A Brave New World: *Russian Gas Exports in a Changing Global Market*

MA Thesis

Julie Jojo Nielen
1169785
Agatha Dekenstraat 6,
1053 AP, Amsterdam
julienielen@gmail.com

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I. Introduction

There are few things in the world that are as impactful and all pervasive in our daily lives as the energy market. Everything from the global economy to the geopolitical arena, from the ways wars are fought to the reasons peace is struck, from the way we feed our children and keep our elders warm to how we travel, is to a large extent decided by how we use energy. Indeed, changes in the makeup of the global energy usage have often heralded entirely new eras in our history; think for instance of the relationship between the steam engine and the Industrial Revolution, the dawn of the Atomic Age or the environmental impact of decades of fossil fuel usage.

Currently, the global energy system is again in a period of major upheaval. Due to a varied set of causes, ranging from the availability of new technologies to the global acknowledgement of climate change, we are currently seeing several developments that carry the potential to drastically change the global energy system as we know it, or at least make their effects felt not only in the short-term, but also in the medium- to long-term. Specifically, these changes are the globalization of the gas market and subsequent opportunity to diversify, the rise of renewable energy sources (RES) and lower energy prices for longer.

In this thesis, we will take a closer look at these changes, and we will do so in relation to one of the most important players in the energy field, namely the Russian Federation (hereafter Russia). Our concrete research question in this regard is: "How do the current changes in the global energy system affect the Russian gas export market and strategy?" In assessing this, we will look at both the strictly economic and empirical effects (i.e. on 'the market') as well as venture more into the theoretical (i.e. the effect of an on 'the strategy'). We will argue that although the Russian gas market and strategy are no longer sustainable in the current global system, negative effects to its market could mostly be mitigated if the Russian leadership would be willing and able to change the strategy behind its gas exports.

The choice to analyse the current changes in relation to Russian gas is motivated by three main ideas. Firstly, there is a clear gap in the research regarding the current changes and their compounded effect on any single player. Secondly, the gas market is particularly interesting as a comparison, as it is generally a market that develops rather slowly and has traditionally always been highly regionalized and inflexible. This is because the physical characteristics of gas a substance meant that, until recently, it could only be conveniently transported in one way: by pipeline. As

pipelines are inherently rigid in their lay-out (i.e. they cannot be moved) and have a limited capacity, they create a very controlled market. This is a major difference with for instance the much more liquid oil market (which can be transported by many different means of transportation to anywhere) or even liquefied natural gas (LNG). The very defined relationship between gas producers and consumers means that there are less variables to take into consideration, and looking at the gas market thus gives us a clearer delineation between the energy system in its previous form and the effects of the changes on that than it would in for instance the case oil.

Thirdly, analysing Russian gas is specifically relevant due to the size and importance of the country on the natural gas market. Indeed, Russia is the single biggest exporter of natural gas in the world and is home to the second largest proved reserves (after Iran) (BP, 2017a). Moreover, as the pipeline-based gas market ties producers and importers together quite literally, their gas market and strategy is of direct influence on one of the most important economic blocs in the world: the European Union (EU), whilst they are also developing export capacity to the second largest economy in the world: China. Furthermore, Russia relies heavily on the income of fossil fuel exports and plans to continue doing so in the future. This means that the current changes have an inherently bigger and more visible effect on Russia than it does for in example the Netherlands, where incomes from gas exports have already taken a back seat in government budget, or Norway, that has hedged its risks through its sovereign wealth fund (the market value of which is twice Norway's GDP) (Norges Bank, 2017; World Bank, 2017a). Lastly, Russian gas exports are inherently linked to the nation's politics – it is no secret that Russia on occasion tries to exert political power through its gas exports – which make the impact of the current changes even more interesting: not only might we expect to discern economic consequences, but also political ones.

In order to answer our research question accordingly, we will first present a literature review. This will go into the current discussion on our topic, or rather lack thereof, and assess where the gaps in the research are found. After this, we will give a descriptive overview of the Russian gas market as a whole, which will cover all basics such as for instance the reserve base, the available infrastructure, and the history and architecture of its current market. It is also here that we will present the theoretical framework in which the Russian gas strategy must be seen and introduce key concepts in this regard. The following chapter will present the main body of the thesis and

focus on the actual changes in the system. In each section, we will first illustrate why the identified change is so disruptive, after which we will analyse its (potential) effects on the Russian gas market and strategy. This will be followed by a general conclusion on the compounded effect of the identified changes on Russia.

II. Literature Review

As stated in the previous section, there is distinct lack of research on the compounded effect of the current changes in the global energy system on any single player, including Russia. Indeed, most research focuses on individual changes and furthermore tends to veer towards the economic and empirical side, rather than also considering the Russian strategy and foreign policy paradigm. In this chapter, we will examine what the current discussion does cover as well as outline why the existing gap impedes on our understanding of the Russian gas market.

The relatively limited scope of the current research is clearly illustrated by for instance an article by the renowned (Russian) energy scholars Tatiana Mitrova, Tim Boersma and Anna Galkina: 'Some Future Scenarios of Russian Natural Gas in Europe' (2016). In this article, the authors outline five different scenarios for the future of Russian gas. The different scenarios are based on four different variables: the oil price in the coming years, whether or not current contracts with European partners will be extended, the accessibility of Ukrainian transit after the current transit contracts expire in 2019, and the possible construction of either Turk Stream (a gas pipeline towards Europe via Turkey) or South Stream (a previously shelved pipeline project which would provide Russian gas directly to the EU via the Black Sea) (Mitrova, 2016).

Although the issues chosen by Mitrova are all valid points of discussion, none of the scenarios incorporate all three of the changes we identified. For instance, in this 28-page publication, renewable energy is only mentioned twice, and on both accounts it is a secondary concern. Firstly, it mentions that the methodology of establishing the future European gas demand can be adjusted 'if resulting gas prices indicate low competitiveness of gas compared with coal, nuclear or renewable energy' (Idem). The second mention concerns the fact that a Southern gas corridor (i.e. the construction of either South or Turk Stream) might be less viable than previously expected considering the fact that the 'Italian market requires less natural gas than was anticipated some years ago, particularly due to an increased share of renewable energy (Idem)'. Both of these instances might imply that renewable energy will have a significant effect on the future of Russian gas, but the article fails to assess the actual effects and neglects to consider for instance the 2020, 2030 or 2050 European Energy Strategy documents. These indicate a projected share of 20%, 27% and 55% of renewable energy in the EU's gross final energy consumption by those respective

years, which would inherently have a significant impact on the Russian sales market (European Commission, 2017a; European Commission, 2011).

Similarly, there is an allusion to the globalization of the gas market and the subsequent opportunities to diversify by ways of an assessment of the future gas demand in Europe. However, nowhere does the article mention for instance the official initiatives for further diversification by the EU, such as in the Third Energy Package and the Energy Union Strategy, which are not only realistic in the light of a more globalized gas market, but is in part driving the decentralization of the market (Idem). This is especially significant when we consider that these diversification policies are to a great extent explicitly targeted towards Russian gas imports (European Parliament, 2017).

Moreover, although the expected price of natural gas does play a significant role in the article – it is mentioned specifically in each scenario – the presumptive prices the article refers to have already proven to be incorrect. In no scenario does the article presume an oil price of lower than $70 per barrel (bbl) in 2016 and $75/bbl in 2017, whereas the actual price has not surpassed $50/bbl since late 2015 (Bloomberg, 2017). This is significant as the price of pipeline gas is generally indexed to the price of oil, and as such any article based on the wrong oil prices cannot project the impact future of Russian gas accurately.

In short, although this article presents a solid projection of future energy scenarios from an economically focused, more status quo-based point of view, it lacks discussion on the three important changes we will discuss in this thesis. Moreover, it lacks an in-depth analysis of the strategic side of the Russian gas market. When we look at other scenario-based articles, we see similar issues: a strict economic focus, a lack of specificity on gas, or simply a lack of discussion of the three changes.[1]

When we look at publications that do intersect with our topic more explicitly, they usually focus on one or the other in regards to the changes we will discuss, and can thus also not project the comprehensive implications on either the Russian export market or strategy. In order to illustrate this we will highlight some articles in topical

[1] See: Institut Energeticheskikh Issledovaniy Rossiyskoy Akademii Nauk (2016), *Prognoz Razvitiya Energetiki Mira i Rossii 2016*. [pdf] Available from: https://www.eriras.ru/files/forecast_2016_rus.pdf; Idem (2014), *Prognoz Razvitiya Energetiki Mira i Rossii do 2040 Goda*. [pdf] Available from: https://www.eriras.ru/files/forecast_2040.pdf ; Paltsev, S. (2014), 'Scenarios for Russia's Natural Gas Exports to 2050', *Energy Economics*, 42, pp. 262-270; Stern J. (2005), *The Future of Russian Gas and Gazprom*, (Oxford University Press, Oxford).

order. Firstly, there are of course many articles available on the effect of the globalization of gas and its subsequent impetus for global diversification. However, they mostly either focus on the importers' side of the story or, when they are more focused on Russia, do not take into account other changes, such as renewable energy or the price slump. In terms of articles that do focus on Russia, The Oxford Institute for Energy Studies' article by Katja Yafimava titled 'The EU Third Package for Gas and the Gas Target Model: major contentious issues inside and outside the EU' (2013) is a good example of the usually limited scope. She does not mention renewable energy a single time and lower prices are only mentioned in passing. Similarly, Rosendahl et al's 'Globalisation of natural gas markets – effects on prices and trade patterns' (2009) mentions neither renewable energy nor the possible effects of lower oil prices, although the article is focused on natural gas pricing. Another example of this would be the Institute of Energy Studies Academy of Sciences' (ERIRAS) publication: 'Gazovy Rynok ES: Epokha Reform' (2016), which mentions renewable energy all of two times in passing and does not go into the current price slump at all.[2]

Secondly, in those publications where renewable energy is mentioned in the context of gas markets (which are few to begin with), it is rarely expanded upon and lacks specificity *vis a vis* Russia. Examples of this can be found in for instance Timothy Boon von Ochsee's dissertation *The Dynamics of Natural Gas Supply Coordination in a New World* (2010), which mentions renewable energy at some length on four occasions, but none of which in context with Russia. We see something similar in Andreas Goldthau and Jan Martin Witte's book *Global Energy Governance: the New Rules of the Game* (2010), even though the title would suggest a thorough analysis of a major aspect of the 'new rules of the game', namely renewables. Correspondingly, where Russia is concerned, the articles published by more renewable energy-oriented scholars limit themselves almost strictly to the direct effects of renewable usage on the European demand for Russian gas, whilst forgoing to assess further effects on Russia, economically and strategically. Indeed, when we look at for instance the combined published work of the Heinrich Böll Stiftung's Energiewende division – Energy Transition, one of the main think tanks on sustainable development in Germany and the rest of Europe – there are no articles linking to the effects of the rise of renewable energy in Europe on Russia specifically

[2] 'Gas Markets in the EU: an Era of Reform' (all translations by author).

available at all.[3]

Thirdly, one should have no trouble finding assessments of how Russia is affected by the current slump in fossil fuel prices – such as in Aleksandra Malova and Frederick van der Ploeg's article 'Consequences of lower oil prices and stranded assets for Russia's sustainable fiscal stance' – but these are mostly assessments of the Russian economy as a whole, with no specific mention of the gas market at all. Where this tie is explicitly made, such as in for instance Henderson and Grushevenko's 'Russian Oil Production Outlook to 2020' (2017) there is again little attention for the effect of non-economic factors or other changes (such as the globalization of the gas market or the rise of renewable energy). Indeed, neither renewable energy nor globalization or the subsequent opportunity to diversify in gas is mentioned in this publication. Indeed, this is a recurrent theme as those engaged with oil and gas economics usually do not consider less financially tangible aspects of a market and thus forgo on large parts of the considerations driving the market.[4] Consequently, these articles often also fail to delve into the strategic considerations associated with changes on the Russian gas market whilst in cases where a connection to policy and strategy is made, such as in for instance George Friedman's Forbes article 'Low Oil Prices Will Make Russia More Aggressive In 2017' (2017) or 'The Effects of Lower Oil Prices on Russia' by Ekaterina Grushevenko (2016), we cannot speak of a thorough academic analysis. These articles do underline the importance of a broader analysis though; the effects of changes in the gas market usually reach far beyond their original realm and a strictly economic analysis is thus of limited value.

