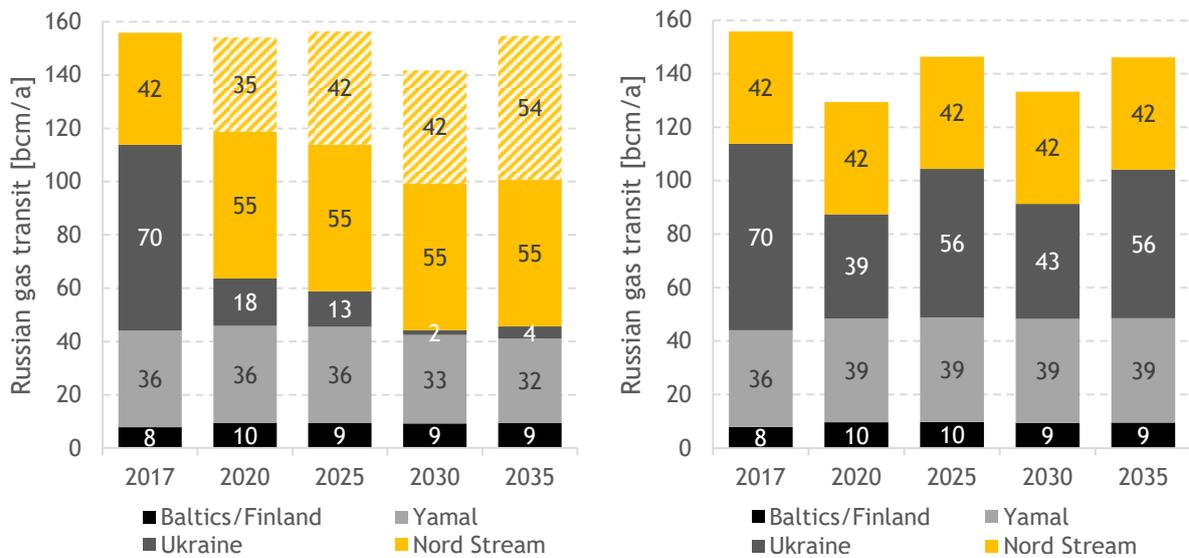
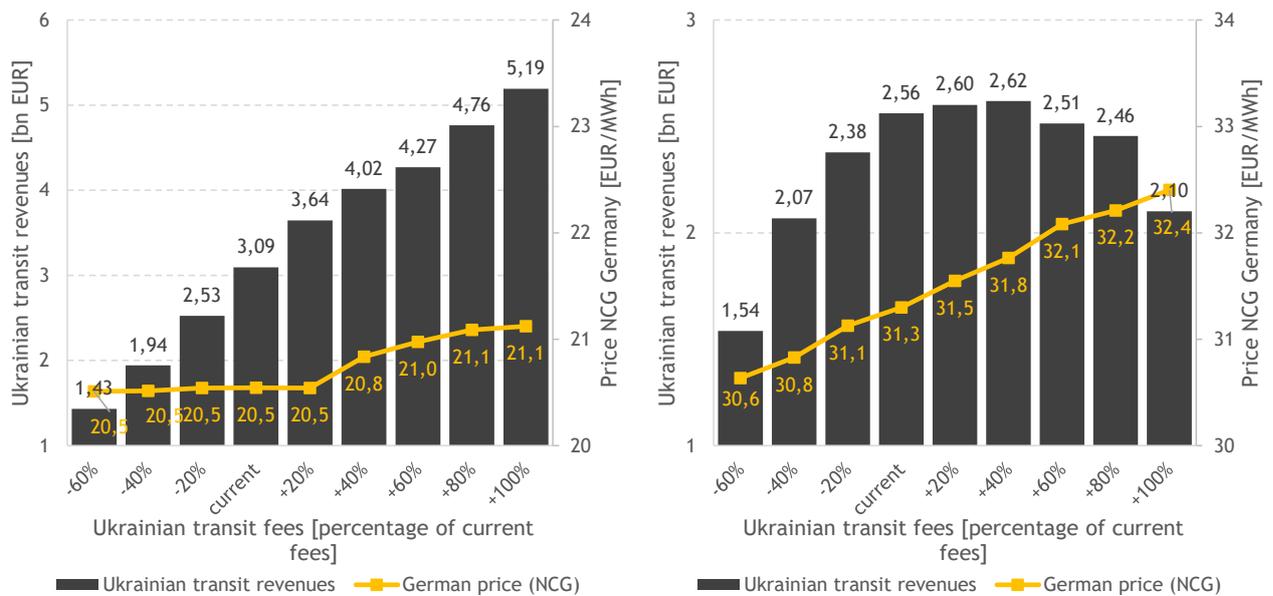


FIGURE S9: PIPELINE UTILISATION IN THE GAS ON SALE SCENARIO WITH NORD STREAM 2 (LEFT) AND WITHOUT NORD STREAM 2 (RIGHT)



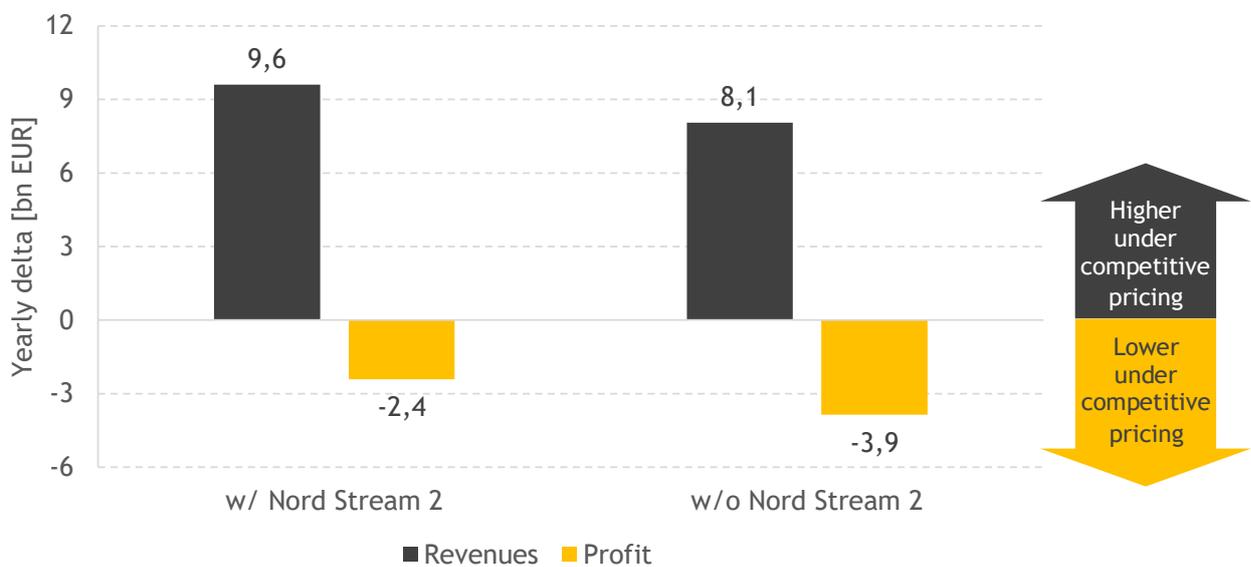
Note: Prices are not inflation-adjusted (EUR 2016)

FIGURE S10: TRANSIT REVENUES OF UKRAINE AND GERMAN WHOLESAL E PRICES IN 2025 (LEFT) AND 2035 (RIGHT) FOR DIFFERENT LEVELS OF UKRAINIAN TRANSIT FEES

In such a scenario, the EU's dependence on Ukrainian transit has implications for its gas prices, as they are affected by Ukraine's tariff policy. If, for example, in 2035, Ukraine raises its transit fees by 60 percent compared to the current fees, European gas prices increase by 0.8 EUR/MWh, Russian gas exports to Europe decrease by 22 bcm, and LNG imports increase by 14 bcm. Hence the expansion of Nord Stream 2 limits the potential impact of Ukraine's transit tariff policy.

**9. If Nord Stream 2 is not realised, Russia has a stronger incentive to play an oligopoly strategy instead of a competitive one.**

Simulations looking at the combined effect of the chosen pricing strategy and the prospects for building Nord Stream 2 yield significant results regarding the profitability of Russian gas exports. If Nord Stream 2 is built, under a competitive pricing strategy Russia gets about 2.4 billion Euros fewer profits than under an oligopolistic pricing strategy. If Nord Stream 2 is not built, however, Russia forfeits annual profits on average 3.9 billion Euro under the competitive pricing strategy. In the latter case, Russia is forced to take the higher priced Ukrainian transport route, making Russian gas more expensive in a competitive pricing strategy. Under an oligopoly strategy, this effect is less important, since Russia ships less gas through Ukraine. Hence, the Nord Stream 2 expansion makes a Russian competitive pricing strategy more likely in terms of profits. Nonetheless, the oligopoly strategy is overall more profitable for Russia. Measured in terms of revenues, Russia gains an additional 9.6 billion Euro under a competitive strategy if Nord Stream 2 is built. If Nord Stream 2 is not built the additional revenues of enforcing a competitive pricing strategy are 1.5 billion Euros lower and amount to only 8.1 billion Euro.



**FIGURE S11: AVERAGE (2020-35) ANNUAL DELTA IN RUSSIAN PROFIT MARGIN AND REVENUES FROM PURSUING COMPETITIVE INSTEAD OF OLIGOPOLY PRICING**

10. With an expansion of Nord Stream 2 Germany’s role as a gas transit and hub country is strengthened. In fact, Germany turns into EU’s main gas transit country. This is particularly true for Russian gas. As Germany achieves access to substantially more foreign gas than its demand, it emerges as a major net exporter.

If Nord Stream 2 is built, as derived in the Gas on Sale scenario, Germany becomes the EU’s and Russia’s most important transit country, and transits will almost double compared to today. Consequently, Germany will receive major volumes of gas via Nord Stream from Norway and Poland. Germany will be a net exporter to the Czech Republic, Austria, Switzerland, France, Belgium, and the Netherlands.

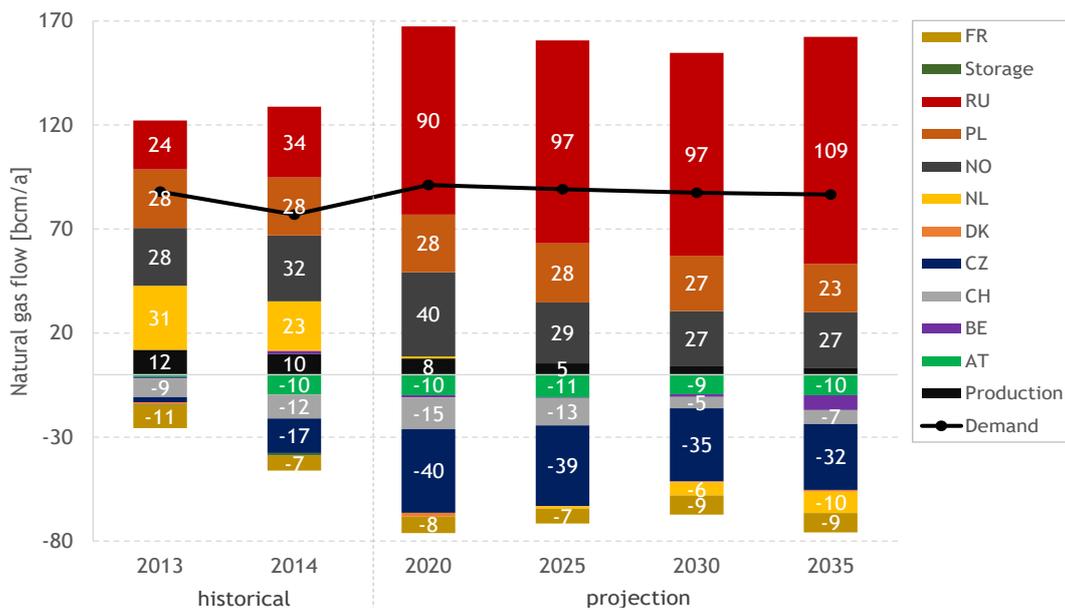


FIGURE S12: NET IN- AND OUTFLOWS FOR GERMANY IN THE GAS ON SALE SCENARIO, 2020-35

Looking at the annual (non-netted) gas trade flows to and from Germany in 2035 underlines Germany’s future role as a crucial gas hub with diverse supply options from neighbouring countries (Figure S13).

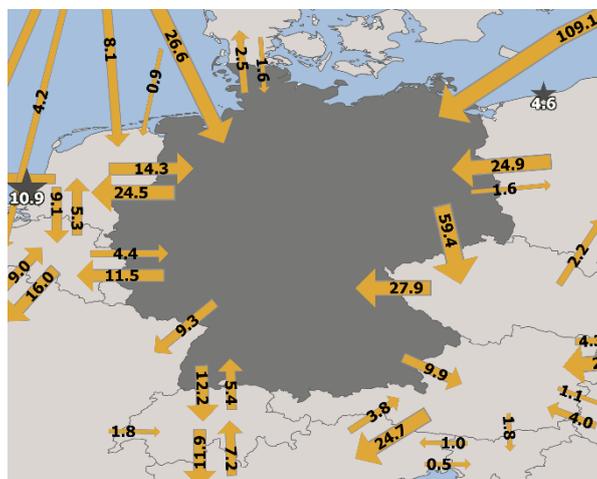


FIGURE S13: ANNUAL NATURAL GAS TRADE FLOWS (BCM) TO AND FROM GERMANY IN THE GAS ON SALE SCENARIO IN 2035

**11. Despite European and German gas production declining, there is no demand for a German LNG terminal in the Gas on Sale scenario.**

Pipeline interconnection with Belgium and the Netherlands is sufficient such that Germany can import LNG indirectly from terminals in France (Dunkerque), Belgium (Zeebrugge), and the Netherlands (Rotterdam). Therefore, a German LNG terminal is not needed in the Gas on Sale scenario. However, in the Southern Setback scenario, assuming oligopoly pricing of Russia and no expansion of the Southern Corridor, the simulation derives a minor capacity demand of less than 2 bcm for a German LNG terminal to be built after 2030. This analysis, however, does not analyse future developments in the small scale LNG market that may, or may not, create a potential business case for a German LNG terminal.

## POLICY IMPLICATIONS

- 1) The EU maintains multiple options to diversify its gas imports in the near-term and in the longer-run. Despite a projected decline in European gas production, the EU is in a strong position to diversify its gas imports and ensure its gas security. Externally, the availability of alternative sources of piped gas and growing possibilities for LNG imports provide a favourable context for increased competition. Internally, the EU is headed towards a fairly well established gas infrastructure and market integration that would further enhance gas market liquidity.
- 2) The future of EU's gas balance will significantly depend on the price of gas, which is likely to be an outcome of the pricing strategy of major suppliers such as Gazprom. Whether Gazprom will adopt a strategy of competitive pricing favouring maintaining a large amount of gas exports to Europe, or an oligopolistic pricing strategy prioritising higher gas prices will be highly consequential.
- 3) If Russia adopts a competitive pricing strategy leading to lower gas prices on the continent, this would ensure continued high gas exports. This provides a business case for constructing Nord Stream 2. Based on the study's simulations, the pricing strategy would trigger a need for investment of 54 bcm/a of additional export capacity for Russian gas, which justifies Nord Stream 2. The new pipeline would allow Russia to reduce its overall transit costs for the duration of the project, making Russian gas more competitive in the EU gas market. This, however, assumes Ukraine maintains its current transit fees, implying that Kyiv has the potential to significantly impact the economics of Nord Stream 2 by lowering its fees. If built and operating close to capacity, the Nord Stream expansion would necessitate the build-up of new interconnection capacity linking Germany, Czech Republic and Slovakia, thereby enabling supplies to Eastern European countries.
- 4) If instead of favouring growing exports, Russia adopts an oligopolistic pricing strategy, higher gas prices will facilitate the growth of supplies from the Southern Gas Corridor and LNG. Under such a strategy, economic factors alone would not justify building Nord Stream 2. If built at its currently projected capacity, the pipeline would remain highly underutilised.
- 5) The future of the EU's gas diversification, however, also depends on political factors that may be partly exogenous to Europe's policy-makers. Two countries critical for EU's gas future, Russia and Turkey, are bound to exhibit a high level of unpredictability. The domestic political context in both countries rests on an excessive degree of concentration of power around the president, which can make policy decisions highly unpredictable.
- 6) A major project such as Nord Stream 2 may proceed under the assumption that the EU and Russia are not engaged in a political crisis that escalates further. Russia's domestic political context makes such an escalation within the range of possibilities, though not the most likely outcome in the near future.

- 7) Likewise, the expansion of gas imports through the Southern Gas Corridor is predicated on Turkey's future role as an energy transit country. Such a role, however, can be influenced by Ankara's strained relations with the EU and its neighbourhood. An expansion of gas imports through the Southern Gas Corridor would depend on ensuring this process is reversed.

## 1 INTRODUCTION

The study provides a comprehensive assessment of EU and Germany's options to diversify gas supplies in the next two decades. It combines economic analysis of market fundamentals, and a detailed assessment of key political risks and factors that are likely to influence Europe's gas future.

The economic analysis is based on an in-house global gas market model, COLUMBUS. As an economic equilibrium model for gas, it allows simulating oligopolistic and competitive strategies, as well as endogenous investment in gas infrastructure. The political analysis is founded on comprehensive research on domestic politics and external policy developments in several key players that have proven to be crucial for European gas. Projections about future political risks and factors in European energy are based on established scenario writing literature. A range of constraints and predetermined outcomes identified in the study allow narrowing down future projections, while it also recognises the key uncertainties for the foreseeable future.

The report recognises that Europe's pursuit for diversification of its gas supplies involves multiple players with varying degree of influence. Yet, it considers three players as crucial for the future of EU's gas diversification. First, the European Union as an entity and a market, which deserves close attention in terms of its gas balance and shifting policy priorities. Second, the study focuses on Russia due to its role as the biggest supplier of natural gas to Europe, and its extensive pipeline network connecting its gas fields with European clients. Third, Turkey's geographic location and its energy diplomacy necessitate a look at its role as a transit country for new sources of gas for the EU. Additional players, such as international LNG and major existing or potential suppliers of piped gas are also examined in the study, particularly in terms of their interaction with Europe.

With the key players in place, the study puts together economic fundamentals and political factors to develop three possible scenarios for EU's gas future: the study's reference scenario "Gas on Sale", an alternative scenario "Nord Dream" and an additional alternative scenario "Southern Setback". Two main factors distinguish the three scenarios. First, the pricing strategy adopted by Gazprom and its competitors in Europe provides a major source of variation. The strategy could be "competitive" when the dominant gas suppliers compete for market share and cut the price of gas, or "oligopolistic" when suppliers are focused on maintaining higher prices instead of a market share. Second, putting politics in, the scenarios vary in terms of the political context which could either facilitate or obstruct the development of key major supply options for Europe. The two main supply options under consideration are the Nord Stream 2 project and the expansion of the Southern Gas Corridor (SGC).

The distinguishing feature of the Gas on Sale scenario is the competitive pricing strategy adopted by Gazprom, which results in relatively less expansive gas on the European continent. For the remaining two scenarios, the study assumes oligopolistic pricing strategy. The Nord Dream scenario reflects the failure to build the Nord Stream 2 pipeline as a result of projected

growth in political tensions between the EU and Russia. Political developments that obstruct the further expansion of the SGC characterise the core of the Southern Setback scenario.

The study proceeds in four parts. Part A provides a detailed analysis of the gas balance in the EU and Germany. It examines gas demand in Europe, along with major sources of gas supply, including LNG. Part B analyses in detail the political context underpinning Europe's gas diversification. EU's drive towards gas market liberalisation and integration, its gas relations with Russia, Russia's domestic political context and foreign policy, and developments in Turkish politics and energy diplomacy are examined at length. Part C introduced the three scenarios of the study. A set of assumptions noted in this part provides the basis for the three distinct scenarios of the study. Part D interprets the results of the market simulation model and describes key potential developments under the three scenarios based on their distinct assumptions on gas market fundamentals.

## 2 PART A: GAS DEMAND AND SUPPLY OPTIONS FOR THE EU AND GERMANY<sup>1</sup>

### 2.1 Current Gas Demand and Supply of the EU and Germany

#### 2.1.1 Demand

After the peak in gas consumption of 542 bcm during the cold winter of 2010, EU-28 gas demand declined considerably in recent years, as Figure 1 illustrates. Main drivers of this development were rising gas prices and a strong promotion of renewable energies, in combination with an only modest recovery of gas demand after the economic downturn in 2008.<sup>2</sup>

Whereas demand amounted to 465 bcm in 2013, overall warm temperatures in 2014 caused a further drop in consumption by 39 bcm to 416 bcm. In 2015, EU gas demand recovered by 4 percent.<sup>3 4</sup>

The development of EU-28 gas demand can be further explained when looking at the gas demand trends in different sectors visible in Figure 1. The transformation sector, hence power and combined heat and power generation, made up for 30 percent of 2014 gas demand. Gas demand in this sector declined considerably between 2010 and 2014. This reduction can be traced back to several developments. Firstly, overall demand for electricity has been lower than expected. Secondly, gas-fired plants were squeezed out of the market due to low carbon and coal prices. The unfavourable position of high gas prices in relation to comparably low coal prices was reinforced by the fall of CO<sub>2</sub> prices in the EU ETS. Due to an oversupply of allowances, triggered by renewable energy national subsidies in many EU member states and a resultant expansion in renewables, prices fell and failed their task to discriminate carbon-intensive coal plants.<sup>5</sup> Finally, overall mild temperatures caused lower gas demand for heating.

In the commercial and residential sector, accounting for 41 percent of demand in 2014, substantial reductions in demand can be seen between 2010 and 2014. An overwhelming reason is temperature, but energy efficiency measures such as more efficient burners or increased building insulation, may have had some impact, too.<sup>6</sup>

---

<sup>1</sup> Corresponding author: Harald Hecking (ewi ER&S)

<sup>2</sup> IEA (2015a) Natural gas information

<sup>3</sup> Note that the calorific value that is applied in this report is 10,620 kWh/m<sup>3</sup>

<sup>4</sup> Eurostat (2015)

<sup>5</sup> Martinez, Paletar, Hecking (2015)

<sup>6</sup> Honoré (2014)

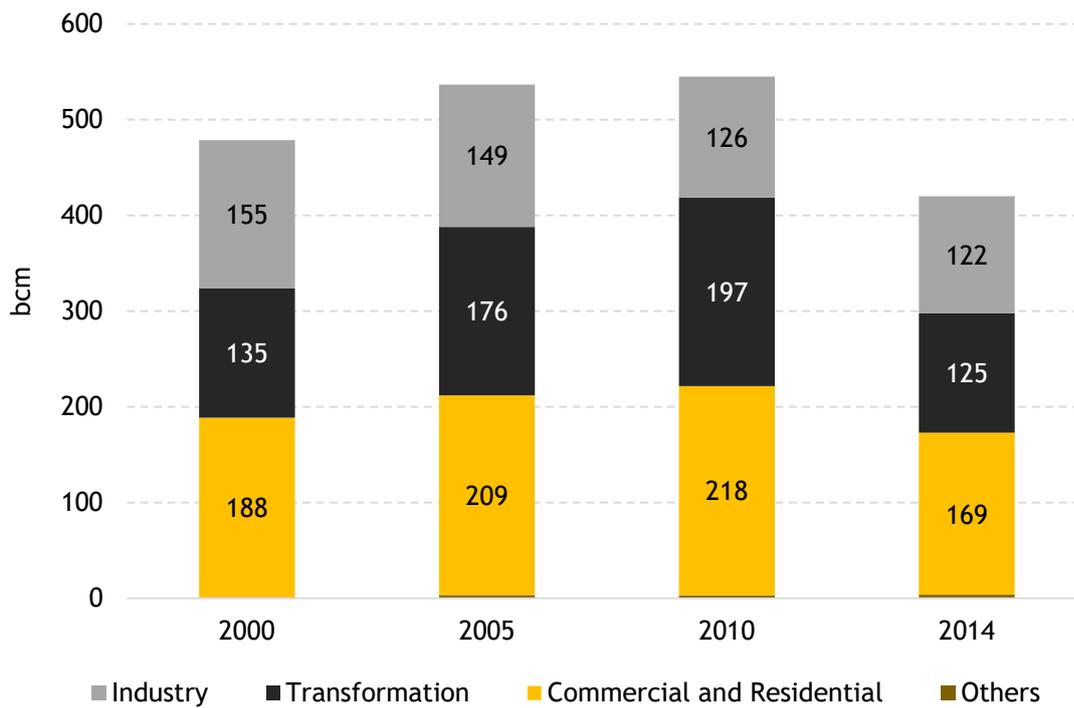


FIGURE 1: GAS DEMAND OF THE EU-28 IN DIFFERENT SECTORS.

SOURCE: EUROSTAT (2015).

The industry sector (29 percent of EU-28 gas demand in 2014) shows a rather constant demand since 2010, however does not reach the pre-crisis levels of 2005. This was due to efficiency gains, strongly promoted by national governments, but also structural changes in the industry. Energy intensives have steadily been playing a decreasing role in the European energy landscape, presumably due to a shift of the industry to other locations.<sup>1</sup> The remaining demand can be allocated to other sectors, in particular transportation.

<sup>1</sup> Honoré (2014)

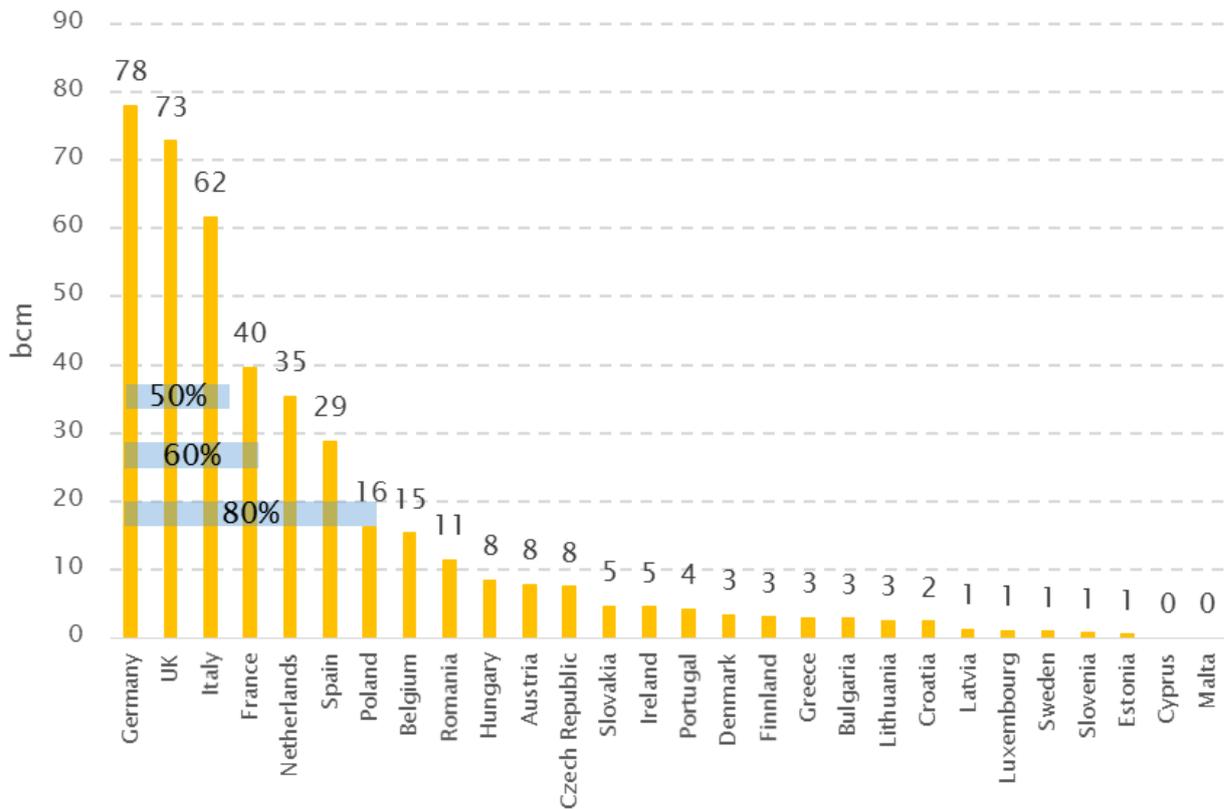
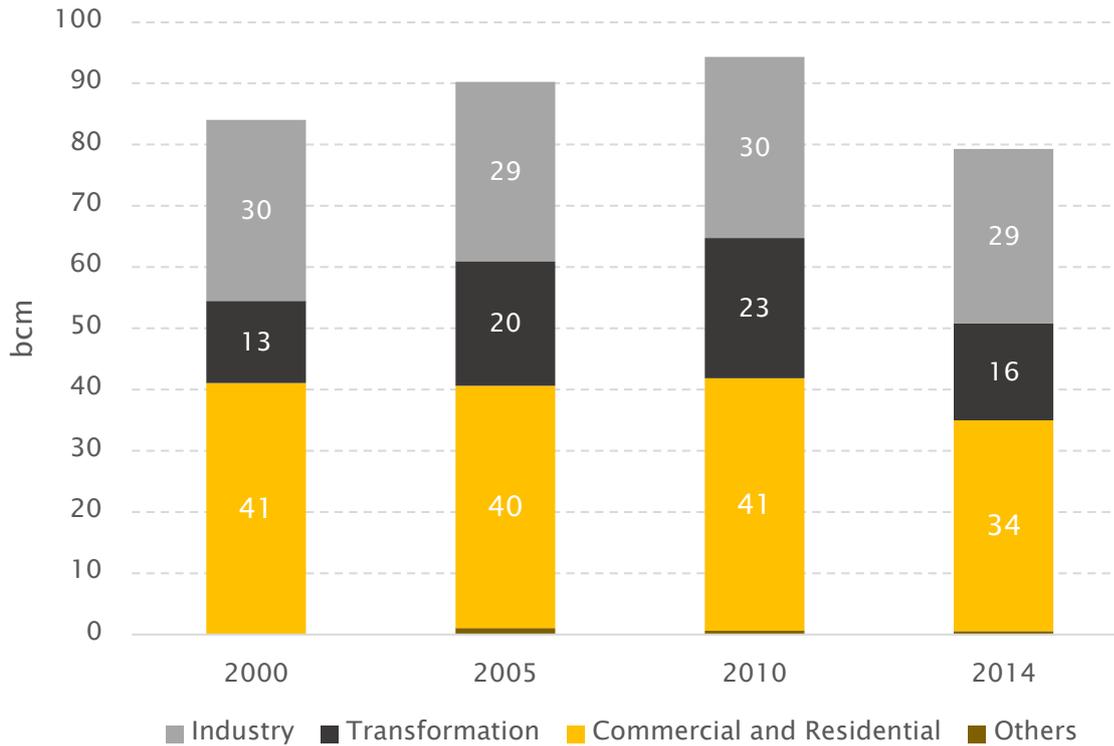


FIGURE 2: NATURAL GAS DEMAND IN 2014 OF EU-28 MEMBER STATES.  
SOURCE: EUROSTAT (2015).

As Figure 2 indicates, the total gas demand of the EU-28 is heterogeneously divided between its member states, with the three biggest consumers Germany, the UK and Italy accounting for roughly 50 percent of total demand. When adding the demand of France it becomes clear that only four of the member states create 60 percent of the total demand. Continuing this procedure eventually shows that seven member states consume 80 percent of European wide demand. With an amount of nearly 78 bcm in 2014, Germany’s gas consumption is highest within Europe. This fact seems not too surprising, as the consumption pattern closely correlates with the size, total population and industrial activity of the country. The main drivers of gas demand are routed in the same three sectors as detected for the EU-wide numbers. However, the sectoral demand allocation deviates slightly when compared with the EU data. In 2014, 20 percent of German gas demand was used for power and combined heat and power generation, 43 percent was consumed by the commercial and residential sector, and 37 percent was needed in the industrial sector as it is illustrated in Figure 3. The composition of gas demand over time follows similar trends as detected for the EU-wide numbers, demonstrated by Figure 3. Gas demand decreased in the transformation sector from

23 bcm in 2010 to 16 bcm in 2014. Demand in this sector was caused for 75 percent by combined heat and power generation. Due to high capacities of power generation units with low variable costs, such as lignite, steam coal and nuclear and a priority feed-in of renewables, gas-fired plants ranged at the end of the merit order and experienced a decline since 2010.<sup>1</sup> Reductions in the residential and commercial sector can be traced back to warm temperatures. Industrial demand remained stable during the last 15 years.



**FIGURE 3: GERMAN GAS DEMAND IN DIFFERENT SECTORS.**  
 SOURCE: EUROSTAT (2015).

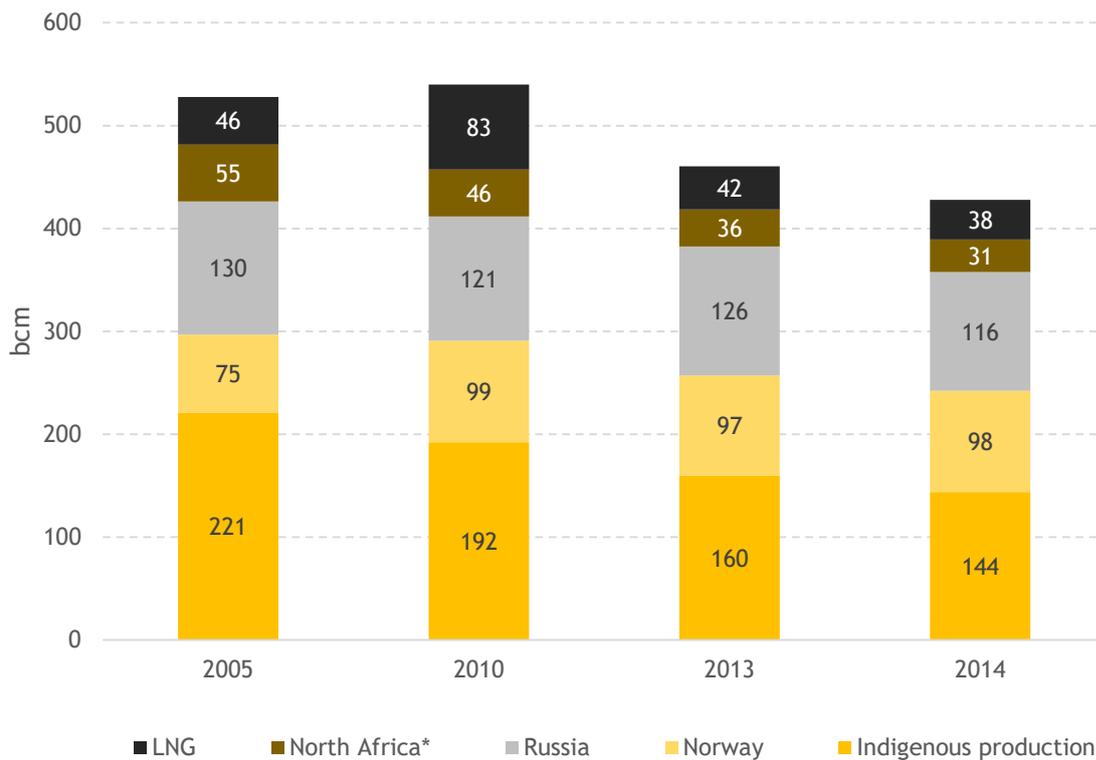
### 2.1.2 Supply

The gas demand of the EU-28 is mainly satisfied by domestic production and imports from Norway, Russia and North Africa, and some supplied through LNG from various countries. As can be seen in Figure 4, EU domestic production declined in the past years to 34 percent in 2014, compared to 42 percent in 2005. In absolute numbers this means a decrease from 221 bcm to 144 bcm, which is mainly due to falling production in the UK and the Netherlands, which are the EU’s biggest gas producers. The slowdown is expected to continue as production rates carry on falling. Declining European production is to an extent made up by imports from Norway, which grew from 14 percent in 2005 to 23 percent in 2014. Supplies from Russia slightly declined

<sup>1</sup> BMWi (2015)

between 2005 and 2010, but recovered by 2014 as new supply infrastructure was introduced in 2011. Currently, Russia satisfies 27 percent of the European consumption. The Southern European countries are supplied with pipeline gas from North Africa amounting to 7 percent of the total EU-28 gas demand. Another 9 percent of demand is met by LNG supplies, which have more than halved between 2010 and 2014.

At present, the EU maintains a complex network of gas pipelines, storage and LNG regasification terminals, which has continuously grown. Figure 5 presents a simplified picture of the essential import routes that bring gas to Europe<sup>1</sup>.



\* North Africa comprises pipeline supplies from Libya and Algeria. For 2005, there is no number for Libya available in IEA (2016), therefore the value only represents supplies from Algeria.

**FIGURE 4: STRUCTURE OF GAS SUPPLIES TO THE EU-28.**  
**SOURCE: EUROGAS (2001, 2006, 2011, 2015) AND IEA (2016).**

Norwegian supplies flow primarily to northern and western Europe, with direct offshore pipelines going to the UK, France, Belgium, the Netherlands and Germany. Germany received 32 bcm of Norwegian gas in 2015, followed by the UK with 27.1 bcm, and 21.9 bcm was transited to the Dutch market. France and Belgium were delivered by volumes of 17.2 bcm and 14.1 bcm, respectively. Thus, Norway delivered about 113 bcm of gas to the EU in 2015. Southern Europe is connected to North African suppliers via four pipelines, partly crossing the Mediterranean Sea. Spain imported approximately 15.5 bcm of Algerian gas via connections from Algeria and

<sup>1</sup> Please consider that there are small statistical differences in natural gas flows between IEA (2016) and EUROGAS (2015).

Morocco. Another two pipelines transported 14 bcm of gas to Italy from Libya and Algeria in 2015.

Russian imports enter Europe via Ukraine, Belarus and the Baltic Sea, and some direct connections to the Baltics and Finland. The route via Ukraine is the oldest, aging back to the former Soviet Union. In 2015, a total of 62.9 bcm of Russian gas was transited through Ukraine with the vast majority being shipped to Slovakia (37 bcm). Significant volumes were also delivered to Romania, Hungary and Poland: 16.4 bcm, 5.8 bcm, and 3.7 bcm, respectively.

In the 1990s the Yamal Pipeline went online running through Belarus to Poland, and in 2015 36 bcm entered the EU via that route. The latest pipeline (launched in 2011) was Nord Stream. It directly links Russia and Germany by an offshore connection. The Baltic States and Finland are directly connected to the Russian gas grid and are delivered with amounts reflecting their national demand. Turkey gets gas via Blue Stream, another pipeline fed with Russian gas crossing the Black Sea. Additionally, it imports some amounts of gas via pipelines from Azerbaijan (via Georgia) and Iran.

Finally, several European countries host LNG regasification terminals, which imported substantial amounts of 13.6 bcm and 12.5 bcm going to the UK and Spain in 2015. Turkey, Italy and France imported 7.6 bcm, 6.0 bcm and 5.6 bcm of LNG respectively. Some small volumes entered Portugal, Greece, Belgium and the Netherlands in 2015. The same holds for Lithuania, where a terminal came online at the end of 2014.

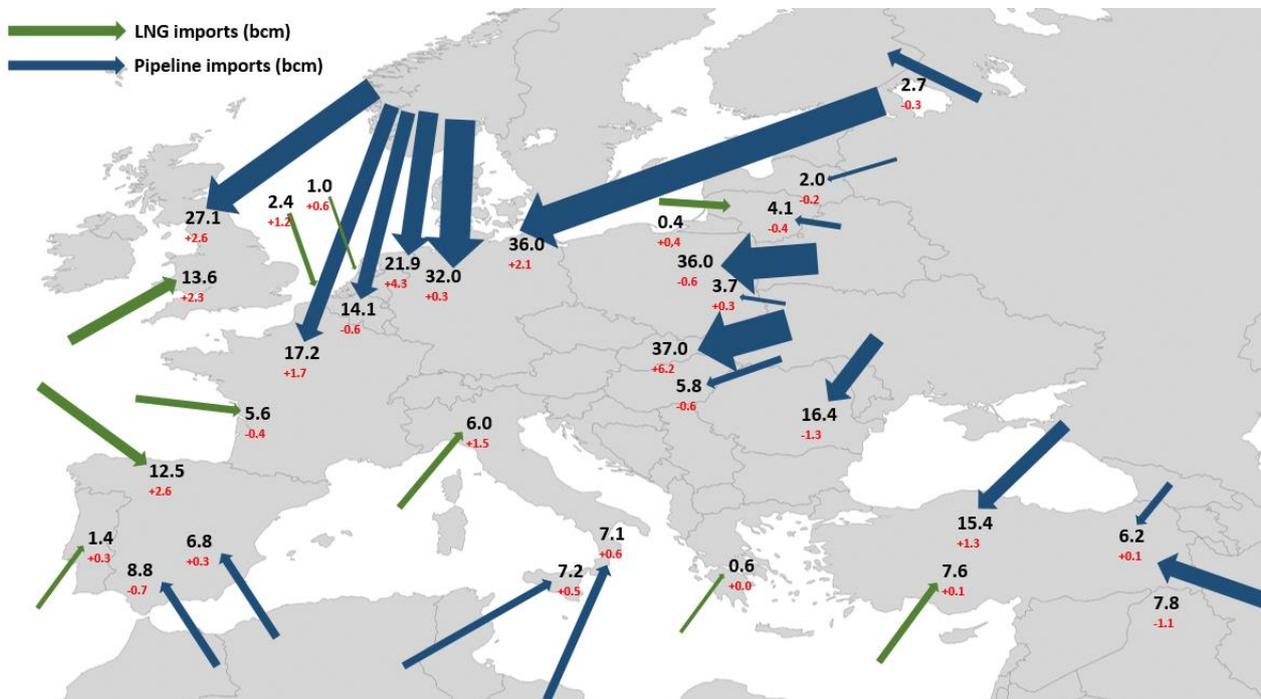


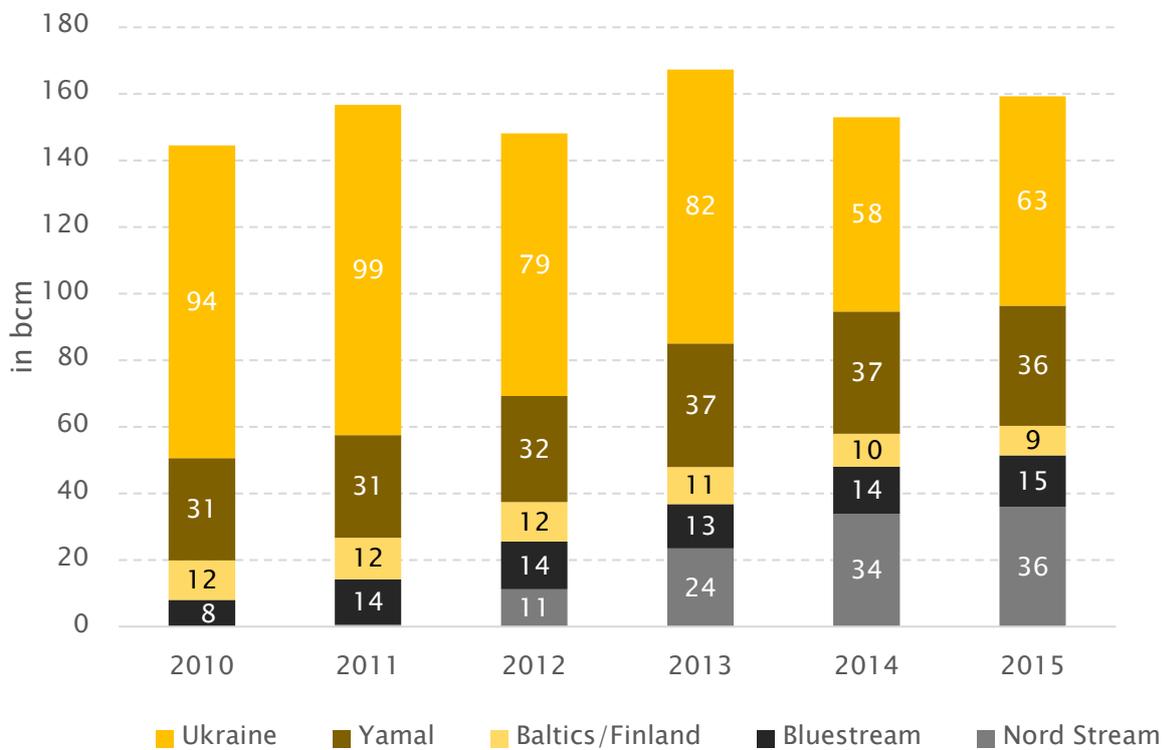
FIGURE 5: GAS IMPORTS BY THE EU AND TURKEY IN 2015 COMPARED TO 2014 (RED).

SOURCE: IEA (2016).

Due to Russia’s important position as the largest supplier of the EU, a closer look is given to the utilisation of its different pipeline routes. As can be seen in Figure 6, supplies via the Ukrainian

route declined substantially during the last years and were replaced by deliveries through Nord Stream. Whereas the pipelines route transiting Ukraine delivered 65 percent (94 bcm) of Russian imports in 2010, last year supplies via this route amounted to only 40 percent, equalling 63 bcm. 36 bcm or 23 percent came to Europe via the Nord Stream pipeline.

The amount of Ukrainian gas was especially low in 2014 due the dispute between Russia and Ukraine.<sup>1</sup> In 2015, a recovery of imports was recognised. Usage of the Yamal route has been relatively constant over the years ranging at roughly 22 percent, indicating a high utilisation of the pipeline. Gas amounts coming to the EU via direct connection to the Baltics and Finland remained stable. The same holds for volumes transported by Blue Stream to Turkey (roughly 14 bcm).



**FIGURE 6: RUSSIAN GAS EXPORTS TO EUROPE (INCL. TURKEY) BY PIPELINE ROUTE.**  
 SOURCE: IEA (2016).

Focusing on Germany, it becomes obvious that supply is dominated by imports from Russia and Norway. Russia delivered 39 bcm of gas to Germany in 2015 which sums up to 32 percent. This means a decrease of 4 percent points since 2014. The second largest supplier was Norway with 31 percent, followed by the Netherlands with 26 percent. Altogether, 117 bcm were imported from the above mentioned countries in 2015. The domestic production in Germany came down from 12 bcm in 2010 to 8 bcm in 2015. Germany is an important transit country with substantial

<sup>1</sup> Martinez, Paletar, Hecking (2015)

volumes of gas flowing out to countries like France, Switzerland, Austria or the Czech Republic. These re-exports increased from 16 bcm in 2010 to 32 bcm in 2015. Because of its geographical position in the heart of Europe, extensive gas infrastructure and manifold trading connections, Germany is now a central hub for gas transports in Europe.

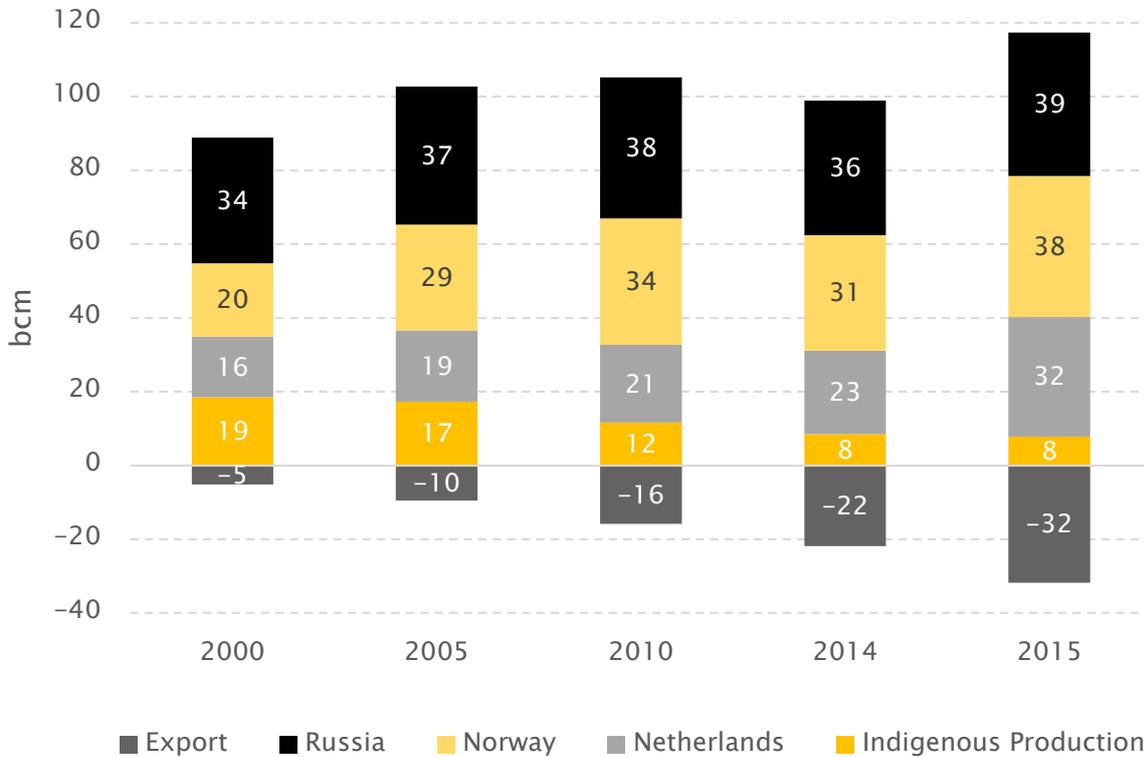


FIGURE 7: STRUCTURE OF SUPPLIES FOR GERMANY.

SOURCE: BAFA (2016).

Focusing on the physical gas flows as derived from IEA (2016), Germany received gas volumes of 153.05 bcm in 2015, more than double its domestic demand. This number differs from the values shown in Figure 7 since the latter focuses on trade flows as tracked by German Federal Office of Export Control (BAFA). Concerning the physical flows, a total amount of 75.3 bcm was transited to neighbouring countries.<sup>1</sup> The various gas flows entering Germany in 2015 are depicted in detail in Figure 8. An amount of 33.4 bcm was imported from the Netherlands. Another 32.0 bcm entered from Norway and a marginal 0.9 bcm via Denmark. The biggest amount of 36.0 bcm got into the country via the Nord Stream Pipeline. Based on the terms of the Third Energy Package, Gazprom is allowed to use only 50 percent of the non-nationally regulated transit capacity from the OPAL pipeline, which is connected to the Nord Stream. Due to this regulation Nord Stream’s full capacity of 55 bcm could not be exploited. Instead, only about 41 bcm can be shipped. Moreover, entry points from Poland delivered 28.5 bcm of gas. Additional gas entered the country via the Czech Republic and Austria, accounting for 18.9 bcm and 1.4 bcm, respectively. These flows cannot clearly be allocated to one supply route. It is

<sup>1</sup> The amount of German re-exports is higher compared to the BAFA number, since the IEA covers physical flows whereas BAFA refers to trade flows.

assumed that a major part is attributable to Ukrainian transits, but re-imports from the OPAL pipeline can be included, too. Additionally, 1.9 bcm of gas arrived into Germany from Belgium. An important part of the imports via Nord Stream and Yamal, precisely 35.7 bcm, exited the country again via the Czech Republic. Additionally, considerable flows went to Austria, Switzerland and France, amounting to 6.6 bcm, 10.7 bcm and 6.1 bcm, respectively. The Netherlands received 14.1 bcm of gas. Some minor amounts were delivered to Belgium, Poland and Denmark.