In essence, after a general reading of publications that intersect with our topic, it is clear that there is a gap in the research where the compounded effect of these three big developments is concerned. Indeed, the only scholar who approaches a discussion of all three would be Professor Andrey Konoplyanik of the Gubkin Russian State University of Oil and Gas. In his work 'Rossya: Slozhnaya Adaptatsiya

[3] To see a collection of their work on Russia, see: https://energytransition.org/page/2/?s=russia&submit=Search

[4] For more examples see: European Commission (2016), *Impact of Low Oil Prices on Oil Exporting Countries*. [pdf] Available from: http://publications.jrc.ec.europa.eu/repository/bitstream/JRC101562/jrc101562_impact%20of%20low%20oil%20prices%2020160512.pdf; U.S. Energy Information Agency, *Low oil prices have affected Russian petroleum companies and government revenues*. Available from: https://www.eia.gov/todayinenergy/detail.php?id=28432 [Accessed: May 23, 2017].

k Novym Realiyam Evropeyskogo Gazovogo Rynka[5]' (2014), he mentions all three changes and discusses them at some length. Nevertheless, his focus is again limited in the sense that he uses all current changes in the European market (short- and long-term) to argue for the restart of negotiations of the South Stream pipeline. Thus, even though he does acknowledge all aspects, we cannot speak of an in-depth analysis of the compounded effects of these particular changes on both the Russian gas market and strategy, something that is underlined by the wide scope and yet humble length of the publication (16 pages).

A final point that should be made is the fact that most of these publications limit themselves to the Russian-European energy nexus. This choice is of course well explicable as Europe is certainly Russia's biggest gas market, but it is also another limitation of the current research. Although the centre of gravity for this thesis will also be Europe we will not limit ourselves to this geographical region per se. Indeed, where relevant, it is even essential to also outline the effect the current changes have on other sectors of the Russian gas market, such as the Chinese connection, as our research question does not pertain only to Russian-European gas.

In conclusion, although there is a substantial body of research available on the different aspects that this thesis will cover, there is a clear gap where the compounded effects of the three changes we identified is concerned. Not yet has a scholar included all these effects in the same research and applied them specifically to the Russian case whilst also including the strategic implications of the combined changes. This thesis aims to close this gap in the research, as a comprehensive understanding of the effects of these changes is crucial in order to better grasp the current state of affairs of the Russian gas market. In the following chapter, we will start our analysis by first giving an overview of the Russian gas market, since it would be impossible to assess the effect of any change without being familiar with the status quo.

[5] 'Russia: a Difficult Adaptation to the New Realities of the European Gas Market'.

III. The Basic of Russian Gas

In this chapter, we will go through the development of the Russian gas market and strategy in order to establish both the tangible and theoretical framework in which the current changes must be perceived. Firstly, we will give an overview of the basics of Russian gas. This will include the size of the resource base, the geographical distribution of said resources and the currently available and planned infrastructure. After this, we will discuss how the market developed since the first cross-border gas exports in the late 1940s and what it looks like today. This will be followed by an analysis of the theoretical framework in which the Russian gas market must be viewed. In this last section, we will introduce some key theoretical concepts in order to better illustrate the non-tangible considerations that have to be taken into account when talking about the Russian gas market.

III.i Reserves

Russia is the single biggest gas exporter globally, accounting for nearly 19% of all gas exports and 25,8% of all pipeline exports (BP, 2017a). Moreover, with 32.3 trillion cubic meters (tcm) of proved reserves, or 17.3% of the global total, Russia houses the second largest proved gas reserves in the world after Iran (Idem). Moreover, these numbers only apply to *proved* reserves, leaving out any potential future discoveries, reserves that have been discovered but are not yet economic to extract and estimated reserves, whereas there is strong preliminary evidence to believe that these are also sizeable in Russia. For instance, according to the United States Geological Survey (USGS), the Arctic houses over 30% of the world's undiscovered gas whilst Russia currently has a claim pending at the UN for almost half of that territory (see Figure 1) (USGS, 2009; UNCLOS, 2016). Indeed, according to a different USGS study, 58% of all undiscovered gas in the Arctic might be located in the West Siberian Basin and East Barents Basin alone (USGS, 2008).[6] In short, when we look at Russia's gas reserves, there is no doubt about its role as a major player, and considering the potential of future discoveries, this is not set to change in the medium or even long term.

[6] These numbers are not proved reserves and thus have to be taken askance, but are estimated at 27.5 tcm, or a 85% increase of Russia's reserves (USGS, 2008).

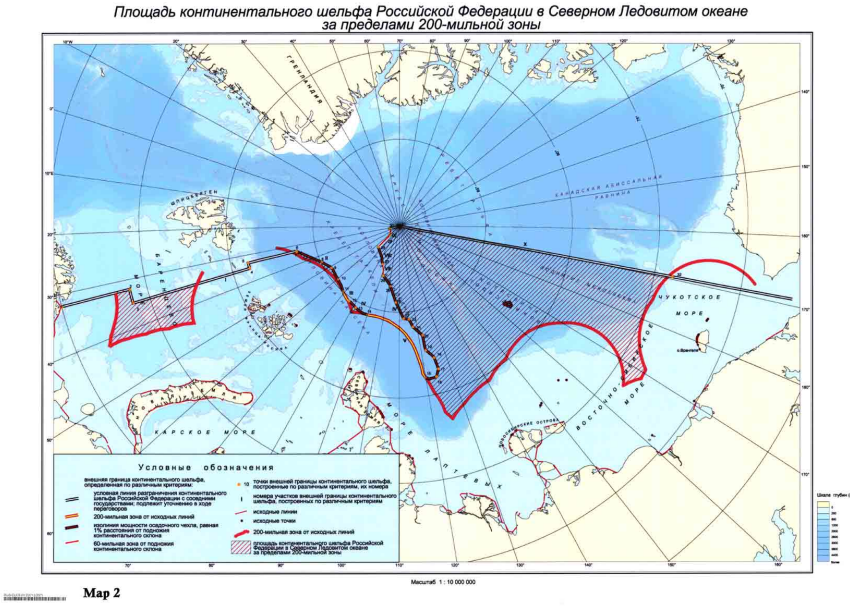

Figure 1. Russian Claims of the Arctic as made to the UN under United Nations Convention on the Law of the Sea. *Source: United Nations (2016).*

III.ii Distribution

The world's gas and oil reserves are distributed highly asymmetrically; over seventy per cent of these reserves are located within a strategic ellipse, often called the 'Eurasian ellipse' (see Figure 2) (Boon von Ochsée, 2010). Even within this ellipse, gas is more asymmetrically distributed than oil, with Russia, Iran and Qatar housing more than half of the global natural gas reserves, again underlining the importance of Russia as a player on the global gas market (Idem).

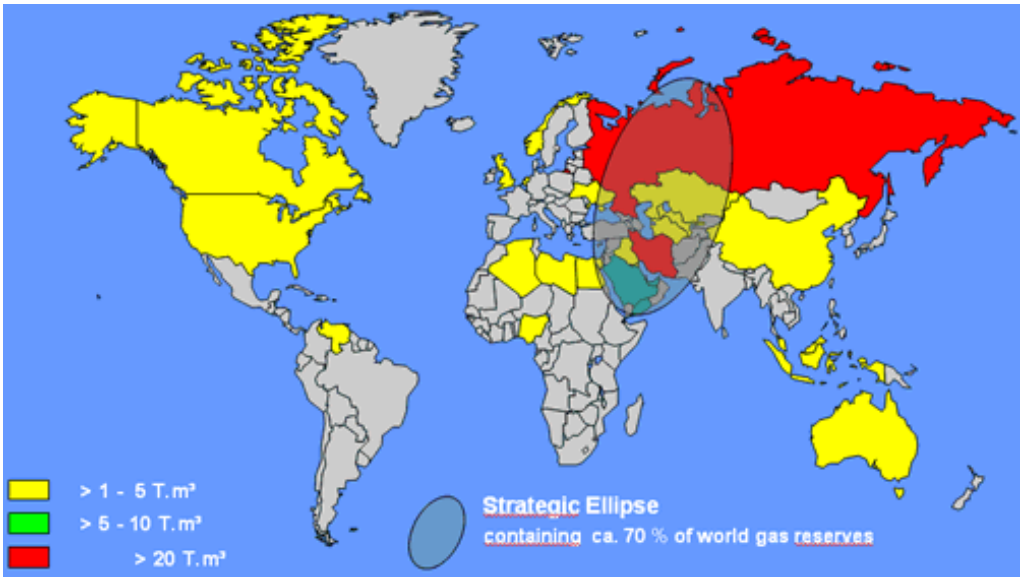

Figure 2. The Eurasian Gas Ellipse. *Source: Boon von Ochsée (2010).*

Consequently, the gas supplies within Russia are also quite centralized. As can be seen in Figure 3, the majority of (currently proved) Russian gas reserves are located in the Nadym-Pur-Taz region in Western Siberia, followed by Eastern Siberia and the far North, surrounding the Yamal peninsula and the Barents Sea.

Figure 3. Major Gas Fields and Supply Infrastructure in Russia. *Source: IEA (2011)*.

There are many ways to distinguish between different fields and these methods usually refer to the status of the reserves, i.e. have they been fully ascertained through drilling or are they merely estimates based on seismic research? For the scope of this thesis, we shall make a different distinction however, conform the one that Timonthy Boon von Ochsée makes in his previously mentioned dissertation *The Dynamics of Natural Gas Supply Coordination in a New World*. He identifies three different types of fields, based on their production rather than only the reserves as such: mature fields (or 'brown fields), fields with a flat production profile and new gas fields (or 'virgin fields') (Boon von Ochsée, 2010).