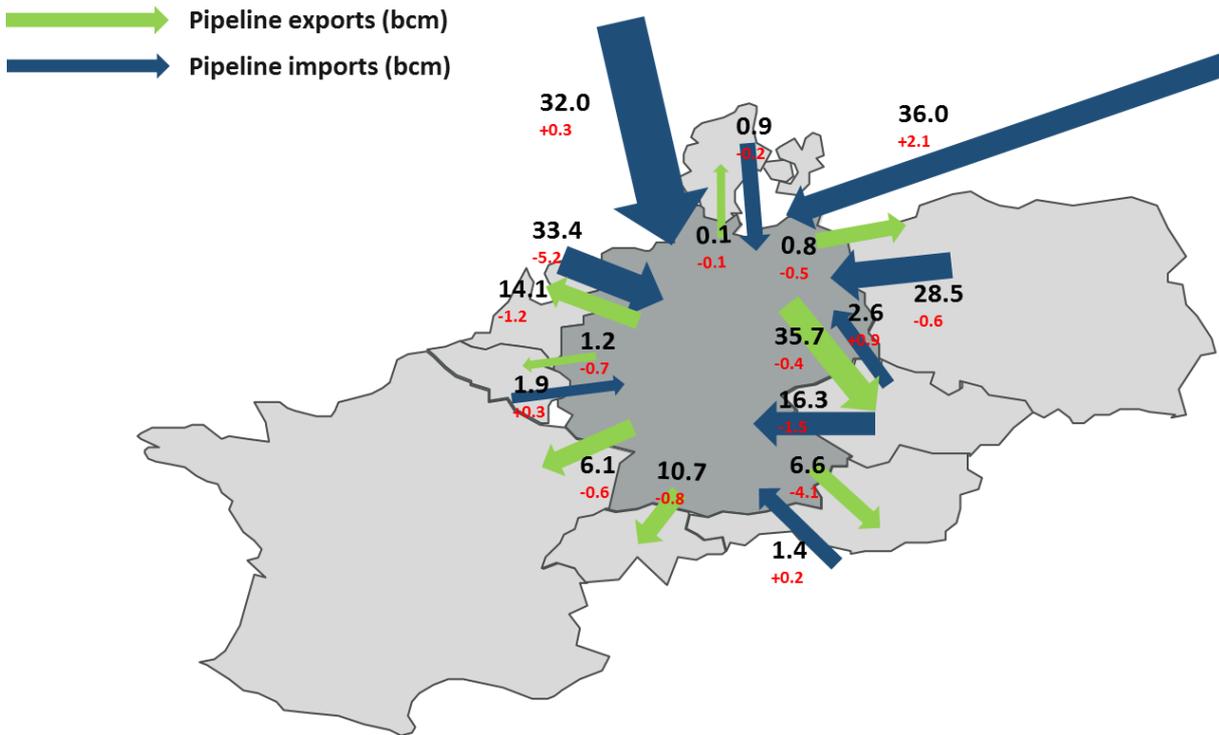
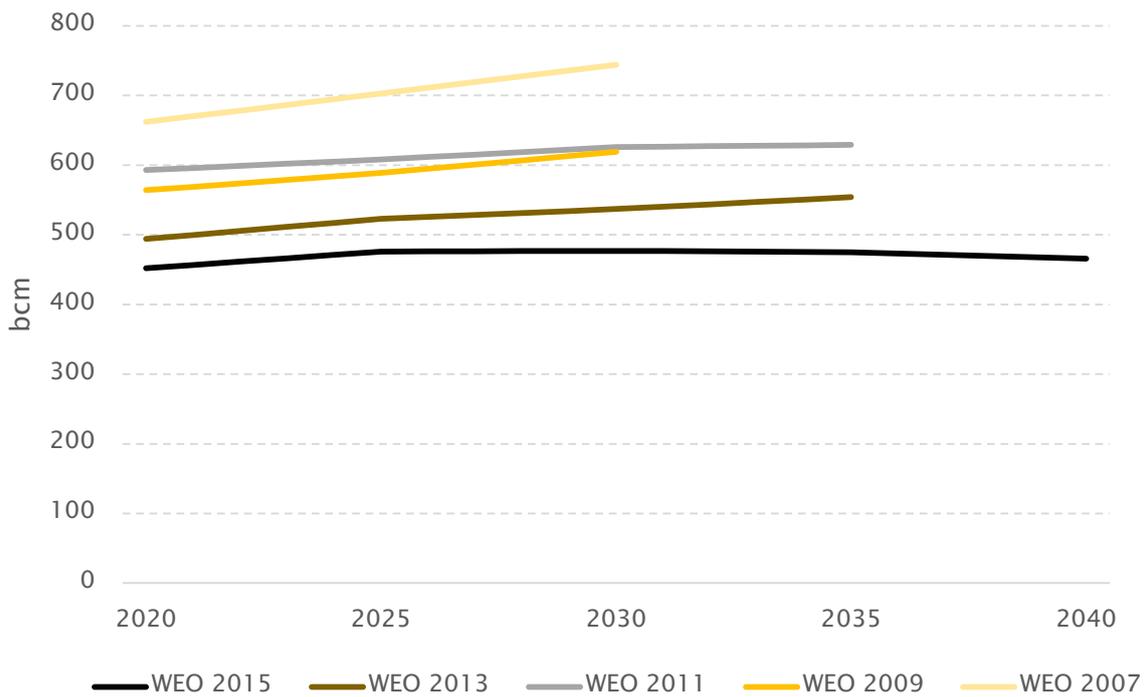


FIGURE 8: GAS FLOWS ENTERING AND EXITING GERMANY IN 2015 COMPARED TO 2014.  
 SOURCE: IEA (2016).

## 2.2 Future Projections of EU Gas Demand

As becomes obvious in Figure 9, projections of future gas demand have been corrected downwards during the last few years. The IEA’s 2007 World Energy Outlook (WEO) projected a sharp increase of total gas demand from 541 bcm in 2005 to 744 bcm until 2030. The 2011 WEO adjusted the number for 2030 to 626 bcm and the current 2015 WEO estimate is 477 bcm. The data of the WEO 2011-2015 in Figure 9 is based on the New Policies Scenario, while the data of the 2007 and 2009 WEO is based on the Reference Scenario. Although there may be some variations depending on the different scenario assumptions, there is a huge gap between the projections of the 2007 WEO and the 2015 WEO for the long-term evolution of gas demand. While the 2007 WEO predicted 744 bcm for 2030, the 2015 WEO prognoses only 477 bcm for

2030. The revision was driven by a weaker-than-expected economic environment and energy demand and less-favourable-than-expected coal and EU ETS allowance prices. The persistent expansion of renewable energies and diverse efficiency and energy saving measures have also contributed to a more negative outlook for total gas demand in the EU. Similarly the downward correction of demand projections could be detected when comparing different scenarios from EU Energy Trends publications.



*\*The WEO 2011, 2013 and 2015 are based on the New Policies Scenario; 2007 and 2009 are based on the Reference Scenario. For the WEO 2014 and 2015, the data refers to the EU-28, but for the WEO 2011, 2009 and 2007 Croatia is not included (here, it refers to the EU-27).*

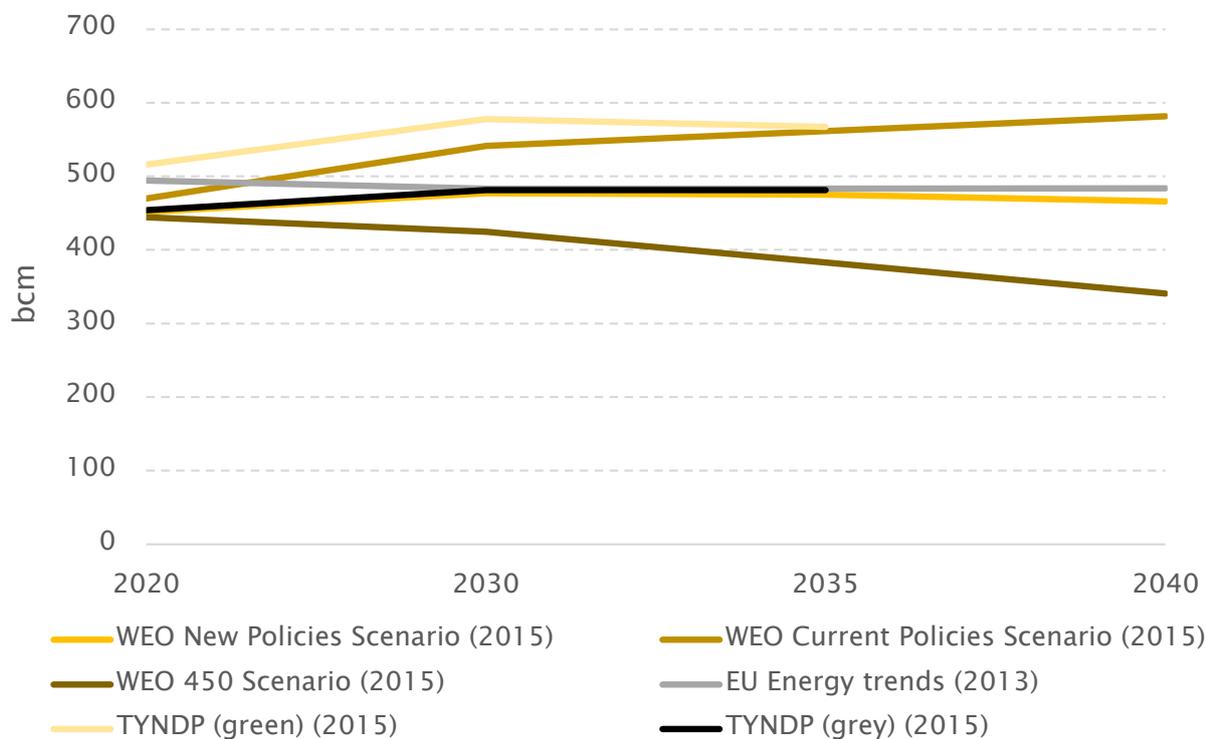
**FIGURE 9: DOWNWARD CORRECTION OF EU-28 GAS DEMAND PROJECTIONS**

**SOURCE: IEA (2007, 2009, 2011, 2013, 2015).\***

The 2015 WEO by the IEA pushes forward three different gas demand scenarios for the EU: the New Policies Scenario, the Current Policies Scenario and the 450 Scenario. The first scenario takes into account all energy-related policy measures that have been adopted as of mid-2015 and intended policy interventions for the future that may affect energy markets in the future. The Current Policies Scenario, on the other hand, only takes policy measures into consideration that have been enacted as of mid-2015. In this respect, it provides an insight of how global energy markets would evolve without new policy intervention. The 450 Scenario depicts a course to the 2°C global warming climate goal relying on certain technologies that are close to becoming available at commercial sale and will help to reach this goal.<sup>1</sup> As it can be seen in

<sup>1</sup> IEA (2015a)

Figure 10, among the WEO scenarios, there is great uncertainty whether European gas demand will increase or decrease over the course of time. The New Policies Scenario predicts a decreasing gas demand of 475 bcm in 2035 and a slight decline to 466 bcm in 2040. In contrast, the 450 Scenario expects a decreasing gas demand reaching a level of 383 bcm for 2035 and a further decline to 341 bcm in 2040. The Current Policies Scenario assumes a more or less constant gas demand for the EU suggesting 562 bcm in 2035 and 582 bcm in 2040. The uncertainty of future gas demand arises from two countervailing trends: on the one hand, gas demand is expected to increase compensating for the declining nuclear and coal-fired capacity in the generation sector or more CO<sub>2</sub>-intensive fuels in other sectors. On the other hand, gas demand may fall considering that renewables will become more price-competitive and efficiency measures become increasingly important. All in all, it is an open question which effect will dominate the other and how total European gas demand will evolve until 2040. The Ten Year Network Development Plan (TYNDP) by ENTSOG creates two different scenarios, both predicting a slightly rising gas demand until 2035. The difference between the green (green transition) and grey (slow progress) scenario is due to different assumptions on the importance of gas for power generation is. The green scenario generally assumes a significantly higher electricity demand due to stricter environmental policies. In particular, gas demand is expected to increase due to its back-up role in the power generation sector. Therefore, total gas demand is expected to increase more strongly in the green scenario than in the grey scenario (see Figure 10). At last, the European Commission has published its own scenarios until 2050, named “Energy trends up to 2050”, projecting a slightly decreasing gas demand until 2030 and a constant gas demand of 435 bcm for 2030 onwards.

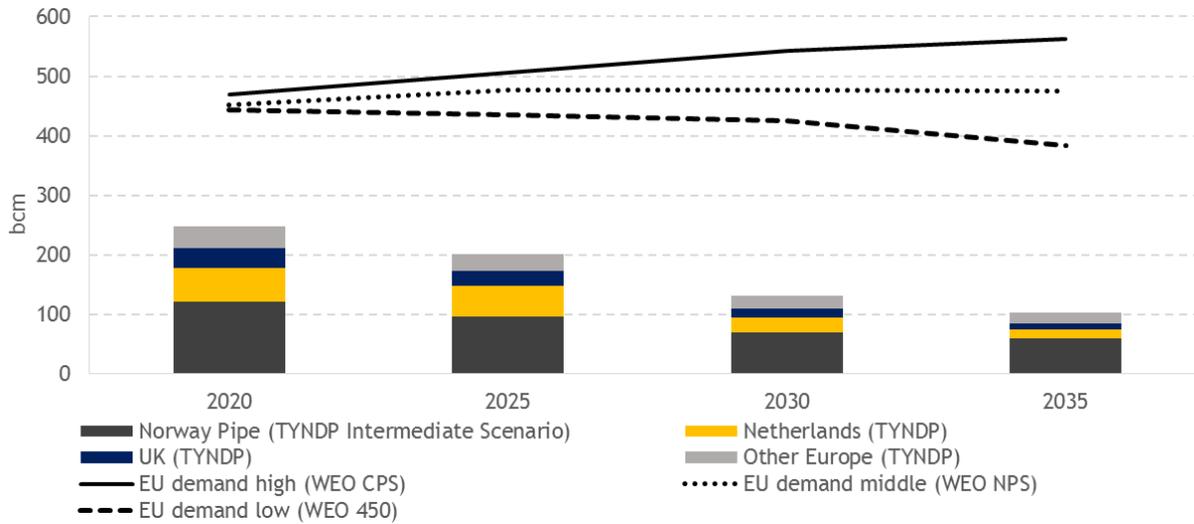


**FIGURE 10: CURRENT PROJECTIONS OF EU-28 GAS DEMAND IN DIFFERENT SCENARIOS.**  
 SOURCE: IEA (2015A), ENTSOG (2015A), EU ENERGY TRENDS (2013).

### 2.3 Future Options of EU Gas Supply

European gas production is expected to plummet over the next decades. As such, the TYNDP by ENTSOG projects conventional gas production in Europe are expected to decline by roughly 60 percent between 2015 and 2035.<sup>1</sup> The decline could be steeper when taking into account recent developments concerning the production cap of the Groningen field. Figure 11 illustrates the expected fall of gas production in Norway, the UK, the Netherlands and the rest of Europe, as projected in the Intermediate Scenario of TYNDP.

<sup>1</sup> ENTSOG (2015a)



**FIGURE 11: GAS PRODUCTION IN EUROPE AS ASSUMED IN TYNDP**  
 SOURCE: IEA (2015A), TYNDP (2015)

However, there are a variety of alternative non-European supply options to compensate for this trend and to fill the supply gap observed in Figure 11. As seen before in Section 2.1.2, Europe has never been self-sufficient on natural gas supply given the significant share of gas imports from outside Europe, foremost from Russia, but as well from North Africa (Algeria, Libya) and from the global LNG market. Therefore, a substantial amount of infrastructure and contractual agreements is already in place to enable gas imports by Europe:

- European importers (including Turkey) currently hold several long-term supply contracts with Russia. Even in 2030, they will still amount to an annual contracted quantity (ACQ) of about 115 bcm.<sup>1</sup> Moreover, overall existing pipeline capacities from Russia to Europe (including Finland, the Baltics and Turkey) add up to roughly 255 bcm/a<sup>2</sup>, of which 140 bcm/a<sup>3</sup> are transit capacities through Ukraine.<sup>4</sup>
- Substantial pipeline capacities exist between Northern Africa, Spain, and Italy. Even though TYNDP projects constant pipeline imports from Northern Africa, they will remain a major source of European gas imports.
- On top of the existing pipelines, the TANAP and TAP pipelines, which are currently under construction, will bring another 10 bcm of Azeri gas to Italy as of 2019.
- Another major source of future European gas supplies may be LNG purchased from the global market. Europe holds large capacities to import LNG: currently, there are 24 active LNG terminals in Europe with an overall import capacity of 214 bcm. Even though some LNG terminal capacities may not perfectly match gas demand with regard to their location

<sup>1</sup> Henderson, Mitrova (2015)

<sup>2</sup> Nord Stream 55 bcm/a, entry Poland 39 bcm/a, Baltics & Finland 5 bcm/a (no transit), Blue Stream 16 bcm/a, exit Ukraine 140 bcm/a

<sup>3</sup> IEA (2015d)

<sup>4</sup> When accounting for the TPA limitations of the non-regulated part of the OPAL pipeline, this value has to be diminished by 16 bcm/a.

because of partly limited pipeline capacities, LNG imports can contribute substantially to future European gas supply.

Besides domestic gas production, as projected in the TYNDP, and gas deliveries via infrastructure from outside Europe, which is currently in place or under construction, other supply options for the EU is discussed that currently require additional investments in transport infrastructure:

- Nord Stream 2, Turkish Stream or the Poseidon pipeline may potentially increase Russian export capacities and enable Russia to circumvent Ukraine as a transit country.
- The further development of the Southern Gas Corridor bringing additional supplies to Europe from countries with vast gas reserves such as Azerbaijan, Iran, Iraq or Turkmenistan.
- Development of new offshore projects in the Black Sea (Romania) and the Eastern Mediterranean Sea (Cyprus/Israel).

Last, European production can be higher than projected in TYNDP. Given sufficient price signals for example Norwegian gas production can be higher - if an investment in rather expensive offshore projects would pay off. Furthermore, Europe (including Turkey) has large resources of unconventional gas of 18.6 tcm in countries such as the UK, Germany, France or Poland.<sup>1</sup> However, due to public opposition and missing expertise on economic feasibility, it is uncertain if these volumes will contribute to European gas supply in the future.<sup>2</sup>

To summarise, Europe has diverse options for gas supply, as illustrated in Figure 12. Europe is surrounded by several countries which provide significant proven gas reserves that could serve the European gas market in the future. According to the BP statistical review 2015, the biggest reserves can be found in Russia with 32.6 tcm of proven gas reserves, in Iran with 34.0 tcm and Turkmenistan with 17.5 tcm.<sup>3</sup> However, there are some other relevant gas reserves in Iraq (3.6 tcm), Azerbaijan (1.2 tcm), and Algeria (4.5 tcm), as well as Egypt and Libya with 1.8 tcm and 1.5 tcm respectively. The Eastern Mediterranean region, encompassing Israel and Cyprus, holds a substantial 0.3 tcm of gas. Also, Europe has some domestic gas reserves located in Norway and the Netherlands amounting to 1.9 tcm and 0.8 tcm respectively.<sup>4</sup> However, these amounts are continuously decreasing as both countries serve the European market, with Norway producing 113 bcm and the Netherlands 42.5 bcm per year in 2014. When talking about future reserves two aspects should be kept in mind; firstly, values should be assessed in relation to Europe's yearly gas demand of 0.45 tcm, and secondly, it should be argued that the amount of proven reserves is only a fraction of existing resources.

In the following section, future European supply options will be discussed in more detail in a country-by-country analysis.

---

<sup>1</sup> EIA (2015b), unproved technically recoverable shale gas

<sup>2</sup> Natural Gas Europe (2015c)

<sup>3</sup> BP (2015)

<sup>4</sup> BP (2015)

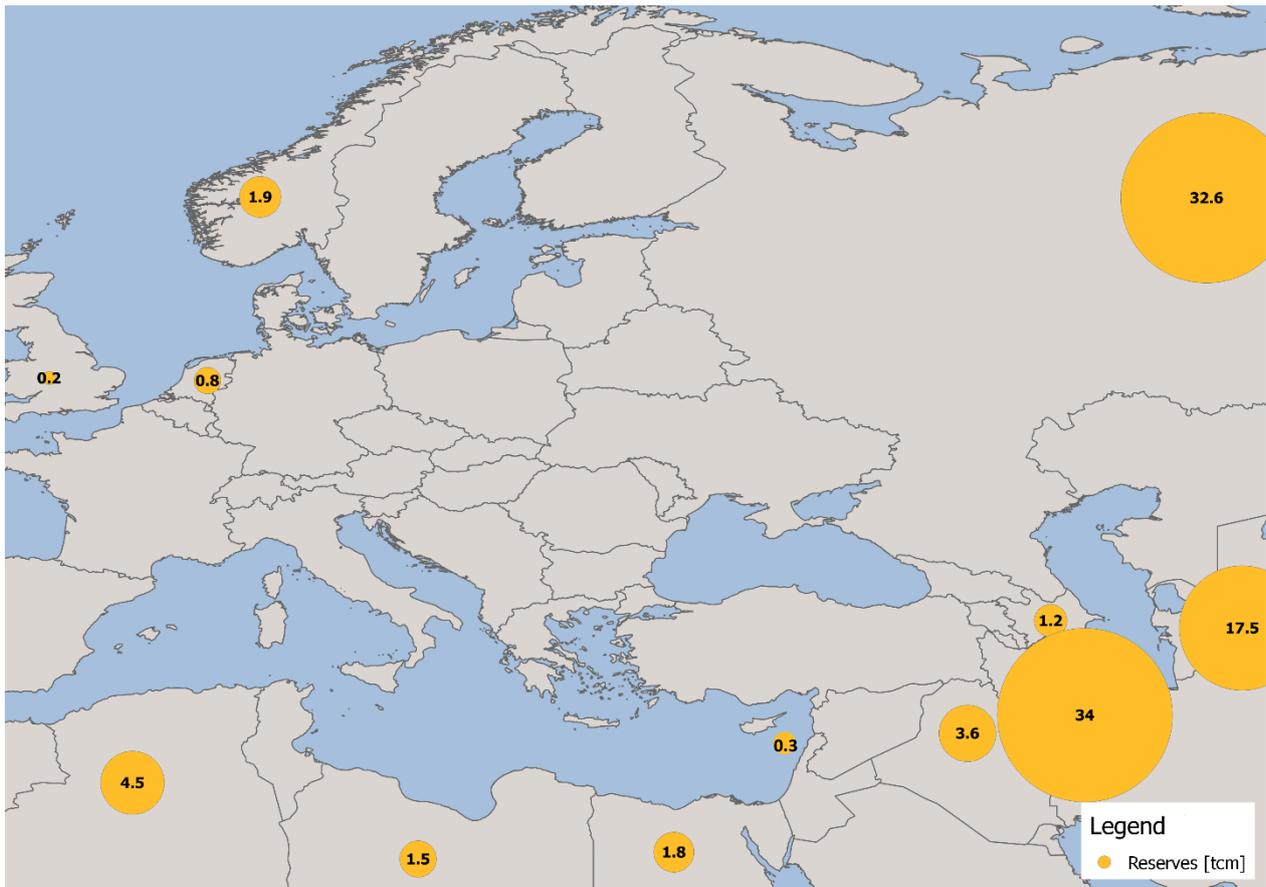


FIGURE 12: PROVEN GAS RESERVES SURROUNDING EUROPE  
SOURCE: BP (2015)

### 2.3.1 European Gas Production

#### 2.3.1.1 Norway

Historically, Norway has been an important supplier of gas for Europe, and has steadily increased its export volumes. In the last decade, though, the exploration of gas resources has been faster than the development of new discoveries. Therefore, the overall export volumes from Norway are expected to decrease 2020 onwards if no significant investments in new gas fields are made. According to the IEA’s 2015 medium-term gas market report, Norway’s gas production is projected to decline until 2020.<sup>1</sup> However, due to recent price decreases, substantial cutbacks in investments have been made which question this projection.

Despite the negative investment environment, some new projects have recently been finished or will be realised in the next five years. For example, there have been investments at the existing fields at Ekofisk Sør and Eldfisk II, Troll (North Sea) and at Åsgard in the Norwegian Sea. Moreover, new fields such as Gina Krog and Aasta Hansteen are expected to start in 2017 and

<sup>1</sup> IEA (2015b)

2018. The Aasta Hansteen field comprises estimated reserves of nearly 50 bcm, but represents an extremely challenging project due to its geological location in the Norwegian Sea above the Arctic Circle. Being located 300 km from the coast and in water depths of 1300 metres, advanced technology is needed to exploit these resources. The project is related to the Polarled pipeline, a new 480 km line starting from the Aasta Hansteen field and ending at the Nyhamna processing plant in the Møre og Romsdal county.<sup>1</sup> The project is estimated to cost 57 billion Norwegian Kronen (6.04 billion Euro).<sup>2</sup> However, the profitability of the project is linked to other fields discovered in the Norwegian Sea, such as Linnorm, Victoria and Zidane, with reserves of 70 bcm. As the discoveries are in deep water only high gas prices would commercially justify these projects.<sup>3</sup>

Moreover, there are some promising new fields that could serve to maintain Norway's production levels in the Barents Sea. In theory, it would be possible to extend the offshore network to connect these new fields to the existing grid and export it to Europe, but investors are reluctant since the evolution of gas prices and demand in Europe are unsure.<sup>4</sup>

Altogether, Norway still offers substantial gas reserves of 1.9 tcm, but investment in new fields would only be commercially attractive with high gas prices.<sup>5</sup> Therefore, the development of demand and prices has an enormous impact on the future level of Norwegian production.

### 2.3.1.2 The Netherlands

In the past, the Netherlands have been the most important producer of gas on the European main land, with production volumes of approximately 80 bcm in 2013. An import share of this amount comes from the Groningen field, the tenth biggest gas field in the world. In addition, significant amounts stem from so-called small fields, which are for the majority located offshore in the North Sea.<sup>7</sup> However, production has decreased largely in the last months, amounting to 49.8 bcm in 2015.<sup>8,9</sup>

In January 2014, the Dutch Minister of Economic Affairs imposed a production cap on the Groningen field set at 39.4 bcm. This was provoked by a big earthquake which happened in August 2012 and permanent small earthquakes concerning the region since then. After criticism of the Dutch Safety Board the cap was gradually further lowered to 30 bcm in 2015.<sup>10</sup> At the end of 2015, another cut in production was announced for 2016 amounting to 27 bcm, which has been reduced to 24 bcm in June 2016. The downward trend in production may be continued in the coming years, with levels of 18 bcm to 24 bcm expected to be maintained after 2020.<sup>11</sup> However, if the frequency of earthquakes is not reduced significantly, the cap may be further decreased.

---

<sup>1</sup> IEA (2015b)

<sup>2</sup> Elliott et al. (2013)

<sup>3</sup> Likvern (2015)

<sup>4</sup> ENTSOG (2015a)

<sup>5</sup> Xu et al. (2015)

<sup>6</sup> BP (2015)

<sup>7</sup> Ebn (2014)

<sup>8</sup> As above, the calorific value that is applied is 10,620 kWh/m<sup>3</sup>.

<sup>9</sup> NLOG (2015)

<sup>10</sup> Natural Gas Europe (2015a)

<sup>11</sup> Sterling (2015)

According to the Dutch Ministry of Economic affairs the remaining reserves of the Groningen field accounted for 680 bcm at the beginning of 2015. It is planned to continue production for several decades until the field is completely exploited. However, as the domestic reserves in the North Sea are insufficient to replace the reduction of the Groningen field volumes, it is expected that the Netherlands turn from a net exporter to a net importer around 2025.<sup>1</sup>

Summing up, the Netherlands have been an important gas supplier in the past, but its role as a future gas supplier will be limited both by the natural decline of small on- and offshore fields and the long-term cap of Groningen set out by the Dutch government.<sup>2</sup>

### 2.3.1.3 The United Kingdom

The British gas production steeply declined since 2000. Production peaked at 107.5 bcm in 2000, but decreased to 37.5 bcm in 2015.<sup>3</sup> The British government projects a further slight decline in production until 2020. A major part of the operating fields are mature predictions, which become less reliable as fields age. Therefore, a big part of future production relies on new fields.<sup>4</sup> According to Oil & Gas UK half of the production in 2019 will come from fields that started operating since end of 2012.<sup>5</sup> As low oil and gas prices make start-ups riskier and increases the chance for project slippage, projections seem even more uncertain than in previous years, when over-prediction has happened regularly.<sup>6</sup>

The latest project coming on stream was the Laggan-Tormore gas field, starting operation in early 2016. It is located offshore 125 km north west of the Shetland Islands. The project with estimated costs of 4.5 billion Euro has been financed by Total.<sup>7</sup> Its start was delayed by two years.<sup>8</sup> The Cygnus gas field is also close to beginning. It contains approximately 18 bcm of gas and was originally scheduled for 2015.<sup>9</sup> Moreover, development is going on at the Platypus field and the Edradour field, the latter is expected to go online in 2017.<sup>10</sup>

Generally, many projects have been envisaged in the last few years, but due to delays many fields are not on stream on time. For example the Columbes field was planned to start its operation in 2015, but plans had to be revised which has caused a still pending start-up.<sup>11</sup> The British government also aims to successfully start the shale gas business, launching the so-called fast-track fracking procedure in 2015.<sup>12</sup>

Altogether, proven gas reserves are estimated at 206 bcm, another 202 bcm are mentioned as probable reserves, whereof 27 bcm and 31 bcm can be allocated to fields under development.<sup>13</sup> However, exploration activity has been lower in 2015 compared to last years. Also, capital

---

<sup>1</sup> Dutch Ministry of Economic Affairs (2015)

<sup>2</sup> IEA (2015b)

<sup>3</sup> EIA (2016); UK government (2016)

<sup>4</sup> UK government (2016)

<sup>5</sup> Oil and Gas UK (2015)

<sup>6</sup> UK government (2016)

<sup>7</sup> Fraser (2016)

<sup>8</sup> Department of Energy and Climate Change (2013)

<sup>9</sup> Heerema (2015)

<sup>10</sup> Offshore Technology (2015)

<sup>11</sup> Serica Energy (2015)

<sup>12</sup> Vaughan (2015)

<sup>13</sup> UK government (2015)

investment has been very poor during 2015 and is expected to remain at a low level.<sup>1</sup> Thus, substantial amounts of reserves seem to exist, however the economic situation will determine the amount of projects that will be realised.

#### 2.3.1.4 Eastern Mediterranean

Latest discoveries of substantial amounts of gas in the Mediterranean Sea have shifted attention to this region as another possible source of import for Europe.

Since 2000 several gas fields have been discovered in Israel. The first - Mari-A and Mari-B - were mainly for national supply, but recently found offshore fields in the Levant basin are promising for gas export.<sup>2</sup> The province was assessed by the US Geological Survey in 2010, which estimated the undiscovered technically recoverable reserves of gas to be at least 1.2 tcm.<sup>3</sup> The basin belongs to the exclusive economic zones (EEZ) of Israel, Cyprus, Lebanon and Syria, whereby the two latter countries are not able to arrange gas exploration or drilling activities due to national unrest. Though, Syria commissioned a Russian company to examine oil production.<sup>4</sup> The EEZ of Israel encompasses the **Tamar**, **Levithian** and **Royee** gas fields. The former contains 300 bcm of natural gas and is expected to be able to produce at a plateau level of 10 bcm per year.<sup>5</sup> Efforts have been made to increase the level to 15 bcm.<sup>6</sup> It already contracted supplies to Jordan in 2014, with sales starting in 2016. The Levithian and Royee gas field with reserves of 622.6 bcm and 90.56 bcm respectively will approximately be able to export from 2019 onwards.<sup>7</sup> Though, the 2015 IEA's Medium-term gas market report predicts that Israel will not become a gas exporter before 2020 due to its inability to secure reliable deals as regulatory, economic and political difficulties grow.<sup>8</sup> The costs for development of the Levithian field are assessed at 8 billion Euro.<sup>9</sup> Its development is planned into two steps of four wells each starting with 12 bcm per year and rising to 21 bcm finally. A fixed platform will be constructed with a connector to the Israeli shore of 12 bcm capacity per year.<sup>10</sup> The Aphrodite field (deep water block 12) situated in the Cyprian EEZ exhibits reserves of roughly 142 bcm.<sup>11</sup> It was discovered at the end of 2011. Yet, exploration is ongoing. If production can be commercial, Cyprus could become a potential gas exporter as the domestic market only needs a small part of the gas production.<sup>12</sup>

---

<sup>1</sup> Oil and Gas UK (2015)

<sup>2</sup> EIA (2015a)

<sup>3</sup> USGS (2010)

<sup>4</sup> Zemach (2015)

<sup>5</sup> EIA (2015a)

<sup>6</sup> IEA (2014)

<sup>7</sup> EIA (2015a)

<sup>8</sup> IEA (2015b)

<sup>9</sup> World Oil Magazine (2015)

<sup>10</sup> Zalel (2016)

<sup>11</sup> EIA (2015a)

<sup>12</sup> Zemach (2015)

In 2015, Eni found a new offshore field in Egypt, Zohr, containing 623 bcm of recoverable reserves. Production from this field is planned to start in 2018 and the costs for development are estimated at 6.3 to 9 billion Euro. The initial production is assumed to be 0.5 bcm per year with its peak in 2026 where production is aimed to reach 31.6 bcm/a.<sup>1</sup>

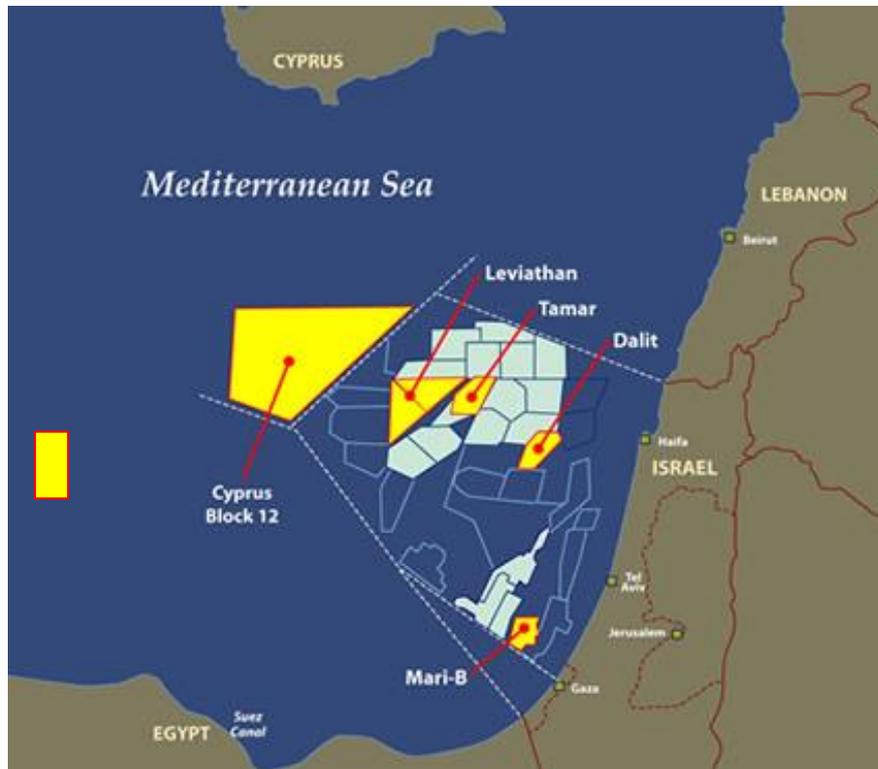


FIGURE 13: GAS RESERVES IN THE LEVANT BASIN.

SOURCE: OFFSHORE ENERGY TODAY (2015) WITH OWN EXTENSION

In 2012, a pipeline linking Israel with Cyprus, Crete and finally the Greek mainland was proposed under the name **EastMed pipeline**.<sup>2</sup> It would have a length of 1530 km, an annual capacity of 10 bcm and could be operating by 2020.<sup>3</sup> Unless the EU listed the project as a “Project of Common interest” (PCI) in 2014 no private investments could be attracted up to now.<sup>4</sup> This is mainly based on two aspects. Due to a depth of up to 3000 km in the Mediterranean Sea, the project is viewed as extremely technically challenging with non-assessable costs.<sup>5</sup> First estimates indicated a price of roughly 13.5 billion Euro which is viewed as prohibitive.<sup>6</sup> Furthermore, the political instability and the territorial conflicts of the region discourage investors.<sup>7</sup> However, due to new insights cost estimates are downgraded to 6.3 billion Euro which may boost the attractiveness of the project.<sup>8</sup>

<sup>1</sup> World Oil Magazine (2015)

<sup>2</sup> IGI- Poseidon (2015)

<sup>3</sup> Neslen (2014)

<sup>4</sup> Lagakos, Tsakiridis (2015)

<sup>5</sup> Neslen (2014)

<sup>6</sup> Mills (2016)

<sup>7</sup> Neslen (2014)

<sup>8</sup> Mills (2016)

At the end 2015 it was revealed that Israel and Turkey are in the middle of negotiations about a 550 km pipeline to transport 30 bcm of Israeli natural gas to Turkey from 2019 onwards. One third of the capacity would be intended for Turkish demand, whereas the remaining 20 bcm could be exported to the EU. The pipeline with estimated costs of 2.5 billion Euro is planned to lie on the bottom of the Mediterranean Sea, with landings in Mersin, a Turkish port. Further discussions on an agreement are expected mid-2016.<sup>1</sup>

It has also been planned to use the existing **Arish-Ashkelon pipeline** reversely. This pipeline supplied Israel with gas from Egypt until the Tamar field was discovered and imports ceased. As Egypt's own gas and oil production decreased while consumption rose, a change in the flow direction of the pipeline was considered to supply Egypt with Israeli gas.<sup>2</sup> In the course of its own gas shortages Egypt had to redirect European export volumes for national supply and liquefaction trains remained unused. The latter could be reused for imports from Israel and thus export Israeli gas to Europe. Partners of the Tamar field agreed to supply the LNG plant in Damietta, Egypt with 4.4 bcm of gas over fifteen years, and the Egyptian Idku LNG plant will be provided with gas from the Leviathan field amounting to 6.9 bcm per year. However, imports would become redundant when production at the new Zohr field begins.

Furthermore, an LNG terminal near the Cyprian Vasilikos has been discussed, operating from 2020. In 2012, the Cyprian government approved this plan, which is estimated to cost 9 billion Euro. However, the project stands not isolated from the field development in Israel and Egypt, and the pipeline development to neighbouring countries like Turkey and Greece. Therefore, it remains to be seen which agreements will be made and what infrastructural facilities fit best into the whole picture.<sup>3</sup>

The option of an onshore LNG terminal, Floating LNG (FLNG) or compressed natural gas (CNG) in Israel has also been considered, but the government questions the viability of these projects.<sup>4</sup> Even if an agreement is signed, operation is unlikely to begin before 2020.<sup>5</sup>

### 2.3.1.5 Others

As mentioned above, Germany's gas production declined steadily in recent years. According to the German network development plan domestic production will reach a level of 5 bcm in 2025.<sup>6</sup> However, the country still possesses resources of recoverable shale gas. According to a recent estimate by geologists at the Federal Institute for Geosciences and Natural Resources (BGR), shale gas resources can be estimated at 0.3 tcm to 2.0 tcm. In April 2015, the German government approved a draft law for the commercial exploitation of shale gas and oil in exceptional cases before 2019, but only after a successful test drilling.<sup>7</sup> However, due to strong public opposition and low gas prices, there is little scope for shale gas in Germany from the

---

<sup>1</sup> Natural Gas Europe (2015b)

<sup>2</sup> Knecht (2015)

<sup>3</sup> Natural Gas Europe (2016f)

<sup>4</sup> Zemach (2015)

<sup>5</sup> IEA (2015b)

<sup>6</sup> FNB Gas (2015)

<sup>7</sup> IEA (2014)

current perspective. As test drilling has not been carried out up to now, final evaluation of the economic potential lacks.

According to an IEA study France shows a high potential for shale gas production within the EU, with approximately 3.8 tcm of resources. However, the French government decided to prohibit hydraulic fracturing for shale gas in 2011 mainly due to environmental concerns.<sup>1</sup>

Poland has originally been subject to high expectations for commercial shale gas production. But decreasing oil prices and unfavourable geology have caused a plummet in private investors in 2014 and early 2015. The remaining shale gas activities are now run by the state-owned gas company PGNiG, but the company closed seven of its eleven concessions, continuing with only four licences in northern Poland. On the whole, shale gas production is not expected to start any time soon, if at all.<sup>2</sup>

A similar picture can be found in Romania where 1.4 tcm of technically recoverable shale gas is suspected. The US company Chevron withdrew investments after finalising exploratory drilling in 2014 in the Bârlad perimeter (East Romania), as well as in the Dobrogea region. The same holds for Lithuania where the firm dropped out in 2014.<sup>3</sup> Romania also possesses conventional gas with proven reserves, accounting for 93.3 bcm at the beginning of 2015. Romanian production steadily declined in the last decades from peak production of roughly 40 bcm in the 1980s.<sup>4</sup> In 2014 production amounted to 11.4 bcm. Therefore, the country is able to satisfy its own gas demand almost entirely by domestic production.<sup>5</sup> However, looking at production rates and remaining reserves it becomes clear that this situation cannot be maintained permanently, making the country try to search for new fields. In late 2015, gas was discovered 170 km offshore in the Black Sea.<sup>6</sup> First estimates resulted in gas reserves of roughly 30 bcm. Drilling activities are on-going with the intent of confirming the data.<sup>7</sup>

### 2.3.2 Non-European Pipeline Gas

In this chapter a detailed overview will be given of potential options for future gas supply in non-EU countries. Therefore, a closer look is taken at different countries concerning development of new fields and establishment of pipeline infrastructure. Moreover, it is evaluated what potential exists for successful realisation of projects.

#### 2.3.2.1 Russia

Currently, Russia is producing large amounts of its gas in East and West Siberia, Yamalo-Nenets, Khanti-Mansiisk and Sakhalin. At the same time, Gazprom is increasingly investing in new fields, such as at the Yamal Peninsula, Eastern Siberia, and Sakhalin. Some of the most promising fields in Western Siberia include Yamburg, Urengoy, and Medvezhye, which are all owned by

---

<sup>1</sup> Shale Gas Europe (2014)

<sup>2</sup> Neslen (2015)

<sup>3</sup> Mihalache (2015)

<sup>4</sup> EIA (2015a)

<sup>5</sup> Bernovici (2015)

<sup>6</sup> Oil & Gas Journal (2014a)

<sup>7</sup> Metea (2015)

Gazprom.<sup>1</sup> The Yamal peninsula region contains the Bovanenkovskoye field with total reserves of 140 bcm, the Kharasaveiskoye field containing 50 bcm and the Kruzenshternskoye field with a further 33 bcm of natural gas. In the Arctic shelf, there are capacities of 71 bcm which could potentially be increased to 95 bcm. An overview of all promising gas production fields are listed in Table 1. The most important fields for Europe are the Yamal peninsula and fields in Western Siberia, while fields in Sakhalin and Irkutsk are more relevant for the Asian market.

Summing up, it can be seen that Russia has the potential production capacities to supply greater volumes of gas to Europe in the future. The question will be in how far these fields will be explored when taking issues such as future European gas demand into account as well as potential competition of LNG and Russian gas.

**TABLE 1: FIELD DEVELOPMENT RUSSIA**  
**SOURCE: FACTBOOK GAZPROM IN FIGURES 2010-2014**

Name	Projected capacity	First production	Projected capacity reached
<b>Nadym-Pur-Taz region (Western Siberia)</b>			
Pestsovoe field	2,1 bcm	2018-2019	2021-2022
Nydinskiy area of the Medvezhye field	2,7 bcm	2011	2015-2016
Urengoyevskoye field (Block 1-5)	36 bcm	2017-2019	2021-2024
<b>Yamal Peninsula and adjacent waters</b>			
Bovanenkovskoye field	25 bcm plus 115 bcm	2022-2024	2024-2025
Kharasaveiskoye field	50 bcm	2024-2025	2025-2027
Kruzenshternskoye field	33 bcm	2025-2026	2027-2028
<b>The arctic shelf</b>			
Shtokmanovskoye field	71 bcm (potentially increased to 95 bcm)	2025	-
<b>Obskaya and Tazovskaya Bays</b>			
Severo-Kamennomysskoye field	14.5 bcm	2023-2025	2028-2029
Kamennomysskoye-sea	15.1 bcm	2021-2023	2023-2025

In summer 2015 Gazprom and five western European gas companies, forming the New European Pipeline AG, decided on the extension of the Nord Stream pipeline. The **Nord Stream 2**

<sup>1</sup> EIA (2015a)

expansion is planned to have a capacity of a further 55 bcm provided by two strings. Besides Gazprom keeping a 50 percent ownership, Uniper (former E.ON), Shell, Wintershall (BASF Group), OMV, and ENGIE (former GDF Suez) may hold a share of 10 percent each.<sup>1</sup> Despite technically and legally less challenging the costs for the extension are estimated at 9.9 billion Euro, 35 percent higher than the costs of Nord Stream 1.<sup>2</sup> This amount will be entirely financed by the private investors, without funding from the EU's 'Project of Common Interest' budget, or subsidies from the German government.<sup>3</sup> Since disclosure of the project plans heavy opposition has arisen, especially by eastern European countries. The investors justify Nord Stream 2 with a rising gas import demand in Europe due to decreasing gas production in the UK and the Netherlands, as well as the replacement of coal in favour of gas for climate mitigation efforts.<sup>4</sup> Nevertheless, Nord Stream 2 is also an important strategic option for Russia in order to become more independent from its transit countries and save transit costs. This is especially true for Ukraine. When transporting gas via Ukraine to the Slovakian border entry-exit costs currently amount to 45 USD/kcm (ca. 41 Euro/kcm) of natural gas. Entry- exit via other countries ranges between 35.5 USD and 38 USD.<sup>5</sup> Assuming a transport volume of 62.9 bcm transiting Ukraine in 2015 results in total transit expenditures of approximately 2.62 billion USD, a major part of which could be saved with Nord Stream 2.

For the purpose of bypassing Ukraine Russia had planned the **South Stream** project with a capacity of 63 bcm per year.<sup>6</sup> It was intended to cross the Turkish territory of the Black Sea, land in Bulgaria and head via Serbia and Hungary to Central Europe. Nevertheless, the project was cancelled in the summer of 2014. According to Russia's official statement this was due to the EU legislation barriers relating to the Third Energy Package. Yet, observers believe several economic aspects such as insufficient investors, the increase of project costs by 40 percent, the falling of the oil price by 37 percent and the collapse of profits by 23 percent due to Ukraine sanctions have majorly influenced the decision.<sup>7</sup>

Quickly after the failure of the South Stream project Russia and Turkey agreed on a pipeline project from Russia to Turkey, named **Turkish Stream** (or Turk Stream). The project in its initial setting comprises four strings of 16 bcm each following a 910 km offshore route through the Black Sea and a 180 km long Turkish inland section.<sup>8</sup> Due to the large offshore part of the pipeline its total costs are estimated quite high with 11.4 billion Euro whereof 4.3 billion Euro already refer to the first string.<sup>9</sup> As former investors of the South Stream do not support the Turk Stream project, Gazprom has to finance the offshore part on its own. The first string is planned to provide Turkey with Russian gas completely independent of Ukraine, the second to supply Southeast Europe and Greece. Pipe orders for the first two strings have taken place, some parts have been delivered already and laying ships have started operating. However, difficulties with approval from the Turkish parliament have decelerated the project. After the

---

<sup>1</sup> Nord Stream 2 (2015)

<sup>2</sup> Strachota (2015)

<sup>3</sup> Leifheit, Powell (2016)

<sup>4</sup> Strachota (2015)

<sup>5</sup> Interfax (2015)

<sup>6</sup> Winrow (2013)

<sup>7</sup> Steiner (2014)

<sup>8</sup> IEA (2015b)

<sup>9</sup> Reuters (2015)

downing of a Russian warplane on Turkish territory in November 2015 the project was put on hold. Following a meeting between the two countries' presidents in August 2016, Ankara and Moscow are on path to reviving their partnership including on the Turk Stream project. However, the two sides are yet to agree on the exact timeline and capacity of the proposed pipeline. Initial discussions appear to focus on building only one or two strings of the pipeline.

Investments into new transport routes to Europe depend to a certain degree on Gazprom's activities towards China, as financial resources are limited and some projects compete for the same fields. Therefore, the two main prospected pipelines to Asia are briefly discussed in the following.

Since June 2014 the first pipeline to China, named **Power of Siberia**, is under construction. It will have a length of at least 2170 km, a capacity of 38 bcm per year and start its operation in 2019/20. Additional capacity extension up to 60 bcm and an elongation of up to 6000 km is possible.<sup>1</sup> Due to the substantial scope of this project, huge costs of 24.3 billion Euro are estimated.<sup>2</sup> However, in December 2015 Gazprom cancelled a 2 billion Euro tender including nearly half of the construction works of the project, presumably due to financial problems.<sup>3</sup> This is why certainty about the future of the project has been shaken.

Besides aforementioned project, Russia agreed on a second pipeline to China in 2014. The **Altai pipeline** is planned to transport an amount of 30 bcm per year from Western Siberia to the northwest of China. The existing gas sources are able to provide 30 bcm of additional gas on relatively low costs and 80 percent of the pipeline would be parallel to existing infrastructure. Therefore, the costs for Russia would be very limited. Only the residual section would have to cross an area of mountains which may generate high construction costs. Overall the project is very appealing for Gazprom.

Nevertheless, on the Chinese side there exist a couple of barriers. Firstly, the Chinese consumption centres lay 4000 km away from the Russian border and has insufficient domestic infrastructure in place. The existing West-East pipeline with a capacity of 77 bcm already operates at its maximum, transporting gas from domestic production and Central Asian supplies. Russian border prices would have to be very competitive in order to allow for additional transportation costs and investment decisions.<sup>4</sup> As the fields planned to feed the Altai Pipeline are also used for pipelines to Europe the realisation of the project could have an impact on Europe's imports.

### 2.3.2.2 Azerbaijan

Russia's Southern neighbour Azerbaijan represents a major gas producer. Located on the west coast of the Caspian Sea the country owns proven reserves of 990 bcm. In 2015, its yearly production reached an amount of 29.1 bcm for three quarters stemming from the **Azeri- Chirag-**

---

<sup>1</sup> IEA (2015b)

<sup>2</sup> Henderson, Mitrova (2015)

<sup>3</sup> Natural Gas Europe (2016a)

<sup>4</sup> IEA (2015b)

**Guneshli block** and from the huge **Shah Deniz (SD)**.<sup>1</sup> The former is an offshore oil field momentarily producing 12.3 bcm of associated gas, which is predominantly used for re-injection. As the oil business is important for Azerbaijan, high gas injection rates will be maintained in the future to secure revenues from oil production.<sup>2</sup> It is even discussed that imports from Russia will be required in the short term as high injection rates use gas needed for industrial and household consumption.