Boon von Ochsée's distinction is highly relevant to us as it gives insight in how the production of natural gas will develop over the next decades. Most important in this regard is the fact that the three biggest gas field – Medvezhe (with a total assessed size of 2.69 tcm), Urengoy (2.5 tcm) and Yamburg (2.6 tcm), generally referred to as 'the big three' (see Figure 3) – are all 'very mature' (Boon von Ochsée,

2010). This means that they have passed peak production and are now in decline. In his book *The Future of Russian Gas and Gazprom* (2005), Jonathan Stern assesses that these fields are now declining a rate of around 20 billion cubic meters (bcm) per year.[7] Thus, these fields will have to be retired in the medium-term, indicating the need for massive investments in new fields in the not too distant future.

Other, smaller fields, mostly in the Nadym-Pur-Taz region are currently in a phase of flat production, with some of them – the relatively big Zapolyarnoye for instance – nearing 'brown status'. This means that enhanced extraction techniques must be used (see Shepherd & Shepherd, 1997), which again indicates big investments and a limited lifespan.

The last category is that of the virgin fields, of which Russia has many. The ones designated for production in the short term are the Kovykta and Bovanenkovskoe fields (with assessed reserves 2.5 and 4.9 tcm respectively), the latter of which has already been brought online (the final pipeline to connect it to the general gas pipeline grid became operational in 2017) (Gazprom, 2017a; Gazprom, 2017b; Boon von Ochsée, 2010). Kovytka in turn has not been connected yet, but is currently in the pilot phase, which constitutes mostly of geological exploration (Gazprom, 2017b).

Other promising virgin fields are located in the Barents Sea (the Shtokman field there is as large as all of Norway's combined reserves) and on the Yamal peninsula (Boon von Ochsée, 2010) However, the development of these fields will demand immense upfront investment, and any development in the Arctic is currently doubtful given the Western sanctions regime, which includes the transfer of specialized oil and gas technology (see chapter IV.iii). Overall, it is mainly important to note however that although Russia clearly houses enough natural gas supplies for decades to come, all of these fields need new investment, which incidentally come on top of expected investments in the current infrastructure, much of which dates from Soviet times (Stern, 2009).

[7] For more information on (brown field) gas production see: Shepherd D. & Shepherd W. (1997), *Energy Studies, Second Edition*, (Imperial College Press, London).

III.iii Infrastructure

As can be seen in Figure 4, the transmission system for Russian gas export is heavily pivoted towards Europe. Indeed, 83% of all Russian pipeline exports go West, with another 13.7% going to Turkey (BP, 2017a). The majority of these exports run through four major pipelines. Firstly, there is the Urengoy-Uzhgorod, or 'Brotherhood' pipeline system (marked pipeline number 3 on Figure 4), which consists of four pipelines and runs from the 'big three' fields to Europe through Ukraine with a combined yearly capacity of over 100 bcm (Gazprom Export, 2017a; Gazprom, 2017c).

Secondly, there is the Yamal-Europe and Northern Lights pipelines (marked number 2 on Figure 4), which run largely parallel and can carry up to 77.9 bcm per annum to Europe through Belarus and Poland (Gazprom 2017d; Yafimava, 2009). This is followed by Nord Stream, which runs from Vyborg to Greifswald (Germany) and has a total per annum capacity of 55 bcm and Blue Stream, which runs straight to Turkey from Dzhubga and has a capacity of 16 bcm per annum (Gaprom, 2017e; Gazprom, 2017f).

As of now, there are no functional pipelines of significance leading anywhere but Europe or Turkey. However, in 2014 construction commenced on a 38 bcm capacity pipeline, known as the 'Power of Siberia' (marked number 12 on Figure 4) that would run from the previously mentioned Kovytka gas field to the North-East of the Chinese border (Gazprom, 2017g). According to Gazprom CEO Alexey Miller, construction on this is currently ahead of schedule, with 720 km of a total 3000 km built. Nevertheless, the completion of the project is not planned until 2025, and no formal terms for gas delivery have been signed yet (Slav, 2017).

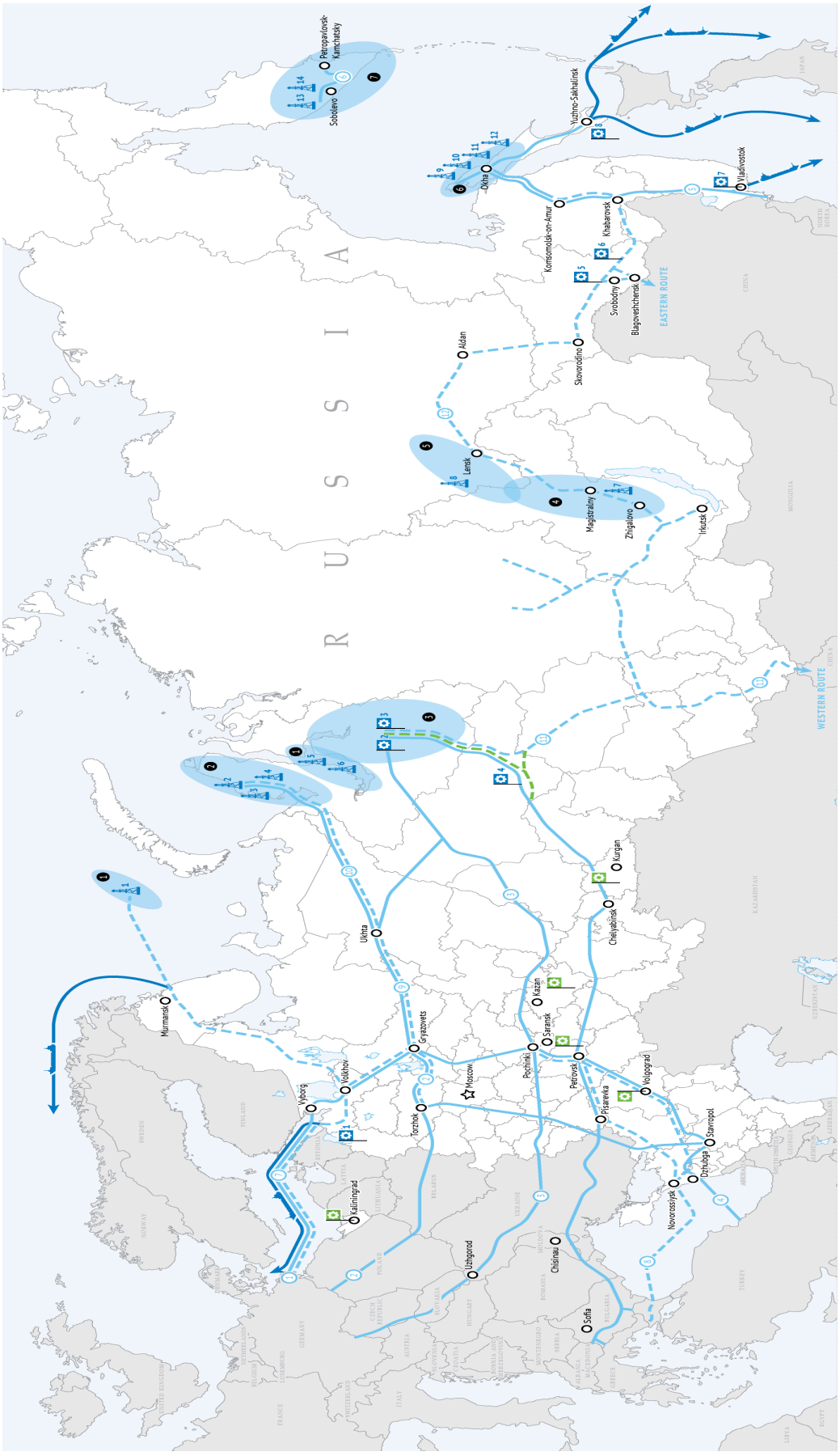

Figure 4. Current and planned export gas pipelines in Russia. *Source: Gazprom (2017c),*

All other proposed export pipelines (marked 7, 8 and 11 on Figure 4) are currently uncertain. The Power of Siberia 2 (also known as the 'Altay' pipeline) is indefinitely postponed after disagreements over pricing, whilst the construction of the third and fourth pipeline on the Nord Stream system (known as 'Nord Stream 2') is highly contended within the EU (Vedomosti, 2015; European Parliament, 2015). Construction on Turk Stream meanwhile might or might not have commenced, with few reliable sources available on the actual proceedings. Although Gazprom, RIA Novosti and Russia Today have confirmed the start of construction on the Russian offshore part, it is yet unclear how the project will develop amidst geopolitical tensions between Turkey and Russia as well as doubts about the financial viability of the project (Gazprom, 2017h; RT, 2017; Ria Novosti, 2017). Moreover, there is currently only one functional LNG export plant in Russia; the Gazprom-led Sakhalin project (marked 8 on Figure 4). Additionally, the Novatek-led Yamal LNG facility is projected to come on stream in 2017, but it is yet unclear whether this goal will be achieved whilst all other LNG projects are delayed or indefinitely postponed (Henderson, 2017; Mitrova, 2013).

In conclusion of this section, when we look at the basics of Russian gas, there are a few things that we must consider throughout this thesis. The sheer size of Russian reserves mean that it will remain a relevant player for some time to come, but between the depleting fields and the pivoted, highly rigid infrastructure, the market is already under some pressure. This is important to consider whilst we assess the effect of the current changes on the system, as any pre-existing problems might be compounded by them or vice versa.

III.iv The Market

III.iv.i History

Russia started natural gas exports stem from the late 1940s, when it started exporting to Poland on a small scale (Smeenk, 2010). Meanwhile, the domestic energy demand in Russia saw a great increase in this period, which presented an impetus to develop the natural gas sector further. Although relatively modest, the first substantial infrastructure was constructed in this time, when the industries around Saratov and the Moscow region started being provided with gas from smaller fields West of the Urals and in Ukraine (Idem).

The next big development in Russian gas happened under Krushchev, who, in

order to make his economic goals reality, focused on gas as a modern fuel with flexible application (Victor & Victor, 2006). In this time, the gas infrastructure was expanded and Russia was connected to fields in Turkmenistan through the Caucasus and further fields in Ukraine (Smeenk, 2010). Although this was of course a domestic market at the time – all nations involved were Soviet Republics – it is generally seen as the start of Russia's dominance on the Eurasian gas market (Idem; Victor & Victor, 2009; Lee & Connolly, 2016).

In the eighth Five Year Plan (1966-1971), Brezhnev solidified the importance of gas for the Russian Republic as further exploration was conducted and new infrastructure led to the first international exports, including to the West. Between 1967 and 1969, the 'big three' were discovered, and further discoveries were made in the Yamal and Orenburg region (north of Kazakhstan) (Smeenk, 2010). Furthermore, in 1968 the first part of the 'Brotherhood' system came online, supplying Czechoslovakia with gas from Eastern Ukraine (Victor & Victor, 2006). This was followed by the first exports to Western countries: in 1968 Austria became the first Western country to sign a gas contract with the USSR, followed by Italy and West Germany in 1969 and 1970 respectively (Lee & Connolly, 2016).

Shortly after the first supply contracts between the USSR and Western countries were signed, big infrastructure investments were made. This resulted in the construction of the Transgas pipeline cluster – providing natural gas to Austria (1974), Italy (1974) West and East Germany (1976) and France (1978) – and the Orenburg pipeline, supplying Romania, Hungary and Bulgaria (1975) (Victor & Victor, 2006). Additionally, the USSR started supplying small quantities of gas to Finland in this period (Idem).

Nevertheless, it was only after the construction of the Transgas and Orenburg pipeline clusters that the deals that most fundamentally shaped the Russian gas export market were signed: the 'gas-for-pipe' deals. After the 1973 and 1979 oil crises, the vested interest of the USSR and its import partners to further develop the international gas trade grew significantly (Idem; Lee & Connolly, 2016; Smeenk, 2010). Gas had become an increasingly important substitute to oil in Europe, whilst the USSR could charge a premium price for it. However, as demand grew and the previously developed fields started being depleted, the USSR was forced to start development on the bigger fields discovered under Brezhnev, all east of the Urals. Due to a lack of hard currency to make the necessary investments for the development of these fields,

as well as a lack of technological know-how, the USSR thus made a deal with several Western actors: in exchange for technological know-how and hard cash payments, they were guaranteed gas deliveries in the future (Gustafson, 1985; Victor & Victor, 2016). The projects agreed upon through the 'gas-for-pipe' deals were carried out throughout the 1980s and by the time of its full completion in 1991, the infrastructure built under these deals reached a total capacity of 180 bcm. Apart from being the most decisive period in terms of infrastructure, this time also marks the full establishment of Russia's *modus operandus* in the gas market: even now, Russia prefers to work on the base of the same long-term contracts (Victor & Victor, 2006).

III.iv.ii Current Status

The current Russian gas market would be best described as a reinforcement of the system developed during the 'gas-for-pipes' era. Although the market grew and new infrastructure was built, the fundamentals of the market have barely changed, and even where Russia has actively sought to change the market, this has materialized only at a glacial pace (such as in the development of LNG facilities). Since 1990, Russian (pipeline) gas exports have grown from 110 bcm to 190.8 bcm in 2016, whilst export capacity has grown by 71 bcm for pipeline gas (through the addition of Blue and Nord Stream) (Gazprom Export, 2017b; BP, 2017a; EEGA, 2013). However, these developments did not fundamentally alter the market, as the direction of the flow of gas remained largely the same.

Furthermore, the vast majority of Russian gas is still sold on the basis of long-term contract with take-or-pay clauses. These contracts are a remnant of the 'gas-for-pipes' era and are based on three major principles: the contracts run for over 20 years, the prices are linked to oil prices (and periodically revised) and the buyer needs to but a minimum of gas or pay for that minimum anyway (take or pay) (Gazprom, 2017i). Currently, over 82% of Russian gas exports is tied up in long-term contracts, with another 4 tcm contracted for the future (Gazprom, 2015; Gazprom, 2017i). This is so designed as to guarantee stability of the market and return on investment for the producer (having made huge capital investments to develop the fields) but is a model that the rest of the globe is moving away from (see chapter IV.i). Similarly rigid and another leftover of Soviet times is that all Russian pipeline exports are still in the hands of one company: Gazprom.

Another point in which the market has not seen any fundamental changes is

the role gas still has in the Russian budget. As was the case during 'gas-for-pipes', and led the ideologically opposing Soviet Union to trading with the West on a massive scale, the hard currency derived from natural resource exports is still crucial to the Russian budget. Historically, the share of gas revenues in the Russian budget moved between 17% and 25%. Although this has dropped to 16% and 6.7% in 2015 and 2016 respectively as a result of the 2014 oil price crash there is no denying that just as in the 'gas-for-pipes' era, gas revenue is still a fundamental part of the Russian budget (Idem; Bloomberg, 2017).[8]

Of course, the fact that the market has not fundamentally altered itself does not mean that it has been at a standstill. On a smaller scale, the current market is somewhat different. For instance, the construction of the Power of Siberia shows a potential shift in focus, as does the fact that Russia now exports a modest 14 bcm of LNG (or 4% of global LNG sales) to different Asian countries (BP, 2017a). Indeed, the rise of LNG is perhaps the biggest change in the Russian gas market to date, but development has been very sluggish. Despite being deemed a top priority by the government, as is for instance illustrated by the fact that they to a limited extent allow companies other than Gazprom to export LNG in order to incentivize more production, there is only one LNG facility currently on stream: Sakhalin in the Far East (Mitrova, 2013; IGU, 2017).

In short, the market as it stands now is quite traditional: it is focused on the historical centres of demand whilst basing itself on a dated contractual model. Active attempts to renew the market have proven difficult, as is shown by the lack of active LNG plants and for instance the failure to launch the Power of Siberia 2 pipeline.

III.v The Strategy

Now that we have assessed the tangible aspects of Russian gas, i.e. where it is, how it moves and where and how it is sold, it is important to also look at the more abstract aspect of it, i.e. the strategy behind Russia's exports. Some fringe scholars might argue that Russia is a purely rational economic actor when it comes to its gas exports (in which case a description of the strategy could be very succinct), whereas in fact, (geo)political considerations are a well-known component of the Russian gas strategy. In this section, we will analyse the theoretical framework in which the Russian gas

[8] Oil indexed prices generally show a delay of a year due to the periodical revision, see chapter IV.iii.

market functions as this is crucial to understanding the market and how it might develop in the future.

Since we presume that the Russian gas export market is, at least to a large extent, part of the political realm, it cannot be seen outside of the broader context of Russia's foreign policy. As gas exports are only one component of Russia's foreign policy, they cannot be assessed in a vacuum. Although the scope of this thesis of course does not allow for a full analysis of Russia's foreign policy, there are some markers we can identify in order to better comprehend the strategy behind it and its gas exports.

When international relations theory in its current form gained traction after World War II, Russia was not privy to its development, as it was ruled under one strict paradigm: Marxism. In the 1990s this paradigm was renounced as Russia sought its new identity. The perestroika and early years of Yeltsin's rule were marked by a budding liberalism among Russia's leaders (Romanova, 2012; Tsygankov, 2010). Liberalism is defined by cooperation, mutual benefits, absolute gains, a great importance attached to international organisations and free trade (Cristol, 2011a). In those early years, Russia did seem to ascribe to this; its eagerness to cooperate with the West (both directly and through the OSCE and UN), radical economic reform (which moved to liberalize the Russian economy) and the decentralization of power under Yeltsin all indicated that Russia would join the ranks of liberal democracies (Tsygankov, 2010; Suny, 2007). Indeed, it even prompted Francis Fukuyama's standard work *The End of History*, which declared the victory of liberalism and defended the idea of global ascendancy of Western-style capitalism (Tsygankov, 2010).

Russia's liberal period was short-lived however. The Russian leadership quickly grew weary of the West's one-sided approach and positive results failed to materialize as expected. Rather than integrating Russia into its fold, Russia felt it was being assimilated on terms set by the US without receiving anything in return (either politically or economically) (Idem). Thus, the political paradigm started changing again and as Yeltsin started underlining the importance of Russia's 'national interest' and liberal economic reform was somewhat curbed, the Russian leadership moved towards a more neo-realist view of foreign relations (Idem).

Realism is an international relations theory based on power politics. It assumes that states are the most important foreign policy actors and that these actors

exist in an anarchic world, i.e. a world without a global arbiter. In this anarchic system, states are driven only by their national interest, which is to preserve and enhance its power *vis a vis* other states (it is thus a zero-sum game based on relative gains). Here, power is equated with *military* power (Cristol, 2011b). Moreover, in classical realist theory, the state's drive for power dominates all other motivations, and as the drive for power exists only in relation to others, the state thus only acts in reaction to external forces and internal politics do not have an effect on a state's foreign policy (Idem; Tsygankov, 2010). This concept is famously explained by the 'billiard ball analogy': the trajectory of a billiard ball (i.e. 'state') is only affected by external forces ('other states') and not by its internal structure or content ('domestic politics') (Romanova, 2012). Over time however, the realist school of thought has evolved to neorealism (or 'structural realism'), which includes all means of power rather than just military power, and neoclassical realism, which to a greater extent includes the influence internal actors and policies have on foreign policy.

After liberalism went out of fashion in Russia, neorealism became the dominant paradigm. It is said that this worldview gained traction so quickly because it aligns closely to Russia's history (Idem). The country has a traditionally strong central state power and has often identified itself only *vis a vis* others; the always returning debate about Russia as a Western state, Eurasian exception or Asian nation comes to mind here. Moreover, its weak civil society strengthens the idea that internal politics do not influence its foreign policy to a great extent (Idem; Boon von Ochsée, 2010).

In the late 1990s and early 2000s it became evident that neorealism was indeed the new dominant foreign policy paradigm in Russia as Putin's domestic and external policies were all geared towards the re-establishment of Russia as a strong state. This is for instance illustrated by his 'power vertical', the power show of Russia in the Second Chechen war (1999-2000) and his taking key industries back under state control. Indeed, the realist paradigm clearly speaks from the Natural Security Concept of the Russian Federation released in 2000, which literally states that: 'Russia's national interests in the international sphere lie in upholding its sovereignty and strengthening its positions as a great power' (Ministerstvo Inostrannykh Del Rossiyskoy Federatsy, 2000). More recent illustrations of Russia's realist viewpoint are its actions in relation to the crisis in and around Ukraine and its participation in the Syrian conflict.

In fact, neorealism as a foreign policy paradigm has established itself with such dominance, that, according to the Saint Petersburg State Univeristy professor Tatiana Romanova, all other foreign policy paradigms are considered 'evil and not meaningful for science' (Romanova, 2012). To her, the only debate that is currently relevant is whether Russia still adheres to neorealism or is venturing more towards neoclassical realism (which does take internal happenings into consideration). She argues that since the protests of 2011, the Russian leadership might lean more towards the latter, as the risk of losing popular support is more tangible now (Idem).

So what does this mean for the Russian gas strategy? As we have already established, the neorealist foreign policy paradigm includes not only military power, but pertains to all levels of relative power, including the economic. As neorealism also dictates that the state is the most important foreign policy actor, the logical consequence of this would be that the gas industry is to be state-managed in order to maximize Russia's power *vis a vis* other states. In economic theory, this is more commonly known as mercantilism; an approach that 'promotes governmental regulation of a nation's economy for the purpose of augmenting state power at the expense of rival national powers' (Encyclopædia Britannica, 2017).

It must first be noted that it is common to have a certain degree of government control in the gas industry due to the strategic properties of energy in general and the complexities of gas development, transit and distribution specifically. In the Russian case however, it is clear that the government's involvement goes far beyond simply assisting the market. It is tempting to link this to the Soviet origins of the Russian gas system. One might assume that as the market came to full form in a centralized, socialist system, the current reality is simply inherited from this. However, to do so would forgo on the fact that in the 1990s – indeed when Russia's leadership took a more liberal approach to foreign policy – the gas market was significantly freer than it is now. For instance, after the establishment of Gazprom as a joint-stock company in 1992, the Russian government never held a controlling stake in the company in the 1990s (Victor & Victor, 2006). As of 2005, however, this stake is just over 50% (Smeenk, 2010; Gazprom, 2017j). Another example is the establishment of the Energy Charter Treaty in this period; a multilateral, legally binding agreement with regards to the integration of the European energy market (International Energy Charter, 2015a). Although Russia ended up pulling out of the agreement later, this is indicative of the trend in the 1990s, as commitment to a multilateral framework is

typically liberal (International Energy Charter, 2015b).