Production at the SD stage 1 started in 2006 with a current amount of nearly 10 bcm per year, of which 67 percent are contracted to Turkey, 8 percent are exported to Georgia and 25 percent stay in the country for domestic consumption.<sup>3</sup> The plateau level production of roughly 10 bcm is planned to be continued.<sup>4</sup> The field development for SD stage 1 generated costs of 7.6 billion Euro.<sup>5</sup>

The second stage encompasses challenging drilling of 26 wells at 6000 metres depth, with nine already finished.<sup>6</sup> SD stage 2 is envisaged to start production in 2017 and will be prepared for export to Georgia and Turkey in 2018 and to Europe by 2020.<sup>7</sup> Its plateau production will amount to 16 bcm: 6 bcm will be meant for the Turkish market and 10 bcm for Europe.<sup>8</sup>

Dependent on the success of the gas exports SD phase 3 could be developed in the early 2030s, with reserves of 1.2 tcm and an annual plateau level of more than 10 bcm.<sup>9</sup>

Moreover, production from the Umid-Babek block operating since 2012 could be increased.<sup>10</sup> Since Azerbaijan stated ambitious plans to develop a petrochemical industry the development of the Absheron field could also be necessary, but production is expected to start 2025 at the earliest.<sup>11</sup> BP plays a major role in all of the projects, as it is the only Western company active in Azerbaijan.<sup>12</sup>

---

<sup>1</sup> EIA (2015a)

<sup>2</sup> Shaban (2016)

<sup>3</sup> Roberts (2016)

<sup>4</sup> Shaban (2016)

<sup>5</sup> Rzayeva (2015)

<sup>6</sup> Shaban (2016)

<sup>7</sup> EIA (2015a)

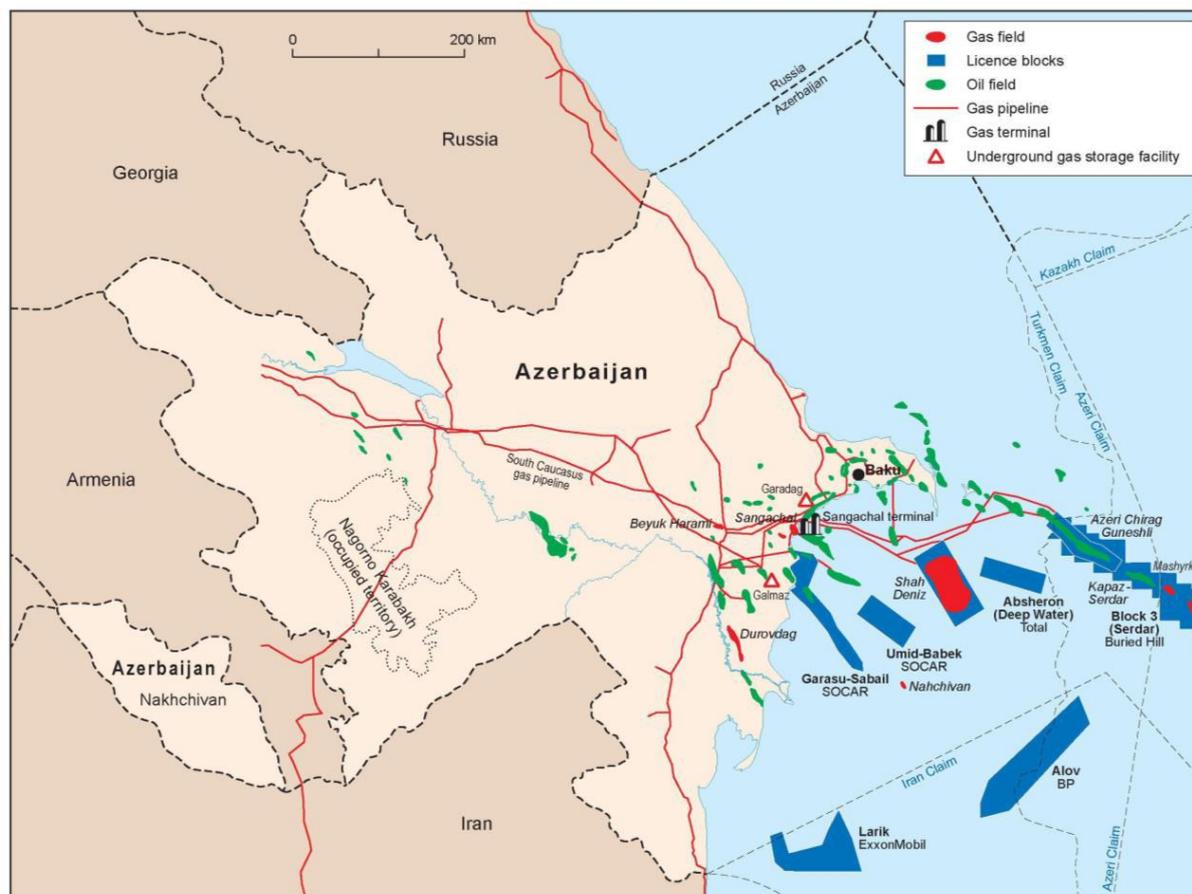
<sup>8</sup> BP (2016)

<sup>9</sup> Rzayeva (2015)

<sup>10</sup> IEA (2014)

<sup>11</sup> Roberts (2016)

<sup>12</sup> Shaban (2016)



**FIGURE 14: LOCATION OF AZERBAIJAN'S OFFSHORE GAS AND OIL FIELDS**  
 SOURCE: RZAYEVA (2015)

Based on the consequences of the Ukraine Crisis in 2006 the Commission decided to improve both the security of supply and the level of diversity between supply sources. One part of this strategy was the development of a fourth gas supply route for Europe called the **Southern Gas Corridor (SGC)**.<sup>1</sup> Its aim is to bring natural gas from the Caspian region and the Middle East to Europe. The project's total investment (field development and pipeline infrastructure) amounts to 40 Billion Euro and includes roughly 3500 km of transport infrastructure running through seven countries.<sup>2</sup> The Azeri company SOCAR plays an important role in all parts of the project.<sup>3</sup> The SGC encompasses three separate projects, which will be explained explicitly in the following. Since 2007 the **South Caucasus Pipeline (SCP)** connects Azerbaijan with Georgia and the Turkish city Erzurum. The pipeline amounts to a length of 692 km and is currently operating with a capacity of 8 bcm. A second parallel line with another 9 bcm to 11 bcm is scheduled for 2019.<sup>4</sup> As published by BP the extension of SCP and the development of the second stage of Shah Deniz will constitute total costs of 25 billion Euro.<sup>5</sup>

<sup>1</sup> Hafner (2015)

<sup>2</sup> Trans- Adriatic Pipeline (2015)

<sup>3</sup> IEA (2014)

<sup>4</sup> Rzayeva (2015)

<sup>5</sup> Rzayeva (2015)

At the Georgian-Turkish border the SCP is linked to the **Trans-Anatolian-Pipeline (TANAP)**, crossing Turkey with a length of 1804 km. By 2019 an initial annual capacity of around 17 bcm is planned, 10.9 bcm of which is meant for European consumption. A capacity of 24 bcm is scheduled for 2023 and maximum capacity of 31 bcm will assumedly be reached in 2026.<sup>1</sup> A consortium of two state-owned Turkish companies BOTAS and TPAO - with a 15 percent and 5 percent share respectively - and the Azeri SOCAR holding the major share of 80 percent conducts the realisation of this project.<sup>2</sup> The European Investment Bank (EIB) finances construction with 1 billion Euro.<sup>3</sup> On 17 March 2015 was the official construction start of the project.<sup>4</sup> Meanwhile, the first part of extensive construction works has been finished in the province of Yozgat.<sup>5</sup> During drilling near Ankara, works had to be suspended in February 2016 due to findings of former Roman buildings.<sup>6</sup> The initial cost estimate of 6.7 billion Euros had to be increased to 10.8 billion Euros, which scaled up the investment risk of the involved parties.<sup>7</sup> Finally the **Trans-Adriatic pipeline (TAP)** will be connected to TANAP and deliver Azeri gas to the Greek, Albanian and Italian markets. TAP is planned in two stages, firstly providing 10 bcm by 2019 and secondly may be expanded to 20 bcm in 2022.<sup>8</sup> Construction works for TAP started in March 2016.<sup>9</sup> The pipeline is to be enlarged by an interconnector from Greece to Bulgaria and a pipeline to the Balkans named Ionic pipeline.<sup>10</sup>

The pipeline projects TANAP and TAP will require investments of about 18 billion Euro.<sup>11</sup>

In order to ship Caspian gas further into Europe, connecting pipelines to the SGC need to be built-up. Different approaches are under discussion mainly aiming to link South Eastern with Eastern and Central Europe.

Firstly, the Eastring is meant to connect the existing infrastructure between Bulgaria, Romania and Slovakia. It has been planned with a bi-directional capacity of 20 bcm and an initial length of 832 km that could be extended to 1015 km in order to be linked to prospective Romanian Black Sea gas fields. Costs are estimated at 1.8 billion Euro (2.2 billion Euro in extended version). The project has been proposed by the Slovak TSO Eustream and is in an early negotiation stage.<sup>12</sup>

Another concept is the BRUA corridor (Bulgaria-Romania-Hungary-Austria), which would amount to a length of 550 km and could also be extended to the Black Sea by another 300 km pipeline section. It is planned as a set of reverse-flow interconnectors with a capacity of 1.5 bcm/a built towards Bulgaria and 4.4 bcm/a to Hungary. The project is targeted to be built by 2019, is entitled for funding from the EU and is estimated at costs of 560 million Euro.<sup>13</sup> The plan for the BRUA corridor was submitted by the Romanian TSO.<sup>14</sup>

---

<sup>1</sup> Rzayeva (2015)

<sup>2</sup> IEA (2014)

<sup>3</sup> Tsurkov (2016)

<sup>4</sup> Gotev (2015)

<sup>5</sup> Azertag (2016)

<sup>6</sup> News.az (2016)

<sup>7</sup> IEA (2014)

<sup>8</sup> Rzayeva (2015)

<sup>9</sup> Natural Gas Europe (2016b)

<sup>10</sup> IEA (2014)

<sup>11</sup> Rzayeva (2015)

<sup>12</sup> Leifheit (2015)

<sup>13</sup> No financial investment decision (FID) status yet

<sup>14</sup> Radut (2016)

The same route has also been considered for the Nabucco West, proposed in 2012, as a shorter alternative to the Nabucco pipeline which was shelved after the final decision for the TANAP pipeline was published in 2013. The capacity of the pipeline has initially been planned for 10 bcm with an extension to 16 bcm in a later stadium.<sup>1</sup>

Finally, the 27 bcm TESLA pipeline has been proposed as a link between Greece, Macedonia, Serbia, Hungary, and the Austrian Baumgarten Hub.<sup>2</sup> The length of this pipeline amounts to 1300 km to 1400 km and costs are estimated at 4 billion Euro to 5 billion Euro. This project (non-FID yet) is meant to be finished by 2019.<sup>3</sup>



FIGURE 15: THE DIFFERENT SECTIONS OF THE SGC  
SOURCE: TANAP (2015)

### 2.3.2.3 Turkmenistan

Located opposite to Azerbaijan on the east site of the Caspian Sea, Turkmenistan possesses natural gas reserves of 7.5 tcm and owns the second largest gas field in the world.<sup>4</sup> The **Galkynysh field** contains 371 bcm of natural gas.<sup>5</sup> It started its commercial production in 2013 and will be developed in two phases, each generating a capacity of 28 bcm per year.<sup>6</sup> The first phase is expected to produce at plateau level by 2019; the second stage will be commissioned in 2018.<sup>7</sup> China is technically and financially involved in the development of this field in order to underpin a strategic partnership.<sup>8</sup>

<sup>1</sup> Kuszniir (2013)  
<sup>2</sup> Badalova (2015)  
<sup>3</sup> Sputnik (2015)  
<sup>4</sup> EIA (2015a)  
<sup>5</sup> Mammadov (2015)  
<sup>6</sup> EIA (2015a)  
<sup>7</sup> IEA (2014)  
<sup>8</sup> IEA (2015b)

Moreover, ten other fields with reserves of over 100 bcm each show great potential for development. Promising projects are the Amu Darya basin with 195 bcm in the southeast, the Murgab Basin in the south, and the South Caspian basin in the west of Turkmenistan.<sup>1</sup> If all projected projects will be realised Turkmen production could reach 100 bcm in 2020.<sup>2</sup> In 2014 the country already exported 42 bcm of gas, with the biggest share going to China.<sup>3</sup>

Until 2011 Turkmen gas was mainly imported by Russia through the **Central Asia-Center Pipeline (CAC)** and the **Bukhara- Urals Pipeline (BUP)**, but exports have declined since then.<sup>4</sup> Although the capacity of the pipelines is high, poor maintenance only allows low operational capacity. During previous years the relationship was characterised by on-going discussions about gas prices. Since 2010 there exists a connection to Iran through the **Korpezhe-Kurt Kui pipeline (KKKP)** and the **Dauletabad-Khangiran Pipeline (DTP)** with a capacity of 12 bcm. The exports go to the Northern part of Iran where most of the Iranian consumption is located.

Currently, the country focuses on eastwards export via the recently built **Central Asia-China Gas Pipeline (CACP)**, which possesses four parallel running lines that cross Uzbekistan and Kazakhstan.<sup>5</sup> With three lines operating from 2016 on, CACP is able to transport 55 bcm. Further expansion will take place until 2020 reaching a total capacity of 85 bcm.<sup>6</sup> Moreover a pipeline via Afghanistan and Pakistan to India with 33 bcm transport capacity is planned.<sup>7</sup> The project costs are estimated at 6.9 billion Euro, encompassing a length of 1735 km.<sup>8</sup> The official start of construction was envisaged for 2015, but various political and territorial obstacles delay and hinder the realisation.<sup>9</sup>

The 300 km long **Trans Caspian Pipeline (TCP)** with a capacity of 30 bcm would be relevant for Europe. It is planned as a subsea pipeline through the Caspian Sea from eastern Turkmenistan to Azerbaijan where it could be connected to the SCP. Even Kazakhstan has indicated an interest to use the TCP in order to connect its Tengiz field to it. The construction costs are estimated at 4.5 billion Euro. As the Caspian Sea is quite deep and construction challenging, costs are likely to exceed the initial amount. Due to various political disputes a final decision on the project lacks up to now. Nevertheless, the Turkmen government has already started with the construction of a national pipeline from the production site to the east coast of the Caspian Sea, called the East-West pipeline.<sup>10</sup>

However, it is questionable if Turkmen prices could be competitive in the European gas market.<sup>11</sup> Moreover, as there is still no decision on the legal status of the Caspian Sea and all littoral states (Azerbaijan, Kazakhstan, Russia, Iran and Turkmenistan) would have to agree on the project, it remains unlikely. As the pipeline represents competition to Russian export strategy it is not willing to support the project.<sup>12</sup> Therefore, the MTGMR 2014 evaluates that the

---

<sup>1</sup> EIA (2015a); Mammadov (2015)

<sup>2</sup> IEA (2014)

<sup>3</sup> EIA (2015a)

<sup>4</sup> EIA (2015a)

<sup>5</sup> Mammadov (2015)

<sup>6</sup> IEA (2015b)

<sup>7</sup> Mammadov (2015)

<sup>8</sup> IEA (2014)

<sup>9</sup> IEA (2015b)

<sup>10</sup> Mammadov (2015)

<sup>11</sup> IEA (2015b)

<sup>12</sup> Carbonnel (2011)

“political, commercial and economic obstacles to tapping Turkmen gas have been increasingly seen as surpassing the benefits of additional gas in a depressed market”.<sup>1</sup>

#### 2.3.2.4 Iran

Iran borders the south of Turkmenistan. Northern Iran is located at the Caspian Sea, and in the South it is surrounded by the Persian Gulf. Iran has the world’s largest gas reserves (since 2015) with an amount of 34 tcm.<sup>2</sup> This amount would be sufficient to satisfy the worldwide gas demand for 10 years.<sup>3</sup> There exist offshore fields in the Persian Gulf and the Caspian Sea (capacity of 57 bcm), as well as several mostly undeveloped onshore fields.<sup>4</sup> The largest field is the South Pars located in the middle of the Persian Gulf contains 40 percent of all Iranian reserves. This field has been developed in 24 stages where the first ten stages serve domestic demand only.<sup>5</sup> Current production from South Pars is at around 0.42 bcm per day and continuously increases due to on-going development of new phases. After completion of all stages the production capacity will amount to 190 bcm.<sup>6</sup> Initially, complete development was scheduled for 2019 but progress has been slower than expected. Especially, Phase 12 was delayed by several years and cost estimates were substantially exceeded assumedly arising from the aggravated situation under sanctions,<sup>7</sup> and development of the remaining phases needs investment of around 18 billion Euro.<sup>8</sup> It is estimated that the total cost for South Pars will exceed 90 billion Euros excluding downstream facilities.<sup>9</sup>

Other major gas fields of the country are Kish, Golshan and North Pars.<sup>10</sup> The latter contains 1.3 tcm of gas and is to be developed in four phases by the Chinese CNOOC. The Kish field possesses 1.3 tcm with a three-stage development plan of 10 bcm/a each.<sup>11</sup>

Although Iran’s natural gas production ranks third in the world, most of the consumption stays in the domestic market with an ample amount of gas even burned off, cumulating to 17 bcm in 2013.<sup>12</sup> This can be explained by lacking infrastructure. In fact, Iran even imports gas from Turkmenistan at the moment, because of insufficient infrastructure to satisfy the large gas demand in the Northern part of the country with the existing pipelines coming from Southern fields.<sup>13</sup> Foreign investment in pipelines and other funding of technology has been limited until recently, due to international sanctions.<sup>14</sup>

---

<sup>1</sup> IEA (2014)

<sup>2</sup> EIA (2015a)

<sup>3</sup> IEA (2014)

<sup>4</sup> EIA (2015a)

<sup>5</sup> EIA (2015a)

<sup>6</sup> Natural Gas Europe (2016c)

<sup>7</sup> IEA (2015b)

<sup>8</sup> Natural Gas Europe (2016c)

<sup>9</sup> EIA (2015a)

<sup>10</sup> EIA (2015a)

<sup>11</sup> IEA (2014)

<sup>12</sup> EIA (2015a)

<sup>13</sup> IEA (2014)

<sup>14</sup> EIA (2015a)

Moreover, due to growing maturity of Iranian oil fields twelve percent of the produced gas is used for reinjection in order to ensure preservation of oil production.<sup>1</sup> As margins on oil export are still more competitive than gas, Iran's priority is maintaining its oil production at the level before the sanctions.



FIGURE 16: IRAN'S GAS AND OIL FIELDS

SOURCE: TAVANA ENERGY (N.D.)

As sanctions ended at the beginning of 2016, Iran is opening up for foreign investments. Up to now only a pipeline to Turkey exists.<sup>2</sup> Several pipeline projects to neighbouring countries have been considered, with connections to Iraq and Oman being most likely. In order to export to Oman a 260 km long pipeline would need to be built starting at Iran's Hormuzgan Province and going to the Sohar port of Oman. In 2014, the countries agreed on a yearly export amount of 10 bcm of which one third is planned to be exported as LNG at the under-utilised Omani LNG plant. Moreover, a 270 km pipeline to Baghdad is under construction delivering 9 bcm of natural gas to Iraq. Nevertheless, security problems have delayed the construction. Other potential export countries are the United Arab Emirates, Syria and Kuwait. Different factors hinder implementation ranging from price disputes to an unsecure political situation. A pipeline from Iran to Pakistan is already completed to the Pakistani border, but Pakistan lacks capital to build its section of the pipeline. Another project could be the IGAT-9, a 35 bcm pipeline connecting the huge South Pars with European markets via transit through Turkey. IGAT stands for Iranian Gas Trunkline and is the name of the existing domestic pipeline system that has been established

<sup>1</sup> Mohamedi (2015)

<sup>2</sup> Mohamedi (2015)

to supply national customers with gas from South Pars.<sup>1</sup> Therefore an extension of the existing pipeline system could be less costly than entirely new projects, but as the political bond between the two countries appear not too good and gas lacks in the northern domestic market the chances for realisation of this project seem low.

Iran, furthermore, envisages a greater cooperation with the South Caucasus region. The South Caucasus is highly attractive due to existing transit possibilities to Western Europe via Azerbaijan and Georgia, and a potential route through Armenia and Georgia. First talks have been held to extend the existing gas pipeline between Iran and Armenia. However, involvement in the South Caucasus region reinforces the geopolitical rivalry with Russia. As Russia is not willing to lose its dominant position it aims to participate in all major infrastructure projects and also blocks plans which it considers as disadvantageous. One example has been Iran's effort to negotiate gas supply to Georgia in January 2016, which was boycotted by Russia through hindering transport infrastructure in Armenia. As political tensions between Iran and Turkey make cooperation between these neighbour states unlikely Iran now focuses on Azerbaijan as a transit state.<sup>2</sup>

It remains to be seen if Iran can manage to outplay Russia or if the rivalry could even be overcome. Apart from their rivalling geopolitical interests both countries share reluctance towards Western-led projects. For instance, both opposed the Nabucco pipeline and do not support the TCP. Moreover, both fear a successful alliance between Azerbaijan, Georgia and Turkey.<sup>3</sup> As Russia still suffers economic sanctions from the EU, trading with Iran may be a promising opportunity. The sum of these factors presents a common ground that may lead to a rapprochement.

Iranian contractual framework alongside the previous sanctions also discouraged investors. The so called buy-back contracts with fixed remuneration, constant risk independent return rates, and short life times of five to eight years did not incentivise application of innovative technology and effort into complex projects. Moreover ownership retains at Iran.<sup>4</sup> In order to boost investments into the country Iran changed the legal framework introducing the Iranian Petroleum Contract (IPC), which is more flexible and is valid for 20 to 25 years.

Overall, successful negotiations on pipelines into Europe are, in the medium term, relatively unlikely. Iran was once considered a potential source for the Nabucco pipeline or TAP, but negotiations did not succeed.<sup>5</sup> In 2007 Iran started the construction of a LNG plant at the Persian Gulf near the Tombak Port, which was planned to be fed by South Pars 12. Due to the sanctions the project, called **Iran LNG**, was on hold after completion of two-thirds of the facility. Capacities amount to 10.5 million tons per year with project costs of approximately 3 billion Euro. Since lifting of the sanctions the National Iranian Gas Company (NIGEC) that holds 49 percent of the project tried to sell a 20 percent share to foreign investors. Even if financing of the remaining equipment succeeds the completion is not expected in this decade.<sup>6</sup> However,

---

<sup>1</sup> IEA (2014)

<sup>2</sup> Natural Gas Europe (2016d)

<sup>3</sup> Natural gas Europe (2016d)

<sup>4</sup> IEA (2014)

<sup>5</sup> IEA (2014)

<sup>6</sup> PressTV (2016)

the Persian Gulf is in direct competition with the existing LNG terminal in Qatar. As long transport routes to Asia and Europe add to the supply costs, and US and Australian LNG exports are growing, justification for and competitiveness of the Iranian LNG terminal is questionable.<sup>1</sup> Other projects such as Pars LNG plant and Qesh LNG are also improbable from the current perspective.<sup>2</sup>

#### 2.3.2.5 Iraq

A similar situation as in Iran can be found in its western neighbour country, Iraq. Iraqi natural gas reserves amount to 3.45 tcm, mostly located in the South of the country where huge oil fields exist and gas is associated. The largest fields are Rumaila, Basrah, West Qurna-1, Zubair, Siba, Akkas, and Al-Mansuriyah, although operations at the two latter fields have been disrupted due to the war with ISIS in the western part of the country.<sup>3</sup>

Three quarters of the mentioned gas reserves are a by-product to crude oil production. Currently 58 percent of the gas generated by this means is burned off, because transport infrastructure lacks. This results from political insecure circumstances discouraging investors from Western companies. Missing pipelines impede both domestic consumption and export.<sup>4</sup> Nevertheless, in 2012, Mitsubishi, Shell and the Iraqi South gas decided upon a 15 billion Euro program to reduce the flaring of gas through upgrading facilities and establishing new processing plants.<sup>5</sup> It was intended to increase gas production from 4 bcm to 20 bcm, but the development is substantially behind schedule.<sup>6</sup>

---

<sup>1</sup> Critchlow (2015)

<sup>2</sup> IEA (2014)

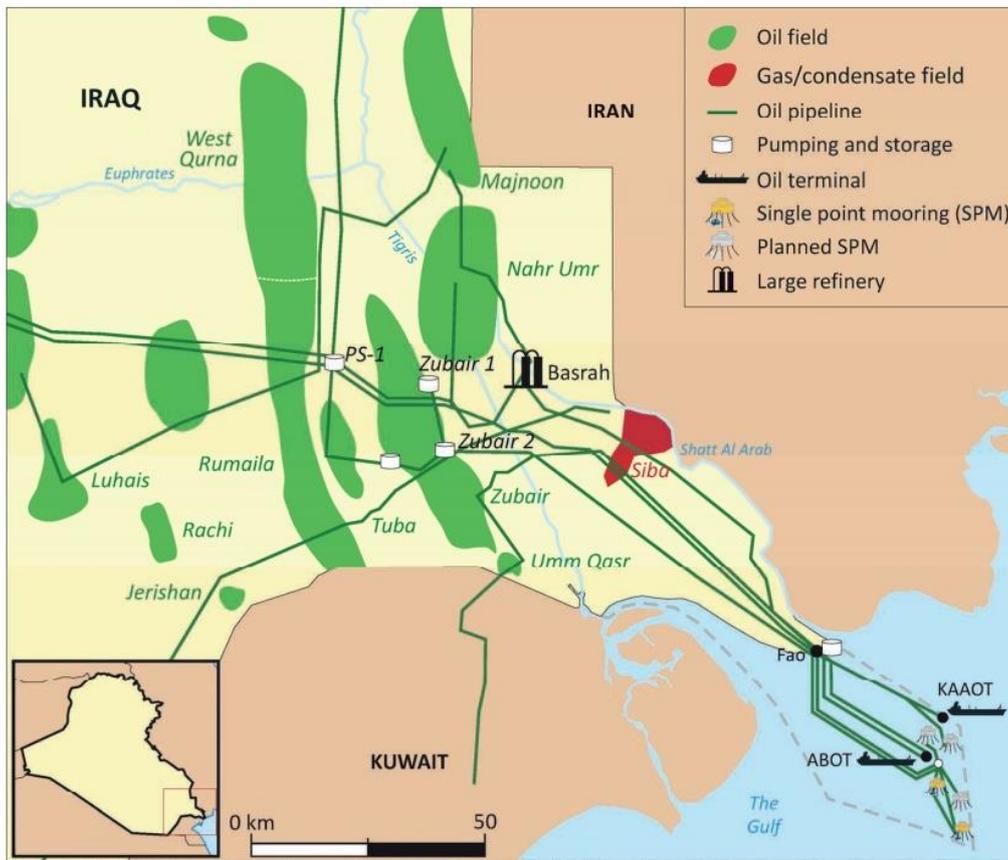
<sup>3</sup> EIA (2015a)

<sup>4</sup> EIA (2015a)

<sup>5</sup> 2bst Consulting (2014)

<sup>6</sup> IEA (2014)

The situation of the Iraqi gas sector suggests that priority is given to the oil business. Indeed, the Kurdistan Regional Government (KRG) is eager to export the gas reserves discovered in the Northern part of Iraq since 2003. The Miran and the Bina Bawi field contain recoverable resources between 220 bcm and 400 bcm and are to be developed by Genel Energy. Furthermore, exploration is on-going for the Chamchamal and Khor Mor fields. However, gas-processing facilities and negotiation of off-take agreements have to be established by the KRG. As the latter lacks financial resources visible by pending payments to oil companies in the Kurdish Region realisation seems implausible. Additionally the Kurdish region is in conflict with ISIS, which attaches risks for delay and decreases the attractiveness for foreign investors.<sup>1</sup>



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

**FIGURE 17: SOUTHERN IRAQ'S GAS AND OIL FIELDS**  
**SOURCE: WEO 2012**

<sup>1</sup> IEA (2015b)

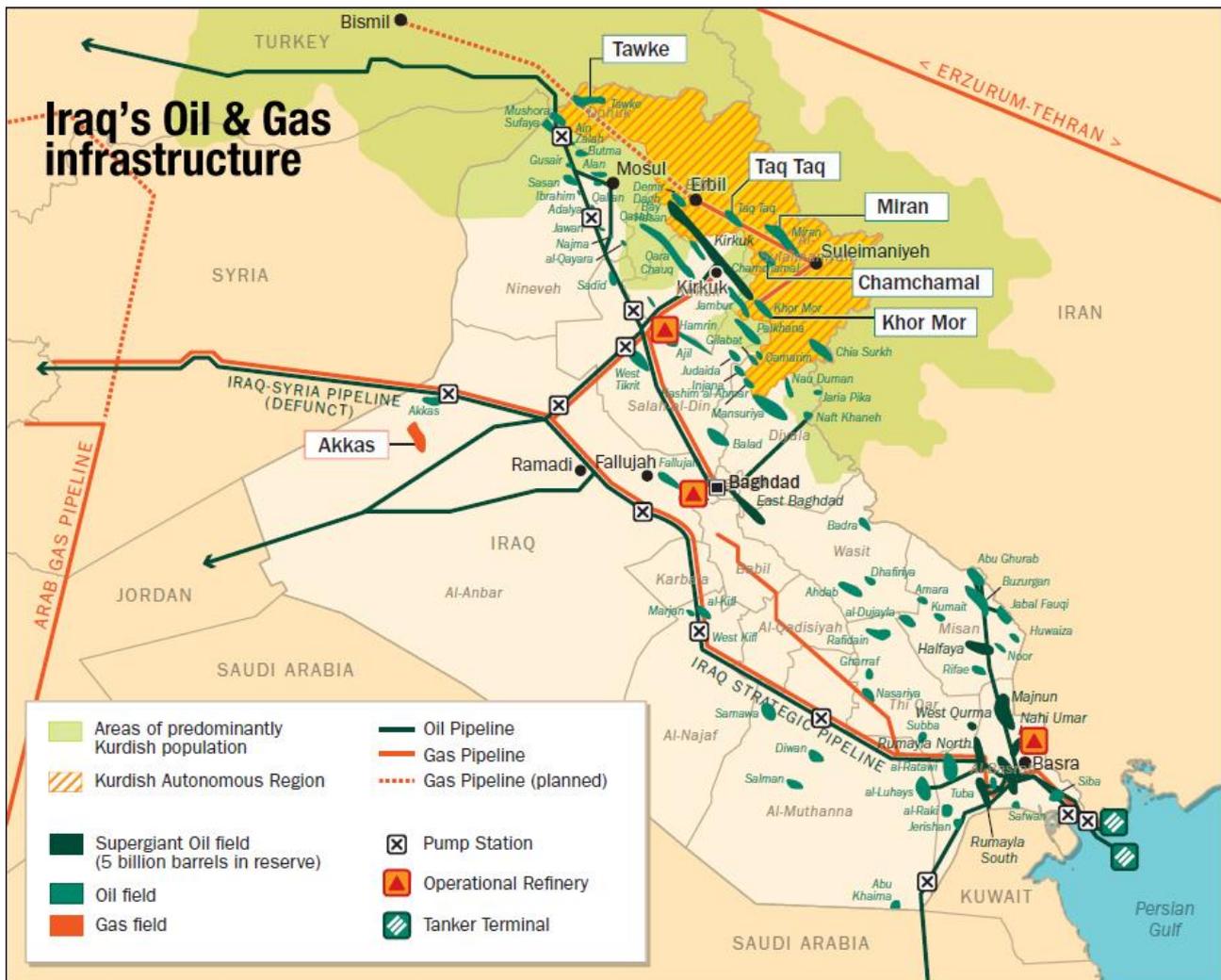


FIGURE 18: IRAQ'S GAS AND OIL FIELDS

SOURCE: PLATTS (2014)

In May 2013, the Iraqi government approved a joint venture with Mitsubishi, Shell and the Iraqi South gas forming the Basrah gas company.<sup>1</sup> It envisages a LNG project in Basrah, the south of the country. The planned capacity of the terminal accounts for 4.5 million tons per year and is scheduled for 2017.<sup>2</sup> Gas deliveries from the three fields Rumaila, Zubair and West Qurna have to be coordinated for this project, but the needed transport infrastructure is only partly in place. Besides missing economic incentives, the slow progress of the project questions the projected start date.<sup>3</sup>

The option of a transcontinental pipeline via Turkey to Europe has also been taken into consideration, but without any firm decisions.<sup>4</sup> Especially the Northern part of the country, where the primarily peaceful semi-autonomous Kurdistan region is located, forms an interesting

<sup>1</sup> IEA (2015b)  
<sup>2</sup> 2bst Consulting (2014)  
<sup>3</sup> IEA (2015b)  
<sup>4</sup> EIA (2015a)

starting point for a pipeline to Turkey. However, the KRG's ambitious plan to export 4 bcm of gas to Turkey by 2017 with an extension to 10 bcm in 2020 is not supported by the central government in Baghdad. Tensions prevail about revenue allocation and selling a monopoly of Iraq's State Oil Marketing Organisation.<sup>1</sup> Moreover, export plans are highly discussed because Iraq uses its gas as fuel for electricity generation, but currently often faces blackouts due to shortages of adequate gas.<sup>2</sup> Ultimately, the current war with ISIS disturbed the region to such an extent that a realisation of the project seems are doubtful.

### 2.3.2.6 North Africa

At present, Algeria is Europe's second largest gas supplier. Its proven reserves were stated to amount to 2.74 tcm late 2015 allowing for 33 further years of production at current levels.<sup>3</sup> In recent years gas production declined gradually as new projects failed to come to fruition on time and existing fields became mature. It is argued that infrastructural gaps, technical obstacles, slow governmental approvals and lacking interest of investors are main drivers of this development. As the In Amemas gas facility was attacked by militants in 2013 fear of investors rose, especially for projects in remote places. In order to compensate for the steady production loss ten projects are planned to come on stream between 2016 and 2019, including a total amount of 48.8 bcm of natural gas. One major project is the South West gas project, which will be developed in two phases and encompasses an amount of 17.5 bcm/a in total. The first phase including three projects will start operating in 2016 and 2017, and another three projects are planned to produce gas by 2018. These projects are necessary to fulfil existing export contracts and domestic demand.

Moreover, the EIA estimated Algeria's shale gas resources at 21.2 tcm, standing at third highest worldwide.<sup>4</sup> However, fracking activities seem unlikely in the medium term as major obstacles persist, for example lacking infrastructure and water availability, as well as insufficient transportation infrastructure to move materials during construction due to the remote locations of the reserves. However, Algerian Sonatrach has developed an ambitious plan including investments of 70 million USD in the next 20 years in order to be able to produce 30 bcm/a from 2020 onwards.<sup>5</sup>

On the whole it is expected that Algeria's production will further fall in the short term, but recover in the medium term. What this means for exports is highly driven by developments in domestic gas demand.<sup>2</sup>

Algeria's eastern neighbour Libya also holds substantial gas reserves, estimated at 1.59 tcm. In 2010, production accounted for 16.6 bcm, but dropped more than half during the civil war in 2011. Production volumes have recovered, but are still under pre-war level. Libya is engaged in two new projects: the Faregh field and the offshore Bouri field. Moreover, it aims to minimise

---

<sup>1</sup> IEA (2014)

<sup>2</sup> EIA (2015a)

<sup>3</sup> Algeria Press Service (2015)

<sup>4</sup> EIA (2015b)

<sup>5</sup> Aissaoui (2016)

flaring rates and make money out of the burned gas. However, needed investment can only be obtained if security can be guaranteed and a legal and political framework is in place.<sup>1</sup>

Algeria is currently twofold connected to Spain and maintains one pipeline to Italy. On top of the existing infrastructure a new transcontinental connection is planned. The Gadotro Algeria Sardegna Italy (**GALSI**) pipeline may transport 7.8 bcm of natural gas to Italy partly through the Mediterranean Sea. Concerns remain regarding logistical matters, cost and long-term commitments of customers. Another prospected pipeline is the Trans Sahara gas pipeline (**TSGP**) running from Nigeria via Niger to Algeria and might be linked to the Medgaz pipeline to Spain. As the Sahel region shows some security issues and Nigeria faces growing demand, investors are persistently sceptical about the commercial value of the project. Combined with several delays that occurred for both projects realisation seems uncertain. Besides pipeline connections, four LNG liquefaction units are in place. Therefore, Algeria is able to deliver 44 bcm of LNG to its customers.<sup>1</sup>

Neighbouring Libya exports gas via a subsea pipeline to Italy. The **Greenstream** has a capacity of 8 bcm. Until 2011 the country also possessed a LNG plant, but after severe damage during the civil war it was not repaired. Currently no plans exist to establish new pipelines, which would need a secure environment and political stability, both of which are fragile in Libya.<sup>1</sup>

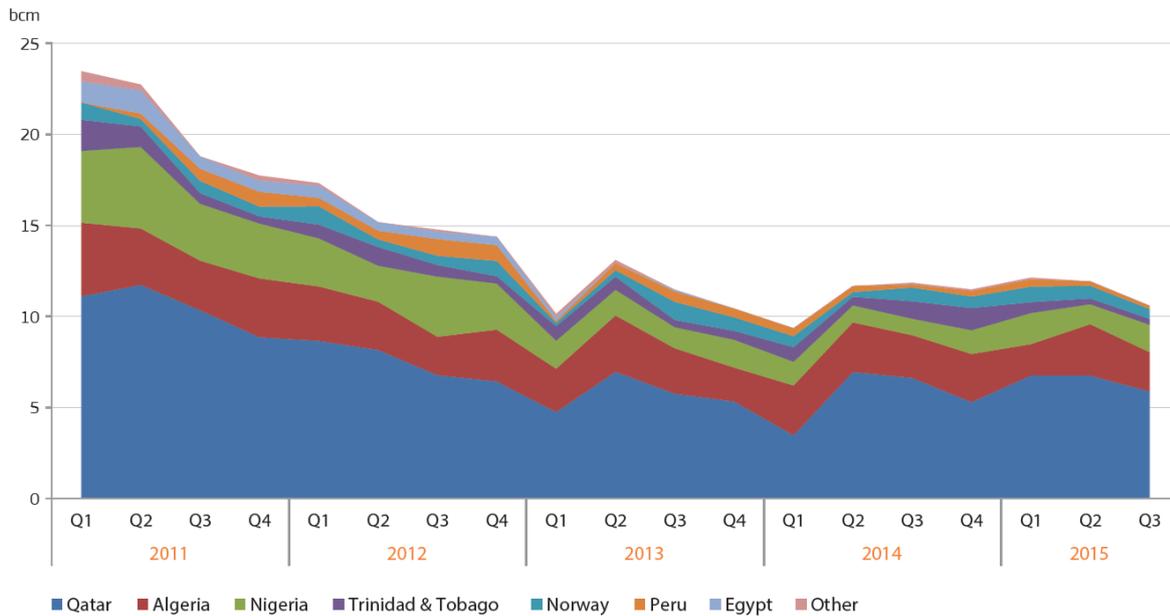
### 2.3.3 Liquefied Natural Gas (LNG)

Besides pipeline gas from Russia, Norway, Algeria, and Libya, EU energy imports are 13 percent LNG on average.<sup>2</sup> Qatar is the main supplier of LNG (50 percent) to the EU followed by Algeria and Nigeria (see Figure 19). Another important supplier is Norway, where the only liquefaction terminal in Europe is located, named Snøhvit LNG.

---

<sup>1</sup> EIA (2015a)

<sup>2</sup> European Commission (2015a)



**FIGURE 19: IMPORTS OF LNG BY SOURCE FROM 2011- 2015**  
 SOURCE: QUARTERLY REPORT ON EUROPEAN GAS MARKETS\_Q3\_2015

LNG can be shipped to 24 regasification terminals throughout Europe. The countries bordering the Mediterranean Sea have established numerous terminals. Portugal’s Sines LNG is able to regasify 7.9 bcm per year. Spain alone has seven LNG terminals with a capacity of nearly 70 bcm per year. Neighbouring France recently opened its fourth LNG terminal, called Dunkerque, which has regasification capacities of nearly 35 bcm that may also serve Belgium and subsequently Germany. There are three LNG terminals operating in Italy with a cumulated capacity of 15 bcm. Greece possesses one terminal with 5 bcm capacity. The geographical location of the UK makes it suitable for LNG and operates four LNG terminals with an overall import capacity of 52.3 bcm. More terminals in Western Europe are located in Rotterdam, Netherlands and Zeebrugge, Belgium, with import capacities of 12 bcm and 9 bcm per year respectively.

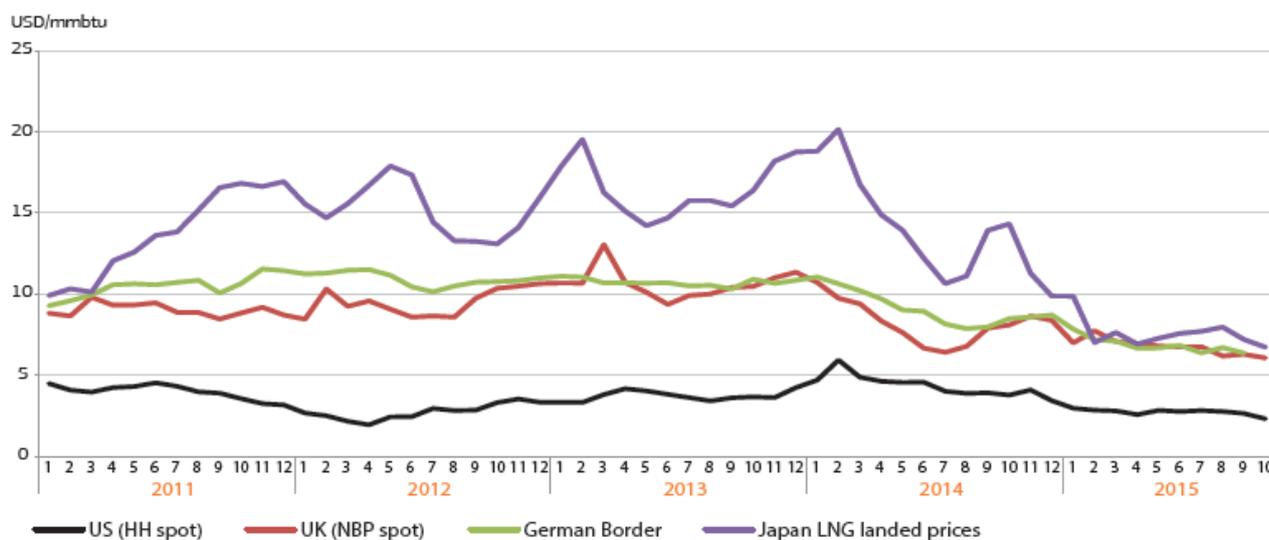
Two import terminals were built on the Baltic Sea coast recently. In 2015, the first Lithuanian LNG regasification terminal opened with a capacity of 4 bcm. The project diversifies Lithuania’s source of gas, as the country has previously been fully reliant on Russia. Additionally, the new Polish LNG Terminal in Świnoujście enables further LNG imports into the EU. It will be on stream in the summer of 2016 with a capacity of 4.9 bcm.<sup>1</sup>

Altogether, EU LNG terminals have a regasification capacity of 214 bcm, but on average only 20.4 percent were used in 2015.<sup>2</sup> Hence, LNG imports to Europe could increase substantially without requiring new regasification terminal capacity.

In recent years the level of gas prices varied significantly among different parts of the world. The shale gas revolution in the US flooded the US market with gas without any considerable export options in place. Therefore, Henry Hub prices fell dramatically and remained at a low

<sup>1</sup> Gas in focus (2015)  
<sup>2</sup> International Gas Union (2015)

level of approximately 3.5 USD/MMbtu. Oppositely, the fast growing economies in Asia showed a high demand for gas due to insufficient domestic production, which became even greater after the nuclear disaster at Fukushima, Japan in March 2011. In the course of this event prices in Asia rose to a level three to four times as high as in the US, which can be seen in Figure 20. European prices ranged between these two regions at a level roughly double the US price.<sup>1</sup>



**FIGURE 20: AVERAGE GAS PRICE PER REGION BETWEEN 2011 AND 2015**  
**SOURCE: QUARTERLY REPORT ON EUROPEAN GAS MARKETS Q3 2015**

Based on this situation several countries like the US, Australia and Russia decided to establish LNG export strategies. The giant price spread would allow for substantial gains even when subtracting liquefaction and transport costs. Therefore, it was expected that heavy investments in liquefaction, storage and shipping facilities could be amortised quickly.

However, in 2014 and 2015 international prices for LNG fell considerably, especially the premium of Asian LNG prices. Whereas price differences between Europe and Asia of more than 5 USD/MMbtu were common in 2012 and 2013 prices converged to such an extent that NBP hub prices only lay 1.2 USD/MMbtu under the Japanese LNG price in the third quarter of 2015. Compared to the US prices at the Henry Hub, Europe's price level was 3.7 USD/MMbtu higher, and Japanese prices were 4.9 USD/MMbtu higher. The general downward price trends of LNG resulted from lower demand in Asian and European markets, a weakened oil price, and rising global LNG supplies. During 2015 176.7 bcm of new liquefaction capacity was under construction of which 55 bcm came online.<sup>2</sup> This shifted the global capacity from 415 bcm/a end 2014 to 470 bcm/a in the last year.<sup>3</sup>

Altogether, the expansion of LNG liquefaction terminals is expected to continue in the following years resulting in tremendous new capacities. Russia, Australia and the US are still involved in

<sup>1</sup> Rogers (2015)

<sup>2</sup> International Gas Union (2015) and Oil & Gas Financial Journal (2015)

<sup>3</sup> International Gas Union (2015)

several projects. The following section will give a detailed insight into the status quo of liquefaction plant development.

### 2.3.3.1 Russia

Russia's first LNG plant began operations in 2009. With 13.2 bcm of annual capacity, Sakhalin II LNG serves the Asian markets only. In 2013 Russia's Novatek, Chinese CNPC, and French Total launched the **YAMAL LNG** project located north of the Yamal Peninsula in the Russian Arctic. The project encompasses three liquefaction trains with an annual capacity of 7.6 bcm each. All LNG production has already sold out to Asian and European markets via 15 to 20 year contracts.<sup>1</sup> For the purpose of LNG exports the port of Sabetta was established and fifteen LNG icebreaker tankers from South Korea will be delivered in 2016. The vessels are constructed to cope with the extraordinary climate circumstances and are able to transport 170 kcm of LNG. According to the operator, construction of the LNG project is on time and the first train will be completed in 2017. Due to sanctions impeding financing from Europe a 10 percent share was sold to the Chinese Silk Road Fund (SRF).<sup>2</sup> However, other opinions claim that the Ukrainian conflict sanctions delayed the construction and will have some impact on the start date.<sup>3</sup>

Another LNG project, called **Baltic LNG**, is planned at the seaport of Ust-Luga, close to St. Petersburg. Its capacity is planned at 13.8 bcm/a, with a possible expansion to 20.7 bcm/a. The project is oriented towards Europe and might come on stream in late 2018. However, as searching for investors does not seem simple the announced start date should be doubted.<sup>4</sup>

### 2.3.3.2 Australia

At the moment, seven Australian LNG terminals are on stream, four of them commissioned in the last two years. Another three projects are under construction and will start in 2018. As early as 1989, cargoes were shipped from the North West Shelf Venture. Since then the project has steadily grown and now encompasses five trains with a total production of 22.5 bcm per year. In 2006 Australia's second LNG terminal, Darwin LNG, started and includes one train with 5.1 bcm/a, followed by Pluto in 2012, which amounts to 6 bcm/a. In December 2014 Queensland Curtis LNG began production with two trains of 5.9 bcm/a each, and half a year later the first train of Gladstone LNG commenced. At the end of 2015 Australia Pacific LNG initiated production. The total capacity will amount to 12.4 bcm/a<sup>5</sup> In January 2016 the Gorgon LNG terminal, with planned 20.7 bcm annual capacity, is online and started exporting in March 2016.<sup>6</sup> The fast pace of LNG terminal construction will continue as three other projects and several extensions are scheduled.

---

<sup>1</sup> Total (2016)

<sup>2</sup> Powell (2016)

<sup>3</sup> Rogers (2015)

<sup>4</sup> Gazprom (2016b)

<sup>5</sup> APPEA (2016)

<sup>6</sup> Zaretskaya (2016)

In July 2016 the Wheatstone LNG facility containing 12.3 bcm/a will get on stream, closely followed by the Ichthys LNG terminal, which will be on line in October 2016 with an annual capacity of 11.6 bcm.<sup>1</sup>

The second train of Gladstone LNG is planned for the second quarter of 2016 and will expand the capacity to 10.8 bcm/a.<sup>2</sup> The Prelude FLNG terminal will start in 2017. With costs of 11.7 billion Euro it will provide liquefaction capacities of 5 bcm per year.<sup>3</sup> Altogether, between 2014 and 2018 Australian LNG capacity of 85 bcm/a has been initiated.<sup>4</sup>

The LNG terminals in the Queensland region (Gladstone LNG, Queensland Curtis LNG and Australia Pacific LNG) are fed by coalbed methane, which makes Australia the second largest producer of unconventional gas.

If the expansion trend continues, Australian exports will be in line with Qatar's by 2018 and could become the world's largest in 2020. There exists sufficient potential for new projects and plans for another four terminals have been made, but a shift in global prices and demand has taken place, making it questionable how many of them will be fulfilled. In fact, the Arrow LNG plant has already been cancelled. When the Power of Siberia Pipeline is completed in 2018 China's demand for LNG is expected to drop. Therefore, a more fierce competition for LNG will occur in the Japanese and South Korean markets. Additionally, Australian labour costs have increased by 13 percent and result in higher project costs.<sup>5</sup>

### 2.3.3.3 United States

As gas prices in the US are considerably low due to the oversupply of gas and lacking export infrastructure, extensive investment in LNG export terminals was decided. Five projects amounting to a total volume of 64.9 bcm/a are currently under construction. The majority of projects are located in the Gulf of Mexico and are associated with existing regasification facilities. As storage tanks and pipeline infrastructure are already in place construction costs are reduced compared to Greenfield projects. Some operators decided to add the liquefaction plant, and others to modify the existing regasification facilities. The latter implies even lower costs.

The first exporting LNG terminal of the US is the Sabine Pass LNG terminal with a capacity of 10.3 bcm. The first train started operation in spring 2016 with three more trains following over the next months. Two more trains could be commissioned in 2018.<sup>6</sup> The Cove Point LNG plant that should be on stream in 2017 will follow it. Construction started in 2014 and costs are estimated at 3 billion Euro.<sup>7</sup> One year later the Cameron LNG terminal with a capacity of 16.55 bcm/a should be commissioned. The project includes three trains, but an expansion to five trains would be possible.<sup>8</sup>

---

<sup>1</sup> Rogers (2015)

<sup>2</sup> APPEA (2016)

<sup>3</sup> Blume (2016)

<sup>4</sup> Rogers (2015)

<sup>5</sup> Blume (2016)

<sup>6</sup> Cheniere (2016)

<sup>7</sup> Oil & Gas Journal (2014b)

<sup>8</sup> Cameron LNG (2016)

The construction of the Freeport LNG plant started in 2014 and is designed with three trains, the first one becoming operational in 2018. The total capacity of the plant will be 19.2 bcm per year. A volume of 18.2 bcm has already been contracted to inter alia BP and the Toshiba Corporation under usage of a use-or-pay liquefaction tolling agreement (LTA).<sup>1</sup> For 2019 the start of the Corpus Christi LNG Plant is scheduled, with an expected capacity of 11.6 bcm. Several other projects with a capacity of approximately 75 bcm have been planned, but realisation depends on the demand in the international LNG markets.

#### 2.3.3.4 Others

As mentioned above, another promising LNG terminal could emerge in Iran, but as construction has suspended realisation seems unsure. Moreover, Malaysia and Columbia are at present constructing floating LNG terminals. With capacities between 0.7 bcm and 2.1 bcm they clearly are smaller than conventional LNG plants. On top of the projects already under construction Australia and the US have planned six other projects. Canada has also planned three LNG terminals, which could be operational in the first half of the next decade. Additionally, Indonesia, Nigeria and Papua New Guinea have planned new investments.<sup>2</sup> As the current situation implies an oversupplied gas market it should be questioned if the projects will be further pursued.

The preceding subsections show that a massive expansion of liquefaction capacity will enter the market. On the whole it is expected that a total LNG liquefaction capacity of 103.5 bcm/a will go online between 2016 and early 2019. Table 2 gives an overview of the current projects under construction.

Moreover, an eye should be kept on Tanzania. Its natural reserves are expected to amount to 1.65 tcm, which are located offshore and plans to build an LNG terminal. The project has been delayed numerous times, but finally the acquisition of a site succeeded early 2016. The plant shall consist of two trains and is planned to lay in Lindi, a town in the Southern part of the country. It remains to be seen how fast the proceeding steps can be fulfilled.<sup>3</sup> Another LNG plant is envisaged by Mozambique, which has managed to proceed more quickly and hopes to start the first LNG terminal on the East African Coast. The country possesses approximately 2.25 tcm of natural offshore gas. The LNG plant would be established in the North Mozambique with an initial capacity of 16.55 bcm divided on two trains. Expansions could be made to enlarge the liquefaction capacity up to 69 bcm per year.<sup>4</sup> Altogether, both countries could become LNG exporters and could form another option of supply for the EU.

---

<sup>1</sup> Freeport LNG (2016)

<sup>2</sup> Global LNG (2016)

<sup>3</sup> Salaam (2016)

<sup>4</sup> Mozambique LNG (2016)

TABLE 2: OVERVIEW OF PROJECTS UNDER CONSTRUCTION (AS OF MARCH 2016)

SOURCE: GLOBAL LNG (2016) AND IEA (2015B)

Country	Project	Capacity (bcm/a)	Major Stakeholders	Target online
Australia	Wheatstone LNG	12.3	Chevron, Apache, KUFPEC	2016
Australia	Ichthys LNG	11.6	Inpex, Total	2016
Australia	Prelude FLNG	5.0	Shell, Inpex, Kogas	2017
Columbia	Carribbean FLNG	0.7	Pacific Rubiales, Exmar	2016
Malaysia	PFLNG 1	1.6	Petronas, MISC	2016
Malaysia	PFLNG 2	2.1	Petronas, Murphy Oil Corporation	2016
Russia	Yamal LNG	15.2	Novatek, Total	2017
USA	Cameron LNG	16.55	Sempra Energy	2018
USA	Corpus Christi LNG	11.6	Cheniere Energy	2019
USA	Cove Point	7.2	Dominion	2017
USA	Freeport LNG	19.2	Freeport, Macquire	2018
<b>TOTAL</b>		<b>103.5</b>		

## 3 PART B: POLITICAL FACTORS AND IMPLICATIONS FOR EUROPEAN GAS<sup>1</sup>

### 3.1 Structure, Rationale and Methodology

Europe's efforts to diversify its gas supplies involves multiple political players with varying degrees of influence over time and across particular issues. This study focuses on three players considered central to the European Union's (EU) gas future. It starts with the EU, outlining its key energy dilemmas and the role of politics in addressing them. Next, Russia as the biggest supplier of natural gas to Europe with a major network of pipelines connecting to the EU member states is focused on. Finally, thanks to its geographical and, thus, geopolitical locus, the study examines Turkey with respect to its role as a transit country and a significant player in securing new gas sources for the EU.

The study incorporates the role of politics in the EU's drive for diversifying its gas supplies for the purpose of providing a more comprehensive understanding of the process. It underscores that economic factors, outlined in detail in the study, are crucial. Yet, political factors can also shape and determine the outcome of Europe's energy policies. The efforts by the EU/Germany to diversify their gas supplies come at a challenging juncture, with perceptions of insecurity of gas supplies exacerbated by political developments in the wider region. Thus, the study looks at both domestic and foreign policy issues affecting major gas projects related to the EU's pursuit for gas diversification.

To put politics into the picture, the study follows a two-step approach. It starts analysing the three key players – EU, Russia and Turkey – in terms of the role of politics in shaping major energy-related outcomes. The ultimate goal is to understand what the past implies about the impact of politics on European gas. To what extent domestic and foreign policy developments affect major infrastructure projects such as pipelines bringing gas to the EU? How important is politics in explaining the EU's preferences for various energy types including gas? How have EU relations with Russia affected Russia's gas ties with Europe? What role has foreign policy played in Russia's decisions to build new gas export routes? How determined is Russia to bypass Ukraine as a transit route? How have Turkey's political leaders approached prospect candidates for new gas supplies for its domestic market and the EU?

Next, after drawing lessons from the past, the study looks into the future and explores the possibility for three political scenarios affecting EU gas diversification. The study highlights some of the major continuities and constraints that help to narrow the spectrum of possible political developments in the future. It also takes into consideration some of the key uncertainties and potential surprises that could ultimately lead Europe's gas diversification policy towards a different trajectory.<sup>2</sup> While, there are multiple possibilities for the future, the study puts together key political variables to deliver three possible storylines about EU's gas

---

<sup>1</sup> Corresponding author: Adnan Vatansver (EUCERS)

<sup>2</sup> Schwartz (1996)

future. They appear under three scenarios: Gas on Sale, Nord Dream and Southern Setback. These scenarios help to navigate discourses surrounding domestic and foreign policies of the three main actors of this study, with the ultimate objective of informing the EU's public policy choices.

## 3.2 The European Union

### 3.2.1.1 Europe's Long Path towards Energy Market Integration

The EU today rests on historically established energy policy trajectories that encompass political and market integration. The 'early' communities set up after World War II in Europe<sup>1</sup> were quintessentially political in scope. By means of delegation of powers from the state to institutional level, administration of the coal and steel sectors had witnessed unprecedented organisational change, helping to manage the conflict-prone resources.

Yet, energy as a whole, outside coal, was left out in the subsequent process of European integration. It took several decades for the integration process to spread to the gas sector in particular. The emergence of the International Energy Agency (IEA), which was set up in 1974 by the Organisation of Economic Co-operation and Development (OECD) following the 'oil shocks' of the 1970s, reinforced the energy security dimension while leaving out progression towards a more integrated single European market concept.<sup>2</sup> The rise of the Organization of Petroleum Exporting Countries (OPEC) coupled with the volatile and politically unstable Middle East facilitated a slow but steady process of energy market privatisation and liberalisation in Europe, pioneered by the United Kingdom. The urgency of energy market reform and integration waned in the face of consumer-friendly energy prices in the 1980s. Yet, market reform for the networked industry, including gas and electricity, finally appeared at the forefront of Europe's integration process in the 1990s, following the adoption of the 1992 Treaty of Maastricht establishing the EU.

Gas market liberalisation ensued with two consecutive waves of energy integration reforms marked by, respectively, the gas directives of 1998 and 2003. The two gas directives provided a legal foundation for natural gas market liberalisation, while in the meantime the European Commission was assigned a more prominent role in the field of energy. The 1998 gas directive aimed to create competition through the introduction of third party, non-discriminatory access to networks and stimulating the unbundling of services. Liberalisation of the downstream gas sector offered the opportunity to strengthen market forces into the European energy system. The 2003 gas directive enacted more tangible market competition through the creation of a wholesale market, opening up of retail markets and market regulation. The 2003 gas directive expanded the regulatory scope of the earlier version of the law by adding the provisions of independent energy regulator and non-discriminatory third-party access to transmission

---

<sup>1</sup> The European Coal and Steel Community (ECSC) and the European Atomic Energy Community (EURATOM)

<sup>2</sup> Aalto (2007), p. 8

infrastructure.<sup>1</sup> The main tenet of the 2003 gas law was the introduction of new measures on legal unbundling and regulation at the national level.<sup>2</sup>

The 1998 and 2003 gas directives marked the beginning of a process that eventually led to the emergence of the so-called Third Energy Package (TEP). Proposed in 2007 and implemented in March 2011, TEP concentrated on internal market liberalisation provisions including ownership unbundling - separation of production, transportation and distribution functions in a vertically integrated company - and the introduction of an EU-level regulator.<sup>3</sup> A step towards more coordinated regulatory oversight throughout the EU was taken with the establishment of the Agency for Cooperation of Energy Regulators (ACER). The liberalisation of the gas market offered an unparalleled opportunity to the Commission. Being in charge of administering the competition policy across the whole of the EU, the Commission has strengthened its role as a crucial player in gas markets and energy security.<sup>4</sup> It has also acquired a key role in ensuring progress in gas market liberalisation through the implementation of the TEP.

Overall, natural gas has been a domain where the EU has sought to play a proactive role domestically and externally by, respectively, market integration and energy rules diffusion into its immediate neighbourhood. Nevertheless, the harmonisation and approximation of energy legislation while embraced by some, has been received with scepticism by others, which has weakened the external dimension of the EU. Following the demise of the Nabucco process<sup>5</sup>, more resources have been brought in to balance the domestic and external dimensions. The internal market integration has been addressed by means of the legal and physical unbundling, a process that is underway.

### 3.2.2 Energy Union

As the next step in European integration, in 2015, the Commission announced its commitment to a new ambitious project: Energy Union. In addition to supply security, Energy Union seeks to prioritise energy efficiency and dedicate funds to climate research and innovation through a fully-fledged internal energy market and climate-focused emission reduction objectives. Led enthusiastically by the President of the European Council, Donald Tusk, Energy Union also has the objective of creating a common European energy and climate policy.<sup>6</sup>

Should the Energy Union be fully embraced, it holds potential for bridging significant gaps in the energy and climate policy of EU member states. It has opened up discussion about energy security from the 'new' and 'old' member state perspectives while prioritising energy market integration as the way to achieve it. In absence of significant conventional energy resources of its own, the Energy Union aims to facilitate market integration as a way for tackling existing divergences across EU's members.<sup>7</sup>

---

<sup>1</sup> European Union (2003)

<sup>2</sup> Talus (2013), p. 79

<sup>3</sup> Agency for the Cooperation of Energy Regulators (ACER)

<sup>4</sup> Goldthau (2015)

<sup>5</sup> Socor (2013)

<sup>6</sup> European Energy Union (2015)

<sup>7</sup> European Commission (2015c)

The Energy Union is also a project about enhancing the external dimension of EU energy and climate policy. This policy dimension has steadily grown in importance since the 2006 Green Paper.<sup>1</sup> By engaging its normative soft power, the EU has since sought to diffuse its policies and laws - the energy *acquis* - by means of dedicated institutional and organisational frameworks.<sup>2</sup> The Energy Union project benefits from such already established policy frameworks. With respect to natural gas in particular, Energy Union is an attempt by the EU to have greater leverage in international gas geopolitics. Thus, it seeks to offer an integrated energy security approach for the EU comprised of energy and climate policy.<sup>3</sup> For the EU to be effective in international energy geopolitics, it needs an energy and climate security framework that necessitates a stricter adherence by its member states. Should the member states' subscribe to the Energy Union's policy objectives, the EU may have more impact on matters of importance for European and international energy security. Importantly, the concept of the Energy Union has emerged at a time of growing possibilities for access to international LNG – a window of opportunity for the EU.

### 3.2.3 EU's Drive towards Decarbonisation

In addition to gas market integration, since its inception the EU has had a strong green energy agenda accompanying the energy dimension. Prospects of slowing down exploration and production domestically (in places such as The Netherlands and the North Sea) while lacking an aggregated, Europe-wide capability to sanction and enforce upstream activities for its energy majors in a unified manner, had a significant role in prompting the EU to embrace a green energy agenda.<sup>4</sup> Major policy initiatives, realised both within and outside of the EU through external institutions such as the Energy Community or European Partnership, have aimed to enhance renewables and energy efficiency measures.

The EU's persistent pursuit of decarbonisation has helped it acquire a leading role in international negotiations on climate mitigation. The EU, with its 28 member states, remains the world's third largest carbon dioxide (CO<sub>2</sub>) emitter. However, its emissions have witnessed a drastic decline in the past two decades.<sup>5</sup> By contrast, emissions in China, the world's largest emitter have grown rapidly, causing concern about global mitigation efforts. The United States, the second largest emitter has also witnessed a peak in its CO<sub>2</sub> emissions growth, though its overall performance in carbon reduction since the 1990s has been less impressive compared to Europe. The recent decline in emissions in the US has been largely an outcome of gas-to-coal substitution in power generation.<sup>6</sup> This phenomenon has shaped the national energy discourse in the US, where natural gas has been widely perceived as a “bridge fuel” to a low-carbon future<sup>7</sup>.

---

<sup>1</sup> European Commission (2006)

<sup>2</sup> The Energy Community, an international entity dealing with energy policy, and the Treaty establishing the Energy Community, have been the key tools of EU's external energy dimension

<sup>3</sup> European Commission (2016a)

<sup>4</sup> Talus (2011), p. 277

<sup>5</sup> China, US and the EU is followed by India, Russia and Japan as, respectively, the fourth, fifth and the sixth largest CO<sub>2</sub> emitters, see: World Bank (2016a)

<sup>6</sup> The introduction of more stringent fuel consumption standards in transportation has also been effective.

<sup>7</sup> Kirkland (2010)

Following the United Nations Framework Convention on Climate Change (UNFCCC) - also known as the 'Earth Summit' - held in Rio de Janeiro in 1992, the EU has embraced international convention to combat climate change. The Kyoto Protocol to the UNFCCC signed in 1997 by 84 countries became a turning point in the EU's drive for a global climate policy and the externalisation of its decarbonisation agenda. The EU became a party to the 1997 convention - committing to binding CO<sub>2</sub> reduction targets. The ensued commitment to curb carbon emissions has become a hallmark of the EU's decarbonisation politics.

What also contributed to the EU's role as a leader in international climate negotiations was the decision by the US to abstain from ratifying the Kyoto Protocol, while China, along with most developing countries, was not bound by the Protocol to cut emissions. In effect, the EU has stepped in in the midst of a "soft power" vacuum, to acquire a leading international role in climate mitigation.

The fact that the EU - after China and the US - happens to be the region of the third largest primary energy consumption in the world<sup>1</sup> has not been without significance in the Community's persistent focus on climate politics. Indeed, by adopting global climate politics the EU has since sought to balance the challenges posed by what it considers as fragile energy security of its own with opportunities offered by a concerted approach to combating climate change.

For the EU, the salience of climate policies has a practical, energy security-focused dimension, which makes the climate and the energy two inseparable elements of its policy. With perceptions of energy insecurity exacerbated by the Ukrainian crisis and the turmoil in the Middle East, the EU's climate objectives have been prioritised as a way to search for feasible non-fossil fuel alternatives in a long-term perspective.

In this context, in October 2014, the EU agreed to reduce CO<sub>2</sub> emissions by 40 percent by 2030 as compared with the 1990 levels. In addition to the decarbonisation measures, the Council agreed to increase the use of renewable energy to 27 percent in the total energy mix and to ensure energy efficiency improvement by at least 27 percent.<sup>2</sup>

The EU-led decarbonisation agenda has been embraced at the level of member states as well. Germany, for instance, adopted a long-term Energy Transition ('Energiewende') strategy that is geared towards a fundamental switch away from fossil fuels to renewable sources while increasing conservation of energy by 2050. The German Energiewende strategy brings tangible substance to the energy-climate nexus: it seeks to combat climate change, reduce energy imports while strengthening energy security, stimulate technological innovation in the green economy and reduce and eliminate nuclear power risks.<sup>3</sup> Denmark has provided another notable example for climate policy aiming at a radical reduction in greenhouse gas emissions. With a focus on renewable energy, the Danish Government seeks to tackle the emissions problem in two phases: reduction by 40 percent by 2020 and reduction by 80-95 percent by 2050 as compared with 1990 base levels.<sup>4</sup>

---

<sup>1</sup> U.S. Energy Information Agency (2016)

<sup>2</sup> BBC (2014)

<sup>3</sup> Energy Transition (2016)

<sup>4</sup> Danish Government (2013)

EU's strong commitment to decarbonisation and climate change mitigation has been consequential for natural gas too. The potential for natural gas to serve as a bridge fuel remains at the centre of lively discourse.<sup>1</sup> However, there is not necessarily unconditional support in the EU for gas as a bridge fuel between the era of fossil fuels and the era of renewable sources of energy. The idea of replicating the US shale gas revolution in Europe has received mixed results while adding to a growing resentment in particular among non-governmental organisations (NGOs).<sup>2</sup> Beyond NGOs, political parties with a major focus on a “green agenda” have witnessed significant success in parts of Europe, calling for a departure from fossil fuels. Proposing various measures to promote renewable energy, such political movements have played a significant role in shaping energy policies in many European countries.<sup>3</sup> Overall, natural gas has remained an important fuel and a substitute of coal in power generation in many parts of the EU. Nevertheless, the perceptions of natural gas have become increasingly politicised contributing to a major gap between the industry interest and NGOs' energy-climate politics.

### 3.2.4 EU's Drive for Gas Diversification

#### 3.2.4.1 Southern Corridor

The Southern Gas Corridor (SGC) - also known as the ‘fourth corridor’ where the other three are gas arteries linking the EU with Algeria, Russia and Norway - refers to the idea of building new gas infrastructure that would interconnect primarily Caspian energy producers with energy markets in the EU. In the official documents of the EU, the SGC project was first mentioned in 2008 in the Commission's communication as one of six priority infrastructure projects to be developed for supply of gas from the Caspian and possibly other regional sources.<sup>4</sup> Described as ‘one of the EU's highest energy security priorities’, the SGC aimed to secure new sources of supply mainly to the EU's South and Central-Eastern European (SCEE) member states via Turkey by a dedicated, high diameter gas pipeline.<sup>5</sup>

The political support for the SGC received at the EU level allowed more discussion about specific pipeline projects that were to underpin the strategy. Among the projects Nabucco - which was conceived by representatives of the gas industry as early as 2002 - became the centrepiece of the SGC strategy receiving EU support as a project of common interest within the Trans-European Network (TEN) framework. Nabucco's projected supply orientation towards the South and Central Eastern European states addressed the EU's diversification prerogatives - as a supply and route diversifying project - and, as such, received a strong support from the Commission. The SGC strategy assigned Turkey the role of a key transit country, necessitating a continuous engagement with its leadership on the prospects of the SGC.

---

<sup>1</sup> Davis and Shearer (2014)

<sup>2</sup> Kilisek (2014)

<sup>3</sup> Carter (2015)

<sup>4</sup> Commission of the European Communities (2008)

<sup>5</sup> Commission of the European Communities (2008)

The culmination of the EU support for SGC was signing the Nabucco Intergovernmental Agreement in Ankara. It was signed in July 2013 in Ankara by Turkey, Bulgaria, Romania, Hungary and Austria, and overseen by the head of the European Commission supplying nations' representatives.<sup>1</sup>

Nevertheless, due to external challenges concerning transit and acceptance of EU energy rules, the Nabucco project never materialised. Concerns about Azerbaijan's ability to meet the supply requirements for the 31 bcm capacity of the pipeline were also important. Eventually, the attention shifted to a range of new pipeline proposals that had scaled down projected gas volumes. This raised hopes for a speedier development of a SGC project.

Though Nabucco received substantial political support within the EU, the industry did not choose it as the optimal solution for a pipeline to Europe.<sup>2</sup> The BP-led consortium - which has been developing the Shah Deniz II field in Azerbaijan - made a decision to opt for the Trans-Adriatic Pipeline (TAP), a smaller and more scalable project to supply gas to Europe.<sup>3</sup> A downgraded version of the Nabucco pipeline, Nabucco West, was not selected as the preferred route. It remains, however, on the agenda as a possible future option connecting the Trans-Anatolian Gas Pipeline (TANAP), already under construction in Turkey, and the Austrian gas hub at Baumgarten.

#### 3.2.4.2 Liquefied Natural Gas (LNG)

While most natural gas is delivered to Europe via pipelines, LNG trade has grown in significance, driven by economics and security of supply. Optimisation along the LNG value chain and growing competition have helped to make this supply mode increasingly attractive compared to long distance pipelines. Concerns about security of supply, particularly in regions with limited access to diverse sources of gas supply have also helped raise interest in LNG.<sup>4</sup> Faced with periodic interruptions of Russian gas supplies through Ukraine in the 2000s, LNG has been gradually perceived as a potential solution to enhance European gas security.<sup>5</sup>

Importantly, the Eastern part of the EU has witnessed some significant progress in increasing LNG capacity, which has heightened their energy security. There is one recently launched floating LNG terminal in Lithuania with another one completed in Poland. In both countries energy supply security has been the key factor in the implementation of an LNG policy.

With the boom in global LNG production in the past few years, and the prospects for even more LNG supply in the near future, the EU has sought to address its energy security by seeking to utilise its existing and planned regasification infrastructure. In 2015 the Commission held open consultation on developing an EU strategy for LNG and gas storage which has been envisaged as a part of the Energy Union package.<sup>6</sup>

---

<sup>1</sup> Barroso (2009)

<sup>2</sup> Raszewski (2016), p. 179

<sup>3</sup> Chazan and Shotter (2013)

<sup>4</sup> Ernst and Young (2012)

<sup>5</sup> Chazan (2014)

<sup>6</sup> Wilson (2015)

As in the case of piped gas, the EU's LNG agenda revolves around long and short-term energy security measures. The short-term energy supply security is to be ensured by availability of storage in cases of supply disruptions. The long-term objective is market integration within the EU. Market integration rests on facilitating construction of interconnections, in particular those linking the Iberian Peninsula with the rest of the continent.

As the international LNG market keeps growing and gets increasingly interconnected, the EU's emerging LNG strategy envisages regular discussions with key LNG players, both existing and prospective, across the world.<sup>1</sup> In this context, a trans-Atlantic partnership in gas has suddenly become an important part of Europe's pursuit for energy security. The US shale gas revolution, which has had an unprecedented impact on energy supply security and gas prices in the US, has already affected European markets.<sup>2</sup> With the launch of US LNG export projects, gas businesses in Europe have embraced the idea of having LNG producers in the US as potential partners.<sup>3</sup>

### 3.3 EU-Russian Energy Relations

#### 3.3.1 Historical Background

The USSR launched its first gas exports to Western Europe in 1968 following a pipeline connection with Austria. Notably, Soviet gas flow to Western Europe began shortly before USSR's invasion of Czechoslovakia. Subsequently, gas export volumes continued to grow, partly driven by an appreciation of natural gas as an increasingly important fuel in the aftermath of the 1967 OPEC oil embargo. Soviet gas played an important role in reducing Europe's dependence on Middle Eastern oil. As demand for gas grew, negotiations for expanding the gas trade with Moscow continued throughout the period after the end of the *détente* in the 1970s.

The early deals with the USSR constituted a challenge for Euro-Atlantic relations, as they raised concerns about creating a dependence on the continuous flow of Soviet energy. Yet, in retrospect, fears in Europe and in the US about Soviet gas never came true.<sup>4</sup> Gas flow continued uninterrupted even at the heights of the Cold War, proving the USSR's role as a reliable gas supplier. For both the European Economic Community and the Soviet Union, the flow of gas represented a win-win situation, whereby Europe obtained the gas it required, while Moscow acquired the much-needed hard currency.

With the end of the Cold War and the dissolution of the USSR, Western Europe's gas relationship with the Russian Federation continued to expand throughout the 1990s. Increased flows of Russian gas proved to be the answer to the growing penetration of natural gas in power generation in Europe: demand for gas in Europe more than quadrupled from about 100 bcm in 1970 to 570 bcm in 2005. European imports of Russian gas in this period rose even more dramatically from 3.5 bcm in 1970 to 162 bcm in 2005<sup>5</sup>.

---

<sup>1</sup> European Commission (2016b)

<sup>2</sup> Meyer (2015)

<sup>3</sup> Bordoff and Houser (2014)

<sup>4</sup> Lough (2011)

<sup>5</sup> Henderson, Mitrova (2015), p. 29-30

Concerns about dependence on Russian gas, however, never fully disappeared. Europe's apprehension resurfaced following Russia's gas disputes with Ukraine in the winters of 2006 and 2009, leading to temporary cut-offs of gas flow to Europe. Russia's decision to annex Crimea and the ensuing military crisis in eastern Ukraine further fed into Europe's concerns about Russia as a reliable gas supplier.

### 3.3.2 Key Areas of Tensions in EU-Russian Gas Relations

While natural gas has remained the most prominent part of the energy relationship between the EU and Russia, it is important to recognise that this energy partnership has been remarkably multifaceted. The share of Russian gas in the EU remains at about 30 percent of its gas consumption.<sup>1</sup> For crude oil and petroleum products, Russia has also been the dominant supplier, accounting for about a third of the imports by the EU 28. Russia has also acquired the status of the EU's main coal supplier, accounting for about 28 percent of its imports, and is a leading provider of uranium for EU nuclear power plants.<sup>2</sup>

As nearly all tensions in EU-Russian energy relations have had to do with natural gas rather than other sources of energy, it certainly begs the question why gas has led to such an outcome. Part of the explanation lies in the nature of natural gas as an energy commodity. The absence of a global market, unlike in the case of coal and oil, has heightened concerns about supply disruptions or potential abuse of monopolistic power by a supplier. Indeed, despite growth in LNG, it is not yet possible to refer to one international and globalised gas market. Markets for natural gas remain regionalised, and even within the EU they still face years of progress towards further integration.

Yet, some major differences in perceptions and gas market practice between Russia and the EU have also contributed to recurring tensions. What stands at the core of their differences is their diametrically opposed position in the gas value chain. For Russia's Gazprom, the ultimate concern has been about security of demand. Ensuring the continuity of its supplies to existing markets and potentially expanding into new markets has been a principal objective for Russia. By contrast, for European clients, the primary concern has been the security of supply.

Both sides have tried to make inroads in the remaining parts of the gas value chain. European companies have strived to acquire a role in upstream in Russia, but have achieved modest success. Barriers for investing in Russian upstream have remained substantial. Russia, conversely, has sought access to the downstream markets in European countries<sup>3</sup>, and has also been met with resistance and disappointment.

One complexity in EU-Russian gas relations has arisen due to their diverging views on how the gas market should function. As an energy-consuming region, along with a rising gas glut, there has been a growing preference within the EU to see natural gas as a commodity subject to competition. This has been considered as essential for ensuring more affordable prices and more flexibility for natural gas consumers. The EU-led legislative changes, epitomised by the three

---

<sup>1</sup> Clingendael (2013)

<sup>2</sup> Eurostat (2013)

<sup>3</sup> Belyi (2010)

consecutive gas directives coupled with the ensuing structural change in global gas markets have provided a stimulus for a market-orientated change in Europe.<sup>1</sup>

The Russian side views the rush to liberalisation from its security-of-demand perspective as highly challenging, posing potential risks for its business in Europe. Both Soviet and subsequently Russian gas supplies have been traditionally based on a business model whereby the realisation of its gas development (upstream) and long-distance gas pipelines (midstream) projects has been based on the assurance provided by long-term contracts with European clients. According to this traditional model, the Russian supplier shared a price risk, indexing the gas to fluctuating oil prices, whereas its European partners adopted the bulk of the volume risk through take-or-pay contractual obligations.

In this context, a bone of contention for the energy exporter Russia has been the role of the EU's *acquis communautaire* related to its energy markets. While both Russia and the EU need “a mutually agreed, common legal framework for their economic and energy relations”, Russia has perceived EU conquests for legal approximation with third countries as an imposition of its legal framework.<sup>2</sup>

Another source of complexity in EU-Russian gas relations has been the growing diversity in the energy balances of EU member states' following the growth in membership during the 2000s. Gas relations already prone to politicisation faced a new challenge following EU enlargement into Central and Eastern Europe (CEE). Arrival of new member states, some of them with very high import dependence on Russian gas and little or no access to alternative sources, reinforced concerns about depending on Russian supplies. Thus, for some countries in Eastern Europe, bringing more Russian gas and constructing new pipelines to Russia meant heightened risks for continued dependence on Russia. For others, mostly in Western Europe, more Russian gas and new pipelines have often been interpreted as a means for a more diversified gas portfolio.

Some aspects of Russia's evolving gas strategy abroad have also contributed to tensions in its relations with the EU. One consistent aspect of that strategy has been the development of gas pipelines that would reduce the dependence on transit countries. This strategy evolved in the late 1990s following repeated tension with Ukraine over unpaid or allegedly siphoned gas. It resulted in the construction of the Blue Stream pipeline connecting Russia directly with the Turkish market, the Yamal-Europe pipeline bypassing Ukraine in favour of Belarus, and the Nord Stream I pipeline providing direct access to the Western European market.

Putting proposals on the table for building another pipeline along the Nord Stream route and an additional one under the Black Sea has raised apprehensions among critics.<sup>3</sup> The arguments have revolved largely around concerns about the potential impact of such new pipelines on transit through Ukraine and its economic predicament. Transit of Russian gas through Ukraine has already declined drastically—from 137 bcm in 2004 to 67 bcm in 2015.<sup>4</sup> Also, concerns have been raised about the potential implications of a pipeline under the Black Sea on the prospects for the SGC.

---

<sup>1</sup> Mitrova, Stern, Belova (2012)

<sup>2</sup> Konoplyanik (2008), p. 109

<sup>3</sup> Mazneva (2015)

<sup>4</sup> Naftogaz (2016)

An additional aspect of Russia's gas policy raising concerns in Europe has been the lack of a common benchmark on how Gazprom sets its prices for its clients.<sup>1</sup> Countries in Eastern Europe have typically paid higher prices than Gazprom's more distant partners in Western Europe. This has contributed to allegations that Gazprom has been abusing its market power, prompting an anti-trust investigation by the Commission.

As Russia has strived to conquer new markets in Asia, this has been met with concerns in Europe about the possible implications for Gazprom's gas negotiations with European partners. For nearly a decade, Russia and China negotiated a gas deal. While a disagreement on the price has remained a main stumbling block, Russia's insistence on the specifics of the route of the proposed pipeline link also contributed to delays. Russia preferred a route linking its Western Siberian resources with Western China, whereas for Beijing the preferred route was one that crossed China's border in its Northeastern provinces. Russia's preferred route would have allowed the possibility for an arbitrage between Gazprom's European and Asian sales, enhancing its bargaining position in Europe.

However, in 2014, when Russia and China succeeded in reaching a gas deal<sup>2</sup>, the victory for the North-eastern route for China has somewhat alleviated Europe's concerns. Furthermore, sales to Europe are bound to remain more lucrative for Russia as they do not involve new major investments in upstream as well as tax breaks needed to secure sales.<sup>3</sup>

Yet, more recent developments in global LNG, progress in EU's market integration, and the EU's stagnating gas demand have somewhat helped to alleviate European concerns about gas security related to Russia. This has lessened the urgency for new gas deals with existing suppliers while enhancing the bargaining power of European companies importing gas. While investment in new gas interconnections is underway, even the modest progress so far has lessened the vulnerability of EU member states, such as Bulgaria, to sudden supply shocks. This has necessitated Gazprom to engage in what might be a long-term process of adapting to a new market reality in Europe. The Russian major has provided price discounts and adopted greater flexibility in its gas sales agreement through indexing part of the gas volumes to spot prices. While this process has been indicative of the EU's easing energy security concerns, for Russia it has further heightened apprehensions about energy demand security.

## 3.4 Russia

### 3.4.1 Russia's Resource-driven Economy and Its Economic Challenges

After the turbulent decade of the 1990s, the Russian Federation went through an episode of remarkable economic growth, lasting till 2008. From 2000 to 2008, Russia grew annually on average by nearly 7 percent, allowing the country to quickly narrow its developmental gap with advanced economies. Largely due to this period of successful economic growth, today the IMF

---

<sup>1</sup> Euro-Atlantic Security Initiative Working Group on Energy (2012)

<sup>2</sup> Paton, Guo (2014)

<sup>3</sup> See: WoodMackenzie (2014), Bradshaw (2014)

ranks Russia as the world's sixth largest economy, and the second largest in Europe, slightly behind Germany.<sup>1</sup>

Yet, Russia's economic success was fundamentally driven by factors that were not sustainable. A large part of the growth was the result of the boom in commodity prices during the 2000s, which also facilitated Russian companies' access to global capital markets. What also helped, especially during the first half of the 2000s, was the increased utilisation of production capacity in various sectors of the economy, left generally idle during the 1990s.

Importantly, economic growth in Russia did not recover to its previous heights despite the rapid reversal in oil prices after 2009. By mid-2009, the price of oil had already doubled compared to its nadir in 2008, and it reached above 100 USD/bbl by early 2011. However, the price of oil, when high, was no longer sufficient to maintain high growth rates. Despite some recovery in prices in 2009, Russia witnessed a sharp economic contraction.<sup>2</sup> The economy recovered the following year, but the growth continued to decline annually, turning negative in 2015. Economic growth rate has averaged 0.36 percent since 2009.<sup>3</sup>

Russia's economic predicament is to a large extent an outcome of its long-term failure to diversify its economy. It fundamentally remains a resource-dependent economy, making it highly vulnerable to commodity price shocks. In 2013, half of the federal budget, about two thirds of export revenues and a quarter of the GDP came from two sectors—oil and gas.<sup>4</sup> Oil remains as the single most important sector in the Russian economy.

Recent economic sanctions against Russia have contributed to the downfall of its economy. However low commodity prices have been estimated to be the principal driver for the economic slowdown and since 2015, the on-going contraction.<sup>5</sup>

Russia's economic struggles are also an outcome of broader structural problems and delayed fundamental economic reforms. Rhetorically, Russian leaders have been aware of the economy's deeper problems. As described candidly by Medvedev, currently the Prime Minister, Russia needs to modernise the economy, and for this it would need not only economic measures, but also steps towards a strong civil society, an efficient legislature and a reformed judicial system.<sup>6</sup>

The Russian leadership, however, has not been able to translate rhetoric into tangible reforms that would revitalise the economy. Reforms have been proposed, but are yet to be implemented in practice. These include strengthened property rights and governance, streamlined regulation, reduced trade barriers, improved transparency and efficiency of public investment, increased competition, reinvigorated privatisation, and more efficient financial system.<sup>7</sup>

Russia remains in search of new sources of economic growth as the principal source of growth in the 2000s—a boom in commodity revenues—appears no longer effective. This pursuit becomes particularly important should oil prices stay relatively low for a prolonged period. Finding a new source of economic growth looks increasingly less likely unless Russia vigorously adopts substantial economic reform measures.

---

<sup>1</sup> GDP measured based on purchasing power parity (PPP), see: International Monetary Fund (2016)

<sup>2</sup> The economy contracted by 7.8 percent in 2009.

<sup>3</sup> This is the average for 2009-2015 period, see: World Bank (2016a)

<sup>4</sup> Oil & Gas 360 (2015)

<sup>5</sup> International Monetary Fund (2015)

<sup>6</sup> Medvedev (2009)

<sup>7</sup> International Monetary Fund (2015)

Looking into the future, a key question about Russia is whether it will be able to return to the fast-paced economic growth it enjoyed till 2008. If oil prices return to previous heights—a key uncertainty for the future—this would most likely help with economic growth. But overall, the state of the Russian economy in the future is likely to depend principally on the ability of Russian leadership to adopt and implement structural economic reforms. The scenarios below provide assumptions on these.

Russia's future economic spectrum ranges from an increasingly isolated and weakened resource-dependent economy to a prosperous one underpinned by intensified economic ties with European and other partners, and a diversified base for growth. Its economic future depends partly on exogenous factors, such as global oil prices, but also on political decisions taken by its leadership.

How Russia's economy evolves will be significant for various reasons. It has been often argued that the resurgence in Russia's foreign policy under Putin has been linked to the economic revival during the 2000s. However, rising tensions in its relations with the EU and the US following the Ukraine crisis in 2013-4 coincided with a period of a weakened rather than a booming economy. Thus, the link between the state of Russia's economy and its foreign policy appears highly complex, hampering any outright conclusions. We examine some likely outcomes under different scenarios below.

The state of Russia's economy may also be of importance for its domestic politics. Yet again, the link between economic growth and domestic political developments is highly complex, necessitating additional assumptions as examined below.

Finally, what is also significant is the future structure of the Russian economy. A key uncertainty revolves around whether Russia will manage to diversify away from natural resources. While a diversification would make the Russian economy less vulnerable to external shocks, it could also help alleviate Russia's concerns about security of energy demand, as the economic cost of lost markets is likely to be less profound.

### 3.4.2 Russia's Domestic Political Context and Implications

Two and a half decades after the collapse of the USSR, and three decades since the launch of *perestroika* and *glasnost* by Gorbachev, the Russian Federation is still not generally recognised as a well-functioning democracy. The Freedom House "Freedom in the World" report has categorised Russia as "not free", and identified its media as "not free" too.<sup>1</sup>

A common term describing the political regime under President Vladimir Putin has been "managed democracy". Some of its key characteristics include a strong presidency and weak institutions, forceful control of the media by the state, and regular though not free elections.<sup>2</sup> Likewise, emphasising the presence of elements of both democracy and autocracy has prompted some scholars to label Russia as a hybrid or semi-authoritarian regime.<sup>3</sup>

---

<sup>1</sup> Freedom House (2016)

<sup>2</sup> Petrov, McFaul (2005)

<sup>3</sup> Hale (2010), Evans (2011)

How Russia's political system evolves is significant for Europe, as it could affect the level of predictability regarding Moscow's foreign and energy policies. It could also have an impact on the scope of cooperation between the EU and Russia. The underlying assumption is that for the EU as whole it is relatively easier to deepen cooperation with countries that share similar political values and goals.

What Russia's current political system entails is a high degree of unpredictability about its leadership's decisions and actions. Power remains firmly concentrated around the president. The role of the legislature, civil society and media in checking the executive's power remains minimal. Political competition is present but political opposition remains highly disorganised and weak. In this context, decision-making is concentrated within a very narrow elite led by the Kremlin. This makes erratic decisions and policy reversals on issues of potential significance for Europe more likely.

Yet, Russia's political system of "managed democracy" and its evolving political culture present certain constraints that are likely to ensure some distinct continuities, at least in the near term. Overall, it is possible to depict the centre of gravity of Russia's public opinion as populist, nationalist and anti-Western. The state-led capitalism that has evolved in Russia enjoys broad support. The appeal of liberal reforms following Russia's turbulent decade of the 1990s remains weak.

Also, President Putin, already in his eighteenth year at the helm of Russian politics, has been enjoying continuously high public support. In the midst of a considerable economic quandary his popularity remains record high. This presents an interesting anomaly with potentially significant implications.

Economic factors have proven not to be decisive for the level of public support for Russia's political elite, at least during the past few years of Russia's struggling economy. Instead, the public appears to be driven by a broader set of factors that the Kremlin is apparently able to control. Following the legislative elections in 2011 and public protests, the Kremlin successfully expanded its appeal by a rhetoric emphasising Russia's "traditional" values. Putin has managed to broaden his support base even more following the annexation of Crimea and the resulting conflict in Ukraine. A large segment of the Russian society has effectively rallied around the national flag<sup>1</sup>.

Thus, a key question about Russia's future politics is whether the current leadership, led by President Putin, will continue to enjoy high public support, securing new rounds of electoral victories. A related question for the next two decades is when and how Russia will witness a political transition. The transition could be in the form of a new leader, handpicked by President Putin. It could also be a more drastic one—a new leadership with a different worldview. If there is a transition, will it entail continuity or a shift in favour of greater cooperation with Europe and the West overall? Assumptions on these points provide a guideline for the scenarios in this study.

---

<sup>1</sup> Greene, Robertson (2014)

### 3.4.3 Russia's Foreign Policy and Its Implications

For nearly a quarter century following the collapse of the Soviet Union, relations between Russia and the West (the EU and the US) were mostly calm. Periodic tensions were not absent. One source of disagreement was NATO's role in Kosovo in the late 1990s. Another crisis emerged during Russia's brief war with Georgia in 2008. However, even after the Georgia crisis, it did not take long for the West and Russia to get back to business as usual.<sup>1</sup> Furthermore, there were prolonged periods of high optimism for cooperation—namely most of the 1990s and the aftermath of the terrorist attacks in the US during September 11. Overall, the dominant foreign policy paradigm was about finding paths for Russia's integration with the West.

This paradigm has abruptly changed in the past two years following Russia's annexation of Crimea and the ensuing military crisis in east Ukraine. Some have argued that Russia is no longer seeking integration with European institutions.<sup>2</sup> The precise goal and scope of such integration was never clear. But, while it had remained at the centre of Russia's interaction with Europe previously, it does not anymore. Instead the dominant paradigm has shifted away from integration and towards intensified geopolitical competition. It is marked by pessimism, and even fear that a military conflict between Russia and European nations has once again become a real possibility.

While looking at what has changed in the past few years may help understand where Russia's relations with the West are headed, it is worth underlining some continuities as well. They are highly significant, as they shed a light on where Moscow's priorities lie and what means of interaction Russia's leadership may prefer.

Several major continuities could be observed in post-Soviet Russia's foreign policy, especially after Putin's rise in politics. A primary one is Russia's determination to challenge what it perceives as a unipolar world dominated by the US. The Kremlin has strived to be accepted as an equal power by Washington. Its leadership has perceived the expansion of NATO to the post-Soviet space as a major threat and a vindication of a unipolar world. After its failure to stop NATO's expansion to the Baltics, it has been determined to stop further expansion within its so-called "near abroad" which it considers as an area of special interest. Moscow's preferred platform for addressing international crises has been the United Nations, where it has a veto power, and it has remained concerned about NATO's role in regional security issues.

Another major continuity, particularly following Putin's consolidation of power, has been the mismatch between some of the West's and Russia's values and perceptions of democratisation. As the US and EU applauded the "colour" revolutions in former Soviet republics, Russia watched on high alert, concerned about similar public unrest at home. Russian leaders have also been cautious about democratisation in the Middle East following the "Arab Spring", warning about potential turmoil in the aftermath of the power vacuum left by Arab dictators. Not unexpectedly, the liberal West and "illiberal" Russia have had some major divergences in their worldviews.

In the context of such continuities, several major changes in Russia's recent approach to the outside world appear significant. One major difference is that Russia has become more willing

---

<sup>1</sup> Giles (2016)

<sup>2</sup> Trenin (2016a)

to use military force abroad.<sup>1</sup> More assertive foreign policy backed by military interventions has intensified tensions with the West. The war in Georgia, the annexation of Crimea and its alleged involvement in east Ukraine, and the deployment of military forces in Syria have all demonstrated that Russia has broken the “monopoly of the US” on the global use of military force<sup>2</sup>. Russia’s build-up of its conventional military in the preceding years has facilitated this outcome.

Russia has also become more interested in joining or leading alternative regional establishments. Its Foreign Policy Concept has emphasised relations with organisations such as BRICS and the Shanghai Cooperation Organisation. Meanwhile, within the “near abroad”, it has strived to revive the Collective Security Treaty Organisation, while aiming to enhance economic and potentially political integration within the CIS through launching a new project—the Eurasian Economic Union (EEU).<sup>3</sup>

What could also be described as a relative novelty is the intensified scope of Russia’s geopolitical competition. For long, Moscow’s competition was principally with the US, as the lead power in NATO. But, the EU’s process of integrating its neighbours through various platforms such as Association Agreements and the European Energy Community has run counter to Moscow’s policy preferences in the former Soviet space. By establishing the EEU, Russia has strived to provide an alternative platform for integration with “near abroad” countries.

At the backdrop of these developments, Ukraine has represented a major arena for competition between the EU and Russia in the geopolitical map of Eurasia. Ukraine’s failure to sign the EU-Ukraine Association Agreement (AA) in 2012 was followed by popular unrest, prompting a political and military crisis. Signing an Association Agreement and Deep and Comprehensive Free Trade Agreement with the EU on the one hand<sup>4</sup>, and joining the EEU on the other were two alternatives that Kyiv had to choose from. They represented competing institutional arrangements—two distinct trade blocs—that could not be reconciled.<sup>5</sup>

Finally, Russia’s resurgent foreign policy has become an ultimate source of legitimacy for the political regime in a way that has not been the case in the post-Soviet period. Many Russians have rallied around the flag leading to the remarkable popularity of President Putin. A changing mood and pride about Russia’s resurgent role in world politics has also been accompanied by growing suspicion of the West.<sup>6</sup> This has magnified the challenge for those willing to build new bridges between Russia and the West.

#### 3.4.4 Russia’s Evolving Approach to the Gas Sector

Russia’s gas sector has witnessed significant changes in the government’s approach in the past two and a half decades. Its evolution, along with the development of other leading sectors such as oil, sheds light on the government’s changing priorities in areas such as the extent of state

---

<sup>1</sup> Giles (2016)

<sup>2</sup> Trenin (2016b)

<sup>3</sup> Monaghan (2013)

<sup>4</sup> EurActiv (2013)

<sup>5</sup> Dragneva, Wolczuk (2012)

<sup>6</sup> Quinn (2014), Ukrainskaya Pravda (2015)

intervention, the role of foreign partnerships, and the extent of competition the Russian leadership finds acceptable in such leading sectors.

Without getting into the details of Russia's gas sector, it is possible to suggest several principal features that have largely been a product of government policy. First, the sector has remained predominantly under state control. Even during mass privatisation in the 1990s, natural gas was one of the few sectors that was left mostly untouched and remained principally under the control of Gazprom.

While Gazprom has not been the only state-owned gas supplier in the EU, there has been a common perception in Europe that questions the ability of the Russian company to conduct its operations autonomously. An extensive scholarly discourse on Russia's ambitions and ability to use natural gas as a foreign policy tool reflect such perceptions.

Second, the role of foreign partnerships in the gas sector has remained generally minimal. Unlike in the oil sector, where British Petroleum, for instance, succeeded in making major inroads in Russia, in the gas sector, foreigner companies remain junior partners. In 2008, new legislation known as the Strategic Investment Law came into force.<sup>1</sup> In a setting that already presented significant roadblocks for foreign investments in sectors designated as strategic, the 2008 Law prescribed new limitations for investing in the gas sector.

Meanwhile, on numerous occasions, Russia's Gazprom has also expressed its concerns about barriers for investing in Europe's gas downstream. In fact, it has perceived major pieces of EU legislation regulating gas as measures aimed at limiting Russia's further entry in European downstream gas.<sup>2</sup>

Overall, mutual investments between EU companies and Russia's Gazprom exist. However, they remain below what companies on both sides have aspired for. The study assumes that a greater extent of mutual investments in the gas sector between Russia and the EU strengthens the stakes on both sides for finding compromising solutions when needed.

Third, while Gazprom has maintained its dominant role in the gas sector, its position has been gradually eroded in the past decade. Thus, its share in Russia's gas output has declined gradually—from about 85 percent in 2004 to about 74 percent in 2015<sup>3</sup>. This reflects a complex set of factors, including elite competition, which has allowed the rise of new players in Russia's gas field—notably Rosneft and Novatek.<sup>4</sup> More recently, pressure has mounted on Gazprom to abandon its monopoly on gas exports. As a first step, Gazprom's monopoly in LNG exports has been broken, though its monopoly position in piped gas exports remains.<sup>5</sup>

---

<sup>1</sup> Clifford Chance (2014)

<sup>2</sup> Euro-Atlantic Security Initiative Working Group on Energy (2012)

<sup>3</sup> "Gas Production in Russia Down 1% in 2015", *Interfax*, January 2, 2016

<sup>4</sup> Henderson, Mitrova (2015), p. 22

<sup>5</sup> Solovyov (2016)

## 3.5 Turkey

### 3.5.1 Turkey's Energy Diplomacy and Its Role in EU's Gas Diversification

Turkey's role in EU efforts to diversify its gas supplies goes back to the 1990s. The rise of new independent states in the aftermath of the collapse of the USSR opened a window of opportunities for Turkey. Several of these independent states, namely Azerbaijan, Turkmenistan and Kazakhstan were not only rich in energy reserves, but also shared historical and cultural ties with Turkey enhancing the ability of the latter to project its "soft power" in the Caspian region.<sup>1</sup>

From the early 1990s, Turkey's policy objectives with regards to energy resources in the Caspian region converged with those of the EU and the US. With strong backing from Brussels and Washington, Turkey was part of active energy diplomacy aimed at connecting Caspian resources with international markets.

For over two decades, Turkey's energy diplomacy in the Caspian region has been driven by several objectives. First, Turkey has strived to enhance the independence of former Soviet republics by ensuring they gain new outlets for exporting their energy resources. The energy-rich countries of the Caspian region inherited a pipeline infrastructure that necessitated their exports to cross the territory of the Russian Federation. Turkey hoped that building new energy export outlets bypassing Russia's territory would lessen the dependence of countries in the Caspian region on Moscow.<sup>2</sup>

Second, Turkey has also been driven by its hopes to capitalise on its geographic location, and serve as a transit route between the Caspian as an emerging energy supply centre and Europe. For Ankara, achieving such a role has been tantamount to enhancing its strategic role in its neighbourhood and beyond.<sup>3</sup>

Finally, Turkey's rapidly growing energy demand in the past three decades has prompted its proactive energy diplomacy. Already in the early 1980s Ankara signed a major gas deal with the USSR. This was the first attempt to ensure that natural gas emerged as a significant part of Turkey's energy balance. Prospects for Azeri and Turkmen gas after the break-up of the USSR raised Turkey's hopes for acquiring access to new sources of gas for its growing demand.

While the Caspian region has been central in Turkey's energy diplomacy, more recently the rise of new prospective gas resources in its neighbourhood has created opportunities for Ankara to play a role in the EU's drive for gas diversification. Turkey has emerged as a possible route for bringing natural gas from northern Iraq and the east Mediterranean to Europe. Likewise, with the demise of sanctions on Iran, Turkey has also appeared central to EU discussions about piped gas from this potential new source.

Yet, the record of Turkey-EU energy diplomacy in Turkey's neighbourhood has been mixed. There have been several areas of success amidst a number of disillusionments. The success has been principally limited to energy resources in Azerbaijan. The first successful step was about

---

<sup>1</sup> Balci (2014)

<sup>2</sup> Sayari (2000)

<sup>3</sup> Roberts (2015)

oil. Following the so-called Deal of the Century signed between an international consortium and Azerbaijan in 1994, the Baku-Tbilisi-Ceyhan (BTC) oil pipeline became active in 2006. It connected Azeri oil to world markets while ensuring Turkey a highly significant transit role.<sup>1</sup> Bringing Azeri gas to international markets turned out to be more challenging. Shortly after the launch of the BTC pipeline, the South Caucasus gas pipeline linking Azerbaijan and Turkey was inaugurated. While this constituted a major step, the pipeline served initially only the Turkish market.

Negotiations for bringing Azeri gas to Europe dragged on for several years. In 2002, preparations started to build a large capacity (31 bcm) pipeline that would bring gas to Europe from Azerbaijan and potentially other regional sources. This would constitute the core of the Southern Gas Corridor. However, the project failed to materialise. Instead, the stakeholders opted for a pipeline with a much more modest capacity to export gas to Europe. Thus, amidst several competing pipeline projects, the consortium developing Azerbaijan's Shah Deniz II opted in favour of the Trans Adriatic Pipeline (TAP), which would initially bring the relatively modest 10 bcm to the EU market.<sup>2</sup> In the meantime, Turkey and Azerbaijan established a consortium to build the Trans-Anatolian Natural Gas Pipeline (TANAP) that would connect with the existing South Caucasus Pipeline and TAP.<sup>3</sup>

While the fate of Nabucco was a major setback for Turkey and the EU, it has not been the only one. Another disappointment was witnessed with regards to the Trans-Caspian pipeline (TCP). Proposed in the mid-1990s, the pipeline aimed to bring Turkmen gas to Europe.<sup>4</sup> Unlike in Azerbaijan, where the size of reserves has been relatively limited, Turkmenistan could offer much greater gas volumes for diversifying EU's gas, while also meeting Turkey's growing demand. However, despite intense diplomatic efforts, the project failed to move forward. This was largely due to the unresolved status of the Caspian Sea<sup>5</sup> and Russia's opposition to the pipeline. Turkey's decision to sign a major gas deal with Russia in 1997 also weakened the prospects for the TCP. The intergovernmental agreement allowed Russia to build a new pipeline to Turkey under the Black Sea, and it practically secured Gazprom a major victory against Caspian gas in the race to supply the Turkish market. The TCP and the possibility for access to Turkmen gas remain on Turkey's and the EU's gas diversification agenda. However, no tangible progress has been achieved so far.

Headway has been slow in negotiations over alternative supplies from Turkey's neighbourhood as well. Gas from Northern Iraq, controlled by the Kurdish Regional Government (KRG), has emerged central to Ankara's energy diplomacy in the past few years.<sup>6</sup> However, security concerns have delayed progress, though the Ministry of Natural Resources of the KRG has indicated its plans to start exporting about 10 bcm to Turkey by the end of the decade.<sup>7</sup> While initially targeting the Turkish market, gas from Northern Iraq remains as a potential long-term alternative source for the EU as well.

---

<sup>1</sup> Cornell, Tsereteli, Socor (2005)

<sup>2</sup> Stamouli (2016)

<sup>3</sup> World Bank (2016b)

<sup>4</sup> RIA Novosti (2007)

<sup>5</sup> Zimnitskaya, Von Geldern (2011)

<sup>6</sup> Özdemir, Raszewski (2016)

<sup>7</sup> Razzouk (2016)

Likewise, hopes for quickly securing access to East Mediterranean gas to meet EU demand have also not materialised. Turkey has once again emerged as a potential transit route for this gas. However, Ankara's tense relations with Cyprus, and with Israel after the Gaza flotilla crisis in May 2010, have constrained its role. Tense relations contributed to a period of delay, prompting gas developers in the East Mediterranean to focus on potentially more costly options, such as LNG shipments to Europe.

### 3.5.2 Turkey's Domestic Political Context and Implications for EU's Gas Diversification

Turkey's domestic political context has not had any significant impact on EU gas diversification so far. Yet, it remains increasingly relevant. As in the case of Russia, the study suggests that the future of Turkey's democracy could have implications for Ankara's relations with the EU, and potentially for EU gas diversification policies. The underlying assumption is that if political values between Turkey and the EU diverge further this would constrain opportunities for cooperation, including in energy.

A comparison with Russia could highlight some of the key characteristics of Turkey's domestic context and its potential implications. Thus, similar to Putin's Russia, Turkey's prospects for a democratic transition have deteriorated in the past few years. Setbacks with regard to press freedom, human rights, and gender equality have lowered Turkey's democratic standing.<sup>1</sup> According to the 2015 Freedom in the World Index, Turkey has moved backwards in democratic norms, with press freedoms receiving a major hit.<sup>2</sup>

Overall, Turkey under Erdogan's leadership has consistently moved towards a growing degree of concentration of power around the executive. The media, NGOs, the judiciary and the legislature have witnessed considerable erosion in their capabilities to check the power of the executive. The military, which has had the tradition to intervene in politics, has also been sidelined.<sup>3</sup> Concentration of power around the executive has further intensified in the aftermath of the failed putsch of July 15, 2016. Turkey has blamed Fethullah Gulen, a Turkish cleric living in the US, for the failed coup attempt and declared "state of emergency", prompting series of purges within various establishments, including the media and the judiciary.

Higher concentration of power around the executive has yielded a growing level of unpredictability about Turkey's policies at home and abroad. As a result, surprises and policy reversals have become more likely than before. This includes relations with other countries as well as key domestic political choices, including on energy.

What distinguishes Turkey from Russia is the lack of overwhelming popular support for the president and the presence of a highly polarised and divided society. The ruling party, AKP, has been in power since 2012 and has consecutively won five general elections. But public support for AKP has hovered below 50 percent, though the electoral system has allowed the party to acquire a majority of the seats in the legislature.<sup>4</sup> The party lost its ability to rule alone after

---

<sup>1</sup> Eligür (2014)

<sup>2</sup> Freedom House (2015)

<sup>3</sup> Cagaptay (2016)

<sup>4</sup> In Turkey's first popularly elected presidential election in 2014, Erdogan succeeded gaining 52 percent, partly owing to significantly lower electoral turnout.

the June 2015 elections, but with snap elections in the fall, amidst resumption of ethnic violence at home, it ensured the continuity of its single-party rule.

Polarisation within the society has been running deep, as revealed in a recent study by the German Marshall Fund.<sup>1</sup> The reasons are partly historical as the principal social cleavages are anything but new. A struggle between secular and Islamist conservatives has been part of Turkish politics for nearly two centuries. Ethnic tensions in the population with Kurdish origins are not a novelty either. Turkey's quandary has been that both of these cleavages have been forcefully reignited by the increasingly authoritarian ruling style of the AKP. Erdogan's policy choices and rhetoric have arguably exacerbated disagreements across the Turkish political spectrum.<sup>2</sup>

As the future of Turkey's domestic politics may be imperative for its foreign and energy relations, there are several questions that are likely to be of determining nature. The immediate question is whether Turkey will go through a constitutional reform transforming the traditional parliamentary republic into a presidential system. Fiercely opposed by the pro-secular parts of the Turkish society, a victory for a presidential system would signify a further setback for Turkey's prospects as a secular democracy. An equally pertinent question is about Turkey's post-Erdogan political transition. When and how it happens may be essential for the state of Turkey's democracy as well as its foreign relations. The transition entails widely different possibilities, ranging from a further entrenched Islamist-authoritarian rule to a return to secular democratisation. Finally, the extent of Turkey's ability to alleviate ethnic tensions at home remains important. Ethnic and political stability is crucial for Turkey to maintain and expand its role as a major player in international transit of energy.

### 3.5.3 Turkey's Foreign Policy and Its Implications

There are three main areas in Turkey's foreign policy that are relevant to EU gas diversification. First, the overall state of Turkey's relations with the EU matters for their energy cooperation. Second, Ankara's relations with Russia are significant, as they could determine Turkey's motivation for diversifying its own dependence on gas imports, affecting its capability to serve as a transit country. Third, Turkey's relations with its neighbourhood, particularly the countries that possess substantial gas reserves could also determine its potential role as a transit country.