In fact, it is the Putin era that has brought on a more mercantilist approach. Indeed, most scholars agree that one of Putin's main policy pillars is to 'catch up with the West through imposing state control over the ownership and management of mineral resources' (Legvold, 2007; Olcott, 2004). This is not only apparent from the reality of the current export market, but has also been clearly vocalized by Putin himself. Most importantly, Putin wrote his *Kandidat* thesis on the management of natural resources in 1997, followed by an article for the journal of the Gorky Mining Institute in 1999, titled 'Mineralno syr'evyye resursy v strategii razvitiya Rossiyskoy ekonomiki[9]'. Although the thesis has since been declared classified and there is even some discussion on whether either publication is actually authored by Putin, these documents are generally considered to be an accurate description of his approach to the natural resource sector (Balzer, 2005; Jack, 2006).

In short, according to recollections of those who read it, his thesis makes a dual argument: on the one hand, he argues that it is fundamental to the prosperity of Russia that the state take the lead in the natural resource sector whilst on the other hand, the state must not be so involved as to deter foreign investment (from the West) (Idem; Balzer, 2005). Although the latter half of this argument is seemingly not in accordance with classical mercantilism, the argument can also be made that if Western investments eventually result in a better functioning (i.e. more profitable) gas sector, they would still serve the purpose of enhancing Russia's relative (economic) power. Furthermore, by dictating the terms on what is 'too much' government involvement and what is acceptable, the state essentially still keeps control over the sector, which again aligns with the definition of mercantilism.

The second publication that underlines Putin's mercantilist tendencies is the aforementioned article on mineral resources in Russia's foreign policy strategy. Here, he makes the same point regarding the state's role in the natural resource sector whilst underlining the danger of deterring investors, but he also places it in the broader perspective of global politics. In the article he states that 'the presence of a strong natural resource potential in Russia gives it a special place amongst industrialized nations', and that the effective use of this potential 'is one of the most important prerequisites to Russia making a sustainable entrance into the world economy' (Putin,

[9] 'Mineral natural resources in the strategy for development of the Russian economy'

1999). He later adds that the state of the country's 'mineral and raw materials complex' remains the 'most important factor' in 'reestablishing Russia's former power on a qualitatively new basis' (Idem). He furthermore underlines the importance of the natural resource sector by indicating that he sees this sector dominating Russia's economy for at least another 50 years. (Idem).

In order to maximize the potential of the country's national resources, Putin proposes the creation of 'state-dominated, vertically integrated financial-industrial groups to compete with Western multinationals' (Idem). These firms shall receive both legislative and financial support from the state on the condition that they serve the state well, i.e. provide it with sufficient resources, increase profits and efficiency, and support and expand exports (Idem; Olcott, 2004).

When we look at the reality of the market, we see Putin's thesis and article clearly reflected in his policies. Bringing Gazprom back under state control and rejecting the Energy Charter Treaty are merely two examples of this in a long list of policies aimed at reinforcing the state's control over the sector. Indeed, even the arrest of Yukos CEO Khodorkovsky in 2003 is rumored to, in part, a response to his plans to sell a significant share (up to 40%) of Yukos company to ExxonMobil (Idem; Balzer, 2005). The fact that the attack on Yukos was initiated by state-owned oil major Rosneft (that later acquired all Yukos assets) and supported by – the also state-owned – Transneft seem to confirm this (Olcott, 2004). Moreover, it shows that the idea of state control seemingly counts heavier for the state than the risk to deter investors; the arrest of Khodorkovsky triggered a lot of suspicion in the West.

After the arrest of Khodorkovsky and subsequent liquidation of Yukos, Putin's intentions became ever clearer. In 2004, he annulled the results of a 1993 tender for the development of three Sakhalin parcels, which was then awarded to ExxonMobil, Chevron and Rosneft. In its place, he announced the sale of a $1 billion exploration license. This was a clear move to push the two foreign companies out of Sakhalin, which was especially radical when considering that Exxon had already invested $80 million in the project (Olcott, 2004). In 2005, he brought Gazprom back under state control. Apart from acquiring a majority share, a law was also adopted that the Russian state shall 'possess no less than 50% plus one share', which was followed by the establishment of an official gas export monopoly for Gazprom in 2006 (Gazprom, 2017k). Although the provision that foreigners shall own no more than 20% of Gazprom shares was lifted in this period as well, it is still prohibited for foreigners to

directly own Gazprom stock (Idem; Victor & Victor, 2006).[10]

In 2008, Putin ensured continuous state involvement in strategic economic sectors by adopting a federal law 'On the Procedures for Foreign Investments in Companies of Strategic Significance for National Defense and Security' (Baker McKenzie, 2017a). This law stipulates a range of restrictions on foreign ownership of 'strategic assets', including 'all activities related to geological research of subsoil or mineral exploration and extraction of federal subsoil' (Idem). If a foreign entity wants to acquire a 'controlling share' in these companies ('controlling' being defined as acquiring 25% or more), a preliminary consent of the Russian government is needed (Idem). Furthermore, the law also knows a clause on 'strategic deposits': oil fields with recoverable reserves of over 70 million tonnes, gas fields with reserves over 50 bcm and all offshore fields (Idem; King & Spalding, 2012). In these cases, foreign investors are even further restricted: subsoil licenses can only be held by Russian companies and in the case of offshore fields (such as for instance, nearly the entire Arctic), only by Russian companies that are at least 50% owned by the state and have no less than 5 years of experience in 'developing Arctic shelf blocks in Russia' (which essentially limits it to Rosneft and Gazprom) (King & Spalding, 2012). The implementation of this law has had clear consequences in the market, as the joint venture TNK-BP – which was 51% British-owned – was for instance forced to give up its majority share in the development of the Kovytka field (IHS Markit, 2010).

More recently, there has been some minor liberalization in the market: since 2013, companies other than Gazprom are allowed to export LNG (Mitrova, 2013). However, as stated earlier, there is currently only one LNG terminal on stream (which is incidentally Gazprom controlled). Furthermore, only companies that hold subsoil licenses for strategic fields (which only Russian companies can hold) or are 50% state-owned have this privilege, which shows that the state is still keeping a tight control over exports (Baker McKenzie, 2017b).

Apart from bringing the gas industry back under state control, one could even make the argument that the continued use of long-term contracts with take-or-pay clauses are also a way to maintain a certain degree of mercantilist control over both the sector itself and the import partners. They ensure sales – and are thus a logical

[10] Rather, Gazprom shares can be acquired via 'American Depository Receipts': 'instruments that carry the promise of exchange for normal Gazprom shares on a 1:10 basis' (Victor & Victor, 2006).

choice from an economic standpoint – but also guarantee that the state has a say in how much gas is exported and where it is exported. In a more liberalized market, neither the state nor gas majors would have this choice.

That Putin, in turn, has used his tight control to directly influence Russia's position *vis a vis* other nations – in true neorealist fashion – is for instance apparent from the 2006 and 2009 Ukrainian energy crises. Although both of these disputes concerned gas pricing rather than a direct political disagreement, it is considered general knowledge that Gazprom's demands were a reaction to Ukrainian's increasingly Western political orientation (Stern, 2006; Newnham, 2011). By threatening with price increases, Russia 'flexed its muscles' towards Ukraine, underlining that gas can be used to exert power over other nations (Idem). The fact that gas prices were again lowered when Yanukovich – who was considered a pro-Russian president – was in power, underlines that Russia is not afraid to use its gas for political purposes (Orttung & Overland, 2013). Moreover, the 2009 cut-off is also rumored to have been a ploy to garner European support for Nord Stream, again underlining how Russia can and *does* indeed influence other powers through its gas exports (Stegen, 2011). After all, Nord Stream was built despite initial resistance from the Baltic States and other EU Member States (Idem).

To conclude this section, we can state that the Russian gas export strategy under Putin is based on a mercantilist model driven by a neorealist foreign policy paradigm. Both his vocalization of the need to use Russia's natural resource potential to maximize its power *vis a vis* other countries, as well as the policies implemented since 2003 clearly underline this. Moreover, as we see a stark contrast between the natural resource strategy in the 1990s – when Russia's foreign policy paradigm leaned more towards liberalism – and the present, there is a strong case to make for the fact that Russia's resource strategy is a direct consequence of its foreign policy approach. The gas crises in Ukraine furthermore underline that the ability to gain relative power through its gas exports is not only an abstract; this method has been used by Russia.

Now that we have established a clear view of the Russian resource base, infrastructure, market and strategy, we will move on to analyzing the potential effects the current changes in the global energy system will have on this industry. In the following section, we will go through each of the changes, highlighting why they are globally disruptive and analyzing their potential effects on the Russian gas export market and strategy.

IV. A Disrupted Market

In this chapter, we will analyze the three most disruptive changes in the global energy system currently – the globalization of the gas market, the rise of RES and lower energy prices for longer – and their effect on Russia. We will go through each of these developments separately, first assessing why they are so disruptive, after which we will analyze the possible effects for the Russian gas export market and strategy.

IV.i Globalization of the Gas Market

The first change we will discuss in relation to the Russian gas market and strategy is the globalization of the gas market. Traditionally, the gas market has always been hampered by two main factors; it could only be conveniently transported through pipelines, and reserves were almost strictly confined to the strategic ellipse. This resulted in the establishment of an inherently rigid and regional market, with very limited options in terms of diversifying or in any way altering already established ties between producers and consumers.

Recent technological developments have opened the door to a more flexible and globalized gas market however. This is firstly due to the fact that LNG is becoming increasingly more popular and has shifted from being an expensive niche fuel to a mainstream way of sourcing gas. Since 2000, both the amount of LNG traded globally as well as the amount of countries importing LNG has more than doubled (IGU, 2017). Currently, there is 413.9 bcm of liquefaction capacity available worldwide, with another 155.8 bcm under construction as of January 2017 (Idem). On the other side of the spectrum, there is now 1,081.2 bcm of gasification capacity available 122.9 bcm underway as of Q1 2017 (Idem). Although still accounting for less than half the amount of globally traded pipeline-gas (346.6 bcm vs. 737.5), trade in LNG is currently growing seven times faster, indicating a growing importance of which the effects should not be underestimated (BP, 2017a, 2017b). Namely, as LNG can be transported by the same means as oil – per train or boat for instance – it frees consumers and producers from the binding ties of pipelines.

Secondly, hydraulic fracturing (better known as ‘fracking’ or ‘shale gas’) has made previously inaccessible gas reserves economically viable to develop. The greatest effect of this can be seen in the North American market, where both the US and Canada are producing shale gas in commercial quantities. Indeed, in the US the share of imported gas in general consumption dropped from 16.7% in 2007 to 2.8% in

2016 as a result of newly accessible domestic gas supplies (U.S. Department of Energy, 2017). This, in turn, has triggered a global discussion on the potential of 'unconventional reserves', as the US Energy Information Strategy estimates that shale gas reserves could amount up to 6,634 tcm, or 32% of the world's total reserves (U.S. Energy Information Administration, 2013). Although development has been slow outside of North America – mostly due to environmental concerns – shale gas has created a paradigm shift in the thinking of importers, as it has created the potential for a decreased dependence on the strategic ellipse.