#### 3.5.3.1 Relations with the EU

Turkey's relations with the EU (and its predecessors) have involved periodic difficulties, but no major crisis that could sever their ties has happened for at least three decades. The dominant paradigm has been about Turkey integrating into European institutions. Turkey has been a member of the Council of Europe since 1949, a member of NATO since 1952, an associate member of the European Economic Community, the predecessor of the EU since 1963, part of

---

<sup>1</sup> German Marshall Fund (2015)

<sup>2</sup> Tsang (2013)

the EU Customs Union since 1995, and a recognised candidate for full membership since the Helsinki Summit in 1999.<sup>1</sup>

Notwithstanding the causes, the failure for the EU and Turkey to move ahead with full membership has been one of the major upsets in Turkey's external relations for over half a century. This has contributed to deep resentment within Turkey, arguably prompting the weakening of its pro-Western and secular popular base.

While a major crisis has been avoided, if either Turkey or the EU would decide to terminate the integration process, it is inevitable that this would have broader repercussions on their relations. It would represent a paradigm shift from decades of integration to a new type of relationship which form is difficult to envision. Turkey and the EU have not reached such a point, but tensions have been brewing. The EU has been increasingly concerned about the erosion of Turkey's democracy, and since the June 2015 elections, the growing ethnic violence in the country.<sup>2</sup>

Such tensions, however, have been overridden by EU's concerns about the refugee crisis stemming mainly from Syria. With about 2.7 million refugees on its territory, Turkey has been the largest host of Syrians seeking shelter away from their civil war-ravaged country.<sup>3</sup> Many EU member states have been concerned about a potential increase of refugees from Turkey, while Ankara has insisted that EU should play a more welcoming role for these refugees.<sup>4</sup> Arguably, the threat of more refugees in Europe, and Turkey's role in stemming such a possibility has "bought" some time for both sides to avoid a crisis in their relations.

### 3.5.3.2 Relations with Russia

Relations with Russia constitute another key area with repercussions for Turkey's relations with Europe. The two countries have gone through a notable period of rapprochement since the end of the Cold War, followed by a sudden spike in tensions in the aftermath of a Russian military jet shot down by Turkish air forces in November 2015, and another attempt for rapprochement since June 2016.

In the context of Turkey's resentments related to the EU and its increasingly "independent" foreign policy in the past decade, Ankara's deepening cooperation with Moscow raised pertinent questions. How far could their cooperation go? Would the impressive growth in their economic ties transcend into new areas, including military? Could Turkey's enhanced relations with Russia and their shared neighbourhood contribute to a shift in Turkey's foreign policy orientations? Turkey's policy of neutrality during the Georgia crisis in 2008, the intensity of high-level meetings between the two countries in the following years, and declarations from Erdogan indicating Turkey's interest in the Eurasian Economic Union, contributed to speculations about the future of Turkish-Russian relations.<sup>5</sup>

---

<sup>1</sup> Tocci (2014), p. 5-8

<sup>2</sup> BBC (2015)

<sup>3</sup> As of June 2, 2016, the number of registered Syrian refugees stood at 2,743,497, see: United Nations High Commissioner for Refugees (2016)

<sup>4</sup> Kingsley (2016)

<sup>5</sup> Kirisci (2015)

Yet, the Turkey and Russia have been operating under some historical and political constraints that appear pivotal and are likely to remain so in the future. Despite their notable rapprochement in the past two decades, the two countries maintain historical disagreements and rivalries. Even at the height of their relations, prior to the downing of the military jet at the end of 2015, the two sides maintained highly distinct views on key regional conflicts, such as the Armenian-Azeri conflict over Nagorno-Karabakh. They have continued to compete for influence in Central Asia. Russia has consistently resisted Turkish demands to recognise the Kurdish-led PKK as a terrorist organisation.<sup>1</sup>

Economic and military ties have also faced some limits. Despite numerous efforts, severe trade imbalances in Russia's favour have remained. Military cooperation never went beyond modest and largely symbolic steps. It is worth recognising that historically, only under severe internal security problems or an actual military confrontation with other countries has Turkey opted to enter into an alliance Russia.<sup>2</sup> Traditionally, the two countries have been on the opposite side in most regional conflicts during the five centuries of their bilateral relations.

Thus, it is not entirely surprising that the two countries found themselves in major disagreements following the turmoil in the Middle East post Arab Spring. For at least three years, both managed to “compartmentalise” their relations by not letting the Syria conflict damage their ties.<sup>3</sup> But as the crisis lingered, their approach could not outlive the conflict.

What has also contributed to the swift reversals in Turkish-Russian relations in the 2015-2016 period is the decision-making style in both countries. Both in Russia and in Turkey, power is strictly concentrated around their two respective leaders. Putin and Erdogan are in a position to disregard input from various stakeholders in the political spectrum without risking a major damage on their public support. In line with this concentration of power around the two leaders, bilateral relations on key issues, such as energy, have been highly personalised.

As the political system in both Russia and Turkey has been conducive for erratic decision-making, this has allowed for a number of reversals and upsets in their bilateral energy relations. Thus, in a surprise move at the end of 2014, President Putin announced the suspension of the South Stream gas pipeline in favour of a new route through Turkey, commonly known as the Turk Stream. Ankara quickly endorsed the project, though it had earlier expressed concerns that such a project might jeopardise hopes for growing volumes of Caspian gas transiting through Turkey. Within a year, the Turk Stream was shelved by Moscow following the military jet crisis. Years of progress in bilateral cooperation in nuclear energy were also affected, as Rosatom announced its decision to halt construction work at Turkey's first nuclear power plant in Akkuyu.<sup>4</sup>

Yet by the end of June 2016, in a sharp turnaround, Ankara apologised for the military jet crisis and started a process of mending its relations with Moscow.<sup>5</sup> Following a meeting between the two countries' presidents, both sides renewed their support for the Turk Stream and the Akkuyu nuclear project. Meanwhile, Moscow has continued to provide mixed signals about its preferred

---

<sup>1</sup> Vatansever (2010)

<sup>2</sup> These occasions are: in 1833 in the aftermath of a rebellion in Egypt, then province of the Ottoman Empire, and in 1919-22 during Turkey's “Independence War”.

<sup>3</sup> Karakullukcu, Trenin (2014)

<sup>4</sup> Coskun (2015)

<sup>5</sup> “Seeking to Improve Ties with Russia, Turkey Apologizes for Downing Warplane”, *New York Times*, June 27, 2016

pipeline route under the Black Sea. The South Stream project, which was shelved at the end of 2014, has periodically reappeared on Russia's agenda, though most former obstacles leading to its demise remain in place. As a result, the study assumes that if there is an undersea pipeline crossing the Black Sea, it is more likely that it will go through Turkey.

How Turkey's relations with Russia evolve is highly significant for the EU. For over two decades, Turkey and Russia were heading towards a deepening partnership. In this context, Ankara continued to expand its energy ties with Russia. Growing volumes of gas imports represented one major aspect of their deepening energy relations. Arguably, while Turkey maintained a policy aimed at diversifying its gas imports, it did not feel the urgency to reduce dependence on Russia. This largely allowed Ankara to agree on what might be described as a major sacrifice in its energy relations with the EU: it agreed to take a minor portion of Azeri gas coming through the Southern Gas Corridor in favour of allowing most of the volumes to be exported to the EU. Thus, TANAP will initially carry 16 bcm of natural gas, as Turkey's intake will be 6 bcm.<sup>1</sup>

In the aftermath of the downing of the Russian military jet, the rhetoric in Turkey changed, as its leadership started emphasising the need to lower its dependence on Russian gas. There are still many years left till Turkey's major import contracts with Gazprom expire. For instance, a 4 bcm contract between BOTAS and Gazprom for gas routed through the Balkans expires in 2021, while BOTAS' largest contract for gas deliveries through the Blue Stream ends in 2025.<sup>2</sup> However, as Turkey's demand for gas keeps growing, a decision to avoid new contracts with Russia would signify a growing diversification of its gas imports.

Following the renewed efforts to restore relations, Turkey and Russia are once again back to the dominant paradigm in their post-Soviet relationship favouring cooperation. Whether and how the two countries restore their relations is crucial for Turkey's future energy diplomacy. Thus, if Turkish-Russian relations were to go through a paradigm shift, whereby sporadic tensions rather than cooperation is the new normal, Turkey's attention is likely to turn increasingly to alternative gas supplies in its neighbourhood. How this might affect gas transit via Turkey will largely depend on Turkey's relations with potential gas suppliers nearby. On the one hand, Turkey may become less willing to "sacrifice" its own access to non-Russian gas in favour of transit. But on the other hand, Turkey may have even greater motivation to find common ground for cooperation with potential suppliers such as KRG, Iran, Israel and Cyprus.

### 3.5.3.3 Turkey's Relations with Potential New Suppliers

For over two decades, Turkey has tended to respond proactively to energy opportunities arising in its neighbourhood. In the aftermath of the USSR's collapse, Caspian oil and gas resources quickly appeared at the centre of Turkey's diplomacy, as did Iran's vast gas reserves. As Turkey appeared determined to expand the use of natural gas for its energy needs, it signed a major gas contract with Iran in 1996.<sup>3</sup> While the gas relationship with Iran has involved repeated commercial controversies, Iranian gas has played a significant role in diversifying Turkey's gas

---

<sup>1</sup> Hafner (2015)

<sup>2</sup> O'Byrne (2016)

<sup>3</sup> The contract was signed for 23 years with initial exports planned to be 4bcm per year, followed by a further expansion to 10 bcm a year, see: Kinnander (2010)

imports. With the demise of sanctions on Iran, the country maintains prospects for further deepening of gas trade with Turkey.

In the past decade new opportunities have arisen in Turkey's immediate neighbourhood. The KRG, through it enhanced autonomy in the aftermath of the fall of Saddam Hussein's regime, has strived to develop its rich oil and gas resources. In a major turnaround in its policy towards the Kurdish autonomous government, the AKP leadership has steered away from its strong ties with central government in Bagdad in favour of deepening economic and energy partnership with the KRG. Ankara agreed to allow the KRG to export oil through the Kirkuk-Ceyhan pipeline, which has started generating the bulk of the government's revenues. Progress on gas cooperation has been slower, though both Ankara and Erbil claim Turkey may start importing up to 10 bcm of Kurdish gas by the end of the decade. Further down the road, the capacity could double, allowing exports to Europe.<sup>1</sup>

While the gas project with the KRG could further enhance Turkey's gas import diversification and potentially contribute to the EU's gas balance as well, geopolitical instability in the region is a factor that could jeopardise progress.<sup>2</sup> Thus, a key question remains whether and how the KRG and Turkey will take further steps in their energy partnership amidst growing turmoil in the region overall, including within Turkey's Southeast provinces bordering the KRG.

Recent discoveries of gas reserves in the East Mediterranean have also created new opportunities for gas diversification both in Turkey and the EU. While several substantial discoveries by Israel, Cyprus and Egypt have put this region on Europe's energy map, questions about the route for shipping the gas from this region remain unresolved. Three alternatives have been under consideration—a pipeline through Turkey to the EU, an undersea pipeline through Greece's islands and exports in the form of LNG.

Amidst these export options for East Mediterranean gas, Turkey has been keen on enhancing its transit role. A route through Turkey may be less costly than others, as suggested by the IEA preliminary assessment.<sup>3</sup> However, some major upsets in Ankara's foreign policy in the past few years have constrained its ability to once again capitalise on its geographic location. Relations with Israel remained tense after Israel's Gaza flotilla raid in 2010. In the end of July 2016, Turkey and Israel signed a deal to mend their relations.<sup>4</sup> While the deal encompasses energy, it remains to be seen whether both sides will successfully re-establish their ties in the near future. Likewise, diplomatic relations with Egypt were downgraded following the military coup by Sisi in 2013. Turkey has signalled its intent to restore relations with Egypt as well. Finally, despite re-emerging hopes for reconciliation between Turkey and Cyprus under the AKP, progress has stalled complicating potential cooperation on energy.

The future of East Mediterranean gas will largely be determined by both economic and political considerations. While the relative costs of various export routes are bound to be crucial, Turkey's ability to secure a turnaround in its relations with regional countries also remains essential. Thus, whether there will be a reconciliation with Cyprus and a successful reversal in

---

<sup>1</sup> Razzouk (2016)

<sup>2</sup> Robert (2016)

<sup>3</sup> Erkul (2016)

<sup>4</sup> "Turkey, Israel Sign Deal to Normalize Ties", *Hurriyet Daily News*, June 28, 2016

Turkey's relations with Israel are likely to determine Turkey's ability to perform a major role in the future of East Mediterranean gas.

Ankara's "multivectoral" foreign policy propagated by the AKP-led government has translated to an unusually proactive foreign policy particularly towards its eastern and southern neighbours. However, in the aftermath of the Arab Spring and the Syrian imbroglio, Turkey has witnessed major setbacks and growing isolation due to severed or downgraded diplomatic relations with many regional countries. In this context, it will be important whether Turkey moves towards further alienation or successfully adopts a policy of reset, which could potentially indicate a revamped role for Ankara in its neighbourhood, including on issues related to new gas opportunities.

### 3.5.4 Turkey's Gas Sector—Opportunities and Constraints

Turkey's gas sector and the government's evolving approach present some major opportunities and constraints in Ankara's role in EU gas diversification. The size of the gas sector is one of Turkey's main strengths. It has evolved rapidly in the past two decades to transform Turkey into Europe's fourth largest gas consumer, and the second largest importer of Russian gas (after Germany). Since 2012, gas has become Turkey's main source of energy.<sup>1</sup> Furthermore, unlike most parts of the EU, Turkey's gas demand continues to grow, driven by relatively higher economic growth rates and expanding power generation. Some forecasts predict gas demand reaching 81bcm by 2030.<sup>2</sup>

Yet, Turkey's aspirations to emerge as a major transit country for gas hinge on its ability to timely address several regulatory and infrastructural constraints. On the regulatory side, in 2001, Turkey took major steps by establishing an independent regulator (Energy Market Regulatory Authority [EMRA]) and launching the liberalisation of its gas sector. However, progress in gas liberalisation has stalled. Steps aimed at limiting the market share of the incumbent gas company, BOTAS, have been slow. As of 2015, it still accounted for about 80 percent of Turkey's imports.<sup>3</sup> Furthermore, as BOTAS has been required to subsidise gas sales in Turkey, this has limited its financial capabilities for new investments.<sup>4</sup> Meanwhile, a legislative proposal is yet to be implemented about unbundling BOTAS.<sup>5</sup>

Another major challenge lies in Turkey's ability to establish the necessary infrastructure that would ensure greater market liquidity within its market along with sufficient capacity for transit. At a minimum, Turkey needs a much larger storage capacity. Large storage has been one of the major strengths of Ukraine's transit system. Yet, Turkey's storage has been inadequate: it stood at 4.1 bcm in 2014 which corresponded to less than 10% of the country's annual imports.<sup>6</sup> Likewise, import and transmission infrastructure has occasionally caused difficulties during peak demand in the winter.<sup>7</sup> Infrastructural bottlenecks and lack of sufficient

---

<sup>1</sup> Clemente (2016)

<sup>2</sup> Rzayeva (2014)

<sup>3</sup> Tuncalp (2015)

<sup>4</sup> Rzayeva (2014)

<sup>5</sup> O'Byrne (2016)

<sup>6</sup> Çolakoglu, Günsel (2014)

<sup>7</sup> O'Byrne (2014)

storage have contributed to Turkey's occasional inability to take the contracted gas, namely from Azerbaijan, causing a financial burden for BOTAS and the country's budget.<sup>1</sup>

Last, Turkey's energy diplomacy abroad has been traditionally constrained by the lack of a Turkey-based international oil major. The country has lacked the equivalent of oil/gas majors found in Western Europe and the US. Turkey's leading companies such as BOTAS and Turkish Petroleum (TPAO) have been predominantly inward looking. TPAO has taken a major step by becoming a shareholder in the Shah Deniz consortium as well as the South Caucasus Pipeline. Likewise, BOTAS has become a shareholder in TANAP. Also, Genel Energy, a privately-owned Turkish-British company has become a leading player in Northern Iraq. For a more active and effective energy diplomacy abroad, the question remains whether Turkish energy companies will move further with their "internationalisation" and expand their capital investments abroad.

---

<sup>1</sup> Natural Gas Europe (2016g)

## 4 PART C: SCENARIOS—THE POLITICAL CONTEXT<sup>1</sup>

### 4.1 Main Assumptions and Results

The political scenarios of this study are based on a set of underlying assumptions. The detailed analysis of the three key players in this study assumes that the past could shed a light on what is likely to unfold in the future. The analysis above has identified particularities regarding political factors shaping the behaviour of the EU, Russia and Turkey. It has also determined the possible impact of politics on the role of natural gas in European energy.

There are a number of constraints these key players for European gas diversification face. These are likely to remain in the future and will limit the spectrum of possibilities. Some patterns of behaviour by key players, and a broader set of drivers that affect such behaviours, are also likely to stay. But there is also a large set of uncertainties that make the task of predicting the future challenging. And certainly, there is always room for surprises.

The task of the study is to outline several possible trajectories for the evolution of EU gas diversification in the future. The outlined trajectories are preconditioned on a set of assumptions that make them more likely. These assumptions relate to a large set of questions that have been already outlined. Yet, two broad questions appear of utmost importance:

- Will political factors provide a conducive environment for continued growth in EU-Russian gas relations, or will they create insurmountable obstructions?
- Will political factors provide a conducive environment for a successful expansion of the Southern Gas Corridor (SGC) or obstruct its further development?

Based on these two fundamental questions, along with key assumptions from the following economic analysis (see below), the study outlines three possible storylines for the future of EU gas diversification. In the Gas for Sale Scenario, the political context is conducive to proceed with major new projects for Russian gas, including the construction of Nord Stream 2. It is also conducive to expand the Southern Gas Corridor, though to a limited extent. Hence, Europe proceeds with multiple import projects simultaneously, which allows enhanced gas diversification, while gas ties with Russia are further reinforced. In the Nord Dream scenario, the overall assumption is that the political context makes impossible to proceed with major new projects for Russian gas—the Nord Stream 2. The SGC meanwhile finds the most opportune context to expand. In the third scenario, the Southern Setback, politics obstructs the potential growth of the SGC while the EU maintains and expands gas ties with Russia.

In all three scenarios, LNG plays a role in EU's gas diversification. The study, however, assumes that the future role of LNG in Europe will be determined principally by relative prices, as

---

<sup>1</sup> Corresponding author: Adnan Vatansever (EUCERS)

established by the study's market simulation model. Political decisions, while still relevant, play a less decisive role.

## 4.2 The Gas on Sale Scenario

### 4.2.1 The European Union

The EU, despite its inherent difficulties of balancing economic and political disparities amongst its members, remains intact. UK's exit from the union does not lead to its break-up, while its leading members agree to reconsider the pace of political and fiscal integration. Its supranational entities continue to enhance their authority on matters affecting the Union overall and its members. Member states, however, continue to exhibit disparities leading to occasional disagreements within the EU. While further progress is made towards a common policy in EU external relations, bilateral ties between individual members and key external players remain important.

The EU's overall approach to natural gas in its energy balance does not immediately change. Gas remains a crucial "bridge fuel", while a growing number of EU members continue to expand their share of renewable energy. By 2035, despite continued growth in renewable energy and an aspiration to move beyond fossil fuels, gas maintains its significant share in the EU's energy mix, partly due to a decline in coal-fired power generation.

Gas liberalisation continues throughout the EU, though not at the pace envisaged in Brussels, leading to occasional infringement proceedings against member states. Meanwhile, the Agency for the Cooperation of Energy Regulators acquires more authority in enforcing the harmonisation of energy legislation across the EU and its neighbourhood.

Further steps taken for the implementation of the Energy Union contribute to a more unified energy and climate policy, though member states maintain a degree of sovereignty in their external energy relations. Divergences across member states fade over time, as markets in EU's eastern members get increasingly in line with EU Directives and achieves a growing degree of liquidity through new interconnections.

In terms of its external energy policy, the EU remains committed to gas diversification. Thus, its members, particularly those in Eastern and Central Europe, retain their support for bringing new gas through the SGC. This region also maintains its interest in greater access to LNG. Particularly the Baltic republics and Poland consider LNG (especially from the US) as an option worth supporting in line with their objectives to reduce their dependence on Russian gas. While the price of LNG determines the full extent of its further penetration in the EU, and LNG import volumes continue to fluctuate in line with international price cycles, some spike in LNG imports have a political ingredient.

#### 4.2.2 Russia

The Russian government continues to adhere to its goal to diversify the economy. But progress is slow as oil and gas retain their role as the main engines of the Russian economy. A degree of diversification is achieved, but the contribution of structural reform to this outcome remains modest. Such reforms proceed slowly at first, though after 2020 there is a renewed pursuit by Russia's leadership of new sources of economic growth. The effectiveness of Russia's "state capitalism" gets increasingly questioned, leading to a new series of reforms. Diversification happens gradually, largely due to a slowdown in Russia's oil sector, which peaks towards the end of the current decade, and its share in the economy continues to shrink through to 2035. The gas sector, while still generating fewer rents than oil as late as 2035, continues to grow in terms of its importance to the economy.

Overall, the Russian economy remains highly vulnerable to fluctuations in international commodity prices, oil in particular. This has some implications for gas. Namely, the economy's dependence on resource rents leads to Moscow's continued emphasis on security of demand for gas.

In terms of Russia's domestic politics, "managed democracy" prevails as power remains highly concentrated around the president, at least till the mid-2020s. President Putin successfully manages to maintain his high popularity and wins the 2018 presidential elections. Opposition remains disorganised, while liberal and pro-Western parties remain weak. The 2024 elections remain crucial, as President Putin decides to step down from the political scene. After picking his successor and using his political capital, he secures a victory for the successor. This ensures continuity for some of the established policies. Also, the new president continues to operate in a context where the power of the executive remains largely unchecked due to a weak opposition, weak media freedoms, a lack of independent judiciary and ineffective civil society. Yet, gradual steps are taken towards political reforms and democratisation, as pressure mounts for change, and there is a growing recognition that political modernisation could help with sustained economic growth.

In its external relations, Moscow remains determined to challenge the US and to oppose what it describes as US-led unipolarism. It is also in competition for influence with the EU in parts of its western neighbourhood. Through the end of this decade competition, instead of a loosely declared goal of further integration with Europe, remains Moscow's dominant paradigm. Russia appears in no hurry to shift back to the old paradigm of integration with Europe. Growing pride about Russia's resurgent role in the world, and growing nationalism and anti-Western attitudes among Russians creates a challenging environment for a major shift.

Overall, due to Russia's apparent willingness to project more frequently its military might abroad, along with the high degree of concentration of power around the president, Moscow remains highly unpredictable. Yet, Russia abstains from a new military adventure abroad at least till the political transition in 2024. Meanwhile, Russia adheres to the Minsk Accords contributing to a thaw in its relations with Ukraine and the EU. This also paves the way for a gradual removal of the economic sanctions by the EU in the aftermath of the 2018 presidential elections in Russia.

In the context of Russia’s political transition to a new leadership in 2024, Moscow orchestrates a brief crisis in its immediate neighbourhood, garnering public support for Putin’s handpicked candidate. However, the crisis, akin to the one with Georgia in 2008, is overcome swiftly. The EU illustrates its readiness to work with the new Russian leadership, prompting a new wave of intensive diplomacy.

In the gas sector, Gazprom continues to dominate exports, as it maintains a monopoly over gas exports through pipelines through to 2035. Its ability to conduct its operations autonomously from the Russian government continues to be questioned. At the end of this decade, this continues to cause anxiety in parts of Europe where dependence on Russian gas remains significant. Gas remains an area prone to politicisation.

However, several developments help to enhance Russia’s gas relations with Europe. Lifting of the sanctions opens the path for more cooperation in joint investments. Russia also goes through a gradual gas market liberalisation that further weakens Gazprom’s role at home and in LNG exports. Meanwhile, Gazprom opts to adapt instead of resist major changes in Europe’s gas market. This entails a greater acceptance of gas-to-gas competition instead of oil-indexed gas pricing. It also involves Gazprom’s growing adherence to EU gas legislation. These developments help to partially alleviate concerns in parts of the EU about dependence on Russian gas.

#### 4.2.3 Turkey

Turkey’s gas diplomacy continues to be driven by its growing demand for gas and its aspirations to emerge as a transit country essential for European energy security. Also, the government extends its policy of gas liberalisation, while channelling more investments in transmission and storage infrastructure.

Yet, Ankara is faced with the need to navigate through a set of difficulties in order to ensure its growing role as a transit country. First, in the near term, further deterioration in Turkey’s democracy heightens tensions with Europe, prompting a more cautious approach with the SGC in European capitals. Tensions however do not lead to a crisis that would end Turkey’s negotiations on EU integration. Nor do they interrupt progress on the development of the SGC. A constitutional reform that would transform the republic into a presidential system fails. Growing popularity for Erdogan in the aftermath of the failed coup attempt in July 2015 does not automatically deliver sufficient support for a presidential system. Prior to the next election cycle in Turkey—the presidential and general elections in 2019—the crisis is averted primarily as a result of EU’s priority to get Ankara’s help in addressing its “refugee crisis”. Elections in 2019 do not bring Turkey’s secular parties back in power. But the AKP is weakened, largely due to a slowdown in the economy. This prompts growing resistance within its ranks for a return to the party’s founding years when democratisation was upheld as an objective beyond rhetoric. Opposition grows stronger and becomes capable to return to power after two decades of rule by the AKP. This helps to ensure continued, albeit still an onerous partnership with the EU.

Second, Turkey’s strained relations with countries in its neighbourhood cause delays in completing negotiations for the import and transit of gas from new sources. Gas imports from the KRG proceed, albeit with a delay due to continuing turmoil in Turkey’s Southeast provinces.

In a context of increased regional alienation, Turkey reaches reconciliation with Israel as early as in 2016, but lack of trust remains. Also it takes much longer to find common ground with Cyprus. East Mediterranean gas finally flows through Turkey to the EU in the second half of the 2020s.

As the Russian and Turkish presidents face little constraints on their power, they are able to enforce a reset in their relationship as early as in 2016. This comes at a minimal political cost for them, while it allows restoring the bilateral economic partnership. Russia and Turkey revive the Turkish Stream project, though for Moscow, its initial purpose remains as serving the Turkish market without depending on transit through Ukraine. A return to “normal” with Russia also benefits the SGC, as Turkey feels no urgency to cut its dependence on Russian gas and allows a substantial portion of East Mediterranean gas to transit its territory.

#### 4.2.4 Implications for Gas Diversification in the EU

In summary, political developments related to the three key players in this study contribute to an environment that does not prohibit the further development of the SGC and the growth in gas relations between the EU and Russia. This outcome is partly preconditioned on economic assumptions in the simulation model, which envisages growing demand for gas imports in Europe.

In the EU, perceptions of energy security relating to gas continue to be shaped by the evolution of its internal energy market and the availability of gas import options. As the EU proceeds towards an Energy Union and the gas markets of its individual members become increasingly integrated and liquid, this enhances perceptions of improved energy security. Its eastern members continue to maintain anxiety over what they consider excessive dependence on Russian gas. Yet, they are largely alleviated by growing market liquidity and contract flexibility that allow access to alternative sources.

For Russia, security of demand for its gas exports remains crucial. It continues its policy of bypassing transit countries as a means for enhancing its own security of demand. As a result, despite a thaw in its relations with Ukraine, it remains committed to drastically reducing transit volumes through this country. Nord Stream 2 and a smaller capacity version of the Turkish stream are built allowing Russia direct access to its markets.

Difficulties in political relations with the EU remain, particularly in the near term. But amidst such difficulties, the EU finds that the benefits of further gas cooperation outweigh the costs of a major diversion in its gas imports away from Russia. Despite a lack of consensus within the EU on the need for Nord Stream 2, the pipeline is built, albeit with a slight delay.

Meanwhile, Gazprom opts for a strategy that further enhances its role as a gas supplier in Europe. Its decision in favour of competitive pricing pays off in terms of growing gas exports to Europe, though at lower prices. Likewise, as Gazprom opts to adapt instead of resist the gas liberalisation process in Europe, this also makes it more politically acceptable for EU member states to continue their flourishing gas relations with Russia.

Turkey continues to serve a constructive role in EU’s gas diversification as it strives to enhance its role as a gas transit country. The downturn in its democracy contributes to delays for the

SGC, but a full-scale crisis in its relations with the EU is averted; in the near term, due to EU's priority on the "refugee crisis" and in the longer-term, due to Turkey's ability to come back from the brink of an Islamist authoritarian regime.

### 4.3 The Nord Dream Scenario

The Nord Dream scenario is characterised by several principal differences compared to the baseline Gas on Sale scenario. The EU's relations with both Russia and Turkey evolve in a different trajectory. Continuous and growing tensions with Russia obstruct further growth in EU-Russian gas relations. Nord Stream 2 is suspended indefinitely as political tensions remain high. By contrast, relations with Turkey flourish allowing an even more conducive context for the expansion of the SGC. The overall extent of Russia's gas exports to the EU and the EU's gas diversification, however, is also shaped by Gazprom's pricing strategy as elaborated in detail below. The scenario assumes Gazprom adopts an oligopolistic pricing strategy that results in lower gas exports, but at higher prices. Higher prices, in turn, facilitate projects aimed at diversifying EU's gas imports through expanding the SGC and increasing LNG imports.

The scenario assumes no significant differences in the EU's own evolution as an entity. Its internal market evolves towards greater liberalisation and integration. Attracted by relatively higher gas prices, LNG and growing volumes of gas from the SGC contribute to a greater diversity in EU gas imports. Countries in Eastern and Central Europe find enhanced opportunities to reduce their dependence on Russian gas as market liquidity increases.

EU's relations with Russia continue to suffer further downturns that lead many to describe Moscow's relations with the West as a new Cold War. Domestic politics is not significantly different from the Gas on Sale scenario, at least in the near term. Putin steps down in 2024, but his successor continues a hard-line policy that favours state capitalism and avoids political modernisation. The main difference is in the Kremlin's foreign policy. Failure to adhere to the Minsk Accords extends the duration of the sanctions. Weak and slow recovery in the economy prompts the leadership to engage periodically in adventurist foreign policy in its neighbourhood. While this helps to maintain high public support for the leadership, it continues to strain relations with the EU and the United States.

In this context, Nord Stream 2 fails to proceed. Yet, Russia maintains its policy of circumventing transit countries. Gazprom strives to reduce transit through Ukraine and succeeds to a great extent largely due to reduced volumes of gas exports to Europe. Hopes to build a pipeline under the Black Sea, despite an initial "reset" with Turkey in 2016, also does not materialise. Turkey aligns its policies with its Western partners and continues its emphasis on gas diversification. This curbs the need for a new pipeline project under the Black Sea.

Turkey exhibits a notable resilience against its rising Islamist authoritarianism. Constitutional reforms aimed at transforming the country into a presidential republic fail and further concentration of power in the hands of the president is averted. High-stake corruption cases in the government and an economic downturn lead to the failure of the AKP to win the 2019 elections. The country's secular majority returns to power and reignites the policy of integration

with the EU, leading EU members to welcome this change in Turkey. As the survival of Turkey's secular democracy remains precarious, the EU maintains a cautious policy of integration that would not once again push the Turkish public back towards Islamist authoritarianism.

In the context of enhanced ties with the EU, Ankara launches a reset in its relations with countries in the neighbourhood. Political stability in its Southeast regions is gradually regained as Turkey is back on track with its democratisation process. These developments allow Turkey to play a more effective role with respect to gas from the KRG and East Mediterranean. This permits a significant expansion in the SGC, while Turkey reinforces its role as a transit country and continues to diversify its own gas imports.

#### 4.4 The Southern Setback Scenario

The Southern Setback scenario is distinguished from the other two scenarios primarily with respect to EU's relations with Turkey. Tense relations obstruct the expansion of the SGC and severely constrain Turkey's ability to play a role in EU gas diversification. This scenario also differs from Gas on Sale in terms of Gazprom's pricing strategy. As in the case of "Nord Dream", Gazprom adopts an oligopolistic pricing strategy with repercussions for EU gas prices and imports.

The EU faces a major setback in its goal to diversify its gas imports through the SGC. Nearly two decades of collaboration with Turkey on gas transit gradually comes to an end. At first, the EU adopts a cautious policy towards Ankara as Turkey goes through a constitutional reform that transforms the country into a presidential republic. With no checks and balances left in the political system, Turkey transitions towards an Islamist authoritarian regime. Elections are held but as free political competition is absent and the opposition's ability to prevent election fraud is compromised, the AKP's continuous electoral victory is reassured. Tensions with the US are also on the rise as cooperation within the NATO framework becomes increasingly difficult. Turkey becomes increasingly isolated from its traditional Western partners. While relations with Russia flourish, Turkey's demand for gas slows down due to the negative economic repercussions of tense relations with the West. Domestic stability in Turkey's Southeast regions fails to be restored as political leadership continues to lean on a mixture of an Islamist and nationalist ideology. In this context, Turkey's ability to enhance its role as a transit country is severely compromised. Neither the KRG nor East Mediterranean gas reaches the EU through Turkey. Only limited volumes of already contracted Azeri gas continue to flow to Europe.

The EU's relations with Russia proceed as in the Gas for Sale scenario. Despite difficulties, no severe crisis occurs as Russia abstains from new adventures abroad and opts for a thaw in its ties with Ukraine. Due to the setback regarding the SGC, gas cooperation with Russia acquires further importance. Thus, the EU does not obstruct the construction of the Nord Stream project. However, as the study's simulation indicates, Russia needs only part of the projected capacity of the pipeline. It sells less gas at higher prices, reflecting Gazprom's strategy.

## 5 PART D: MARKET SIMULATION OF FUTURE EU GAS SUPPLY SCENARIOS<sup>1</sup>

Having deduced three narratives for future scenarios of the political landscape in terms of EU gas supply in Part C, Part D comprises an economic quantification of these scenarios. The three scenarios are quantified by applying an economic simulation model of the global gas market. The model enables a consistent analysis of the complex interdependencies concerning future EU gas supply, such as strategic behaviour of gas suppliers, infrastructure investment, pipeline and LNG imports, gas production, and price arbitrage.

### 5.1 Design of the Market Simulation

This Section briefly discusses the design of the market simulation conducted below. Section 5.1.1 provides an introduction to the global gas market simulation model COLUMBUS applied in this analysis. Section 5.1.2 gives an overview of important data assumptions, and 5.1.3 describes how the scenarios outlined in Part C are modelled in the market simulation.

#### 5.1.1 Methodology: Economic Analysis with the COLUMBUS Simulation Model

The economic analysis is conducted by applying the global gas market model COLUMBUS, which was developed at ewi ER&S by Hecking and Panke (2012) and further extended Growitsch/Hecking/Panke (2013). COLUMBUS is a long-term, partial-equilibrium simulation model for modelling international natural gas trade with a special focus on the European market. Taking into account worldwide interdependencies, the model derives possible gas market developments up to the year 2035. COLUMBUS is designed as a dynamic, spatial, and intertemporal model and designed as a mixed complementarity programming problem (MCP). Hence, COLUMBUS is able to consider the strategic behaviour of individual players in the global natural gas markets. Although the model is not a prognoses tool, it enables the scenario analysis of interdependencies within the global natural gas market under consistent modelling conditions.

COLUMBUS maps the spatial structure of the global natural gas market as a network-flow model. Nodes represent production and demand regions, as well as turnover points such as regasification or liquefaction terminals. These nodes are connected by arcs, which represent transport routes such as pipelines or naval routes.

On the supply side, the model includes all key gas-producing countries (accounting for more than 95 percent of global natural gas production) as well as their specific supply characteristics, for example production costs of various extraction sites, connection to infrastructure, and long-term contracts. COLUMBUS also optimises investments in natural gas infrastructure capacities,

---

<sup>1</sup> Corresponding author: Harald Hecking (ewi ER&S)

for instance investments in additional production, transport and storage capacities. Hence, investment and gas flows are an output from the model, not an input.

The demand-side modelling includes all key demand countries, accounting for over 95 percent of global gas demand. Demand seasonality is accounted for. In this study, the model uses a semi-annual time resolution, but the model can be run with up to a monthly granularity. Demand is modelled with price-elastic demand functions.

The key actors in the model are the termed ‘exporters’, which establish a trading relationship between the production and demand regions. Apart from the global gas trade, the exporters must also identify the efficient physical transport path while competing with other exporters for transport infrastructure. Exporters can be modelled as both competitive and strategic players.

Model results include trade flows, utilisation of pipelines and LNG infrastructure, production volumes, country-wise equilibrium prices as well as investment in new production, transport and storage infrastructure capacity.

### 5.1.2 Main Data Assumptions

The natural gas market model COLUMBUS requires fundamental data input for future natural gas demand, together with the current global natural gas infrastructure and production capacity.

#### **Demand**

Apart from a few exceptions, the demand data corresponds to the developments derived by the International Energy Agency (IEA). More precisely, the Natural Gas Information 2015 (NGI), the Medium Term Gas Market Report 2015 (MTGMR) and the World Energy Outlook 2015 (WEO) serve as main data sources. Regarding WEO 2015, the assumptions are based on the New Policies Scenario. Therefore, a nearly constant demand developing for the EU is assumed in this analysis. Note that the general level of the demand development is an input to the model. However, since the model is an equilibrium model, the equilibrium demand is an output to the model and can deviate slightly from the input demand path.

#### **Production**

In order to obtain input data about production capacities and costs, a detailed literature research has been conducted about current and historic projects. Moreover, data has been derived from Seeliger (2006), several publications of the Oxford Institute for Energy Studies, and other public sources<sup>1</sup>. Furthermore, production costs are based on scientific literature,<sup>2</sup> current notifications about new field discoveries and developments, and data provided by the industry that is updated within an internal ewi ER&S database. In the COLUMBUS model, cost data is distinguished in operational and capital costs.

---

<sup>1</sup> Seeliger (2006), Rzaeva (2015), Henderson, Mitrova (2015), IEA (2015a), IEA (2015b), IEA (2015c), Aguilera, Eggert, Lagos, Tiltonf (2009)

<sup>2</sup> Aguilera, Eggert, Lagos, Tiltonf (2009)

## Infrastructure

The COLUMBUS model displays the norm of worldwide gas infrastructure including pipelines and LNG terminals. Certain projects that have reached FID status, for example some LNG terminals in the US and Australia, are exogenously given to the model. The capacity map and the Ten Year Network Development Plan (TYNDP) of ENTSOG have served as a data base for the existing pipeline infrastructure in Europe.<sup>1</sup> Regarding LNG liquefaction and regasification capacities information has been gathered from the Retail LNG Handbook 2015 published by the International Group of Liquefied Natural Gas Importers (GIINGL)<sup>2</sup> and from publications of Gas Infrastructure Europe (GIE)<sup>3</sup>. Data about gas storage has been obtained from reports of Gas Storage Europe (GSE)<sup>4</sup> and the Natural Gas Information 2015<sup>5</sup>. Moreover, ewi ER&S maintains its own data base.

Moreover, the model is able to endogenously invest in new pipeline and LNG infrastructure. As such the model can decide, for example, whether it is economical to invest in the Nord Stream 2, Turkish Stream, or the Southern Gas Corridor (SGC) as well as into new LNG liquefaction or regasification terminals. However, the model allows prohibited investments in certain pipelines in order to adequately reflect current developments. For example, in the simulation at hand the South Stream project, or an expansion of the Yamal pipeline, have been excluded as options of future investments, a priori. Yet, these assumptions can be revised in the calculation of different scenarios.

In order to mirror realistic investment costs a detailed literature analysis of historic pipeline and LNG projects has been conducted as well as an evaluation of costs for currently discussed projects. Transport costs for existing pipeline infrastructure is modelled with entry/exit fees for the European market, as well as transit fees. For non-European world regions, where no detailed cost data is available, a distance-based approach is applied to derive transport costs. Entry/exit fees for the existing transport infrastructure in Europe have been based on the ACER market report 2015 and remain constant over the analysis horizon.<sup>6</sup> For all other countries, a distance-based approach is applied.

## Long-term contracts

Moreover, the COLUMBUS model takes into account pipeline and LNG based long-term contracts. Based on a literature survey of Neumann et al.<sup>7</sup>, publications of the International Group of Liquefied Natural Gas Importers (GIINGL) and ewi ER&S research a detailed data base was developed, which is included in the model. Long-term contracts are modelled with a take-or-pay (ToP) quantity and an annual contracted quantity (ACQ).

---

<sup>1</sup> ENTSOG (2015a) and ENTSOG (2015b)

<sup>2</sup> GIINGL (2015)

<sup>3</sup> GIE (2015)

<sup>4</sup> GSE (2015)

<sup>5</sup> IEA (2015c)

<sup>6</sup> ACER (2015)

<sup>7</sup> Neumann, Ruster, von Hirschhausen (2015)

### 5.1.3 Modelling Scenarios of Future EU Gas Supply

Three scenarios of future developments of the political landscape concerning EU gas relations were derived in Part C. In Part D, these scenarios will be quantified from an economic perspective by applying COLUMBUS, a numerical simulation model of the global gas market. In order to parameterise the model, three distinctive features of the narratives presented in Part C are identified (see Table 3). First, the future pricing strategy of important gas suppliers such as Gazprom/Russia; second whether the multi-bcm gas supply routes Nord Stream 2; and third whether the Southern Gas Corridor can be expanded or not.

The Gas on Sale (GoS) scenario is the studies most likely scenario and assumes a competitive pricing strategy. In addition to the political arguments mentioned in Part C, the assumption of a more competitive future European gas market is based on current market developments, highlighted by Henderson and Mitrova (2015). Furthermore, the scenario assumes that the expansion of the Southern Gas Corridor as well as Nord Stream 2 is possible. Whether or not these projects will be in fact realised endogenously in the model simulation is driven by their economic feasibility, which is analysed in the Sections below.

The Nord Dream (NoD) and Southern Setback (SoS) scenarios both assume oligopolistic behaviour of major European gas suppliers, such as Russia's Gazprom. In the Nord Dream scenario, the Southern Gas Corridor expansion is possible, whereas the Nord Stream 2 expansion is excluded from possible investment projects in the simulation. In the Southern Setback scenario, the opposite holds.

**TABLE 3: DISTINCTIVE CHARACTERISTICS OF THE MODELLED SCENARIOS**

		Scenario		
		Gas on Sale	Nord Dream	Southern Setback
Characteristics	Pricing strategy	Competitive	Oligopolistic	Oligopolistic
	Southern gas corridor expansion	Possible	Possible	Not possible
	Nord Stream 2 expansion	Possible	Not possible	Possible

## 5.2 Overview of the Scenario Results

### Key findings

- Despite lessening European gas production, the EU is in a strong strategic position due to a variety of actual and potential alternative gas supply options.
- Russian pricing strategy proves to be crucial for the future gas supply mix of the EU and the EU gas prices. If Russia wants to fill the European supply gap, it has to pursue a competitive pricing strategy.
- If Russia decides to pursue an oligopoly strategy, higher prices will attract more LNG and gas from the Southern Gas Corridor, making Russia lose market share.
- An expansion of Nord Stream by 55 bcm/a is only needed when Russia pursues a competitive pricing strategy. Playing an oligopoly strategy, Russia would only need an expansion of 12 to 15 bcm/a.
- The EU benefits from lower gas prices if Russia opts for a competitive pricing strategy instead of oligopolistic pricing.

The following Section provides an overview of the main results of the three scenarios analysed in this study. Detailed results for each scenario are discussed in the Sections below.

To start with, Figure 21 provides a year wise comparison of the EU gas supply mix for each scenario. For 2013 and 2014 historic data (Hist.) is depicted in order to better range future development. The first bar of each column relates to the Gas on Sale (GoS) scenario, the second and third bar refer to the Nord Dream (NoD) and the Southern Setback (SoS) scenarios, examining both oligopoly cases.

European gas production is declining similarly in all three scenarios whereby small differences are caused by demand elasticity connected with endogenous production functions. Russian pricing strategy proves to be crucial for future EU supply mix. In the Gas on Sale scenario assuming a competitive pricing situation in the European market, Russia supplies up to 156 bcm or 33 percent to the EU in 2035, thereby replacing a major part of decreasing European production. Assuming oligopolistic pricing in Scenarios 2 and 3, this amount is approximately 60 bcm lower in 2035 when comparing to the Nord Dream scenario (with Southern Gas Corridor expansion) and 50 bcm lower in the Southern Setback scenario (no Southern Gas Corridor expansion).

Russia's pricing strategy heavily affects the amount of LNG imports to the EU. In the Gas on Sale scenario, assuming a market share strategy by Russia, LNG imports reach 71 bcm in 2020, increasing to 120 bcm in 2035, an amount roughly three times higher than in 2014. In the other two scenarios assuming oligopolistic behaviour by Russia and other important gas suppliers, higher EU wholesale prices attract substantially higher volumes of LNG imports. As such, overall EU LNG imports would amount to 90 bcm in 2020 in the Southern Setback scenario (assuming no expansion of the Southern Gas Corridor), reaching 164 bcm in 2035.

The Southern Gas Corridor supplies 26 bcm to the EU in the competitive case, whereas higher prices due to oligopolistic pricing attract an amount of 41 bcm in 2035 in the Nord Dream scenario.

Russia’s pricing strategy affects the build-up of pipeline infrastructure. As such, an almost full implementation (54 bcm) of the Nord Stream 2 pipeline is economical in the Gas on Sale scenario and would increase competition among transit routes in Europe. Thus, demand for additional transport capacity on the Nord Stream route largely depends on the pricing strategy of Russia (competitive vs. oligopoly). In an oligopoly case, the simulation reveals a demand for capacity expansion of only 15 bcm/a. This means that both strings of Nord Stream 2 are only profitable if Russia enforces a competitive strategy. Therefore, realisation of the Nord Stream 2 project is an indicator that Russia may plan to pursue a strong competition for volumes.

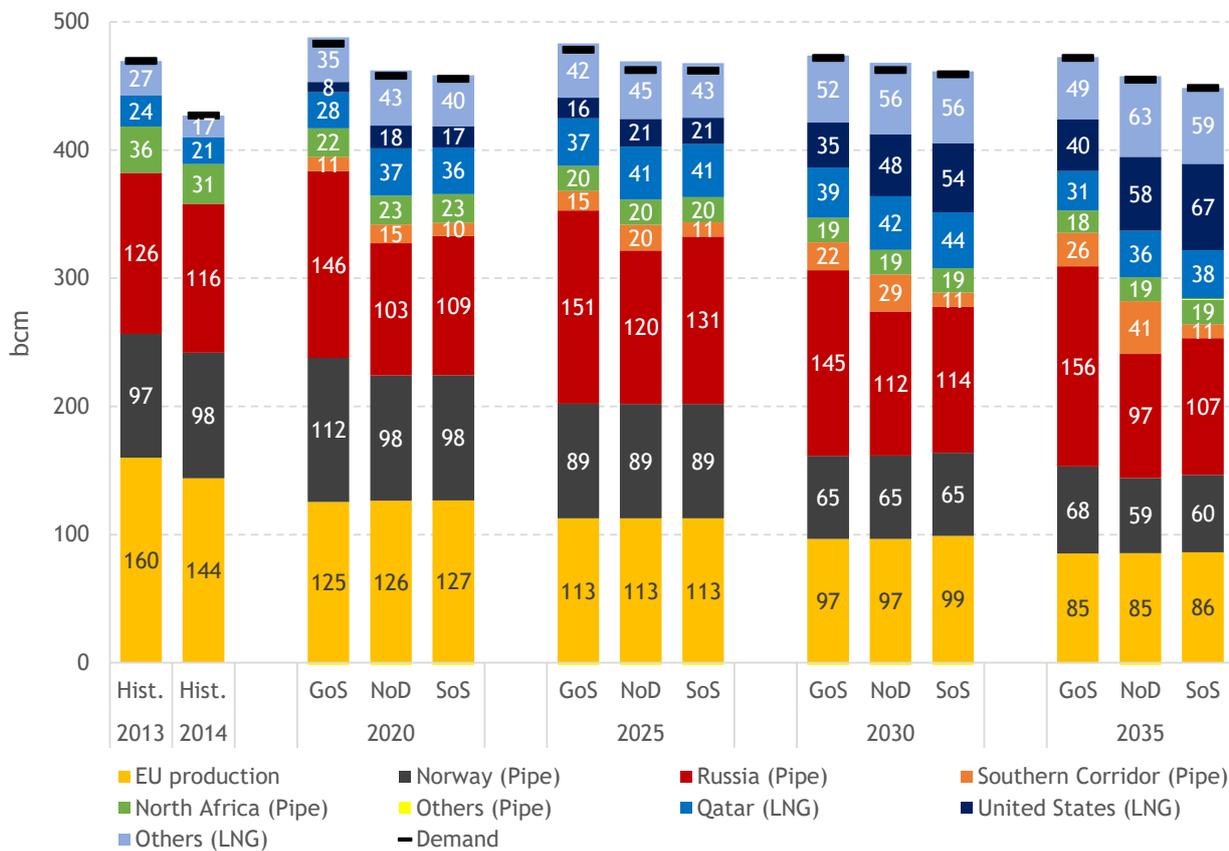


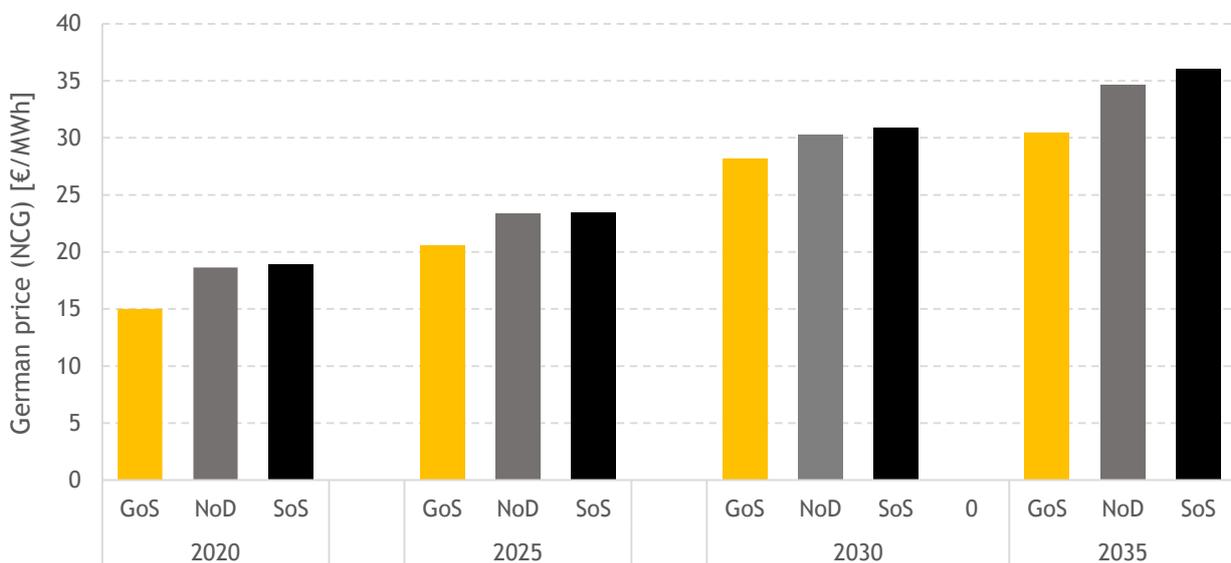
FIGURE 21: COMPARISON OF SCENARIOS FROM 2020 TO 2035

The three scenarios imply different equilibrium gas prices for the EU. Figure 22 illustrates wholesale price estimators for Germany between 2016 and 2035 as derived by the COLUMBUS model. However, it is to stress the fact that the model is not a price forecasting model. Therefore the price development has to be interpreted as a long-term equilibrium price derived on market fundamentals such as full costs of gas production and infrastructure. As shown in Figure 22, Russian pricing strategy proves to be crucial for EU gas prices. As such, the Gas on

Sale scenario assuming competitive pricing always shows a lower price with price differences of 4.1 EUR/MWh to 5.6 EUR/MWh, compared to the alternative scenarios in 2035. The Gas on Sale scenario price stands at 15 EUR/MWh in 2020, increases to 20.6 EUR/MWh in 2025 and reaches 30.5 EUR/MWh ten years later. In 2020, gas prices are estimated to be approximately 3.6 EUR/MWh and 3.9 EUR/MWh higher in the alternative Scenarios Nord Dream and Southern Setback compared to the Gas on Sale scenario price. Five years later the projection indicates an oligopoly price mark-up of 2.85 EUR/MWh. Finally, in 2035 the reference price is 4.1 EUR/MWh lower than in the second scenario, and 5.6 EUR/MWh lower than in the oligopoly setting without Southern Gas Corridor.

Overall, the comparison of the three scenarios in terms of supply volumes and prices suggests that the EU market is in a strong strategic position due to a high degree of potential and actual competition from the global LNG market and the Southern Gas Corridor. If Russia reduced volumes to increase prices, higher prices attract substantial amounts of LNG and make investments into gas from the Southern Gas Corridor more economical. However, Russia forfeits annual profits of 2 to 3 billion Euros by competitive pricing instead of oligopoly pricing. On the other side, it gains a strategic value from de-incentivising new investments in competing supply capacities. Moreover, lower priced gas would make gas more attractive in the European primary energy supply mix given EU’s climate targets.

In the next Sections, each of the three scenarios is discussed in more detail.



Note: Prices are in real terms based on EUR<sub>2016</sub>.

FIGURE 22: GERMAN GAS PRICE PROJECTIONS 2020-35 FOR THE DIFFERENT SCENARIOS

## 5.3 Scenario 1 - Gas on Sale

### Key findings

- In the Gas on Sale Scenario assuming a competitive pricing strategy by the main exporters, Russia will be the main supplier accounting for 33 percent or 156 bcm of EU gas demand in 2035.
- European gas production (EU & Norway) is projected to decline to 153 bcm in 2035, which is 100 bcm less than in 2013.
- LNG imports make up for 25 percent or 120 bcm of EU-28 gas supply in 2035 with 40 bcm coming from the US.
- The Southern Gas Corridor delivers 26 bcm of EU-28 natural gas supply in 2035.
- European gas equilibrium prices are projected to remain low at 15 Euro/MWh in 2020, rising up to 30.5 Euro/MWh in 2035.
- Model results yield a need for investment in Nord Stream 2 and pipelines connecting the Southern Corridor with Eastern Europe in the time range 2020-35. Investment in Nord Stream 2 is rational since it avoids comparably high Ukrainian transit fees.
- Following the expansion of Nord Stream 2, Germany becomes the major transit country for Russian gas. Transits will almost double compared to today's level reaching 75 bcm in 2035.
- In the Gas on Sale scenario, Germany has no need for an own LNG terminal.

As illustrated in Figure 23, the EU's indigenous production, in particular located in the Netherlands and the UK declines over the next 20 years from 160 bcm in 2013 to 85 bcm in 2035. The same can be observed for Norway, a further important supplier of the EU's natural gas market. Although, Norway's natural gas supply to the EU is expected to increase in the short term from 97 bcm in 2013 up to 112 bcm in 2020, it decreases in the long term to 68 bcm in 2035. In the Gas on Sale scenario, assuming a market share strategy, Russia increases its supply to the EU from 126 bcm in 2013 to 156 bcm in 2035, and likewise its market share from 27 percent to 33 percent. Thus, Russia extends its position as the main non-EU supplier for the EU's natural gas market.

LNG imports by the EU-28 reach 120 bcm in 2035: triple compared to 2014 levels. Not only do LNG deliveries from Qatar increase from 24 bcm back in 2013 to 31 bcm in 2035, imports of US LNG gain a significant market share reaching up to 40 bcm in 2035. Besides Qatar and the US another 49 bcm of LNG reaches the EU market from smaller LNG exporting countries such as Nigeria, Russia or Algeria. These volumes also include small exports from Iran, which is expected to become an exporter of LNG to the EU in the years after 2025 due to the lifting of western sanctions.

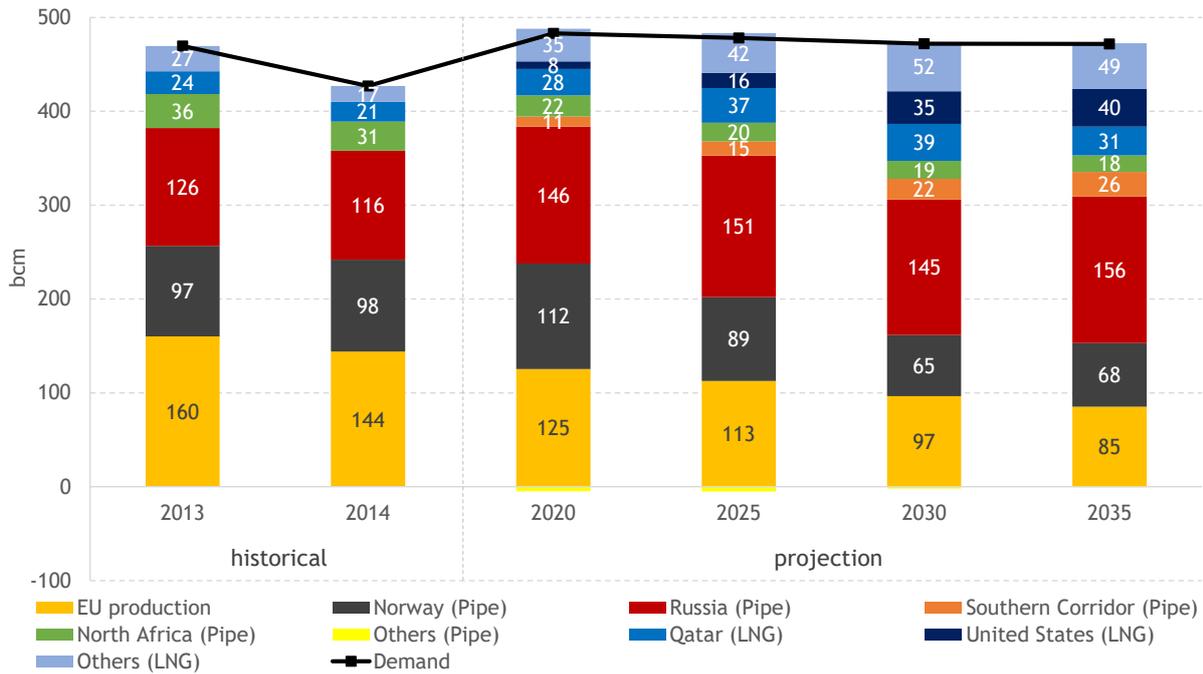


FIGURE 23: DEVELOPMENT OF EU GAS SUPPLY MIX IN THE GAS ON SALE SCENARIO UNTIL 2035

Natural gas from the Southern Gas Corridor finds its place within the EU’s natural gas market at the currently planned capacity of 11 bcm in 2020 (capacity of the TANAP/TAP connection to Europe), increasing to 26 bcm in 2035. Gas reaching the EU via the Southern Gas Corridor will predominantly stem from Azerbaijan, with some minor volumes being delivered from the Eastern Mediterranean and Iran. Simulation results reveal no imports from Turkmenistan on the outlook horizon.

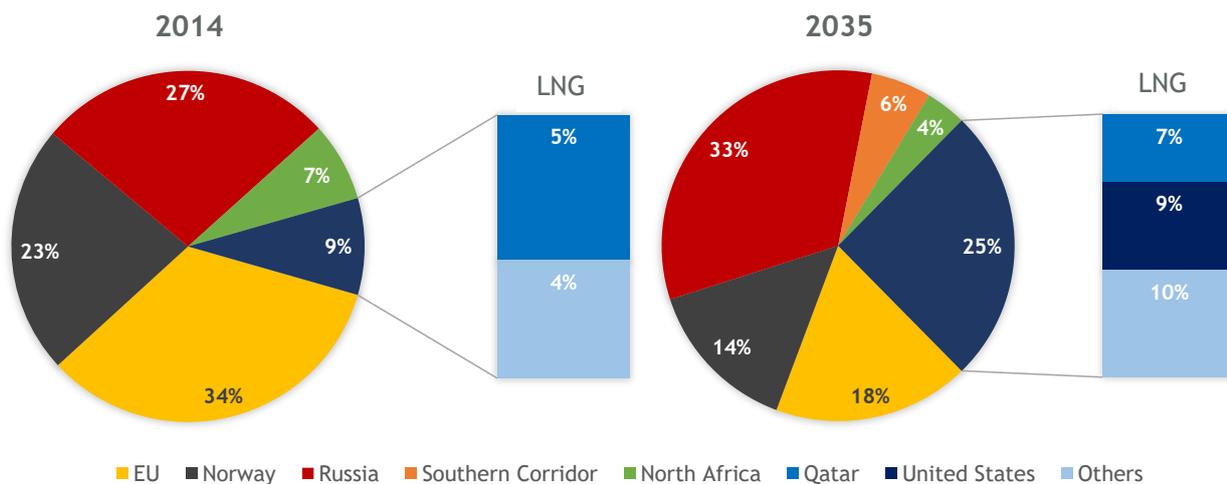
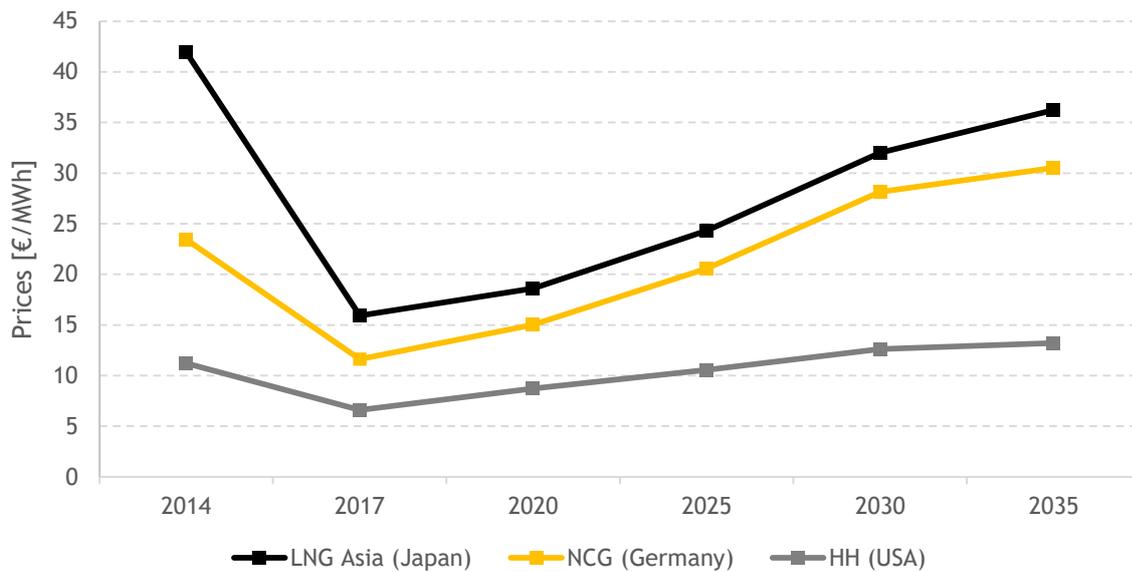


FIGURE 24: PROPORTIONAL SUPPLY STRUCTURE IN 2014 AND 2035

Overall, simulation results reveal that declining European gas production will mainly be replaced by Russian gas and LNG imports from the global market. This fact can again be recognised in

Figure 24 picturing the supply structure of the EU in proportions of supplier. In the EU gas supply mix of 2035, EU and Norwegian gas production makes up only 32 percent compared to 57 percent in 2014. In the Gas on Sale scenario, assuming competitive pricing among the main suppliers, Russia will be the major source of EU gas accounting for 33 percent of EU total demand in 2035, compared to 27 percent in 2013 and 2014. However, this does not mean that Europe is highly dependent on Russian gas due to the availability of potential alternative supply sources such as LNG imports, which amount totally to 121 bcm in 2035. Thereby LNG accounts for 25 percent of EU gas supply in 2035, which is 16 percentage points higher than in 2014.



**FIGURE 25: DEVELOPMENT OF NATURAL GAS WHOLESALE PRICES IN THE GAS ON SALE SCENARIO UNTIL 2035**

Concerning wholesale gas prices, the model derives the price development as illustrated in Figure 25. For the Gas on Sale scenario assuming competitive pricing, the COLUMBUS model projects gas prices in Germany reaching 15 EUR/MWh in 2020, accounting for the expected oversupply in the global LNG market. Prices will further increase to 30 EUR/MWh in 2030 in order to trigger new investment in gas fields and gas transport infrastructure as discussed below. The map in Figure 26 provides an overview of simulated natural gas flows in Europe for 2017. The yellow arrows are the aggregated gross natural gas flows between the European countries in bcm per year. The grey stars represent the yearly amount of LNG imports aggregated over each country’s respective LNG import terminals.

The situation in 2017 is comparable to current European natural gas supply. Norway satisfies in particular the demand of western and partly central Europe. However, as Norway also enforces a competitive pricing strategy in this scenario, it can increase its natural gas sales to the EU to around 117 bcm. Western Europe, furthermore, imports gas from North Africa via its LNG import terminals.

Eastern Europe is mainly supplied by natural gas from the Russian Federation flowing in via Ukraine, the Yamal and Nord Stream pipelines. The Nord Stream pipeline delivers 42 bcm as Gazprom and its affiliates can only use 50 percent of the non-nationally regulated part of the OPAL pipeline. Some small amounts are supplied by LNG imports.



FIGURE 26: NATURAL GAS FLOWS WITHIN EUROPE IN THE GAS ON SALE SCENARIO IN 2017

Figure 27 picturing European gas flows in 2035 demonstrate a significantly changed situation. Norway still supplies gas to Western European countries, but volumes decline considerably by a cumulative 49 bcm compared to 2017, affecting all pipeline connections to Europe. LNG imports increase substantially compared to 2017 with large amounts being imported by the UK (38.1 bcm) and Spain (28 bcm). Moreover, supplies to France, the Netherlands, Belgium and Italy increase compared to 2017. In total, Western Europe imports 68 bcm more LNG than in 2017.

As depletion of the Groningen field progresses, the Netherlands changes from a net exporter into a net importer of 20 bcm. Imports are largely supplied via LNG shipments and deliveries from Germany, which becomes the most important transit country in Europe. Besides 14 bcm of Italian LNG imports, Southern Italy receives gas deliveries from Greece via the TAP. New are also reverse flows in the TENP, allowing gas originating from the gas bubble in Northern Italy to flow via Switzerland to Germany supplying the latter with 5.3 bcm.

Russia, being the major supplier of gas to the EU changes its supply routes between 2017 and 2035. Enormous volumes of 109.1 bcm flow in via the Nord Stream pipeline in 2035. This means an increase of more than 67 bcm compared to 2017. Therefore, the simulation with the

COLUMBUS model yields a capacity increase on the Nord Stream route, hence considers the expansion of Nord Stream 2 to be economical. Secondly, the scenario endorses the suspension of the OPAL regulation in order to fully use the capacity of Nord Stream. Following the expansion of Nord Stream 2, the Czech Republic and Slovakia are supplied by Germany. In Slovakia, these gas flows are routed towards Austria and onwards to Italy.

Utilisation of the Yamal pipeline remains relatively stable due to the fact that this pipeline has comparably low transit costs for Russian gas to Europe. However, significantly smaller amounts are supplied via Ukraine, pointing to an avoidance of this supply route by Russia. Avoidance of the Ukrainian routes is mainly traced back to the substantial transit costs Russia can avoid. For instance, Ukrainian entry/exit fees for transiting Russian gas to Slovakia amount to 45.27 USD/1000m<sup>3</sup> in 2016. The same transit fees are assumed until 2035 in this simulation.



FIGURE 27: NATURAL GAS FLOWS WITHIN EUROPE IN THE GAS ON SALE SCENARIO IN 2035

Additionally, Russian gas transit through Ukraine via the Trans-Balkan pipeline to Turkey is reduced strongly, reaching a level of 3.3 bcm (compared to 12.6 bcm in 2017). Instead, the COLUMBUS model results suggest that additional pipeline capacity between Russia and Turkey will be built, for instance through a new Turkish Stream or a Blue Stream expansion, hence Turkey would be supplied directly from Russia and would not rely on Ukrainian transit anymore. However, most of Russian gas transported through the Black Sea remains within the Turkish market, with only minor volumes passed from Turkey to Europe.

Furthermore, the figure illustrates the development of the Southern Gas Corridor. In 2035, roughly 26 bcm reaches the EU's natural gas market, mainly from Azerbaijan and the East Mediterranean area. However, about 10 bcm is passed from Turkey to Greece. The majority of the natural gas supply from the Southern Gas Corridor exits Turkey to the Balkans along the often-discussed pipeline projects Nabucco West or Eastring, where the COLUMBUS model considers investment in new capacity along that route to be economical.

In North Eastern Europe the two LNG terminals, which came online in 2014 (Lithuania) and 2015 (Poland), are used more extensively. Moreover, the interconnecting pipeline GIPL between Lithuania and Poland which is planned to come online in 2019, enables flows between the Baltics and Central Europe.<sup>1</sup>

The differences in flows between the simulations for the year 2017 and 2035 can be seen more clearly in an additional map provided in Appendix Figure A 1.

Figure 28 summarises the need for investment in new infrastructure for the Gas on Sale scenario between 2020 and 2035 as derived by the COLUMBUS model. These investments in new pipeline capacity need to be made in order to realise the natural gas flows shown in the figure above. As mentioned earlier, the COLUMBUS simulation considers the Nord Stream 2 expansion as economical. As shown in Figure 28, additional capacities of 54 bcm/a are needed for transporting Russian gas via the Baltic Sea, which mirrors nearly the complete capacity of the discussed pipeline Nord Stream 2. In order to spread these volumes in Europe a capacity expansion towards the Czech Republic and build-up of new interconnection capacity enabling supplies to Eastern European countries would be required. Furthermore, the model yields a need for new investment in the GIPL interconnector (Poland-Lithuania).

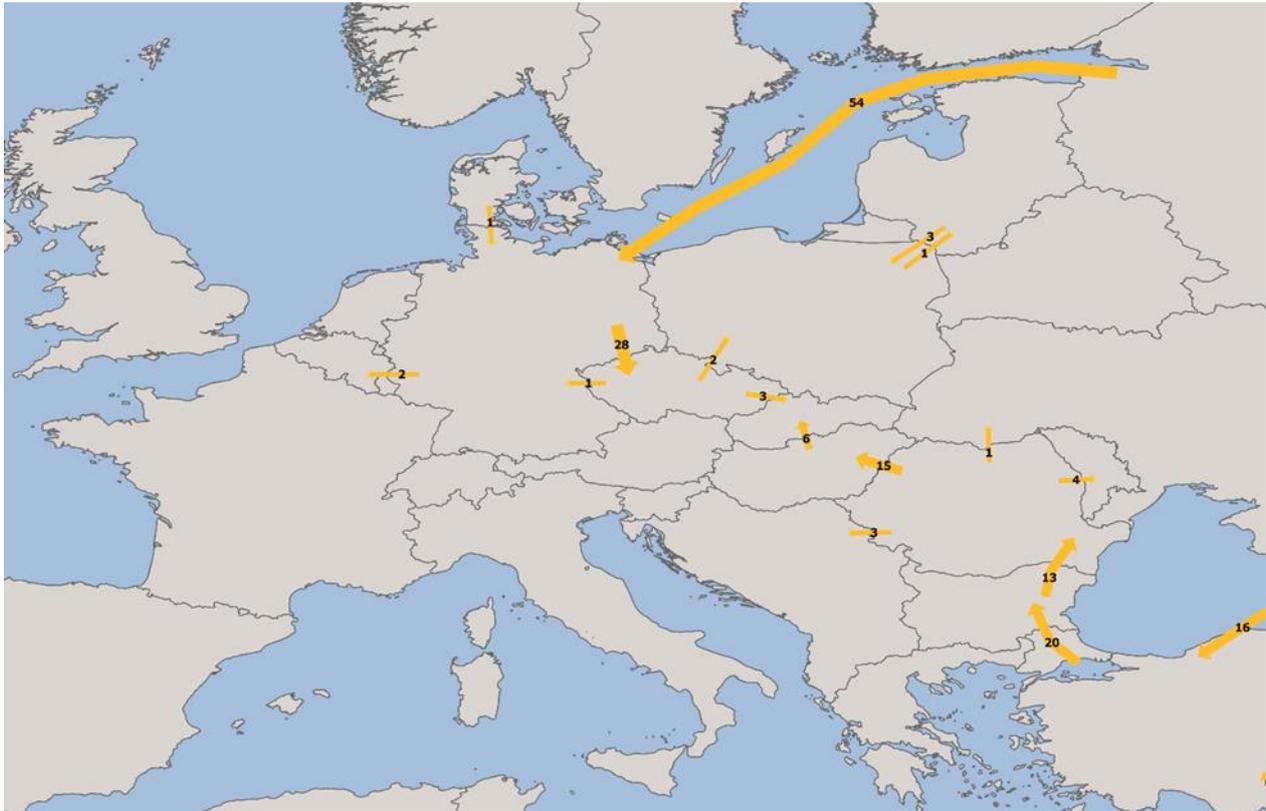
The COLUMBUS results reveal a need for an expanded capacity of 16 bcm between Russia and Turkey via the Black Sea. This amounts to roughly one string of the Turk Stream pipeline as discussed in Part A.

In order to transport some of the gas from the Southern Gas Corridor to Europe, new supply infrastructure has to be established in South Eastern Europe connecting Turkey, Bulgaria, Romania, and neighbouring countries. Different approaches are discussed, for instance the Nabucco West, the Eastring or the BRUA pipeline. All those projects have been outlined in detail when discussing the Southern gas corridor in Part A.

Furthermore, within the EU natural gas market there is no demand for additional LNG import terminal infrastructure. The current regasification capacity of 214 bcm/a is sufficient to satisfy LNG demand, which is also valid for Germany. Pipeline interconnection with Belgium and the Netherlands is sufficient such that Germany can import LNG indirectly from terminals in France (Dunkerque), Belgium (Zeebrugge), and the Netherlands (Rotterdam). Therefore, no German LNG terminal is needed in the Gas on Sale scenario.

---

<sup>1</sup> European Commission (2015b)



**FIGURE 28: DEMAND FOR INVESTMENT IN THE GAS ON SALE SCENARIO BETWEEN 2020 AND 2035**

The changing pattern of European gas flows makes Germany become the main transit country for gas in Europe. Figure 29 illustrates the development of the net natural gas in- and outflows of Germany. Focusing on Germany reveals that domestic production will decline to under 5 bcm by 2035 and net imports from the Netherlands will vanish by 2025. Imports from Norway rose in the last few years, but will decrease from 2020, reaching levels of 27 bcm in 2035 comparable to volumes in 2013. A clear boost of Russian gas can be seen, in particular in 2020 when considering the commissioning of Nord Stream 2 and assumed abolition of the OPAL regulation. Nord Stream deliveries more than double in 2020 and experiences further growth until 2035. Quantities flowing in from Poland remain constant.

However, gas only partly stays in Germany as demand is assumed to be constant. As Figure 29 clearly shows, Germany becomes an even more important transit country for Russian gas, which is spread to neighbouring countries such as Austria, Belgium, France and Switzerland. Major exports are routed to the Czech Republic since net exports - with inflows from Czech Republic via the MEGAL pipeline at Waidhaus - amount up to 40 bcm in 2020. From 2030, Germany becomes a net exporter for the Netherlands and Belgium, since Russian gas is transited via Germany to those two countries.

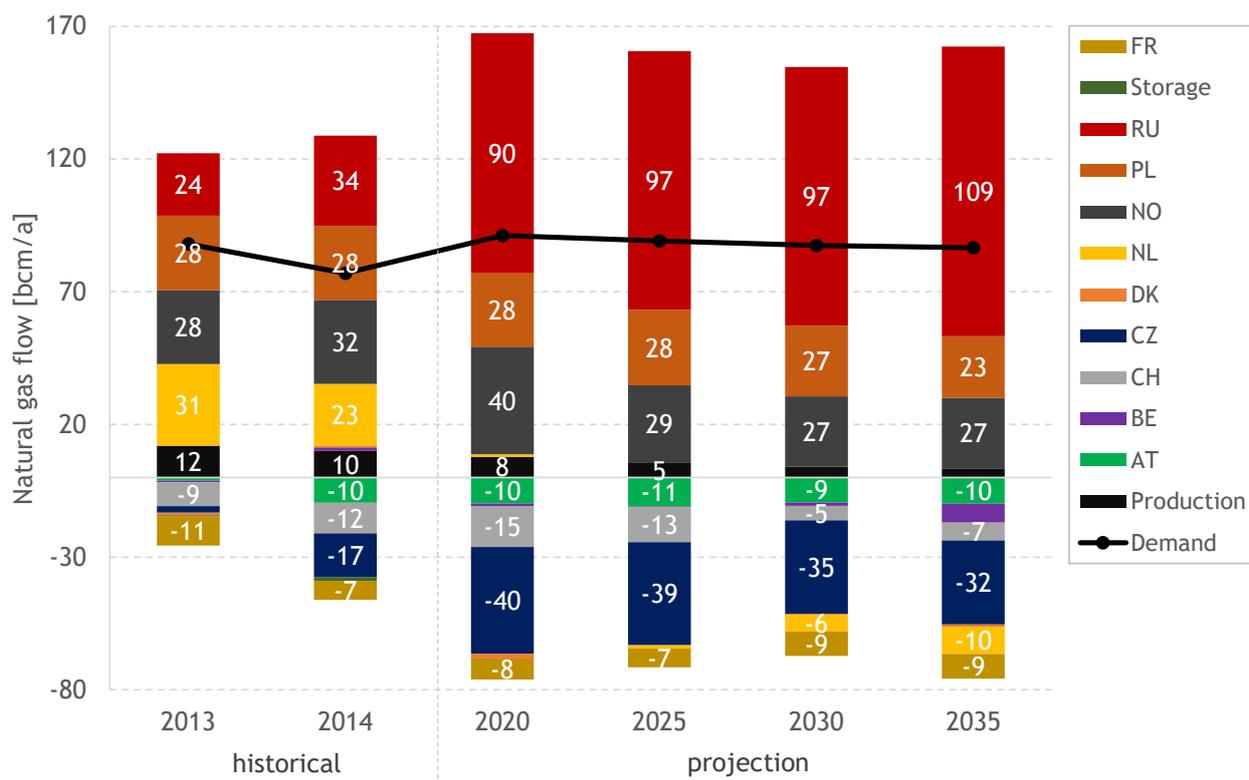


FIGURE 29: NET IN- AND OUTFLOWS FOR GERMANY IN THE GAS ON SALE SCENARIO BETWEEN 2013 AND 2035

## 5.4 Scenario 2 - Nord Dream

### Key findings

- Assuming oligopoly pricing, Russia remains the largest gas supplier to the EU over the outlook horizon. However, in an oligopolistic market equilibrium Russia withdraws substantial volumes of gas delivering 95 bcm to the EU, which is 59 bcm less than in the Gas on Sale scenario.
- LNG imports to the EU amount to 158 bcm in 2035 (compared to 120 bcm in the Gas on Sale scenario). Hence, Russia's oligopoly strategy and higher prices attract strong competition from LNG.
- Oligopolistic behaviour also attracts a substantial expansion of volumes from the Southern Gas Corridor, amounting to an annual 43 bcm in 2035.
- The simulation reveals a need for additional pipeline infrastructure connecting the Southern Gas Corridor to the European market.
- Investment in Nord Stream 2 is not possible in the Nord Dream scenario. Nonetheless, Ukraine benefits only slightly from higher transits, because under an oligopoly strategy, Russian volumes are low and alternative transit routes would be sufficient.
- In the Nord Dream scenario, Germany's role as a gas transit country fades until 2035 since LNG supplies, especially to Western Europe, become more important.

The main assumption of the Nord Dream scenario is that the main EU natural gas suppliers, including Russia, will pursue an oligopoly strategy by withholding quantities to enforce higher prices. In addition to that, any investment into Nord Stream 2 is prohibited. The results show that in that scenario, Russia is the most important supply source, although its contribution to the EU gas supply mix in 2035 will only amount to 97 bcm. Russia's market share decreases from 27 percent in 2017 to 21 percent in 2035. Thus, Russia withholds substantial volumes to stabilise gas prices in a situation where diverse supplies are available to Europe. As such, EU LNG imports, attracted by high prices, amount to 157 bcm in 2035, which is roughly four times higher than LNG imports were in 2014. This relationship can also clearly be seen in Figure 30. The figure shows the absolute gas supply (left) as well as the difference in gas supply amounts, compared between the Nord Dream and the Gas on Sale Scenario (right). Compared to the competitive Gas on Sale scenario the higher prices incentivise additional LNG imports. Overall, 37 bcm of LNG is imported additionally to the Gas on Sale scenario. In particular, LNG supply from the US increases in an oligopolistic pricing scenario with deliveries amounting to 58 bcm in 2035. Moreover, additional gas volumes via the Southern Corridor are attracted by Russia's retention strategy. In 2035, 15 bcm of natural gas can flow in via this route additionally to the Gas on Sale scenario.

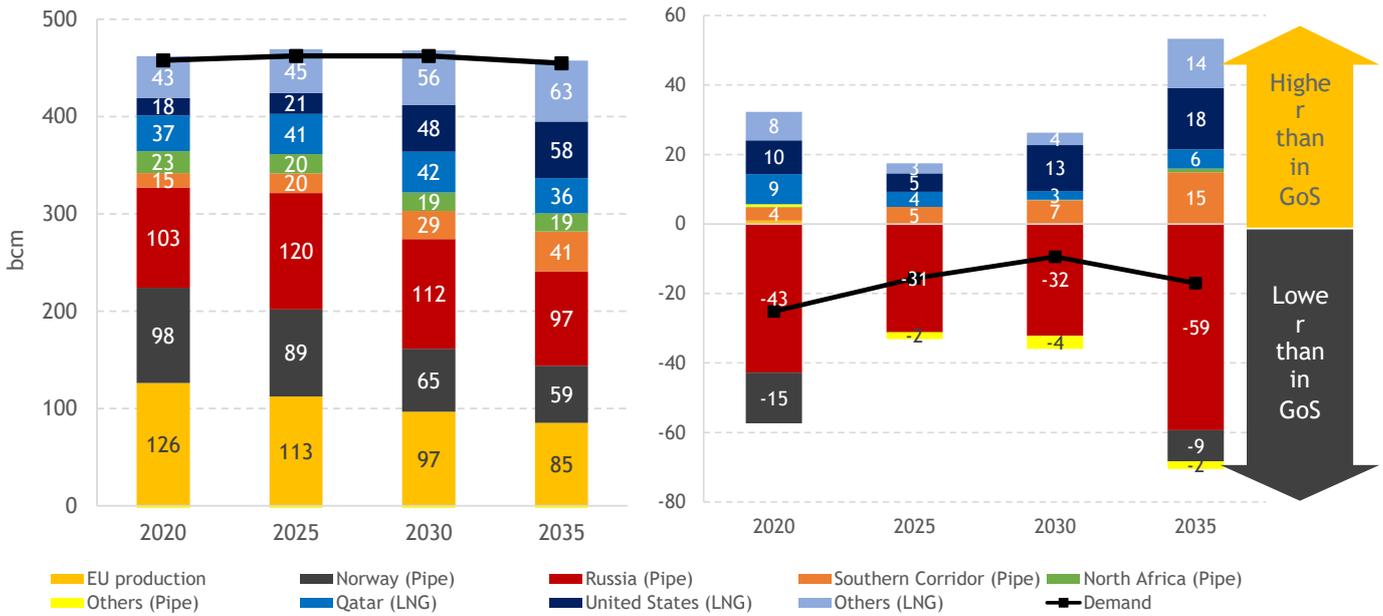
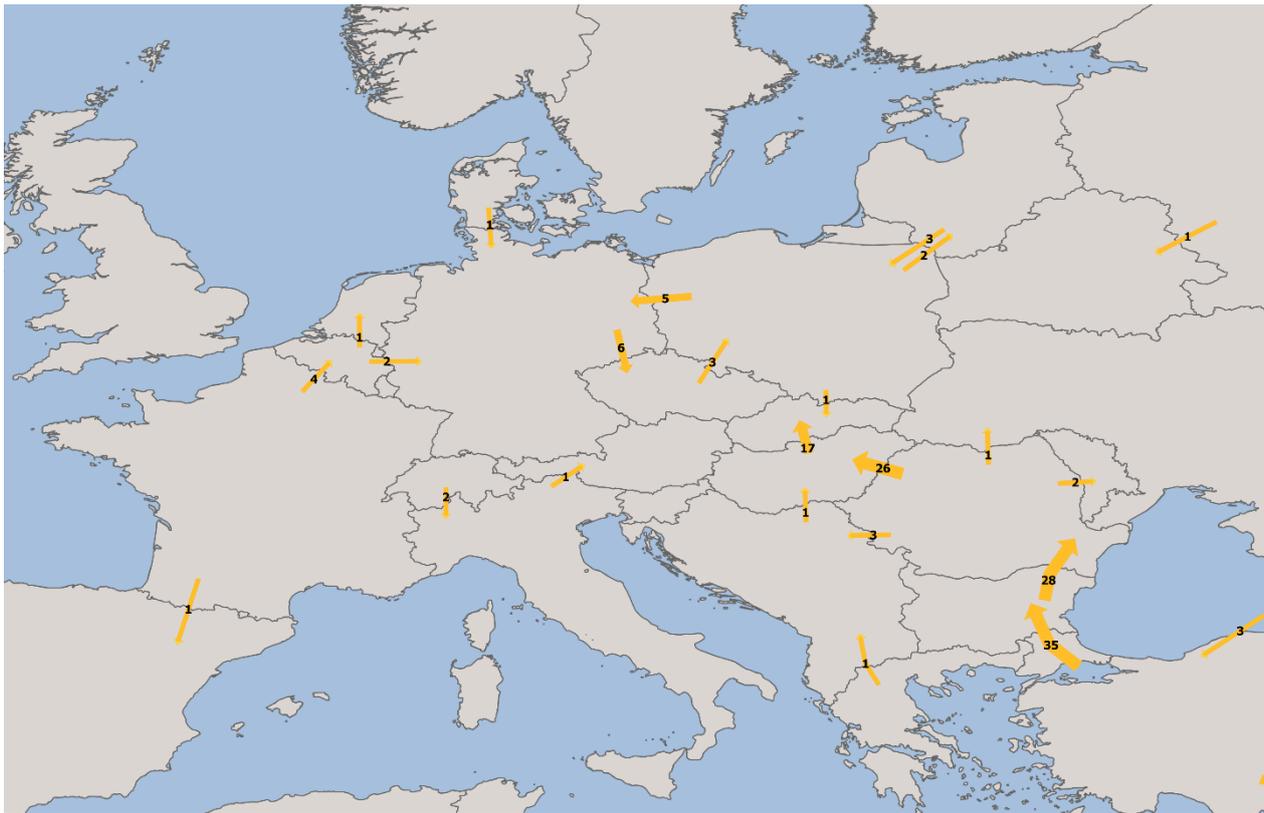


FIGURE 30: EU-28 GAS SUPPLY IN THE NORD DREAM SCENARIO (LEFT); DIFFERENCES IN SUPPLY QUANTITIES BETWEEN NORD DREAM AND GAS ON SALE SCENARIO (RIGHT)

The increase of gas prices as a consequence of Russia’s oligopolistic behaviour entails a slight reduction in total demand. This result is accomplished due to modelling of demand elasticities for different demand sectors considered in the model.

When looking at the demand for infrastructure investment between 2020 and 2035 as shown in Figure 31 the strongest need is revealed in the expansion of the Southern Gas corridor and its further pipeline connections into South Eastern Europe. This implies connections along Bulgaria, Romania and Hungary, thus the often discussed potential routes of future pipeline projects as Nabucco West or Eastring are relevant. Compared to the Gas on Sale scenario, there is an additional demand for investment between Turkey and Bulgaria (+15.3 bcm/a) amounting to a total of 35 bcm/a, as well as onwards to Romania, Hungary, and Slovakia. Moreover, several interconnections, especially between East European countries, need to be built or extended, like the GIPL pipeline that connects Poland and the Baltics. Furthermore, there is some additional demand for investment within the EU to achieve a better market integration between the different market areas viewable between France, Belgium, and the Netherlands, or Italy and its Northern neighbours.



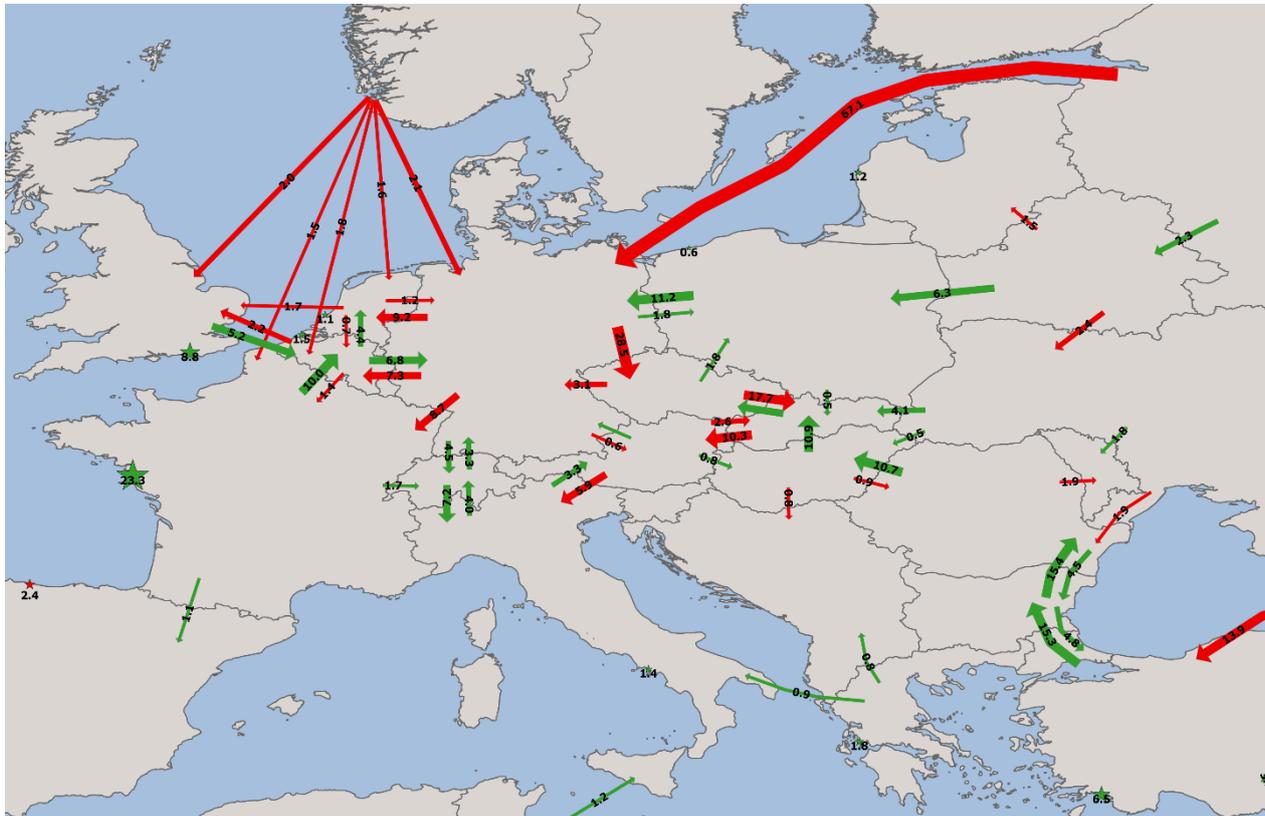
**FIGURE 31: DEMAND FOR INVESTMENT IN INFRASTRUCTURE FOR NORD DREAM SCENARIO BETWEEN 2020 AND 2035**

Comparing natural gas flows of the Nord Dream scenario and the Gas on Sale scenario shows the withdrawal of quantities by the major traditional gas suppliers. Figure 32 shows the differences in natural gas flows between the two scenarios for 2035.<sup>1</sup> The red arrows show the reduction in natural gas flows compared to the Gas on Sale scenario, and the green arrows depict additional flows. It can be seen that Norway withdraws its natural gas supply resulting in reduced gas flows at each pipeline. Due to the oligopolistic behaviour significantly less Russian gas is entering the European market. However, due to prohibition of Nord Stream 2 (- 67.1 bcm), Turkish Stream (-13.9 bcm), and the regulation of the OPAL pipeline, as assumed in this scenario, more Russian gas enters Europe via the Yamal route than in the Gas on Sale scenario. Even though Nord Stream 2 and Turkish Stream are not built in this scenario, the Ukraine benefits only slightly in terms of higher transit volumes when assuming oligopolistic behaviour of Russia. The Ukrainian gas transits register a slight increase to a level of 9 bcm, which is 4.5 bcm higher compared to the Gas on Sale scenario, a result driven by the high transit fees.

However, in the Nord Dream scenario, more LNG is imported, especially in France (+ 23.3 bcm compared to the Gas on Sale Scenario), but as well in most other European LNG destinations. 10 bcm of the additional French LNG imports are transported to Belgium and onwards to Germany and the Netherlands, respectively. In the opposite France gets 9 bcm less Russian gas transits from Germany in this scenario.

<sup>1</sup> The absolute flows of 2035 can be also seen in Appendix Figure A 3.

Additionally, the Southern Gas Corridor benefits from the oligopolistic pricing in the EU and higher market prices. Thus, compared to the Gas on Sale Scenario, an additional 15.3 bcm of Southern Corridor gas flows into South Eastern Europe and increases gas flows via Bulgaria, Romania, and Hungary, to Slovakia.



Note: Green arrows: gas flows are higher in NoD than in GoS; Red arrows: gas flows are lower in NoD than in GoS

**FIGURE 32: DIFFERENCES IN GAS FLOWS (BCM) BETWEEN GAS ON SALE SCENARIO AND NORD DREAM SCENARIO IN 2035**

When again focusing on Germany, it can be seen that the importance of Germany as a transit country vanishes without realisation of the Nord Stream 2. Figure 33 pictures the netted gas in- and outflows for Germany in Nord Dream Scenario, hence where investment in Nord Stream 2 is assumed to be impossible. Volumes of Russian natural gas flowing into the country are restricted to the maximum quantity that is allowed by the OPAL regulation. Therefore pipeline imports from Russia are more than 50 percent lower than in the competitive case. Accordingly, gas outflows reduce drastically. Until 2020, volumes of roughly 50 bcm leave the country again. After 2020 outflows further decrease amounting to 25 bcm in 2035, with volumes going to the Czech Republic especially affected. In the competitive scenario net flows of 32 bcm of natural gas were exported to the Czech Republic while in the setting without Nord Stream 2 net flows only amount to 6 bcm. Moreover, it can be seen that western neighbour countries such as France and Belgium, which have been delivered with Russian gas beforehand, do not receive net inflows

via Germany anymore. Yet, Belgium turns into a net export country for Germany implying LNG imported by Belgium and transported to Germany.

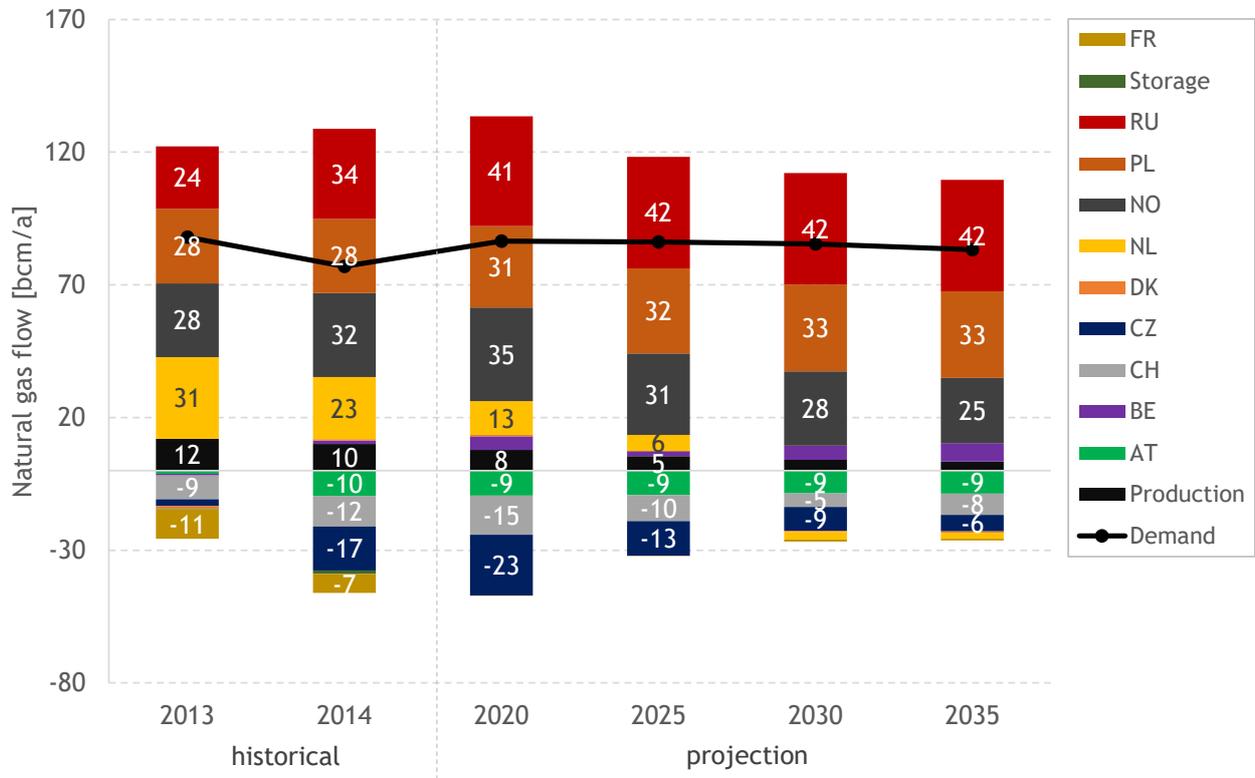


FIGURE 33: NET IN- AND OUTFLOWS FOR GERMANY 2013-35 IN THE NORD DREAM SCENARIO

## 5.5 Scenario 3 - Southern Setback

### Key findings

- Russia, playing an oligopoly strategy, remains the largest supplier country of gas to the EU with annual deliveries of 107 bcm.
- Thus, non-realisation of the Southern Corridor makes Russia supply 10 bcm more than in the Nord Dream scenario. However, due to the oligopoly strategy, Russian supplies are 49 bcm lower than in the Gas on Sale scenario assuming competitive pricing.
- Low Russian supplies to the EU make full realisation of Nord Stream 2 uneconomical. The capacity demand is 12 bcm, which is less than one string of the pipeline project.
- Ukrainian transits in 2035 amount to 5 bcm since Russian volumes are generally low and alternative routes are preferred.
- In 2035, LNG is a major source of EU gas supply with total imports of 164 bcm equalling 37 percent of EU demand.
- Due to the high LNG imports to Western Europe, the simulation reveals an investment need for a German LNG terminal with capacity of 1.9 bcm after 2030 and an increase of cross-border capacity between Belgium and Germany of 10 bcm.
- Equilibrium prices are up to 1.5 Euro/MWh higher than in the Nord Dream, 5.4 Euro/MWh higher than in the Gas on Sale scenario.

In the Southern Setback scenario, Russia and the other main EU natural gas suppliers again pursue an oligopolistic strategy. However, first, unlike the Nord Dream scenario the model is able to endogenously invest in Nord Stream 2 capacity. Second, a further potential extension of the Southern Gas Corridor above the currently built TANAP/TAP capacities is assumed to be impossible. The Southern Gas Corridor will thus only supply 11 bcm of natural gas to the EU's market, amounting for the capacities of the TANAP or TAP pipeline that are already under construction or FID. Compared to the second scenario this would mean an amount of 30 bcm less transported via Turkey into the EU in 2035.

The results illustrate in the Southern Setback scenario Russia as the major gas supplier of the EU. If additional gas imports via the Southern Gas Corridor are not realised, Russia delivers 107 bcm in 2035 to Europe, which is 50 bcm less than in the Gas on Sale scenario. This can also be seen in Figure 34 showing differences in quantities between the Nord Dream and Gas on Sale scenario. The additional Russian amounts flow into Europe via Nord Stream, which is assumed to run at full utilisation due to ended regulation of the OPAL pipeline, which also justifies the expansion of Nord Stream 2. However, only 15 bcm/a of the initially planned capacity of Nord Stream 2 (55 bcm/a) are needed, if Russia enforces an oligopoly pricing strategy.

In such a scenario, hence Russia playing an oligopoly strategy, but assuming no further extension of the Southern Gas Corridor except for the currently planned TANAP/TAP, LNG will be even more crucial to compensate for decreasing European production. In total, an amount of 165 bcm

of LNG is delivered to the EU in 2035; 44 bcm more than in the Gas on Sale scenario, and 4 times as much as current LNG imports. LNG imports from the US reach 67 bcm in 2035.

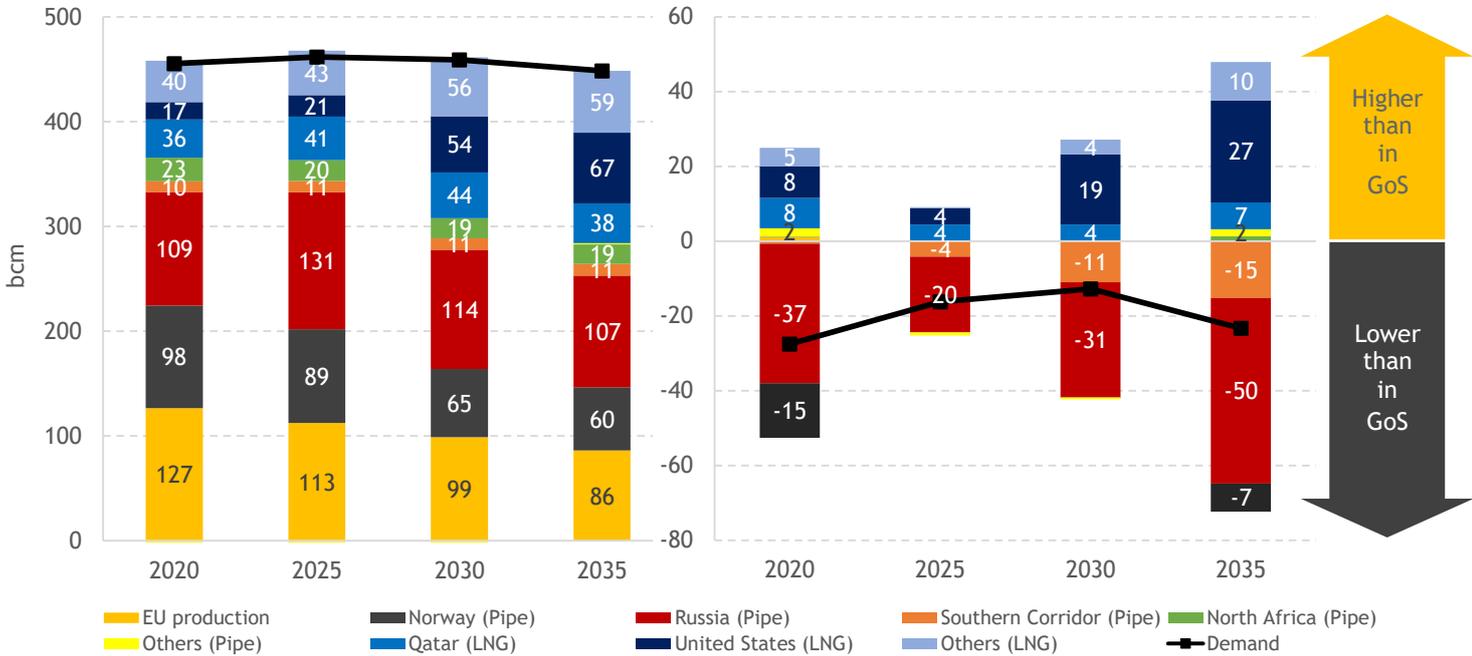
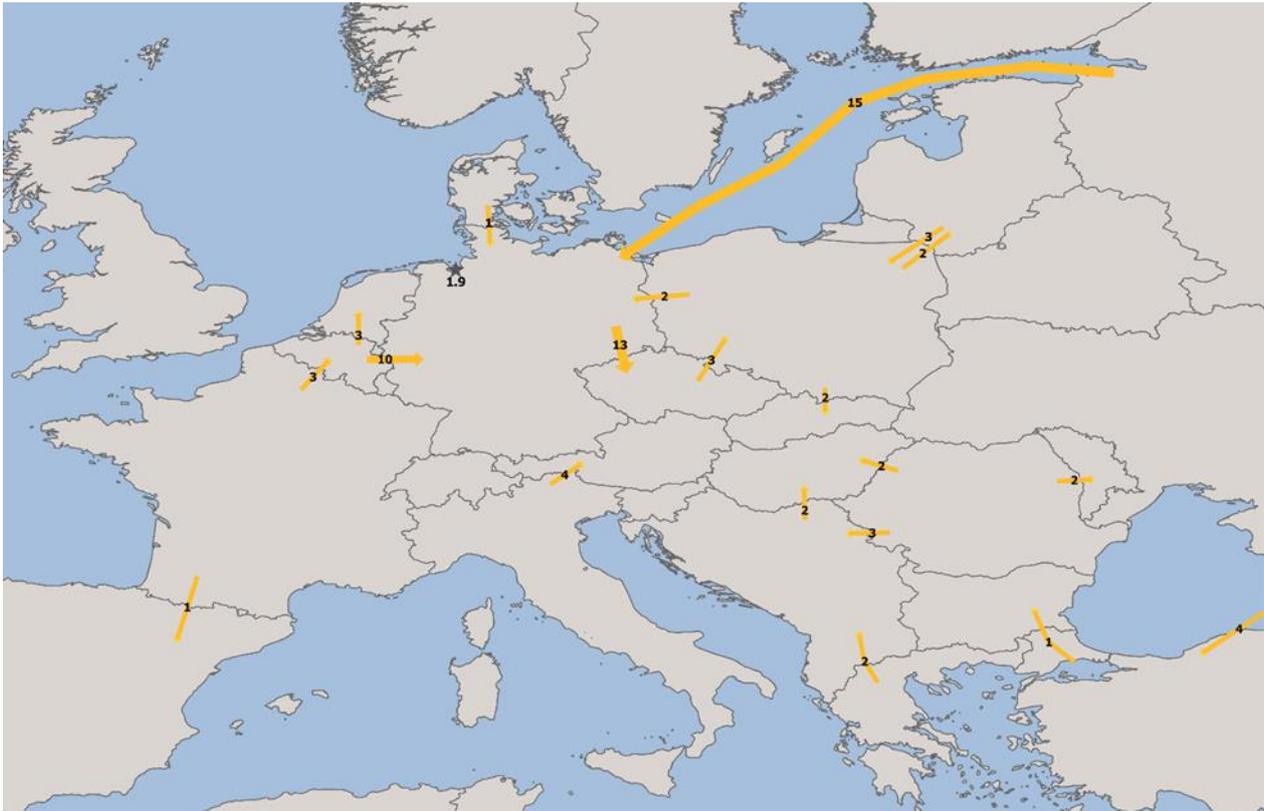


FIGURE 34: EU-28 GAS SUPPLY IN THE NORD DREAM SCENARIO (LEFT); DIFFERENCES IN SUPPLY QUANTITIES BETWEEN NORD DREAM AND GAS ON SALE SCENARIO (RIGHT)

Figure 35 shows the demand for new transport infrastructure between 2020 and 2035 in the Southern Setback scenario.