As these changes make both new sources and new markets accessible, it is generally expected that the gas market will become increasingly globalized in the future (Aune, Rosendahl & Sagen, 2009; Hafner & Tagliapietra, 2013). This, in turn, is associated with a myriad of different effects such as the eventual standardization of prices and a decrease of imports in countries with domestic unconventional resources (Aune et al., 2009; Medlock, Jaffe & O'Sullivan, 2014). Indeed, the United States is for instance set to become a net exporter of natural gas as of 2018, which is driven by its unconventional gas production and access to new markets (U.S. Energy Information Administration, 2017). Most importantly to this thesis however is the fact that these developments create the option of diversification (Cohen, Joutz & Lougani, 2011). This applies to both importers and exporters; as new markets and sources become available, the previously unchangeable dependencies no longer need to persist. Gas could, in theory, be traded from anywhere to anywhere in the future, which is a stark contrast from the traditional system.

So how does this affect the Russian market? As can be expected, the answer to this is not univocal. On the one hand, the option to diversify makes Russia's biggest market, namely the EU, less dependent on its gas supplies. This is especially negative in the light of recent European legislation, which clearly indicates that there is a strong will to diversify away from Russian gas. On the other hand, LNG also presents Russia with the opportunity to diversify its exports destinations, indicating a potentially positive effect. Nevertheless, we will argue that significant changes will need to be made in its gas exporting strategy in order for Russia not to face significant difficulties as a result of the globalization of the gas market in the future.

In order to fully assess the (potential) effects of, we must first look at the situation on the EU market. As is well known, the EU is heavily dependent on Russian gas: at 106 bcm per annum, Russia currently accounts for 38.5% of all

natural gas imports, and 24.7% of total consumption (Eurostat, 2017; Statista, 2017). For countries in the (South-)East, this dependency is even higher, as they do not have access to alternative suppliers such as Norway (Luciani, 2016). Moreover, as domestic gas production is projected to decline sharply, the EU will become increasingly dependent on energy imports in the future, implicating a growing role for Russia if the status quo in terms of infrastructure is maintained (Idem).

That the strong dependence on Russia is considered a risk to European energy security is something that has often been vocalized by the EU leadership, especially since the 2006 and 2009 gas crises. Currently, enhancing the energy security through diversity of supply is a pillar of the EU Energy Strategy, with the urgency of diversifying away from Russia being continuously underlined by the leadership (European Commission, 2017a). As few other options are available to the EU, and the development of unconventional resources is unlikely due to lack of public support, LNG is a big part of this strategy (Luciani, 2016). Indeed, the current plan is to have a minimum of two potential sources of supply for every Member State, which can only be attained through an expansion of the LNG infrastructure (European Commission, 2016a). Hence there are currently seven LNG regasification terminals under construction or planned, which would increase the total regasification capacity to well over 225 bcm, which would be just short of covering the EU's total gas imports of 2016 (see Figure 5) (European Parliament, 2015; Eurostat, 2017).

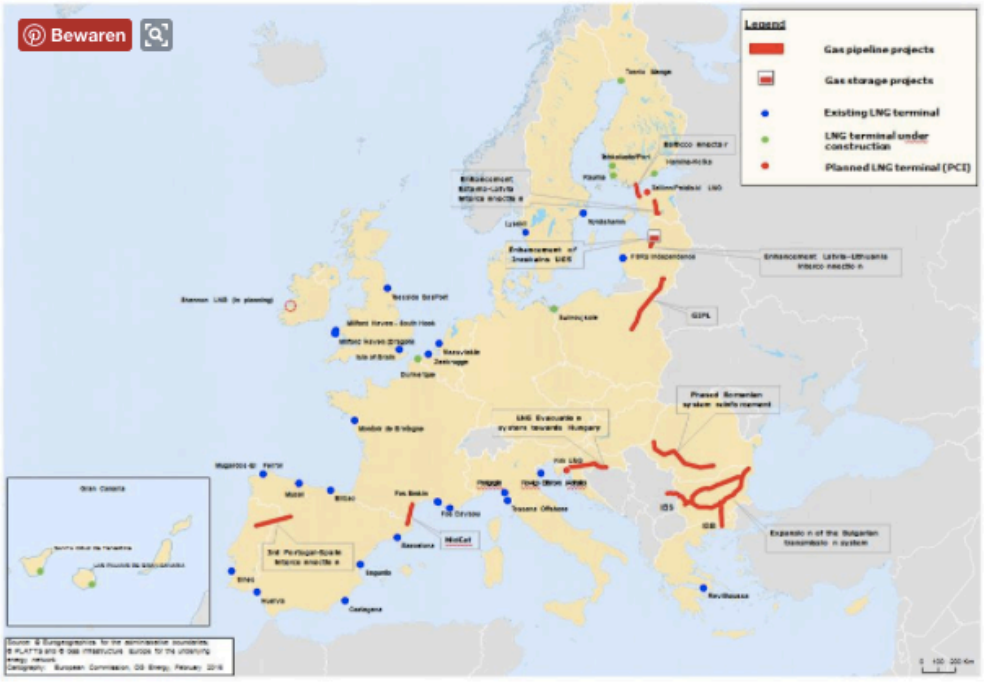

Figure 5. LNG Infrastructure in the EU, *Source: European Commission (2016)*.

The EU's eagerness to develop LNG infrastructure in order to diversify away from Russian gas is problematic for Russia in several ways. Firstly, and although there has been no discernible effect on Russia sales volumes yet, having more competitors on the European gas market is eventually projected to cut into the Russian market share and thus depress sales and income (European Commission, 2016a; ERIRAS, 2016). More importantly however is the fact that the drive to diversify away from Russian gas is not motivated by market concerns, but rather by strategic considerations. This means that instead of only having to stay competitive and keep up a solid and reliable transit system, Russia would have to make far-reaching changes in its strategy in order to maintain its market share and avoid a European switch to a more LNG-focused market.

Essentially, if the EU's concern about its security of supply were price-driven, Russia would merely have to ensure the competitiveness of its gas prices *vis a vis* LNG. This should not prove insurmountable for Russia however, especially considering the fact that liquefaction and regasification of LNG is relatively costly at $4 to $5 whilst a strong pull from Asia has been racking up LNG prices globally (Luciani, 2017; Stern et al., 2014). Moreover, Europe would still have to make large and costly investments in infrastructure in order to refocus its dependency whilst continuously lower oil prices also mean lower prices for oil-indexed gas (see chapter IV.iii) (Idem). That this is however not the main concern is illustrated by for instance the (adopted) European Parliament (EP) motion 'On an EU Strategy for Liquefied Natural Gas and Gas Storage', which openly states LNG has historically always more expensive than pipeline gas, but still pledges for the switch strongly (European Parliament, 2016). A more concrete example of the fact that other concerns take precedence would be the construction of the Klaipeda LNG FSRU terminal in Lithuania. Since this has been taken into production, the gas prices here have only been about equal to those of Gazprom, whilst the building of the terminal cost $114 million and its upkeep is $30 million yearly (Vaida, 2015; European Commission, 2013). When these costs are added together, LNG thus costs unequivocally more than Russian pipeline gas. Despite the fact that LNG was never competitive here however, Klaipeda is considered as a good example of Europe's diversification strategy and a model for other countries to such an extent that the European Commission provided

Lithuania with over $500 million in aid to finance its construction and upkeep (Idem).

Similarly, if the concerns were driven by the idea of supply disruptions due to external forces such as extreme weather conditions or problems in transit countries – not unimaginable considering the Ukrainian case – LNG would still not be the most attractive option. Indeed, it would then suffice to build a varied network of mostly direct pipelines, as was the idea behind Nord Stream, the plans for its extension and South Stream (Konoplyannik, 2014). Again however, the aforementioned motion shows that physical security of supply is not the primary concern. In example, the motion refers very specifically to the proposed doubling of the Nord Stream system and even though this would theoretically be the absolute safest option in terms of guaranteeing supplies of cheap natural gas in Northern Europe, the motion only covers potential downsides to the project (European Parliament, 2016). Indeed, the EP 'expresses concern at the proposed doubling of capacity of the Nord Stream pipeline, and the counterproductive effects this would have on energy security and diversification of supply sources and *the principle of solidarity* among Member States', whilst it moreover '*highlights the geopolitical implications* of the project' (Idem).[11] Furthermore, it 'underlines that a doubling of the capacity of the Nord Stream pipeline would give one company a dominant position on the European gas market, which should be avoided' (Idem). Both this message and its wording ('geopolitics implication', 'solidarity') indicate considerations beyond the concrete concern for the safety of supply.

Indeed, rather than direct market concerns, it is the strategy behind Russia's gas exports which worries the EU. Accordingly, it is said that the EU's biggest issue regarding Russian gas imports is the fact that all imports are controlled by a single state-owned entity (Stern, Pirani & Yafimava, 2015). Due to the political connotations of the 2006 and 2009 Ukrainian gas crises, there is a strong perception that the centralized management of the Russian gas export sector and the strong state involvement puts the EU at risk of disruptions as a result of political issues (Idem; Stegen, 2011). Moreover, the EU has generally been pursuing a strategy of far-reaching liberalization in its gas market, indicating that Russia's mercantilist approach inherently contradicts the European vision, even if it were to be political ally.

That the EU considers the Russian strategy unacceptable for its market is most

[11] Emphasis by author

strongly exemplified by the 2009 Third Energy Package. Instead of centralized control and strong companies, this Package consists of a set of directives and regulations specifically targeted at further liberalizing the European gas market and increasing competition (Yafimava, 2013). The most important measures in this regard are the fact that energy producers can no longer be involved in upstream development as well as transit operations ('ownership unbundling') and the fact that third-party access needs to be guaranteed in all transmission networks and storage facilities (European Commission, 2017b, 2017c). These rules are directly targeted towards big 'vertically-integrated' gas companies like Gazprom and have had significant impact, mostly in relation to the tenability of Russia's strategy. In example, as the Third Energy Package applies to all entities active in the EU, Gazprom was forced to sell off significant transmission assets in order not to be in violation; a clear case of forced liberalization and deviation from its usual strategy (Grigas, 2015; ERIRAS, 2016).

Moreover, third-party access has created uncertainty about the accessibility of pipeline capacity, as it has for instance kept Nord Stream from functioning at full capacity. Pipeline construction is associated with high capital investment, which in the Russian case is always in large part paid for by Gazprom, as was the case with Nord Stream. However, as third-party access needs to be guaranteed at 50% of the capacity (or 29 bcm) of the pipelines Nord Stream is connected to in the EU (OPAL and NEL), but the only connection to them is with Gazprom gas, Nord Stream (capacity: 55 bcm) can thus not function at capacity (Stern et al., 2015). Furthermore, the Nord Stream case is an excellent example of how the general tendency towards liberalization is exacerbated by the underlying political tensions in the Russian case specifically. Namely, the Third Energy Package allows for exemptions of the third-party access rule in cases where it impedes on the supply security or puts future investment at risk, but it has proven impossible to get such an exemption in the case of Russian imports.