As mentioned before, the model derives an investment need of 15 bcm for new Nord Stream 2 capacity. For that reason, new transport capacity of 13 bcm is required to ship gas from Germany to the Czech Republic. Similarly as in the other scenarios interconnections between Eastern European markets are needed. The extension of the capacity between Russia and Turkey (Blue Stream or Turk Stream) is supported by an additional amount of 4 bcm which is only meant to satisfy Turkish demand. The model reveals no need for investment into a large additional connection in South Eastern Europe, as the scenario at hand assumes no further extension of the SCG.

As Figure 35 illustrates, only the Southern Setback scenario reveals a minor investment need of a German LNG terminal capacity of 1.9 bcm. This infrastructure is needed as of 2030. In the Gas on Sale and the Nord Dream scenario pipeline interconnection with Belgium and the Netherlands is sufficient such that Germany can import LNG indirectly from terminals in France (Dunkerque), Belgium (Zeebrugge), and the Netherlands (Rotterdam). As demand for investment seems very limited due to the small capacity of 1.9 bcm results have to be taken with caution. Additionally, this analysis does not evaluate a business case of a German LNG terminal as important infrastructure for small scale LNG business.

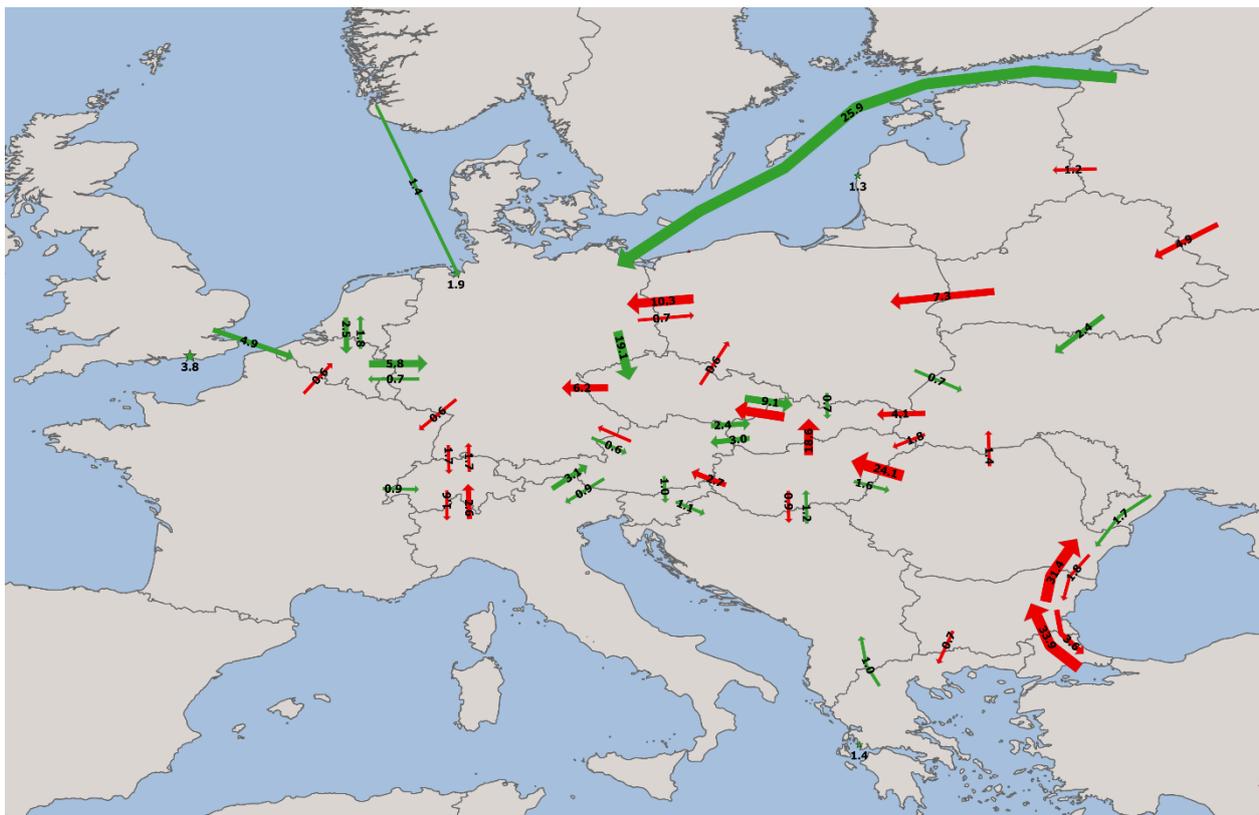


**FIGURE 35: DEMAND FOR INVESTMENT IN NEW INFRASTRUCTURE IN SOUTHERN SETBACK SCENARIO BETWEEN 2020 AND 2035**

Finally, comparing the flows of the Nord Dream and the Southern Setback scenario, Figure 36 illustrates the effects on gas flows when assuming no Southern Corridor expansion but possible investments into Nord Stream 2.<sup>1</sup> Gas flows from Turkey via Bulgaria, Romania, Hungary, and Slovakia to the Czech Republic are substantially lower in the Southern Setback scenario compared to the Nord Dream scenario<sup>2</sup>. Lower volumes via the Southern Gas Corridor are partly compensated with higher LNG imports from the terminals in the UK, Lithuania, and Greece. Additionally, even though playing an oligopoly strategy in Southern Setback scenario Russia compensates for the rest and uses the Nord Stream route at 67.9 bcm in 2035, almost 26 bcm more than in the Nord Dream scenario.

<sup>1</sup> The absolute flows of 2035 can be seen in Appendix Figure A 2.

<sup>2</sup> A comparison between the Southern Setback and the Gas on Sale Scenario can be seen in Appendix Figure A 4.



Note: Green arrows: gas flows are higher in SoS than in NoD; Red arrows: gas flows are lower in SoS than in NoD

**FIGURE 36: DIFFERENCES IN GAS FLOWS BETWEEN NORD DREAM AND SOUTHERN SETBACK SCENARIO IN 2035**

## 5.6 Economics of Nord Stream 2

### Key findings

- A 55 bcm expansion of Nord Stream 2 is economical under two assumptions: Russia playing a competitive pricing strategy and continued high Ukrainian transit fees.
- Simulating Russia pursuing an oligopoly strategy shows less than one string of Nord Stream 2 is needed.
- Profitability of Nord Stream 2 is strongly influenced by Ukrainian transit fees. The lower Ukrainian transit fees are the lower becomes the profitability of Nord Stream 2. Reducing transit fees, for example by 60 percent, makes Nord Stream 2 unprofitable.
- If Nord Stream 2 is built and given constant European gas demand, Ukrainian transits reduce to less than 5 bcm/a in 2035.
- Prohibiting Nord Stream 2 would enable Ukraine to raise its transit revenues by increasing transit fees, hence strengthening the dependence of Russia and Europe on Ukraine.
- If Nord Stream 2 is prohibited, EU imports from Russia are substantially lower (-8 to -3 bcm in the outlook horizon). These volumes are mainly replaced with LNG.
- If the realisation of Nord Stream 2 is impossible, Russia has a stronger incentive to play an oligopoly strategy instead of a competitive one.

In this section a closer look is given regarding the economics of the Nord Stream 2 pipeline and its effects on the European natural gas market. The analysis is built on the Gas on Sale scenario. Thus, a constant demand for the EU is assumed as described in the main results. The results of the Nord Stream 2 analysis illustrate that the profitability of the pipeline depends strongly on the Ukrainian transit fees. The transit fees or the entry/exit cost to transport natural gas through the Ukrainian natural gas grid are shown in Table 4: Overview of Ukrainian entry/exit costs.

The entry costs into Ukraine are the same for all points, amounting to 12.47 USD/1000m<sup>3</sup>, but exit costs differ between Ukraine's neighbouring countries. The exit via Slovakia with the largest volume flows exhibits the highest cost at 32.8 USD/1000 m<sup>3</sup>. Poland and Hungary both transiting smaller amounts of Russian gas have the same exit fee of 25.73 USD/1000m<sup>3</sup>. Finally, the cheapest transit is via exit to Romania (23.12 USD/1000 m<sup>3</sup>). Figure 37 depicts the economics of the Nord Stream pipeline in 2035 when altering Ukrainian transit fees. The graph shows the amount of gas transits per route depending on the level of Ukrainian transit fees. The vertical axis displays Russian gas transits in bcm/a, and on the horizontal axis transit fees are illustrated in percentage of the 2016 level of transit fees. The yellow crosshatched area mirrors utilisation of Nord Stream 2 at different amounts of transit fees.

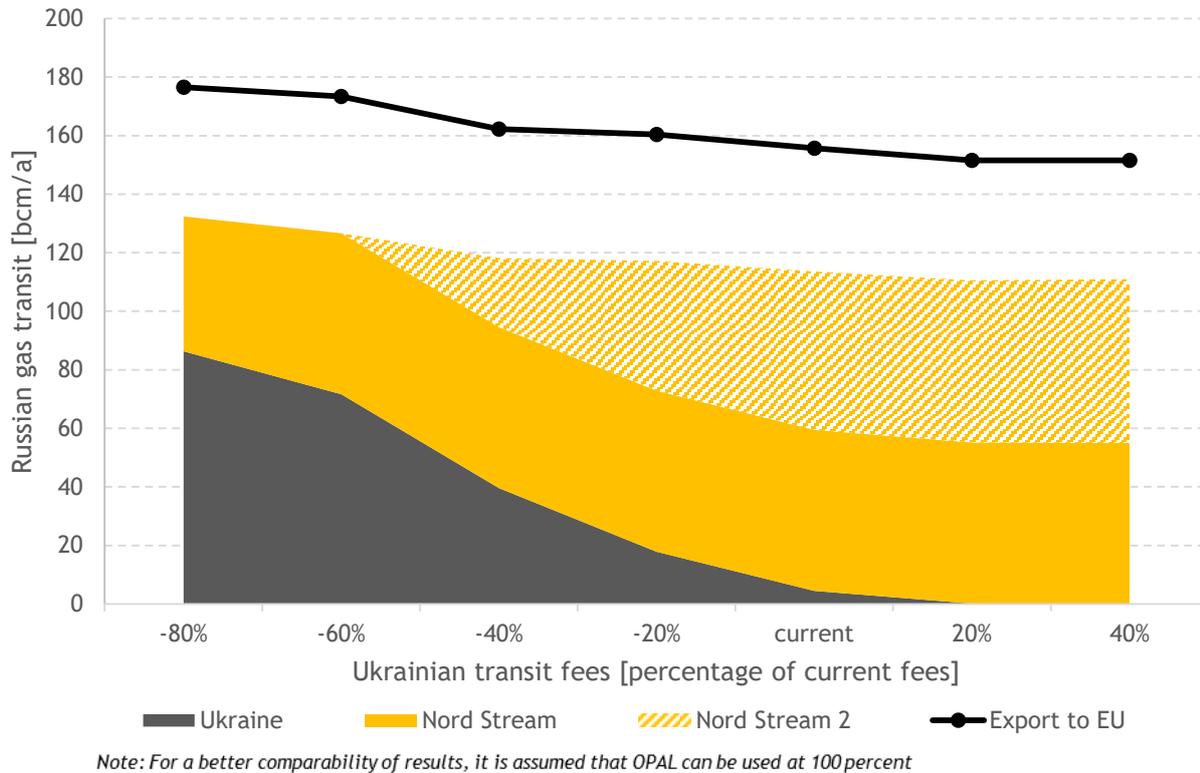
TABLE 4: OVERVIEW OF UKRAINIAN ENTRY/EXIT COSTS

SOURCE: INTERFAX (2015)

Entry/Exit Costs	In USD/1000m <sup>3</sup>
<i>Entry Ukraine</i>	
All points	12.47
<i>Exit Ukraine to</i>	
Romania	23.12
Poland	25.73
Slovakia	32.80
Hungary	25.73

If Ukraine hypothetically reduced its entry/exit costs by 80 percent, which yields a price of 9.05 USD/1000m<sup>3</sup> when considering exit via Slovakia, 80 bcm of Russian gas would transit Ukrainian territory. Capacity of the Nord Stream is used to 46 bcm, thus below maximum capacity. Therefore, investing in Nord Stream 2 would not be profitable. When lowering transit costs by 60 percent of the current level and assuming that the OPAL regulation is lifted Nord Stream is fully utilised but there is still no demand for more capacity on the Nord Stream 2 route. Rising transit fees further to 25 USD/1000 m<sup>3</sup> (reduction of 40 percent of the existing costs via Slovakia) shows a giant drop in Ukrainian transit volumes by 45 percent to 39.5 bcm. At this point, there is also a demand for a Nord Stream 2 pipeline. However, the demand is only 22.5 bcm or less than one string. Determining transit fees at minus 20 percent of the actual level provokes an on-going decline of transits via Ukraine and nearly doubles utilisation of the Nord Stream 2 to 43.3 bcm. At the current level of transit fees Ukrainian transits almost vanish in 2035 (4 bcm) and capacities of Nord Stream 2 are utilised by nearly 10 bcm more. Lifting transit fees to plus 20 percent of the current price indicates the end of Ukrainian transits and nearly full utilisation of Nord Stream 2 (54.3 bcm). Overall, the Figure underlines that the profitability of the Nord Stream 2 is highly correlated with the amount of Ukrainian transit fees. A reduction of Ukrainian transit fees decreases the profitability of Nord Stream 2.

Generally, total Russian deliveries to the EU decline with steadily increasing transit costs through Ukraine. This relationship can be explained by the fact that lower transit costs enable Russia to lower its gas prices, which causes slightly higher import demand for Russian gas in the EU.



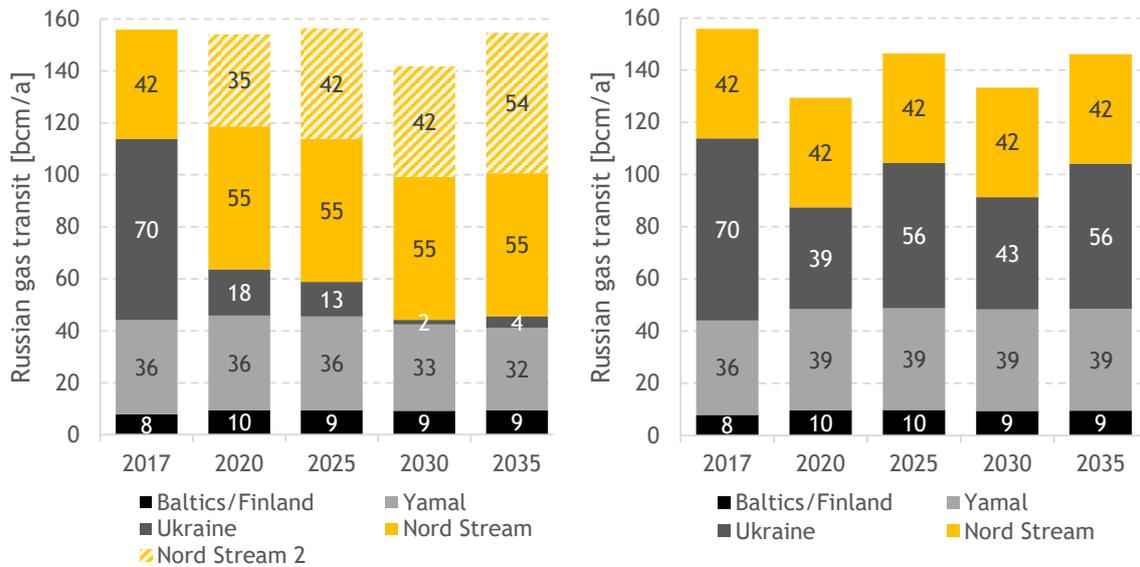
**FIGURE 37: UTILISATION OF RUSSIAN EXPORT ROUTES WITH RESPECT TO DIFFERENT UKRAINIAN TRANSIT FEES IN 2035**

To get a better idea of the effects of the Nord Stream 2 project on the European gas market, a sensitivity is simulated that prohibits an investment into the project. Again, the sensitivity is ceteris paribus and based on the Gas on Sale scenario. Figure 38 depicts the differences in Russian natural gas supply to Europe by route in the reference case with possible investment into Nord Stream 2 (left), and with a prohibition of Nord Stream 2 including the 50 percent third party regulation of the OPAL pipeline (right).

The Yamal pipeline and connections to the Baltics and Finland face nearly unchanged utilisation over time, independent of a Nord Stream 2 expansion. Ukrainian transits, however, are severely affected by a build-up of Nord Stream 2. As soon as Nord Stream 2 comes online in 2020 gas flows via Ukraine diminish drastically and decrease to small amounts of below 5 bcm after 2030. Nord Stream is used at full capacity as of 2020. Utilisation of the Nord Stream 2 increases steadily till 2035.

When considering a prohibition of Nord Stream 2 (Figure 38 right), Nord Stream is utilised constantly at 42 bcm, which is the maximal capacity under current regulation of the OPAL pipeline. The Ukrainian transit pipeline system shows altering utilisation. In the first place, volumes drop between 2017 and 2020 due to LNG deliveries and from gas the SGC entering the market. However, when European natural gas production continues to decrease substantially between 2020 and 2025, Russian natural gas supply through the Ukraine recovers remarkably in 2025 to 56 bcm. This is explained by higher Russian supplies in the period due to sufficient

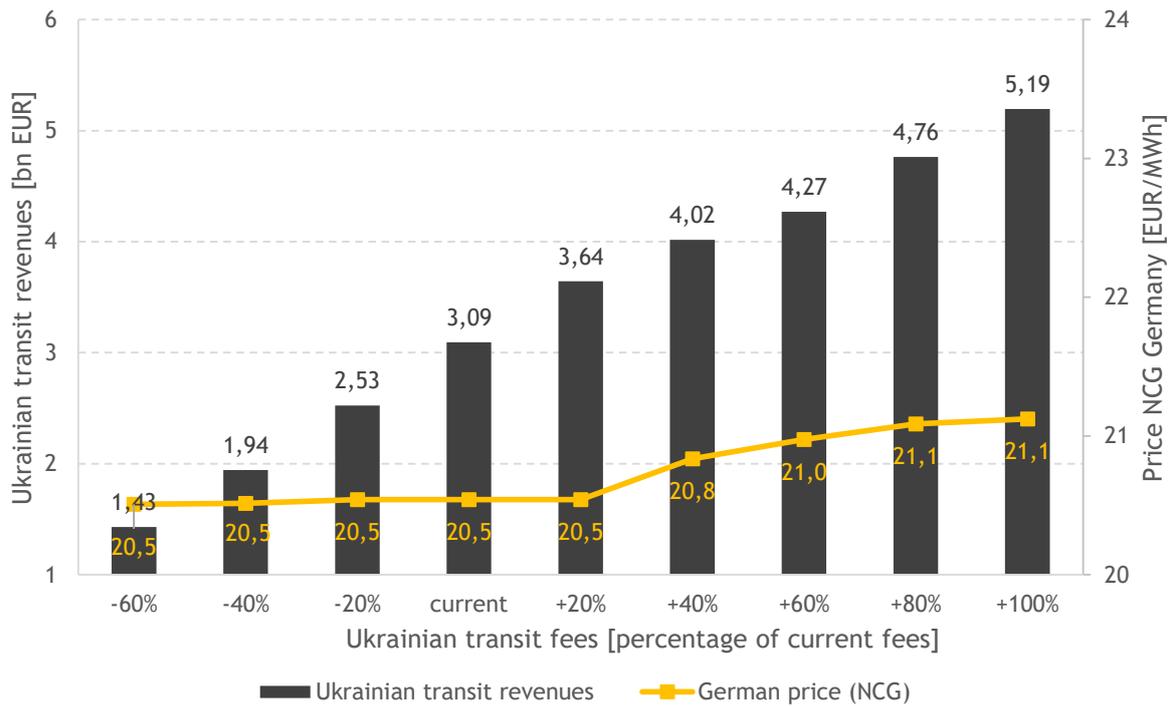
capacities of the Western Siberian fields. Because the Ukraine route is the only available one, Ukraine benefits from the situation. After 2025 more expensive new Russian production capacities have to be developed. Therefore, LNG and gas from the SGC is more competitive and partly replaces Russian gas. Therefore, Russian transit volumes through the Ukraine decrease again to 43 bcm. In 2035 Ukrainian transits experience a boost to 56 bcm due to Russian supply incentivised by higher European prices.



**FIGURE 38: UTILISATION OF RUSSIAN GAS TRANSIT ROUTES IN THE GAS ON SALE SCENARIO WITH NORD STREAM 2 (LEFT) AND WITHOUT NORD STREAM 2 (RIGHT)**

Next, the study investigates how dependent the EU will be from Ukrainian transits in the case of a prohibition of Nord Stream 2. Therefore, it is analysed if Ukraine could hypothetically raise transit tariffs in order to maximise revenues from gas transit.

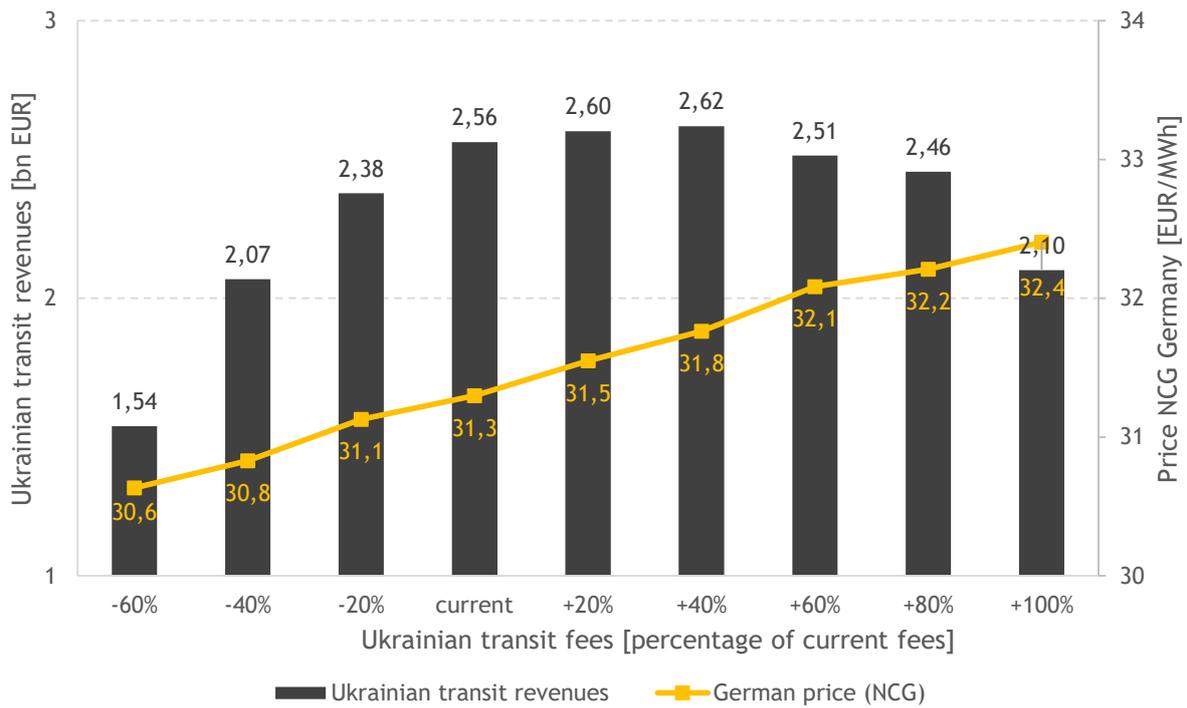
In 2025, as can be obtained from Figure 39, Ukrainian transit revenues steadily increase by increasing its transit fees. Consequently, prices in Europe (shown through Germany) rise slightly. In 2025, Russia is an important supplier of gas to the EU, especially when accounting for decreasing European gas production with large amounts of long-term supply contracts still in place. However, besides Ukraine, there exist no substantial alternative routes for gas supply to Europe, given that the Nord Stream 2 expansion is banned. Hence, dependence from Ukraine is quite high. Therefore, taking only into account the results from this ceteris paribus analysis, Ukraine could exploit the situation and skim high margins.



**FIGURE 39: TRANSIT REVENUES OF UKRAINE AND PRICES OF NCG IN CORRELATION TO LEVEL OF TRANSIT FEES IN 2025**

Figure 40 depicts the same context for the year 2035. Nevertheless, the situation is somewhat changed. The figure indicates that Russia reduces its volumes due to rising transit fees, but Ukraine could achieve similar transit revenues as in the current situation up to an increase of fees by 40 percent. From an increase of fees by 60 percent onwards revenues are remarkably reduced. This may mean that Russia diminishes quantities to such an extent that higher transit costs cannot level out the drop in revenues.

Prices react to a rise or drop in transit fees. Prices steadily rise with increasing transit fees whereby the delta between doubled transit fees and the current level amounts to approximately 1 Euro/MWh. When considering a decrease in transit fees this would also reduce NetConnect Germany (NCG) prices. For instance, a 60 percent reduction of fees yields a price decrease of 0.7 Euro/MWh.



**FIGURE 40: TRANSIT REVENUES OF UKRAINE AND PRICES OF NCG IN CORRELATION TO LEVEL OF TRANSIT FEES IN 2035**

This is the result, because in 2035, Russia, playing a competitive strategy has to be competitive in terms of prices with competing gas supply sources such as LNG or the Southern Gas Corridor. The higher Ukrainian transit fees are the more expensive the marginal unit of Russian gas will be, due to the lack of alternative gas transport options, given that Nord Stream 2 expansion is prohibited. Hence Russia loses market share when Ukrainian transit fees become too high. Last, the analysis evaluates whether the expansion of the Nord Stream 2 pipeline influences the pricing strategy played by Russia. For that purpose, Figure 41 shows the average loss of Russian profit margin (defined as prices minus production and transport costs) and the average revenues between 2020 and 2035 if it pursues a competitive instead of an oligopoly pricing strategy. Figure 26 Following a competitive pricing strategy, Russia forfeits annual profits of 2.4 billion Euro compared to an oligopoly strategy, in the case Nord Stream 2 is built. If Nord Stream is not expanded, Russia forfeits annual profits of 3.9 billion Euro. In the latter case, Russia is forced to take the higher priced Ukrainian transport route, making Russian gas more expensive in a competitive pricing strategy. Under an oligopoly strategy, this effect is less important, since Russia ships less gas through Ukraine. Hence, the Nord Stream 2 expansion makes a Russian competitive pricing strategy more likely in terms of profits. Nonetheless, the oligopoly strategy is overall more profitable for Russia. Measured in terms of revenues, Russia gains an additional 9.6 billion Euro under competitive strategy if Nord Stream 2 is built. If Nord Stream 2 is not built the additional revenues of enforcing a competitive pricing strategy are 1.5 billion Euros lower and amount to only 8.1 billion Euro. Additionally, Russia gains a strategic value from de-incentivising new investments in competing supply capacities when playing a competitive pricing

strategy. The dynamics concerning the Russian pricing strategy (Russia may, for example, switch its strategies until 2035) requires more detailed research.

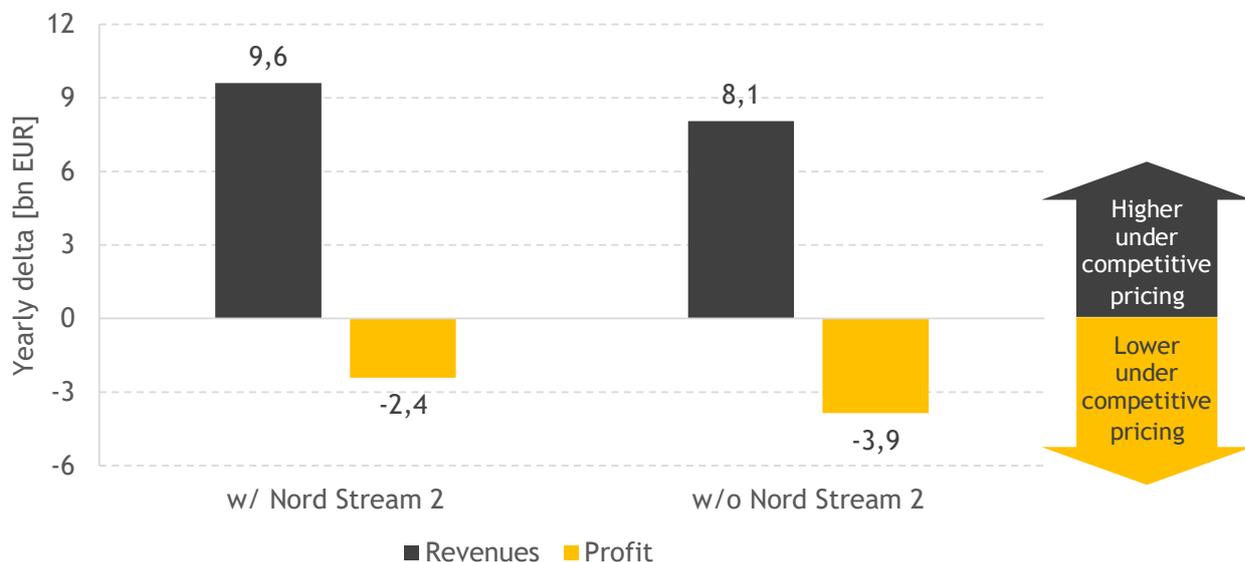


FIGURE 41: AVERAGE (2020-35) ANNUAL DELTA IN RUSSIAN PROFIT MARGIN AND REVENUES FROM PURSUING COMPETITIVE INSTEAD OF OLIGOPOLY PRICING (GOS SCENARIO)

## 5.7 Risk Analysis

### Key findings

#### EU gas demand

- Imports of LNG and Russian gas prove to be the swing supply sources that balance higher and lower EU gas demand. As such, both sources compensate for roughly 75 percent the simulated demand variation.
- Assuming a higher EU demand, roughly 550 bcm in 2035, there is no significant additional demand for infrastructure than compared to the reference demand of roughly 473 bcm.
- Given a lower EU demand (82 bcm lower than in the reference case), the demand for a Nord Stream 2 expansion is 23.4 bcm, underlining that the profitability of a full 55 bcm expansion faces the risk of low EU gas demand.

#### Interdependencies with global LNG market

- Lower LNG prices due to lower Asian demand plus lower US Henry Hub prices makes European (including Turkey) LNG imports rise to 167 bcm in 2035 (compared to 125 bcm in the reference Gas on Sale scenario).
- European LNG imports amount to 83 bcm in 2035 if higher LNG prices caused by higher Asian demand in combination with higher US Henry Hub prices are assumed.
- In the high price case, European long-term equilibrium gas prices would be roughly 2 EUR/MWh higher than in the Reference case. Higher prices would trigger more investment into pipeline based gas sources around Europe, which would avoid steep cost increases amongst others due to sufficient existing gas infrastructure, some of which is underutilised.
- Nonetheless, Europe's strong position on the gas market cannot be taken for granted. Even though long-term gas equilibrium prices are robust against changes in the fundamental data, sudden situations of scarcity can occur triggering high prices.

The following Section provides a sensitivity analysis of the scenario results discussed above. The Section focuses on two major risk factors that may affect the results; first development of European gas demand, and second interdependencies with the global LNG market.

### 5.7.1 Demand Sensitivity

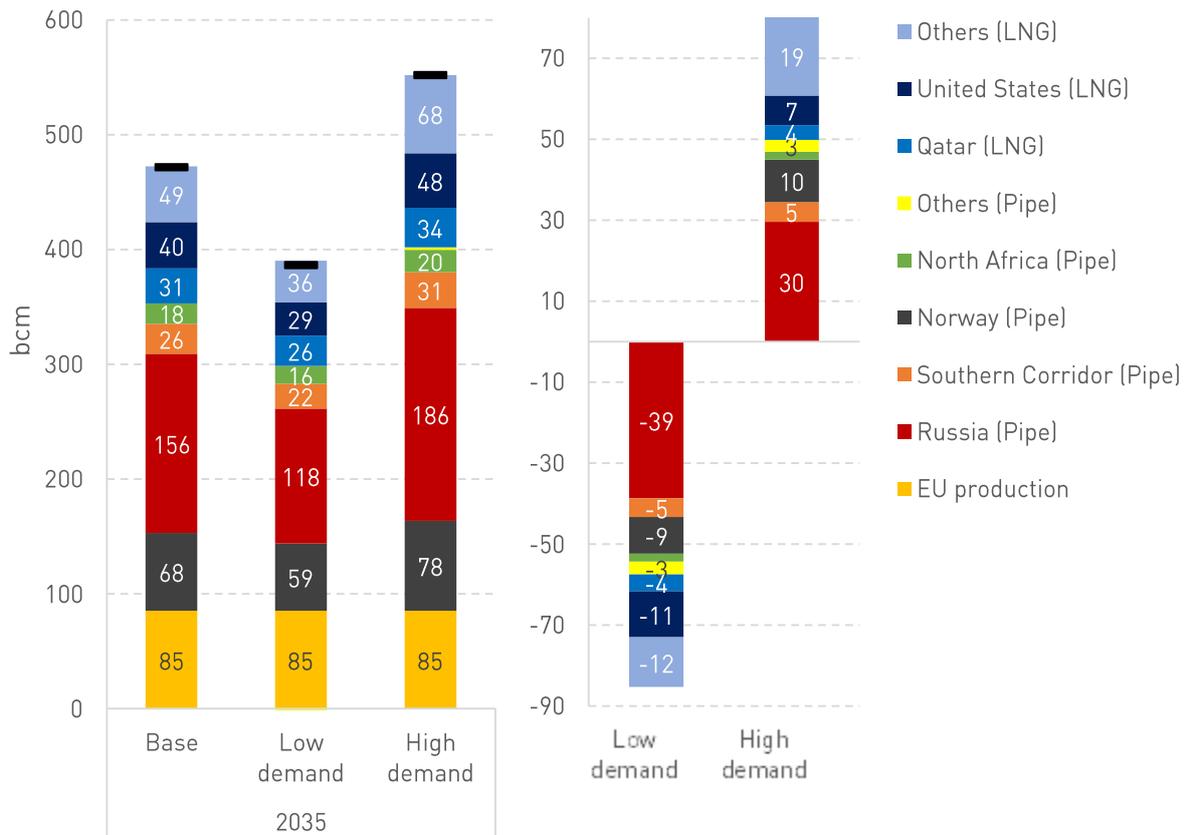
As discussed in Section A, future EU gas demand depends on numerous factors such as economic development or energy and climate policy. Therefore, scenario results always have to be taken with caution due to the fact that demand can develop differently. In order to assess the robustness of the results above, a variation of the EU natural gas demand is executed. The variation is based on the IEA WEO 2015 forecast that has been outlined earlier in this report. The WEO forecast encompasses a low demand scenario called 450 Scenario and a Current

Policies Scenario assuming high demand. The reference demand is in line with the New Policies Scenario. The difference between the low and high demand forecast amounts to roughly 166 bcm in 2035. This huge delta demonstrates the high uncertainty regarding the development of demand in the long term. Figure 42 illustrates the results of the demand variation in 2035. Assuming gas demand to be more than 80 bcm lower than in the reference case, Russian gas and LNG are affected in particular. Supplies from the Russian Federation would be lower by roughly 25 percent, reaching only 118 bcm instead of 156 bcm. Thus, the demand for a Nord Stream 2 expansion is only 23.4 bcm, underlining that the profitability of a full 55 bcm expansion faces the risk of low EU gas demand.

EU LNG imports only amount to 91 bcm (-27 bcm), meaning, US LNG imports are 11 bcm lower. LNG from other destinations is affected similarly. Qatari LNG volumes are 17 percent lower. Pipeline gas from Azerbaijan is 4 bcm lower (16 percent), and Norwegian amounts are 9 bcm lower equalling 13 percent.

As can be seen in Figure 42, assuming a higher EU demand of ca. 550 bcm in 2035 boosts Russian gas and LNG imports, but also Norwegian gas. In such a case, Russia would supply 186 bcm to the EU, assuming that Nord Stream 1 and 2 is not extended beyond a total capacity of 110 bcm/a. Apart from the Nord Stream 2 and Southern Corridor expansion, no further infrastructure is needed to satisfy the EU demand even in a high demand case. This highlights the EU's strong strategic position concerning its well-equipped infrastructure.

LNG imports would amount to 150 bcm with 48 bcm being delivered from the US. Norwegian gas deliveries would amount to 78 bcm, which is 10 bcm more than in the Gas on Sale scenario.



**FIGURE 42: DEVELOPMENT OF THE EU-28 SUPPLY MIX FOR DIFFERENT DEMAND ASSUMPTIONS (LEFT) AND DIFFERENCES COMPARED TO BASE CASE DEMAND (RIGHT)**

### 5.7.2 Global LNG Market Interdependencies

Besides the uncertain development of EU gas demand, another key factor for future European gas supply is the development of the global LNG market. As seen in the analysis above, LNG will contribute 120 bcm to EU gas supply in 2035 in the Gas on Sale scenario. Hence, in the following sensitivity is analysed, focusing on global interdependencies within the natural gas market. The uncertainty about future Asian demand is addressed as well as the uncertain development of US LNG prices. We derive two sensitivities: a high and a low EU LNG price case.

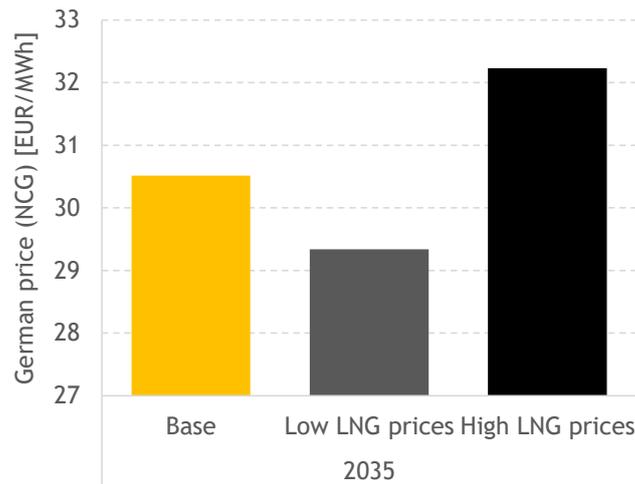
Firstly, in the high EU LNG price case, increased costs for liquefied US LNG and a higher demand in Asia are considered. It is assumed that the costs of US LNG are 1 USD/MMbtu or 3.1 €/MWh<sup>1</sup> higher than initially assumed in the Gas on Sale scenario. Furthermore, total demand development in Asia is assumed to be 20 percent higher as in the reference case. Compared to the reference case that equals an additional demand of about 240 bcm in 2035.<sup>2</sup>

Secondly, in the low EU LNG price case, 1 USD/MMbtu or 3.1 €/MWh lower US LNG export costs are assumed as well as a lower Asian demand of 20 percent.

<sup>1</sup> Exchange rate 1.1 USD/EUR

<sup>2</sup> Due to domestic Asian production, e.g. in China which may react on higher demand, this does not necessarily mean that LNG demand from Asia increases that much. Also higher demand triggers more investment in gas production facilities worldwide.

Higher Asian demand and higher US LNG export costs boost in particular hub prices in Asia, but the development has repercussions on natural gas prices in the EU. Thus, Figure 43 illustrates the price effect exemplary for Germany. The yellow bar refers to the reference case so the Gas on Sale scenario, which amounts to 30.5 Euro/MWh, the grey bar depicts the case of low LNG prices, and the black bar high LNG prices. Variation from the reference case accounts for minus 1.1 Euro/MWh when considering lower Asian demand, more liquefaction capacity, and lower US LNG export costs, and a plus of 1.7 Euro/MWh in the case of high LNG prices.



**FIGURE 43: PRICE DEVELOPMENT UNDER ALTERING ASIAN LNG DEMAND AND US LNG COSTS**

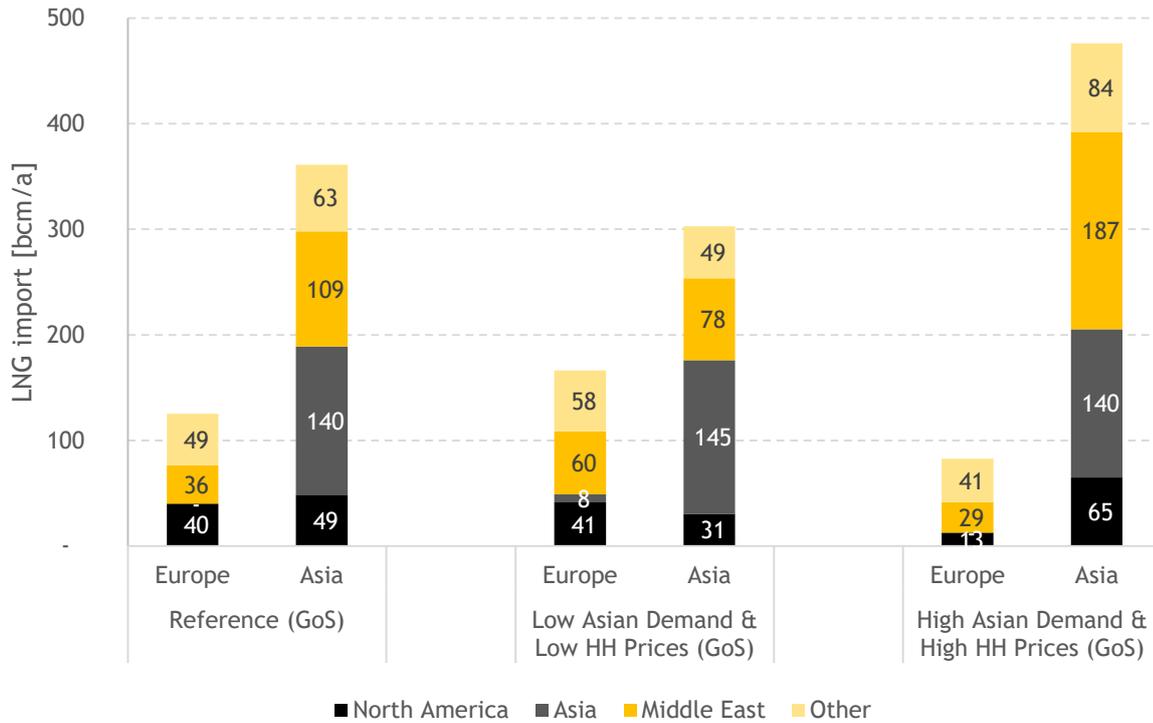
It is important to note that the sensitivity simulation focuses on long-term equilibria driven by fundamental data. Hence, sudden supply or demand shocks are not modelled. If, for example, Asian gas demand rose tremendously during a short time period such that no additional built-up of production or LNG liquefaction capacities could be realised, stronger price movements would be likely. This analysis, however, focuses on fundamental developments based on long-term production and infrastructure costs.

Besides influencing prices, global LNG developments also impact the structure of LNG supply in Asia and Europe<sup>1</sup>. Therefore, Figure 44 shows yearly LNG imports for the Gas on Sale scenario and in the case of low EU LNG prices due to decreased US LNG costs and Asian demand, as well as high EU LNG prices due to increased US LNG costs and Asian demand.

In the case of high Asian demand LNG is shifted away from Europe to Asia. European imports only amount to 83 bcm compared to 125 bcm in the reference case in 2035. In particular, US LNG is squeezed out of the European market as its costs (and its opportunity costs to deliver LNG to Asia) increases. As can be seen in the fifth bar of Figure 44, European LNG imports from the US amount to 13 bcm instead of 40 bcm in the reference Gas on Sale scenario.

<sup>1</sup> Incl. Turkey's LNG imports

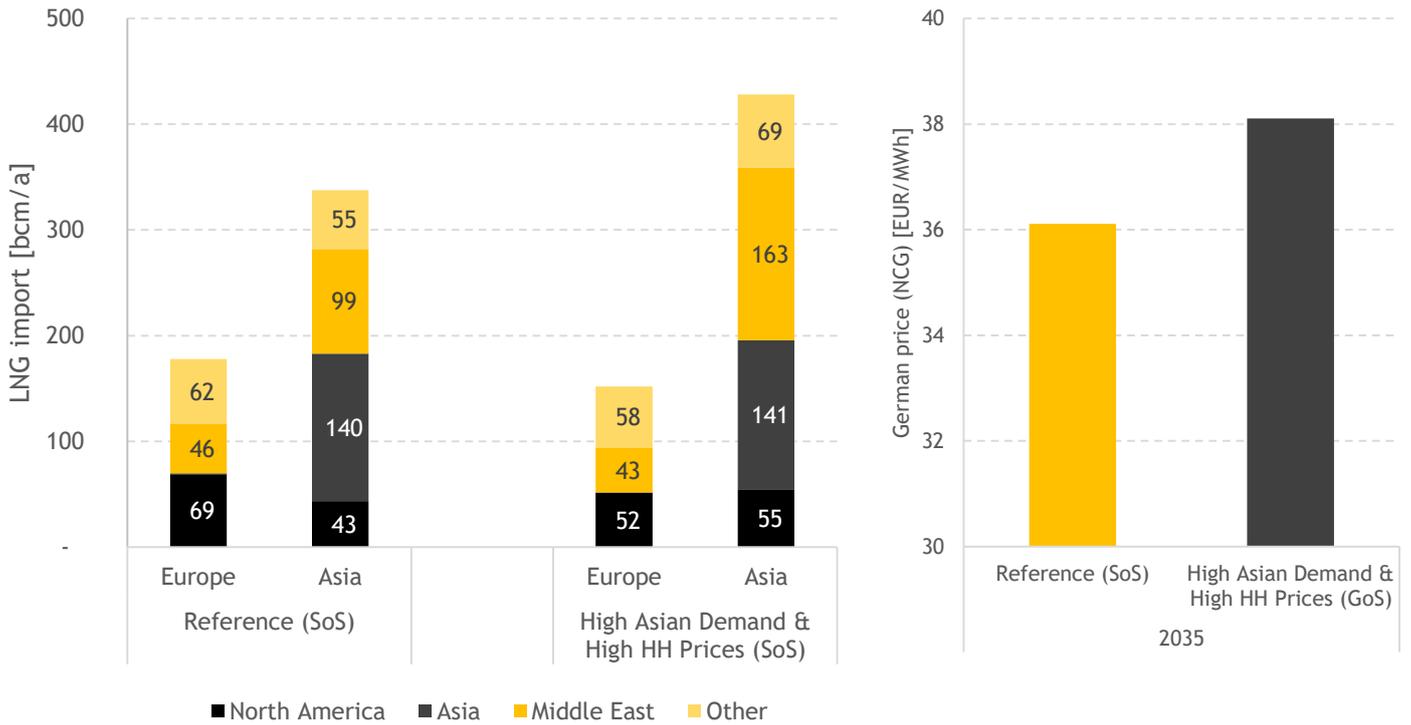
When considering low LNG prices in the competitive Gas on Sale scenario, LNG imports to Europe are 25 percent or 42 bcm higher, amounting to 167 bcm in total. However, US LNG exports are only 1 bcm higher, thus Europe prefers more competitive LNG supply from other regions. This is caused by the low Asian demand that results in oversupply and strong competition.



**FIGURE 44: LNG IMPORTS IN EUROPE (INCL. TURKEY) AND ASIA UNDER DIFFERENT LNG MARKET DEVELOPMENTS IN 2035**

Looking at a situation where the main European suppliers play an oligopoly strategy leads to a different condition as shown in Figure 45. As already described in the Southern Setback scenario the withdrawal of pipeline gas increases European LNG quantities up to 177 bcm in 2035<sup>1</sup>. Quantities from the US experience a rise of 29 bcm. However, due to the higher market prices within Europe, Asian LNG imports are 24 bcm lower than in the Gas on Sale scenario. When assuming higher LNG prices in Asia and higher US LNG costs, prices are 5 percent higher, accounting for 38 Euro/MWh compared to 36 Euro/MWh in the Southern Setback reference case. Compared to the Gas on Sale scenario prices are 15 percent higher. Europe’s import quantities are slightly lower at 153 bcm, but not as much as in the reference case.

<sup>1</sup> Incl. Turkey’s LNG imports



**FIGURE 45: DEVELOPMENT OF LNG SUPPLIES TO EUROPE (INCL. TURKEY) IN NORD DREAM SCENARIO AND WITH HIGH LNG PRICES (LEFT); DEVELOPMENT OF HUB PRICES IN GERMANY IN THE SAME CONTEXT (RIGHT)**

The moderate price increase is explained by the fact that the simulation model is a long-term model that derives more investment in gas supply infrastructure when (Asian) demand is high, as in the “High LNG” case. Due to a rather flat long-term global gas supply curve, price increases are moderate. If however, a situation would arise where all of the sudden higher capacities are needed, temporal scarcities can make prices boost, for instance in a situation similar to 2011, when Japanese LNG demand in the Fukushima aftermath made prices soar.