To illustrate: in 2016, Germany pushed for an exemption of the rule in the case of OPAL and NEL, (seemingly correctly) arguing it would enhance its security of supply (Euractiv, 2016). After the European Commission granted an initial exemption however, Poland put in a complaint against the decision at the EU Court of Justice, which subsequently led to its repeal in December 2016 (European Commission, 2016b; PGNiG, 2016). As the Polish complaint was generally seen as politically motivated, this is again a clear example of the fact that Russia needs to

consider more than just market forces when trying to maintain its position in the EU gas market. In fact, it indicates that the Russian model of building and financing big infrastructure (such as for instance South Stream or Nord Stream 2) in order to guarantee its sales to the EU would become a risky sales model if its mercantilist export strategy is maintained; without guaranteed access, it can never be ensured that it will get return on the investment. However, if Russia were to allow other companies to export pipeline gas, this problem would be mitigated; these new companies would then be the 'third party', whilst income would still flow to Russia. If Russia were to move towards this model – and many scholars expect that they will in the medium term – this would again be a clear case of forced liberalization, and thus shows the negative effect of the EU's changing legislation on Russia's preferred strategy (Stern et al., 2015; Stern et al., 2014; Özdemir & Karbuz, 2015).

To summarize, we can state that without a strategy change, the effect of the globalization of the gas market is unequivocally negative for the Russian gas export market and strategy in the EU. This is mainly due to the fact that this globalization allows the EU to diversify away from Russian gas through the means of increased LNG usage. Although we have seen that there are no market-based reasons that Russian gas should not be competitive *vis a vis* LNG, we have also assessed that the motivation of the EU goes beyond market principles. The main concern for the EU remains the fact that Russian gas exports are too centrally controlled, whilst the Union is consciously trying to limit the power of any single actor. The divergence between these two visions is furthermore exacerbated by the political tensions between the two blocs, ensuring that no exceptions will be made in granting Gazprom more access to the market for instance. Thus, the only realistic way for Russia to mitigate the risks of increased competition on the European gas market would be through a strategy change. Only if Russia were to switch to a more liberalized and less mercantilist export model can they be ensured of their future position in the EU market, which will otherwise seemingly gladly switch to more expensive LNG.

If for any reason Russia should refuse to change its strategy in Europe, the argument could be made that Russia could still benefit from the globalization of the gas market through its ability to reach new markets with LNG. This would mostly pertain to the Asian market, where gas demand is growing and especially Japan and China could be attractive markets for Russia. Japanese demand for LNG went up by 10% (to 116 bcm) in the aftermath of the 2011 Fukushima disaster and subsequent

nuclear shut down and although demand is expected to stabilize around 110 bcm in the coming years as nuclear power is phased back in, this is a steady LNG market (BP, 2017a; Rogers, 2016). A similar situation applies to China, where gas demand is projected to double over the next 15 years, from 192 bcm to 418 bcm according to the Chinese state oil major CNPC (Rogers, 2016). LNG imports in turn are set to account for at least 20% of its consumption (Idem). Moreover, as these markets are not dependent on Russia and are the political issues at play in the EU are absent, the Russian strategy should not present a significant problem here. Indeed, although diversification is also a main pillar in the Japanese energy strategy, it currently imports 60% of its LNG from Malaysia, Australia and Qatar so Russia could actually be a country to diversify towards rather than away from (Enecho, 2016; Motomura, 2014). In the Chinese case, a big share of domestic unconventional production combined with a more varied sources of pipeline gas (China currently already imports from Myanmar, Uzbekistan, Kazakhstan and Turkmenistan) makes that no single exporter could take a dominant position, negating the potential risks that apply in the EU (Rogers, 2016; BP, 2017).

However, although Russia's strategy would most likely not be negatively affected by the globalization of the gas market when we look at the Asian side, the speed of the current change might make it difficult to find an upside for the concrete market. Namely, whilst Russia only has one LNG terminal currently on stream, Qatar and Australia have already cornered 50% of the Asian-Pacific gas market, whilst they account for over 35% of global liquefaction capacity (IGU, 2017; BP, 2017). In 2018, Australia is furthermore expected to overtake Qatar as the world's largest LNG exporter (Luciani, 2016). Although this need not 'kill Russia in the crib' necessarily, it does show that if Russia does not develop further LNG export capacity with some urgency, it might fall behind and find a fully established market already in place by the time it is capable of significantly increasing its exports (Henderson, 2017). This is enhanced by the fact that the only other LNG facility set to come on stream in the short term (Yamal LNG) cannot realistically serve the Asian market due to its geographical location. Moreover, even though this market is less politicized and strategy-based, there is the salient detail of the fact that Russia has already liberalized its LNG exports to a certain extent (Mitrova, 2013). This implies that the Russian leadership is well aware of the fact that in order to increase LNG export capacity in the short-term, it will have to loosen its control over the market, reinforcing what we

assessed before. Namely, that the only way Russia can maintain its position as a dominant exporter in a globalizing gas market is by altering its strategy.

In conclusion of this section, we must assess that the globalization of the gas market presents a formidable challenge to Russia's gas export market and strategy. Especially in the European case, where the option to diversify through LNG is slowly enabling the EU to move away from Russian gas, it is clear that without far-reaching changes to its strategy, Russia will eventually lose market share. The motivation behind the EU's diversification strategies, which is primarily strategic and based on curtailing the influence of individual actors, means that even when Russian gas would remain competitive and it could guarantee direct and uninterrupted supplies, its market share would still suffer without changing its strategy. In the Asian case, the situation is quite different, but here the globalization might negatively impact Russia's gas export market potential as its LNG development is lagging behind on other major exports. Moreover, the slight liberalization of the LNG market shows that the Russian leadership acknowledges that its mercantilist, highly controlling strategy might not be beneficial to its market share here either. In conclusion, although this is of course a long-term projection, it seems that the in order to mitigate the otherwise negative effects on the Russian gas export market, the globalization of the gas market will force Russia towards a more liberal and less mercantilist gas export strategy.

IV.ii The Rise of Renewable Energy Sources

The second change we will discuss is the rise of RES. The recent increase in RES usage in undoubtedly one of the most disruptive developments the global energy system has seen in many decades. Since the dawn of the modern age, the world has been powered by fossil fuels. From the coalmines of Industrial Revolution-era England to state of the art oil-facilities in Saudi Arabia today, fossil fuels have continuously shaped our energy landscape over the last two hundred years. Increasingly however, governments are realizing that the status quo in energy is no longer sustainable and that the price to pay for a fossil fuel-based system is too high. From the historic climate change deal made during the COP 21 in Paris and the ambitious goals set by the EU, China and others, the global energy landscape is now slowly moving away from its traditional staples.

This awareness and the magnitude of the impact of RES on the global energy system are clearly illustrated by the recent growth in global capacity. Since 2007,

RES capacity has more than doubled, from 989 213 Megawatt (MW) to 2 006 202 MW in 2016, or approximately 13% of the global energy supply (IRENA, 2017; OECD Data, 2017). Most of this growth comes from 'modern renewables' (i.e. wind and solar), which have consistently grown at twice the rate of global energy demand (REN 21, 2017).

Another element reinforcing this trend – whilst also showing it is not a temporary phenomenon – is the fact that nearly all countries currently have a pledged commitment to increasing the share of RES in their energy mix or at least decrease the amount of greenhouse gas (GHG) emissions, which is essentially impossible without RES. In example, 148 out of the 197 signatories have now ratified the aforementioned Paris agreement, which aims to keep the global temperature rise below 2 degrees Celsius and 'to reach global peaking of GHG emissions as soon as possible' (UNFCCC, 2017a, 2017b). Moreover, in the last three years, over 160 countries have made specific commitments to implement more clean energy (i.e. RES) (Ross, 2016).

Some of the most important actors in regards to the global transition to a more RES-focused system are incidentally also Russia's biggest (future) gas export partners: China, the EU, and Germany in particular. Together, these countries account for almost half of global RES capacity (REN 21, 2017). Moreover, their pledges regarding RES are some of the most far reaching. The EU aims at an RES share in its gross final energy consumption of 27% in 2030 and 55% in 2050, whilst China pledged a share of 20% by 2030 (which is affirmed in its 13th Five-Year-Plan) (Xinhuanet, 2015; European Commission, 2017a; European Commission, 2011). Meanwhile, Germany – Russia's biggest gas export market – is in a league of its own. In 2010, its government announced a strategy for a full-blown transition to a more sustainable energy system – also known as the *Energiewende* – and as a part of this it pledged a share of RES of 30% in 2030 and 60% in 2050 (BMWi, 2010).

That these pledges cannot be ignored when assessing the future energy market becomes apparent when you look at the current status of RES in these markets. As of 2015, RES accounts for circa 12,5% of the EU's gross inland consumption (a 179% growth since 1990), with a similar number for Germany (representing an astounding 751% of growth since 1990) (AG Energiebilanz, 2016; Eurostat, 2016a, 2016b). In

China, no separate data on the exact share of RES is available[12], but as energy consumption growth slows down and RES capacity grows, some observers are projecting a 17% share in 2020 (China Statistics Press, 2016; Myllyvirta, 2017). Indeed, in 2015, China's added RES capacity was the same as Germany's total generating capacity whilst energy consumption only grew with 0.9% (China Statistics, 2016; Göss, 2017).

With this size and growth rate, it should be evident that the rise of RES is indeed fundamentally changing the global energy balance and will inevitably impact the fossil fuel sector as well. This leads us to the question: 'Which effect will it have on Russian gas exports?' As we have assessed, Russia's main export markets are on the forefront of RES usage and as such, we can expect to find significant effects. Moreover, RES and gas are direct competitors – both are primarily used in electricity generation – compounding the possible impact on Russia as a gas exporter.

To answer our question, we will highlight one case: Germany. This is firstly because as of now, there are no gas exports to China yet and thus no effect can be discernible. Secondly, to analyze the data of every EU 28 member is beyond the scope of this thesis. Thirdly, at 46 bcm in 2016, Germany is by far Russia's biggest gas importer, increasing the relevance of any changes (BP, 2017a). However, as the characteristics of gas and RES do not differ from case to case and, it should be kept in mind that although we underline this one case, our findings should be considered equally applicable to other Russian gas export markets (including, in the future, China).

In theory, the effects of increased RES usage on gas consumption need not be negative at all. Quite the contrary actually: even though they are direct competitors in the electricity sector, they also have a complimentary function. This is due to two reasons: firstly, RES needs a back-up fuel to allow for inevitable fluctuations in production and secondly, gas is the most flexible and cleanest fossil fuel.