## LIST OF FIGURES

Figure 1: Gas demand of the EU-28 in different sectors. ....	4
Figure 2: Natural gas demand in 2014 of EU-28 member states. ....	5
Figure 3: German gas demand in different sectors. ....	6
Figure 4: Structure of gas supplies to the EU-28. ....	7
Figure 5: Gas imports by the EU and Turkey in 2015 compared to 2014 (red). ....	8
Figure 6: Russian gas exports to Europe (incl. Turkey) by pipeline route. ....	9
Figure 7: Structure of supplies for Germany. ....	10
Figure 8: Gas flows entering and exiting Germany in 2015 compared to 2014. ....	11
Figure 9: Downward correction of EU-28 gas demand projections. ....	12
Figure 10: Current projections of EU-28 gas demand in different scenarios. ....	14
Figure 11: Gas Production in Europe as assumed in TYNDP. ....	15
Figure 12: Proven gas reserves surrounding Europe. ....	17
Figure 13: Gas reserves in the Levant Basin. ....	21
Figure 14: Location of Azerbaijan's offshore gas and oil fields. ....	28
Figure 15: The different sections of the SGC. ....	30
Figure 16: Iran's gas and oil fields. ....	33
Figure 17: Southern Iraq's gas and oil fields. ....	36
Figure 18: Iraq's gas and oil fields. ....	37
Figure 19: Imports of LNG by source from 2011- 2015. ....	40
Figure 20: Average gas price per region between 2011 and 2015. ....	41
Figure 21: Comparison of scenarios from 2020 to 2035. ....	85
Figure 22: German gas price projections 2020-35 for the different scenarios. ....	86
Figure 23: Development of EU gas supply mix in the Gas on Sale scenario until 2035. ....	88
Figure 24: Proportional supply structure in 2014 and 2035. ....	88
Figure 25: Development of natural gas wholesale prices in the Gas on Sale scenario until 2035. ....	89
Figure 26: Natural gas flows within Europe in the Gas on Sale scenario in 2017. ....	90
Figure 27: Natural gas flows within Europe in the Gas on Sale scenario in 2035. ....	91
Figure 28: Demand for investment in the Gas on Sale scenario between 2020 and 2035. ....	93
Figure 29: Net in- and outflows for Germany in the Gas on Sale scenario between 2013 and 2035. ....	94
Figure 30: EU-28 gas supply in the Nord Dream scenario (left); Differences in supply quantities between Nord Dream and Gas on Sale scenario (right). ....	96
Figure 31: Demand for investment in infrastructure for Nord Dream scenario between 2020 and 2035. ....	97
Figure 32: Differences in gas flows (bcm) between Gas on Sale scenario and Nord Dream scenario in 2035. ....	98
Figure 33: Net in- and outflows for Germany 2013-35 in the Nord Dream scenario. ....	99
Figure 34: EU-28 gas supply in the Nord Dream scenario (left); Differences in supply quantities between Nord Dream and Gas on Sale scenario (right). ....	101
Figure 35: Demand for investment in new infrastructure in Southern Setback scenario between 2020 and 2035. ....	102
Figure 36: Differences in gas flows between Nord Dream and Southern Setback scenario in 2035. ....	103
Figure 37: Utilisation of Russian export routes with respect to different Ukrainian transit fees in 2035. ....	106
Figure 38: Utilisation of Russian gas transit routes in the Gas on Sale scenario with Nord Stream 2 (left) and without Nord Stream 2 (right). ....	107
Figure 39: Transit revenues of Ukraine and prices of NCG in correlation to level of transit fees in 2025. ....	108
Figure 40: Transit revenues of Ukraine and prices of NCG in correlation to level of transit fees in 2035. ....	109

---

Figure 41: Average (2020-35) annual delta in Russian profit margin and revenues from pursuing competitive instead of oligopoly pricing (GoS scenario) .....	110
Figure 42: Development of the EU-28 supply mix for different demand assumptions (left) and differences compared to base case demand (right).....	113
Figure 43: Price development under altering Asian LNG demand and US LNG costs.....	114
Figure 44: LNG imports in Europe (incl. Turkey) and Asia under different LNG market developments in 2035 .....	115
Figure 45: Development of LNG supplies to Europe (incl. Turkey) in Nord Dream scenario and with high LNG prices (left); Development of hub prices in Germany in the same context (right).....	116

## LIST OF TABLES

Table 1: Field development Russia.....	24
Table 2: Overview of projects under construction (as of March 2016) .....	45
Table 3: Distinctive characteristics of the modelled scenarios.....	83
Table 4: Overview of Ukrainian entry/exit costs.....	105

## LIST OF ABBREVIATIONS

\$	US-Dollar
€	Euro
€/MWh	Euro per Megawatt hour
BAFA	German Federal Office of Export Control
Bcm	Billion cubic metres
Bcm/a	Billion cubic metres per annum
BUP	Bukhara- Urals Pipeline
CAC	Central Asia Center Pipeline
CACP	Central Asia-China Gas Pipeline
CNG	Compressed natural gas
CO <sub>2</sub>	Carbon dioxide
DTP	Dauletabad-Khangiran
EEZ	Exclusive Economic Zones
EIA	Energy information Administration
ENTSO-G	European Network Transmission Operators- Natural Gas
EU ETS	EU Emissions Trading System
EU	European Union
EU-28	The 28 member states comprising the European Union
EUCERS	European Centre for Energy and Resource Security
EWI	Institute of Energy Economics at the University of Cologne
FID	Final Investment Decision
FLNG	Floating LNG
IEA	International Energy Agency
IPC	Iranian Petroleum Contract
KKKP	Korpezhe-Kurt Kui pipeline
KRG	Kurdistan Regional Government
kWh	Kilowatt hour
LNG	Liquefied Natural Gas
mcm	Million cubic metres
MMbtu	Million British Thermal Units
MWh	Megawatt hour
NGI	Natural Gas Information (IEA)
OPAL	Ostsee-Pipeline Anbindungsleitung

PCI	Projects of Common Interest
SCG	Southern Gas Corridor
SCP	South Caucasus Pipeline
SD	Shah Deniz
SRF	Chinese Silk Road Fund
TANAP	Trans Anatolian Pipeline
TAP	Trans Adriatic Pipeline
TCP	Trans Caspian Pipeline
TYNDP	Ten Year Network Development Plan
USD	US Dollar
USD/m <sup>3</sup>	US Dollar per cubic metre
WEO	World Energy Outlook (IEA)

## BIBLIOGRAPHY

**2bst Consulting (2014):** Shell and South Gas at design phase on first Iraq LNG Plant. Available at: <http://www.2b1stconsulting.com/shell-and-south-gas-at-design-phase-on-first-iraq-lng-plant/>

**ACER (2015):** ACER Market Monitoring Report 2015. Available at: [http://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Publication/ACER\\_Market\\_Monitoring\\_Report\\_2015.pdf](http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER_Market_Monitoring_Report_2015.pdf)

**Aguilera, Eggert, Lagos, Tiltonf (2009):** Depletion and the Future Availability of Petroleum Resources. *The Energy Journal* 30 (1).

**Aissaoui (2016):** Algerian Gas: Troubling Trends, Troubled Policies. Oxford Institute for Energy Studies. NG 108

**Algeria Press Service (2015):** Hydrocarbon exports expected to grow by 4.1% in 2015. Available at: <http://www.aps.dz/en/economy/8839-hydrocarbon-exports-expected-to-grow-by-4-1-in-2015>

**APPEA (2016):** Australian LNG projects. Available at: <http://www.appea.com.au/oil-gas-explained/operation/australian-lng-projects/>

**Azertag (2016):** Les travaux de construction de TANAP vont bon train. Available at: <http://azertag.az/fr/xeber/france-922294>

**Badalova (2015):** Tesla gas pipeline project may be included into European Commission's PCIs (exclusive). Trend news agency. Available at: <http://en.trend.az/business/energy/2429480.html>

**Bafa (2016):** Entwicklung der Erdgaseinfuhr in die Bundesrepublik Deutschland-Bilanzen 1998 - 2015

**Balci (2014):** Strengths and Constraints of Turkish Policy in the South Caucasus. Insight Turkey. Carnegie Endowment for International Peace. Available at: <http://carnegieendowment.org/2014/06/18/strengths-and-constraints-of-turkish-policy-in-south-caucasus>

**Barroso (2009):** Remarks by Commission President José Manuel Barroso upon the signature of the Nabucco intergovernmental agreement. European Commission Press Release Database, Ankara, SPEECH/ 09/339. Available at: [http://europa.eu/rapid/press-release\\_SPEECH-09-339\\_en.pdf](http://europa.eu/rapid/press-release_SPEECH-09-339_en.pdf)

**BBC (2014):** EU leaders have reached a landmark deal to cut greenhouse gas emissions by 40% by 2030, compared with 1990 levels. Available at: <http://www.bbc.co.uk/news/world-europe-29751064>

**BBC (2015):** EU criticises Turkey over human rights and democracy. Available at: <http://www.bbc.co.uk/news/world-europe-34774624>

**Belyi (2010):** Third energy package: implications for Gazprom. Energy Law Research Forum Conference, Cambridge, 9 December.

**Bernovici (2015):** Romania's gas production, up in 2014, meaning 0.3 pc of world production, BP data show. The Romania Journal. Available at: <http://www.romaniajournal.ro/romanias-gas-production-up-in-2014-meaning-0-3-pc-of-world-production-bp-data-show/>

**Blume (2016):** Australian LNG projects juggle rising costs with a will to succeed. Available at: <http://www.gasprocessingnews.com/columns/201410/boxscore-construction-analysis.aspx>

**BmWi (2015):** Versorgungssicherheit bei Erdgas. Monitoring-Bericht nach § 51 EnWG, Bundesministerium für Wirtschaft und Energie, 2015.

**Bordoff and Houser (2014):** American Gas to the Rescue? The Impact of US LNG Exports on European Security and Russian Foreign Policy. Columbia University, Center on Global Energy Policy. Available at: [http://energypolicy.columbia.edu/sites/default/files/energy/CGEP\\_American%20Gas%20to%20the%20Rescue%3F.pdf](http://energypolicy.columbia.edu/sites/default/files/energy/CGEP_American%20Gas%20to%20the%20Rescue%3F.pdf)

**BP (2015):** Statistical Review of World Energy 2015. Available at: <http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>

**BP (2016):** Shah Deniz Stage 2. Available at: [http://www.bp.com/en\\_az/caspian/operationsprojects/Shahdeniz/SDstage2.html](http://www.bp.com/en_az/caspian/operationsprojects/Shahdeniz/SDstage2.html)

**Bradshaw (2014):** Why Russia isn't abandoning Europe for Chinese gas revenue. The Conversation. Available at: <https://theconversation.com/why-russia-isnt-abandoning-europe-for-chinese-gas-revenue-34112>

**Cagaptay (2016):** Erdogan's Nationalist Path to a Full Presidential System. The Washington Institute PolicyWatch 2620. Available at: <http://www.washingtoninstitute.org/policy-analysis/view/erdogans-nationalist-path-to-a-full-presidential-system>

**Cameron LNG (2016):** Liquefaction helps the future look bright. Available at: <http://cameronlng.com/liquefaction-project.html>

**Carbonnel (2011):** Russia calls on EU to halt talks on Caspian gas pipeline. Reuters. Available at: <http://uk.reuters.com/article/russia-eu-caspian-pipeline-idAFL5E7KD2FW20110913>

**Carter (2015):** Greens parties in Europe: rivals or partners to the centre left? Policy Network. Available at: [http://www.policy-network.net/pno\\_detail.aspx?ID=4851&title=Greens+parties+in+Europe%3a+rivals+or+partners+to+the+centre+left%3f](http://www.policy-network.net/pno_detail.aspx?ID=4851&title=Greens+parties+in+Europe%3a+rivals+or+partners+to+the+centre+left%3f)

**Chazan (2014):** Europe seeks alternative gas supplies. Financial Times. Available at: <https://next.ft.com/content/b943b2c4-b8ed-11e3-98c5-00144feabdc0>

**Chazan and Shotter (2013):** TAP clinches Azeri gas pipeline deal. Financial Times. Available at: <http://www.ft.com/cms/s/0/41a3c048-de4f-11e2-b990-00144feab7de.html#axzz478BLAIfZ>

**Cheniere (2016):** Project schedule. Available at: <http://www.cheniere.com/terminals/sabine-pass/trains-5-6/56-schedule/>

**Clemente (2016):** Turkey's Rising Gas Demand Needs US LNG. Forbes. Available at: <http://www.forbes.com/sites/judeclemente/2016/02/07/turkeys-rising-natural-gas-demand-needs-u-s-lng/#2f8f389e2ac7>

**Clifford Chance (2014):** A Legal Overview of Foreign Investment in Russia's Strategic Sectors. Clifford Chance Briefing Note. Available at: [http://globalmandatoolkit.cliffordchance.com/downloads/a\\_legal\\_overview\\_of\\_foreign\\_investment.pdf](http://globalmandatoolkit.cliffordchance.com/downloads/a_legal_overview_of_foreign_investment.pdf)

**Clingendael (2013):** Russian gas imports to Europe and security of supply - factsheet. Clingendael International Energy Programme. Available at: <http://www.clingendaelenergy.com/files.cfm?event=files.download&ui=9C1DEEC1-5254-00CF-FD03186604989704>

**Çolakoglu, Günsel (2014):** Liberalising natural gas in Turkey. PWC. Available at: <https://www.pwc.com.tr/tr/publications/industrial/energy/assets/turkiyede-dogalgaz-piyasasinin-liberallesmesi-raporu.pdf>

**Commission of the European Communities (2008):** Second Strategic Energy Review: an EU Energy Security and Solidarity Action Plan. Brussels, COM(2008) 781 final. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0781:FIN:EN:PDF>

**Cornell, Tsereteli, Socor (2005):** Geostrategic Implications of the Baku-Tbilisi-Ceyhan Pipeline. In: Starr, Cornell (eds) The Baku-Tbilisi-Ceyhan Pipeline: Oil Window to the West. Washington, D.C./Uppsala: Central Asia-Caucasus Institute & Silk Road Studies Program.

**Coskun (2015):** Russia Halts Turkey Nuclear Work, Ankara Looks Elsewhere. Reuters. Available at: <http://www.reuters.com/article/mideast-crisis-turkey-russia-nuclear-idUSL8N13Y31G20151209>

**Critchlow (2015):** Iran to trigger natural gas race with Qatar in Persian Gulf. Available at: <http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/11920043/Andrew-Critchlow-Iran-to-trigger-natural-gas-race-with-Qatar-in-Persian-Gulf.html>

**Danish Government (2013):** The Danish Climate Policy Plan: Towards a low carbon society. Available at: [http://www.ens.dk/sites/ens.dk/files/policy/danish-climate-energy-policy/danishclimatepolicyplan\\_uk.pdf](http://www.ens.dk/sites/ens.dk/files/policy/danish-climate-energy-policy/danishclimatepolicyplan_uk.pdf)

**Davis and Shearer (2014):** Climate change: A crack in the natural-gas bridge. *Nature* 514, pp. 436-437.

**Department of Energy and Climate Change (2013):** Oil and gas project pathfinder. Current and Future UKCS Oil & Gas Projects, Aberdeen.

**Dragneva, Wolczuk (2012):** Russia, the Eurasian Customs Union and the EU: Cooperation, Stagnation or Rivalry? Chatham House Briefing Paper, Russia and Eurasia Programme. Available at: [https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Russia%20and%20Eurasia/0812bp\\_dragnevawolczuk.pdf](https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Russia%20and%20Eurasia/0812bp_dragnevawolczuk.pdf)

**Dutch Ministry of Economic Affairs (2015):** Available at: [https://www.unece.org/fileadmin/DAM/energy/se/pp/geg/gif5\\_19Jan2015/s2\\_6\\_vantHof.pdf](https://www.unece.org/fileadmin/DAM/energy/se/pp/geg/gif5_19Jan2015/s2_6_vantHof.pdf)

**Ebn (2014):** Focus on Dutch Oil & Gas. Available at: [http://www.nlog.nl/resources/Posters/prospectfair2014/ebn\\_focus\\_on\\_dutch\\_oil\\_gas\\_2014.pdf](http://www.nlog.nl/resources/Posters/prospectfair2014/ebn_focus_on_dutch_oil_gas_2014.pdf)

**EIA (2015b):** World Shale Resource Assessments. Available at: <https://www.eia.gov/analysis/studies/worldshalegas/>

**EIA (2015a):** Country Analysis. Available at: <https://www.eia.gov/beta/international/analysis.cfm>

**EIA (2016):** Country Analysis Brief: United Kingdom. Available at: <https://www.eia.gov/beta/international/analysis.cfm?iso=GBR>

**Eligür (2014):** Turkey's Declining Democracy, Hudson Institute. Available at: <http://www.hudson.org/research/10525-turkey-s-declining-democracy>

**Elliott et al. (2013):** Statoil to go ahead with \$10 bn Aasta Hansteen project. Available at: <http://www.platts.com/latest-news/natural-gas/london/statoil-to-go-ahead-with-10-billion-aasta-hansteen-8043076>

**Energy Transition (2016):** The German Energiewende website. Available at: [www.energytransition.de](http://www.energytransition.de)

**ENTSOE (2015a):** Ten-Year Network Development Plan, Main Report.

**ENTSOG (2015b):** Transmission Capacity Map. Available at:  
<http://www.entsog.eu/maps/transmission-capacity-map>

**Erkul (2016):** Eastern Mediterranean Gas Secures Region's Energy: IEA. Anadolu Agency.  
<http://aa.com.tr/en/economy/eastern-mediterranean-gas-secures-regions-energy-iea/508897>

**Ernst and Young (2012):** Global LNG Will new demand and new supply mean new pricing?  
Ernst and Young. Available at:  
[http://www.ey.com/Publication/vwLUAssets/Global\\_LNG\\_New\\_pricing\\_ahead/\\$FILE/Global\\_LNG\\_New\\_pricing\\_ahead\\_DW0240.pdf](http://www.ey.com/Publication/vwLUAssets/Global_LNG_New_pricing_ahead/$FILE/Global_LNG_New_pricing_ahead_DW0240.pdf)

**EU Energy trends (2013):** EU Energy, Transport and GHG Emissions. Trends to 2050-  
Reference Scenario 2013, Luxembourg

**EurActiv (2013):** Ukraine wants trade agreements with EU and Russia. Available at:  
<http://www.euractiv.com/section/europe-s-east/news/ukraine-wants-trade-agreements-with-eu-and-russia/>

**Euro-Atlantic Security Initiative Working Group on Energy (2012):** Energy as a Building Block  
in Creating a Euro-Atlantic Security Community. Endowment for International Peace. Available  
at: <http://carnegieendowment.org/2012/02/03/energy-as-building-block-in-creating-euro-atlantic-security-community#>

**Eurogas (2001):** Statistical Report 2001

**Eurogas (2006):** Statistical Report 2006

**Eurogas (2011):** Statistical Report 2011

**Eurogas (2015):** Statistical Report 2015

**European Commission (2006):** Green Paper: A European strategy for sustainable, competitive  
and secure energy. Brussels, COM(2006) 105 final. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV%3A127062>

**European Commission (2015a):** Quarterly report on European gas market. Market observatory  
for energy. DG Energy vol. 8, issue 3 (3<sup>rd</sup> quarter)

**European Commission (2015b):** Ende der Isolierung der baltischen Staaten im Energiebereich:  
Die neue Gasverbindungsleitung Polen-Litauen (GIPL). Available at:  
[http://europa.eu/rapid/press-release\\_MEMO-15-5845\\_de.htm](http://europa.eu/rapid/press-release_MEMO-15-5845_de.htm)

**European Commission (2015c):** State of the Energy Union 2015, Brussels, COM(2015) 572  
final. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1449767367230&uri=CELEX:52015DC0572>

**European Commission (2016a):** Towards Energy Union: The Commission presents sustainable  
energy security package. Brussels. Available at: [http://europa.eu/rapid/press-release\\_IP-16-307\\_en.htm](http://europa.eu/rapid/press-release_IP-16-307_en.htm)

**European Commission (2016b):** Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an EU strategy for liquefied natural gas and gas storage. Brussels, COM(2016) 49 final. Available at:  
[https://ec.europa.eu/energy/sites/ener/files/documents/1\\_EN\\_ACT\\_part1\\_v10-1.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v10-1.pdf)

**European Energy Union (2015):** Vice-President Maroš Šefčovič and Commissioner Miguel Arias Cañete present the Energy Union. Available at: <http://europa.eu/!hR86XP>

**European Union (2003):** A Secure Europe in a Better World: European Security Strategy, Brussels, 12 December 2003. Available at:  
<http://www.consilium.europa.eu/uedocs/cmsUpload/78367.pdf>

**Eurostat (2013):** Energy production and imports. Available at:  
[http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy\\_production\\_and\\_imports](http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_production_and_imports)

**Eurostat (2015):** Statistical Database. Available at:  
<http://ec.europa.eu/eurostat/web/energy/data/database>

**Evans (2011):** The Failure of Democratization in Russia: A Comparative Perspective. *Journal of Eurasian Studies*, vol. 2, issue 1, pp. 40-51

**FNB Gas (2015):** Netzentwicklungsplan Gas 2015, Berlin.

**Fraser (2016):** Total turns on gas from west of Shetland Laggan and Tormore fields. Available at: <http://www.bbc.com/news/uk-scotland-north-east-orkney-shetland-35516144>

**Freedom House (2015):** Freedom in the World 2015. Highlights from Freedom House's annual report on political rights and civil liberties, 2015. Available at:  
[https://freedomhouse.org/sites/default/files/01152015\\_FIW\\_2015\\_final.pdf](https://freedomhouse.org/sites/default/files/01152015_FIW_2015_final.pdf)

**Freedom House (2016):** Freedom in the World 2016. Available at:  
[https://freedomhouse.org/sites/default/files/FH\\_FITW\\_Report\\_2016.pdf](https://freedomhouse.org/sites/default/files/FH_FITW_Report_2016.pdf)

**Freeport LNG (2016):** Project status and schedule. Available at:  
[http://www.freeportlng.com/Project\\_Status.asp](http://www.freeportlng.com/Project_Status.asp)

**Gas in focus (2015):** Existing and planned LNG terminals. Available at:  
<http://www.gasinfocus.com/en/indicator/existing-and-planned-lng-terminals/>

**Gazprom (2016):** LNG projects and Baltic LNG. Available at:  
<http://www.gazprom.com/about/production/projects/lng/> and  
<http://www.gazprom.com/about/production/projects/lng/baltic-lng/>

**German Marshall Fund (2015):** Turkish Perceptions Survey 2015. Available at:  
[http://www.gmfus.org/sites/default/files/TurkeySurvey\\_2015\\_web1.pdf](http://www.gmfus.org/sites/default/files/TurkeySurvey_2015_web1.pdf)

**GIE (2015):** GIE Publications. Available at: <http://www.gie.eu/index.php/publications/gie>

**GIINGL (2015):** Retail LNG Handbook 2015. Available at:  
[http://www.giingl.org/sites/default/files/PUBLIC\\_AREA/Publications/giingl\\_retail\\_lng\\_handbook.pdf](http://www.giingl.org/sites/default/files/PUBLIC_AREA/Publications/giingl_retail_lng_handbook.pdf)

**Giles (2016):** Russia's 'New' Tool for Confronting the West—Continuity and Innovation in Moscow's Exercise of Power. Chatham House Research Paper. Available at:  
<https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/2016-03-21-russias-new-tools-giles.pdf>

**Global LNG (2016):** World's LNG Liquefaction Plants and Regasification Terminals. Available at: <http://www.globalnginfo.com/world%20lng%20plants%20&%20terminals.pdf>

**Goldthau (2015):** Addressing the Russian Energy Challenge: Why Regulation Trumps Geopolitics. GMF Policy Brief, German Marshall Fund of the United States. Available at:  
<http://www.gmfus.org/file/7141/download>

**Gotev (2015):** Turkey and Azerbaijan begin construction of TANAP pipeline. Euractive. Available at: <http://www.euractiv.com/section/energy/news/turkey-and-azerbaijan-begin-construction-of-tanap-pipeline/>

**Greene, Robertson (2014):** Can Putin's Popularity Last? The Moscow Times. Available at:  
<http://www.themoscowtimes.com/opinion/article/can-putin-s-popularity-last/506234.html>

**Growitsch, Hecking, Panke (2013):** Supply disruptions and regional price effects in a spatial oligopoly - an application to the global gas market, EWI working papers 2013-8, Energiewirtschaftliches Institut an der Universitaet zu Koeln (EWI)

**GSE (2015):** Paper on the GSE Investment database 2015-2025. Available at:  
<http://www.gie.eu/index.php/publications/gse>

**Hafner (2015):** The Southern Gas Corridor and the EU Gas Security of Supply: What's Next? Natural Gas Europe. Available at: <https://naturalgaseurope.com/southern-gas-corridor-and-eu-gas-security-of-supply-22688>

**Hale (2010):** Eurasian Polities as Hybrid Regimes: The Case of Putin's Russia. *Journal of Eurasian Studies*, vol. 1, issue 1, pp. 33-41

**Hecking, Panke (2012):** Columbus- a global gas market model, EWI working papers 2012-6, Energiewirtschaftliches Institut an der Universitaet zu Koeln (EWI)

**Heerema (2015):** Heerema completed Cygnus topsides and module. Available at:  
<http://hfg.heerema.com/content/news-media/news-releases/news-detail/article/heerema-hartlepool-completed-cygnus-topsides-and-m/>

**Henderson, Mitrova (2015):** The Political and commercial dynamics of Russia's Gas export strategy. The Oxford Institute for Energy Studies. NG 102. Available at:  
<https://www.oxfordenergy.org/wpcms/wp-content/uploads/2015/09/NG-102.pdf>

**Honoré (2014):** The outlook for natural gas demand in Europe, Oxford Institute for Energy Studies, no. 87

**IEA (2007):** World Energy Outlook 2007. IEA Publications, Paris

**IEA (2009):** World Energy Outlook 2009. IEA Publications, Paris

**IEA (2011):** World Energy Outlook 2011. IEA Publications, Paris

**IEA (2013):** World Energy Outlook 2013. IEA Publications, Paris

**IEA (2014):** Medium term gas market report 2014. Market Analysis and Forecasts to 2019

**IEA (2015a):** World Energy Outlook 2015. IEA Publications, Paris.

**IEA (2015b):** Medium term gas market report 2015. Market Analysis and Forecasts to 2020.

**IEA (2015c):** Natural Gas Information 2015.

**IEA (2015d):** IEA Flowmap. International Energy Agency. Available at:  
<https://www.iea.org/gtf/>

**IGI Poseidon (2015):** Eastern Mediterranean Pipeline, Athen.

Inter-agency Information Sharing Portal. Available at:  
<http://data.unhcr.org/syrianrefugees/country.php?id=224>

**Interfax (2015):** НКРЭКУ установила "Укртрансгазу" тарифы на транзит газа для точек входа и выхода. Interfax. Available at: <http://interfax.com.ua/news/economic/314958.html>

**International Gas Union (2014):** Small scale LNG- Triennium work report 2012-2015

**International Gas Union (2015):** World LNG report- News, views and knowledge on gas. 2015 Edition

**International Monetary Fund (2015):** Russian Federation—2015 Article IV Consultation. IMF Country Report. Available at: <http://www.imf.org/external/pubs/ft/scr/2015/cr15211.pdf>

**International Monetary Fund (2016):** World Economic Outlook 2016. Available at:  
<http://www.imf.org/external/pubs/ft/weo/2016/01/>

**Karakullukcu, Trenin (2014):** Exploring the Prospects for Russian-Turkish Cooperation in a Turbulent Neighborhood. Carnegie Moscow Center. Available at:  
[http://carnegieendowment.org/files/CP\\_Turkey2014\\_web\\_Eng.pdf](http://carnegieendowment.org/files/CP_Turkey2014_web_Eng.pdf)

**Kilisek (2014):** Energy Quote of the Day: ‘Natural Gas is Often Described as a Bridge Fuel. How Long Should that Bridge Be? The Energy Collective. Available at:  
<http://www.theenergycollective.com/roman-kilisek/2150401/energy-quote-day-natural-gas-often-described-bridge-fuel-how-long-should-bridg>

**Kingsley (2016):** Erdogan Calls on Europe to Take in More Syrian Refugees. The Guardian. Available at: <https://www.theguardian.com/world/2016/may/23/erdogan-calls-on-europe-to-take-in-more-syrian-refugees>

**Kinnander (2010):** The Turkish-Iranian Gas Relationship: Politically Successful, Commercially Problematic. Oxford Institute for Energy Studies. Available at:  
<https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG38-TheTurkishIranianGasRelationship-ElinKinnander-2010.pdf>

**Kirisci (2015):** Warming Up Turkey: The Importance of Economic Engagement. Brookings Institution. Available at: <http://www.brookings.edu/blogs/order-from-chaos/posts/2015/04/06-turkey-economic-engagement-kirisci>

**Kirkland (2010):** Natural Gas Could Serve as "Bridge" Fuel to Low-Carbon Future. *Scientific American/Climatewire*. Available at: <http://www.scientificamerican.com/article/natural-gas-could-serve-as-bridge-fuel-to-low-carbon-future/>

**Knecht (2015):** Egypt's giant Zohr gas field aims to start output in 2017 -minister. Reuters. Available at: <http://uk.reuters.com/article/mideast-investment-egypt-gas-idUKL3N12X4DX20151102>

**Konoplyanik (2008):** Regulating energy relations: Acquis or Energy Charter? In: Barysch (ed.) *Pipelines, politics and power*. London: Centre for European Reform.

**Kusznir (2013):** TAP, Nabucco West, and South Stream: The Pipeline Dilemma in the Caspian Sea Basin and Its Consequences for the Development of the Southern Gas Corridor, CAUCASUS ANALYTICAL DIGEST No. 47, Bremen.

**Lagakos, Tsakiridis (2015):** East Med Pipeline: the “Game-Changer” Europe Chooses to Ignore. Natural Gas Europe. Available at: <http://www.naturalgaseurope.com/east-med-pipeline-the-game-changer-europe-chooses-to-ignore-23628>.

**Leifheit (2015):** Eastring: Diversifying Eustream's portfolio. Natural Gas Europe. Available at: <http://www.naturalgaseurope.com/eastring-diversifying-eustreams-portfolio-24818>

**Leifheit, Powell (2016):** Nord Stream 2 ‘Fits with the Market’: Gazprom M&T. Natural Gas Europe. Available at: <https://naturalgaseurope.com/nord-stream-2-fits-with-the-market-gazprom-mandt-27725>

**Likvern (2015):** Shrinking Norwegian Natural Gas Production Puts Europe In Dire Situation. Available at: <http://oilprice.com/Energy/Natural-Gas/Shrinking-Norwegian-Natural-Gas-Production-Puts-Europe-In-Dire-Situation.html>

**Lough (2011):** Russia’s Energy Diplomacy. Chatham House Briefing Paper. Available at: [http://www.chathamhouse.org/sites/default/files/19352\\_0511bp\\_lough.pdf](http://www.chathamhouse.org/sites/default/files/19352_0511bp_lough.pdf)

**Mammadov (2015):** Turkmenistan positions itself as Eurasian natural gas power. Oil & Gas Journal. Volume 113, Issue 12

**Martinez, Paletar, Hecking (2015):** The 2014 Ukrainian crisis: Europe’s increased security position. Natural gas network assessment and scenario simulations

**Mazneva (2015):** Russia Plans to End Ukraine Gas Transit for New Route After 2019. Bloomberg. Available at: <http://www.bloomberg.com/news/articles/2015-04-13/russia-plans-to-end-ukraine-gas-transit-for-new-route-after-2019>

**Medvedev (2009):** Go Russia. Available at: <http://en.kremlin.ru/events/president/news/5413>

**Metea (2015):** Lukoil discovers large gas field offshore Romania. Available at: <http://www.offshoreenergytoday.com/lukoil-discovers-large-gas-field-offshore-romania/>

**Meyer (2015):** US natural gas glut prompts price warning. Financial Times. Available at: <https://next.ft.com/content/2716649e-4b6f-11e5-b558-8a9722977189>

**Mihalache (2015):** No shale gas in Eastern Europe, after all: implications of Chevron’s exit from Romania. Available at: <http://www.energypost.eu/shale-gas-eastern-europe-implications-chevrons-exit-romania/>

**Mills (2016):** Energy Minister: Israel Is Considering New Pipelines to Greece, Turkey. Natural Gas Europe. Available at: <http://www.naturalgaseurope.com/energy-minister-steinitz-israel-greece-turkey>

**Mitrova, Stern, Belova (2012):** Европейский газовый рынок: мечты не всегда сбываются. Energy Center of the Skolkovo Moscow School of Management. Available at: <http://ineiran.ru/articles/2012jul-mitrova-t-stern-j-belova-m-evropejskij-gazovyj-rynok-mechty-ne-vsegda-sbyvayutsya-energeticheskij-tsentr-moskovskoj-shkoly-upravleniya-skolkovo.pdf>

**Mohamedi (2015):** The oil and gas industry. Available at: <http://iranprimer.usip.org/resource/oil-and-gas-industry>

**Monaghan (2013):** The New Russian Foreign Policy Concept: Evolving Continuity. Chatham House Research Paper. Available at:  
[https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Russia%20and%20Eurasia/0413pp\\_monaghan.pdf](https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Russia%20and%20Eurasia/0413pp_monaghan.pdf)

**Mozambique LNG (2016):** A Cleaner Source of Energy for the World. Available at:  
<http://www.mzlng.com/The-Project/>

**Naftogaz (2016):** Маршруты транзита газа по территории Украины. Available at:  
<http://naftogaz-europe.com/article/ru/UAGasTransitRoutes>

**Natural Gas Europe (2015a):** Netherlands caps Groningen gas production at 30 bcm in 2015. Available at: <http://www.naturalgaseurope.com/netherlands-cap-groningen-gas-production-at-30-bcm-in-2015-24309>.

**Natural Gas Europe (2015b):** Turkey Plans to Build a Pipeline From Israel. Available at:  
<http://www.naturalgaseurope.com/turkey-plans-to-build-a-pipeline-from-israel-27244>

**Natural Gas Europe (2015c):** Whatever Happened to the Great European Fracking Boom? Available at: <http://www.naturalgaseurope.com/europe-fracking-boom-22622>

**Natural Gas Europe (2016a):** Russia's Prospects for a New Pipeline to Europe Look Bleak  
<https://naturalgaseurope.com/russia-prospects-pipeline-europe-outlook-analysis>

**Natural Gas Europe (2016b):** TAP Building Work to Start in March. Available at:  
<http://www.naturalgaseurope.com/tap-building-work-to-start-in-march-28384>

**Natural Gas Europe (2016c):** Eni Reportedly Proposes \$4bn Investment in Iran's South Pars Project. Available at: <http://www.naturalgaseurope.com/eni-proposes-4b-investment-in-irans-south-pars-gas-project-27788>

**Natural Gas Europe (2016d):** After sanctions. Iran's growing role in the Caucasus. Available at: <http://www.naturalgaseurope.com/sanctions-iran-south-caucasus-cooperation-russia-azerbaijan>

**Natural Gas Europe (2016f):** East Med and Cyprus Preview of Energy Developments in 2016. Available at: <http://www.naturalgaseurope.com/east-med-and-cyprus-preview-of-energy-developments-in-2016-27433>

**Natural Gas Europe (2016g):** Turkey hopes to catch up with Azeri gas by 2017: Report. Natural Gas Europe. Available at: <http://www.naturalgaseurope.com/turkey-hopes-to-catch-up-with-azeri-gas-by-2017-report-27601>

**Neslen (2014):** Israel And Cyprus Are Pushing The EU To Help Build The Longest Gas Pipeline Ever. Business Insider. Available at: <http://www.businessinsider.com/israel-and-cyprus-push-eu-to-build-the-longest-gas-pipeline-ever-2014-12?IR=T>

**Neslen (2015):** Polish shale industry collapsing as number of licenses nearly halves. Available at: <http://www.theguardian.com/environment/2015/oct/09/polish-shale-industry-collapsing-as-number-of-licenses-nearly-halves>

**Neumann, Rüster, Hirschhausen (2015):** Long-Term Contracts in the Natural Gas Industry- Literature Survey and Data on 426 Contracts (1965-2014). Deutsches Institut für Wirtschaftsforschung. Data Documentation 77

**News.az (2016):** TANAP construction in Turkey suspended. Available at: <http://news.az/articles/economy/104832>

**Nord Stream 2 (2015):** Gazprom and ENGIE modify Nord Stream 2 shareholdings, equalizing EU-Russian ownership. Available at: <http://www.nord-stream2.com/media-info/news/gazprom-and-engie-modify-nord-stream-2-shareholdings-equalizing-eu-russian-ownership-6/> Access on 27.4.2016

**O'Byrne (2016):** Turkey to Legislate for Further Opening of Gas Market. Platts. Available at: <http://www.platts.com/latest-news/natural-gas/istanbul/turkey-to-legislate-for-further-opening-of-gas-26413922>

**O'Byrne (2014):** Pace of Turkish energy market liberalization slows. Platts: Available at: <http://www.platts.com/latest-news/electric-power/istanbul/feature-pace-of-turkish-energy-market-liberalization-26813977>

**Offshore Energy Today (2015):** <http://www.offshoreenergytoday.com/wp-content/uploads/2012/11/MedGasFields426.jpg>

**Offshore Technology (2015):** Edradour Gas Field Available at: <http://www.offshore-technology.com/projects/edradour-gas-field/> Access on 17.2. 2016

**Oil & Gas 360 (2015):** Will Russia Survive the Oil & Gas Downturn? Available at: <http://www.oilandgas360.com/will-russia-survive-the-oil-gas-downturn/>

**Oil & Gas Financial Journal (2015):** North America leading rise in global LNG liquefaction capacity growth by 2019. Available at: <http://www.ogfj.com/articles/2015/08/globaldata-north-america-spearheading-rise-in-global-lng-liquefaction-capacity-growth-by-2019.html>

**Oil & Gas Journal (2014a):** Lukoil makes natural gas discovery in offshore Romania. Available at: <http://www.ogj.com/articles/2015/10/lukoil-makes-natural-gas-discovery-in-offshore-romania.html>

**Oil & Gas Journal (2014b):** Construction begins on Cove Point LNG export project. Available at: <http://www.ogj.com/articles/2014/10/construction-begins-on-cove-point-lng-export-project.html>

**Oil and Gas UK (2015):** Activity Survey 2015. Available at: <http://oilandgasuk.co.uk/wp-content/uploads/2015/07/EC044.pdf>

**Özdemir, Raszewski (2016):** State and Substate Oil Trade: The Turkey-KRG Deal. *Middle East Policy*, vol. XXIII, no. 1, pp. 125-135.

**Paton, Guo (2014):** Russia, China Add to \$400 Billion Gas Deal With Accord. Bloomberg. Available at: <http://www.bloomberg.com/news/articles/2014-11-10/russia-china-add-to-400-billion-gas-deal-with-accord>

**Petrov, McFaul (2005):** The Essence of Putin's Managed Democracy. Carnegie Endowment Q&A. Available at: <http://carnegieendowment.org/2005/10/18/essence-of-putin-s-managed-democracy>

**Platts (2014):** Map: Iraq's Oil & Gas Infrastructure. Available at: <http://blogs.platts.com/2014/01/30/MAP-IRAQS-OIL-GAS-INFRASTRUTURE>

**Powell (2016):** Russian Novatek Sells 9.9% Yamal Stake to Silk Road. *Natural Gas Europe*. Available at: <http://www.naturalgaseurope.com/novatek-sells-9.9-yamal-stake-to-silk-road-28645>

**PressTV (2016):** Iran firing up first LNG project. Available at: <http://www.presstv.ir/Detail/2016/01/17/446124/Iran-gas-LNG-foreign-investment-NIGEC/>

**Quinn (2014):** Russians regard for the West has plummeted, poll shows. *The Moscow Times*. Available at: <http://www.themoscowtimes.com/news/article/russians-regard-for-the-west-has-plummeted-poll-shows/504670.html>

**Radut (2016):** BRUA natural gas pipeline receives EC funding. Available at: <http://www.nineoclock.ro/brua-natural-gas-pipeline-receives-ec-funding/>

**Raszewski (2016):** Dichotomy of Energy Policies in the Caspian: Where Two Strive Another Benefits? In: Piet and Simão (eds) *Security in Shared Neighbourhoods Foreign Policy of Russia, Turkey and the EU*. London: Palgrave Macmillan.

**Razzouk (2016):** Iraq's Kurds to Start Natural Gas Exports to Turkey in 2019-2020. Bloomberg News. Available at: <http://www.bloomberg.com/news/articles/2016-01-15/iraq-s-kurds-to-start-natural-gas-exports-to-turkey-in-2019-2020>

**Reuters (2015):** Russia's Gazprom estimates TurkStream costs at 11.4 bln euros. <http://af.reuters.com/article/commoditiesNews/idAFR4N10G00W20150810>

**RIA Novosti (2007):** Energy Nexus: Russia and Central Asia. Available at:  
<http://sputniknews.com/analysis/20070514/65456353.html>

**Robert (2016):** Turkey, Kurds in Duel over Energy. Natural Gas Europe. Available at:  
<http://www.naturalgaseurope.com/turkey-and-the-kurds-energy-security-28260>

**Roberts (2015):** Analysis: Turkey pivotal to future of European gas supplies. The Financial Times. Available at: <http://www.ft.com/cms/s/0/2c4b25f8-c81b-11e4-8210-00144feab7de.html#axzz4BfTWRKzC>

**Roberts (2016):** From Feast to Famine in Azerbaijan. Natural Gas Europe. Available at:  
<http://www.naturalgaseurope.com/azerbaijan-caucasus-gas-georgia-russia-gazprom>

**Rogers (2015):** The impact of lower gas and oil prices on global Gas and LNG markets. Oxford Institute of Energy studies- NG 99.

**Rzayeva (2014):** Natural Gas in the Turkish Domestic Energy Market: Policies and Challenges. Oxford Institute for Energy Studies NG 82. Available at:  
<https://www.oxfordenergy.org/wpcms/wp-content/uploads/2014/02/NG-82.pdf>

**Rzayeva (2015):** The outlook for Azerbaijani Gas supplies to Europe: Challenges and perspectives. Oxford Institute for Energy Studies. NG 97

**Salaam (2016):** Tanzania finalises land deal for delayed LNG project. Available at:  
<http://www.reuters.com/article/tanzania-energy-idUSL8N15D0MS>

**Sayari (2000):** Turkey's Caspian Interests: Economic and Security Opportunities. In: Ebel, Rajan, Menon (eds) Energy and Conflict in Central Asia and the Caucasus, Oxford, NY: Roman & Littlefield Publishers.

**Seeliger (2006):** Entwicklung des weltweiten Erdgasangebots bis 2030: eine modellgestützte Prognose der globalen Produktion, des Transports und des internationalen Handels sowie eine Analyse der Bezugssituation ausgewählter. Thesis. University of Cologne.

**Serica Energy (2015):** Columbus forward development plans. Available at:  
<http://www.serica-energy.com/columbus-3.php>

**Shaban (2016):** BP's Birrell Discusses Caspian Gas, Azerbaijan, and Low Oil Prices. Natural Gas Europe. Available at: <http://www.naturalgaseurope.com/birrell-shaban-bp-azerbaijan-caspian-gas-interview>

**Shale Gas Europe (2014):** Shale Gas Explained. Available at: <http://shalegas-europe.eu/shale-gas-explained/shale-gas-and-europe/france/>

**Socor (2013):** The Curtain Falls on Nabucco's Last Act', Eurasia Daily Monitor vol. 10, issue 123. Available at:

[http://www.jamestown.org/single/?tx\\_ttnews%5Btt\\_news%5D=41089&no\\_cache=1#.V2b6Q9LhBHO](http://www.jamestown.org/single/?tx_ttnews%5Btt_news%5D=41089&no_cache=1#.V2b6Q9LhBHO)

**Solovyov (2016):** Russia's Gazprom says won't share its Europe-bound gas export monopoly: RIA. Reuters. Available at: <http://www.reuters.com/article/us-russia-gazprom-exports-idUSKCN0X60I4>

**Sputnik (2015):** Europäer streiten über Verlängerung der „Turkish Stream“-Pipeline. Available at: <http://de.sputniknews.com/zeitungen/20150819/303884310.html>

**Stamouli (2016):** Construction Begins on Trans Adriatic Pipeline. The Wall Street Journal. Available at: <http://www.wsj.com/articles/construction-begins-on-trans-adriatic-pipeline-1463508079>

**Steiner (2014):** Pipeline-Stopp legt Russlands große Schwäche offen. Die Welt magazine. Available at: <http://www.welt.de/wirtschaft/article134948965/Pipeline-Stopp-legt-Russlands-grosse-Schwaeche-offen.html>

**Sterling (2015):** Update 2- Dutch to sharply cut Groningen gas production. Available at: <http://www.reuters.com/article/netherlands-gas-groningen-idUSL8N1472WC20151218>

**Strachota (2015):** The case against Nord Stream 2. Energypost. Available at: <http://www.energypost.eu/case-nord-stream-2/>

**Talus (2011):** *Vertical Natural Gas Transportation Capacity, Upstream Commodity Contracts and EU Competition Law*. NY: Wolters Kluwer.

**Talus (2013):** *EU Energy Law and Policy: A Critical Account*. Oxford: Oxford University Press.

**TANAP (2015):** The Southern Gas Corridor. Available at: <http://www.tanap.com/store/file/common/A49F6725BD1878FADE7DC0862416C98A.jpg>  
Access at: 12.1.2016

**Tavana Energy (n.d.):** Iran Oil and Gas Projects. Available at: <http://tavanaenergy.ir/IRAN-OIL-AND-GAS-PROJECTS/>

**Tocci (2014):** Turkey and the European Union: A Journey in the Unknown. Brookings Turkey Project Policy Paper Number 5. Available at: <http://www.brookings.edu/~media/research/files/papers/2014/11/turkey-european-union-journey-unknown-tocci/turkey-and-the-european-union.pdf>

**Total (2016):** Yamal LNG: The gas that came in from the cold. Available at: <http://www.total.com/en/energy-expertise/projects/oil-gas/lng/yamal-lng-cold-environment-gas>

**Trans Adriatic Pipeline (2015):** Southern Gas Corridor. Available at: <http://www.tap-ag.com/the-pipeline/the-big-picture/southern-gas-corridor>

**Trenin (2016a):** The West and Russia: For Now, Do No (Further) Harm. Die Welt. Available at: <http://carnegie.ru/2016/04/10/west-and-russia-for-now-do-no-further-harm/iwyq>

**Trenin (2016b):** A Five-Year Outlook for Russia's Foreign Policy: Demands, Drivers and Influences. Carnegie Task Force White Paper. Available at: <http://carnegie.ru/2016/03/18/five-year-outlook-for-russian-foreign-policy-demands-drivers-and-influences/ivkm>

**Tsang (2013):** Erdogan: Polarising Opinion in Turkey. Financial Times. Available at: <http://blogs.ft.com/the-world/2013/06/erdogan-polarising-opinion-in-turkey/>

**Tsurkov (2016):** European Investment Bank to allocate 1B euro for TANAP. Trend news agency. Available at: <http://en.trend.az/business/energy/2490402.html>

**Tuncalp (2015):** Turkey's Natural Gas Strategy: Balancing Geopolitical Goals and Market Realities. Turkish Policy Quarterly. Available at: <http://turkishpolicy.com/article/774/turkeys-natural-gas-strategy-balancing-geopolitical-goals-market-realities>

**U.S. Energy Information Agency (2016):** International Energy Statistics, 2016. Available at: <http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=44&pid=44&aid=2&cid=regions,&syid=2008&eyid=2012&unit=QBTU>

**UK government (2015):** UK Gas Reserves and Estimated Ultimate Recovery 2015. Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/441392/UK\\_Gas\\_Reserves\\_and\\_EUR\\_2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/441392/UK_Gas_Reserves_and_EUR_2015.pdf)

**UK government (2016):** UKCS Oil and Gas Production Projections. Oil and Gas Authority, Aberdeen.

**Ukrainskaya Pravda (2015):** Плохое отношение россиян к Западу достигло исторического максимума - опрос. <http://www.pravda.com.ua/rus/news/2015/02/9/7057953/>

**United Nations High Commissioner for Refugees (2016)** Syria Regional Refugee Response

**USGS (2010):** Assessment of Undiscovered Oil and Gas Resources of the Levant Basin Province, Eastern Mediterranean. Available at: <https://pubs.usgs.gov/fs/2010/3014/pdf/FS10-3014.pdf>

**Vatansever (2010):** Will Turkey's New Energy Diplomacy Enable a "Grand Bargain" with Russia. IHS CERA Decision Brief.

**Vaughan (2015):** Governments will step in if councils don't fast-track fracking applications. The Guardian. Available at:

<http://www.theguardian.com/environment/2015/aug/13/government-will-step-in-if-councils-dont-fast-track-fracking-applications>

**Wilson (2015):** Liquefied Natural Gas in Europe. European Parliamentary Research Service.

Available at:

[http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/571314/EPRS\\_BRI\(2015\)571314\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/571314/EPRS_BRI(2015)571314_EN.pdf)

**Winrow (2013):** The Southern Gas Corridor and Turkey's Role as an Energy Transit State and Energy Hub. Insight Turkey, Volume 15. No 1

**WoodMackenzie (2014):** Russia-China gas deal opens up "New Europe" for Gazprom. Available at: <http://www.woodmac.com/media-centre/12104309>

**World Bank (2016a):** CO2 emissions (kt). Available at:

<http://data.worldbank.org/indicator/EN.ATM.CO2E.KT/countries/EU-US-CN-IN-RU-JP?display=graph>

**World Bank (2016b):** Trans-Anatolian Natural Gas Pipeline Project. Available at:

<http://www.worldbank.org/projects/P157416/?lang=en&tab=overview>

**World Oil Magazine (2015):** Egypt's Zohr gas field could boost other east Mediterranean projects: GlobalData. Available at: <http://www.worldoil.com/news/2015/11/24/egypt-s-zohr-gas-field-could-boost-other-east-mediterranean-projects-globaldata>

**Xu et al. (2015):** Reserves grow modestly as crude oil production limps. Oil & Gas Journal, Volume 113, Issue 12

**Zalel (2016):** Leviathan Partners Plan to Up Output to 21bn m<sup>3</sup>/yr. Natural Gas Europe.

Available at: <http://www.naturalgaseurope.com/leviathan-announced-a-21bn-m3/year-development-program-28359>

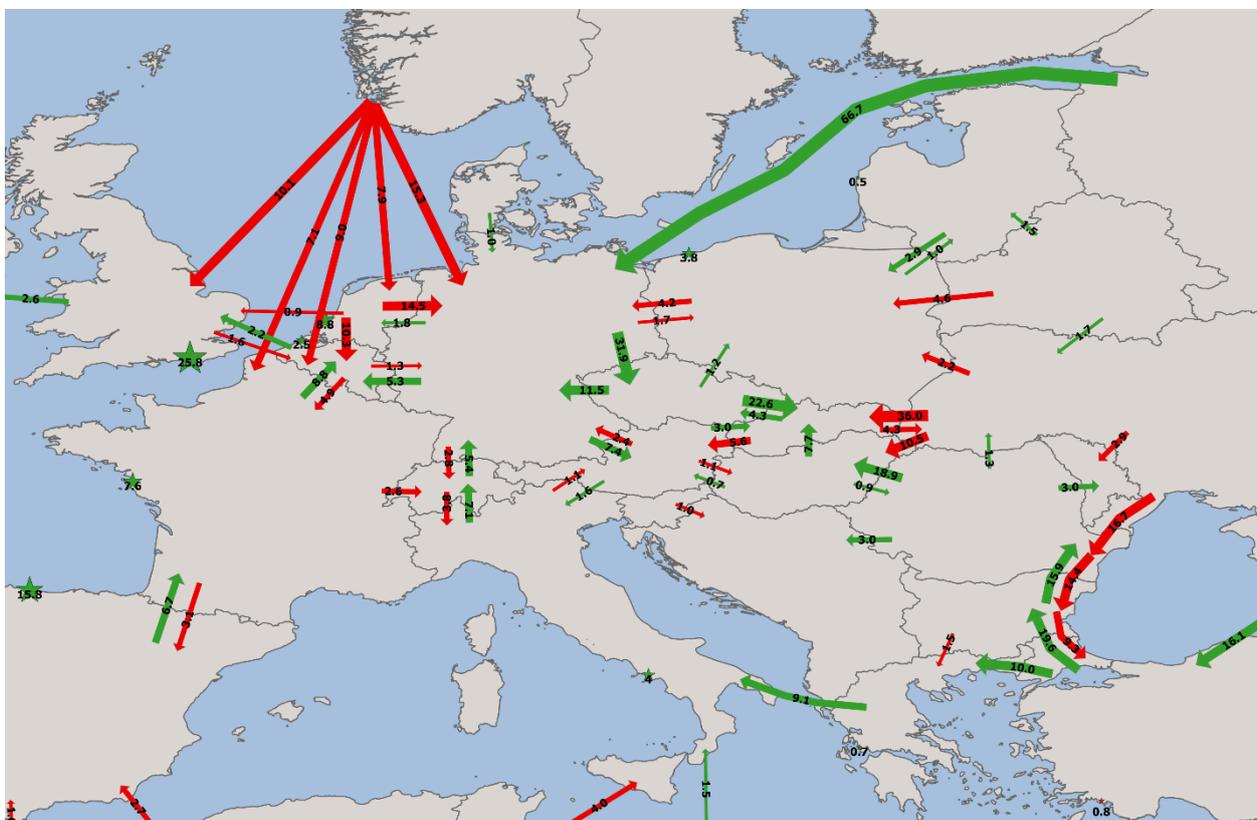
**Zaretskaya (2016):** Australia's Gorgon, one of the world's largest LNG terminals, ships first cargo. Available at: <https://www.eia.gov/todayinenergy/detail.cfm?id=25612>

**Zemach (2015):** Levant basin presents narrowing resource opportunities. Oil & Gas Journal. Volume 133 Issue 4

**Zimnitskaya, Von Geldern (2011):** Is the Caspian Sea a Sea; and Why Does it Matter? Journal of Eurasian Studies, vol. 2, issue 1, pp. 1-14



## APPENDIX



**FIGURE A 1: DIFFERENCE IN FLOWS BETWEEN 2017 AND 2035 IN THE GAS ON SALE SCENARIO**

Figure A 1 delineates the differences in flows in the Gas on Sale scenario between the simulations for the year 2017 and 2035. The red arrows reflect reductions, the green arrows additional amounts that flow in by 2035. The decline in Norwegian quantities can be noticed clearly. Especially Belgium experiences a reduction of 67 percent, followed by the Netherlands and France which deliveries are cutted by 49 and 41 percent, respectively. The bolt red arrows exiting the Netherlands clearly show that the Dutch production is not sufficient anymore to act as a net exporter. Western European countries replace Norwegian and Dutch quantities majorly with LNG imports as can be seen in higher amounts delivered at the British, France, Dutch and Belgium terminals. Striking is moreover the difference of 67 bcm flowing to Germany via the Nord Stream and Nord Stream 2. Consequently, more quantities are transported via Czech Republic further into Eastern Europe. Transits from Ukraine to Slovakia and Hungary decrease tremendously. For instance, Slovakia receives 31.7 bcm less from Ukraine which accounts for a reduction of roughly 80 percent compared to 2017. Lastly, flows coming from Turkey increase substantially by 29.6 bcm with at the same time a reduction of flows via Ukraine to Turkey of 9.3 bcm.



FIGURE A 3: NATURAL GAS FLOWS WITHIN EUROPE IN THE NORD DREAM SCENARIO IN 2035



FIGURE A 2: NATURAL GAS FLOWS WITHIN EUROPE IN THE SOUTHERN SETBACK SCENARIO IN 2035