When an electricity system is based on conventional power sources, demand is covered by a 'base load', which can be supplemented with an 'intermediate load' and 'peak load' in moments that the demand exceeds the base load (for instance during dinner time or in the morning) (see Figure 6). This base load is usually accounted for

[12] In Chinese government statistics, renewables energy is grouped under the general denominator 'primary electricity and other energy', which accounted for 12% of consumption in 2016 (China Statistics Press, 2016).

by nuclear or coal-fired power plants. These types of plants are used because they can provide cheap and consistent power in large amounts. However, they cannot be ramped up or down efficiently; it takes a long time to turn them on and off and. Thus, sudden surges in demand are usually covered by gas or other more flexible power sources such as large hydro-plants (Institute for Energy Research, 2014). Keeping this balance is crucial to the health of the system, as too much power on the grid at once would cause an overload, which can lead to faltering or even a shut down of the transmission network. Moreover, it could lead to negative prices for energy, which is not a healthy economic precedent to set.

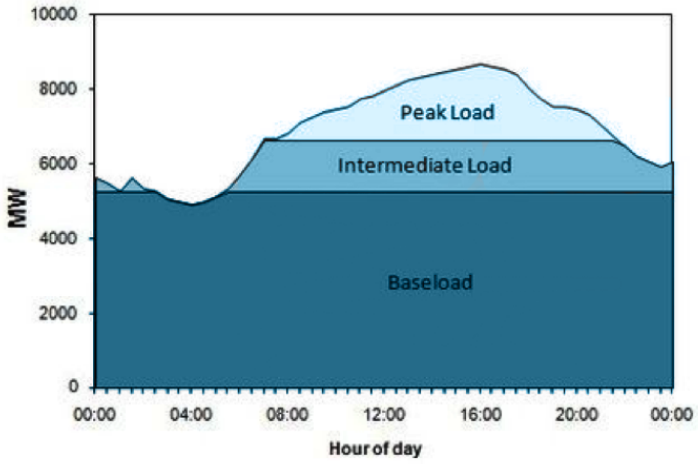

Figure 6. Example of an electricity supply based on conventional sources. *Source: Institute for Energy Research (2014).*

When RES come into play however, such a base load suddenly becomes detrimental to the health of the system. RES output is inherently variable; the sun and the wind do not function according to power demand. Thus, in a system with a large share of RES, it impossible to predict the amount of base load needed over a longer period of time. The continued use of a base load would then put the system at risk of overloading, as high RES output would cut into the base demand. That such a scenario is not merely theory can be illustrated by a recent event in Germany. On April 30th, 2017, which was an unexpectedly warm day, Germany managed to cover a record 85% of its electricity usage with RES (Hanley, 2017). This kind of RES output would have surely caused an overload if had Germany relied on a big base load.

Rather than a base load, RES needs 'flexible back-up': the back-up of an additional power source that can be turned off an on with relative ease and speed to compensate for unexpected surges and shortfalls in RES production. It is here that natural gas comes in as gas turbines can achieve 100% capacity within 10 to 30

minutes, depending on whether it is a combined (30 minutes) or simple cycle (10 minutes) turbine (Balling, Lothar & Siemens, 2010; Institute for Energy Research, 2014).

Of course, there are other sources of power that could be used as a flexible back up. The most logical of these would be oil, as it is already commonly used for the peak load in conventional systems. However, as natural gas emits 28% less CO2 per unit burnt, and even 45% less than the most commonly used coal (lignite), it would be assumed to be the perfect complimentary fuel to RES (U.S. Energy Information Administration, 2017). Thus, when for instance Germany launched their *Energiewende* project, many observers expected a rise in natural gas consumption together with RES (Agora Energiewende, 2014).

This is not to say that the potential effects can only be positive. Although gas is for instance a much more appropriate backup fuel, it is also considerably more expensive than coal, especially at times of high oil prices and thus higher gas prices. Moreover, RES usage is rarely an isolated event; pledges often include both a RES commitment as well as commitments to energy efficiency, which lead to decreased energy consumption and thus narrow the market for gas.

When we look at Russian gas exports to Germany, the duality of the relationship between gas and RES becomes clearly visible. Indeed, although Russia gas exports to Germany did not suffer under the implementation of more RES, the positive effects that were projected also did not materialize. Moreover, in order to keep its market share up, Russia was forced to alter its strategy towards Germany, indicating that in its current form, the rise of RES is disadvantageous to the Russian market and strategy.

The implementation of the *Energiewende* in 2011 and the subsequent upswing in RES usage had surprisingly mild effects on the German gas market. However, mild though they might be, also some of these smaller changes are actually very revealing as to the future potential for gas in an RES-driven system. Firstly, it is clear from Figure 7 that the expectation of significant growth in gas consumption was false. Although the market has developed somewhat haphazardly and gas is currently in an upswing again, absolute consumption (80.5 bcm) is still considerably lower than for instance in pre-*Energiewende* 2010 (84.1 bcm) (BP, 2017a). Moreover the current upswing – a growth of nearly 10% compared to last year – coincides strongly with a

lower price for oil-indexed gas, implying this might be due to price elasticity of demand rather than a renewed impetus for the role of gas on RES-heavy markets.

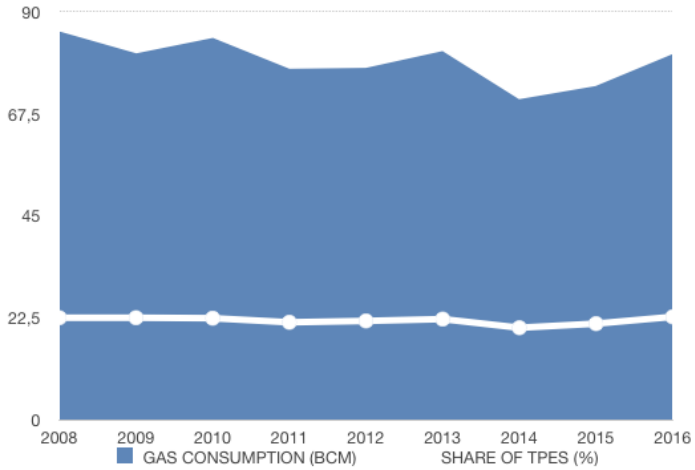

Figure 7. Gas Consumption in Germany (bcm) and Share of TPES (%), *Source: BP (2017); AG Energiebilanz (2016), (2017b); graph by author*.

That the potential positive effects did not materialize as theorized is even clearer when we look at the electricity sector. Here, the share of gas fell from 14.1% of all electricity generation in 2010 to 9.6% in 2015 (AG Energiebilanz, 2016). Again, we see a slight upswing currently, with preliminary reports projecting a share of 12% in 2016 (AG Energiebilanz, 2017a). However, although this might be the start of a positive trend, the absolute share of gas is still considerably lower in the electricity sector than it was pre-*Energiewende*. As most energy efficiency policies focus on the electricity sector as well, a small decrease in gas' share already translates to big absolute numbers; it simply takes less to make up a 10% share. Hence, although the difference in gas' share in the electricity mix between 2010 and 2016 would be a mere -2.1%, gross electricity (i.e. absolute) production from gas dropped by 18%; from 86.67 Terra Watt hours (TWh) to 71.3 TWh (Idem).

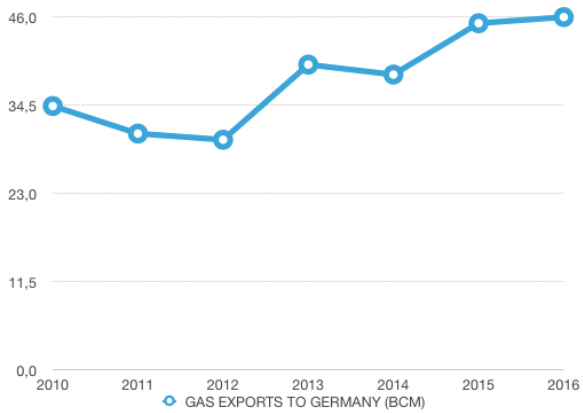

Figure 8. Russian Gas Exports to Germany (bcm), *Source: BP (2017), (2016), (2015), (2014), (2013), (2012), (2011)*; graph by author.

Somewhat surprisingly, and despite the ambiguous performance of gas since Germany's RES boom, Russia imports have actually not been suffering. As can be seen in Figure 8, Russian imports decreased somewhat directly after the implementation of the *Energiewende*, but have since rebounded. Nevertheless, this does not mean that the changes in Germany have not had any impact on the Russia gas export market or strategy. Indeed, the German case underlines how precarious the situation for Russia in a more RES driven market is. There are three main reasons for this: energy efficiency, the relatively low competitiveness of gas as a fuel and, most importantly, the structure of Russian gas contracts.

Firstly, the impact that energy efficiency has had on gas' share of the gross electricity production of Germany should be considered a warning sign. Although not directly related to the rise of RES, all actors with strong RES pledges have a similarly strong commitment to decreasing their overall energy usage (or stalling its growth, as is the case in China). As energy efficiency measures are mostly applied in the same sectors as gas however –most importantly, the electricity sector – this means that this could hit gas disproportionately hard. Considering the pledges of the EU, Germany and China, we can thus assess that this secondary effect of the rise of RES usage and increased awareness about sustainability could still prove detrimental to Russia in the long term.

Secondly, the fact that gas usage initially decreased after the implementation of the *Energiewende* and did not bounce back until after prices had dropped (indicating a certain elasticity of demand), warrants some worry about the competitiveness of gas. Indeed, as long as there are cheaper substitutes such as coal available, it is difficult for gas to stay competitive as a back-up fuel. The initial drop in gas usage in Germany after 2011 is often attributed to the 'coal conundrum'; as oil-indexed gas prices kept rising, coal became more attractive as a back up fuel, despite Germany's dedication to sustainability. Now that oil prices are low with gas prices following suit, this problem is temporary abated. However, as long as Russia holds on to oil-indexed pricing, it is bound to encounter this problem again in the future. This applies to the EU 28, where coal is widely available and the access to LNG (the prices of which are generally 'spot-based', i.e. decided by the market) is growing, but even more so for China. Considering the distance the gas must travel to reach market – making it inherently less competitive –, and the wide availability of very cheap coal there, Russia would do well to try to ensure the competitiveness of its gas in that

market by looking at other options than oil-indexation.

This brings us to the last, and most important, reason why Russia cannot be assured of its position in energy systems with a high share of RES: Russia's gas contract structure. Russia's determination to continue its gas trade on the basis of long-term gas contracts with oil-indexed prices and take-or-pay clauses is problematic in relation to RES for one important reason: it defeats the purpose of gas as a flexible fuel. As we have already assessed, it is difficult to assess the power demand that RES can or cannot cover on a certain point in time. Hence, if a consumer is forced to buy a pre-set amount of gas on a pre-set time at a pre-set price, the possibility arises that this gas is either not needed (which, considering the take-or-pay clauses, would create the need for significant, and costly, storage capacity) or that is does not cover base demand.

In fact, this incompatibility between Russia's preferred contract structure and more RES usage has already led to a new precedent in Germany, set by two of its energy majors: E.On and RWE. The decrease in demand combined with the high prices of gas in the early years of the *Energiewende* prompted these companies to file arbitration again their contracts with Gazprom, claiming that long-term natural gas contracts and oil-indexed prices were no longer a feasible business model in the newly structured market (Reuters, 2011, 2013).

E.On was the first to make a case against its long-term contract with Gazprom (which runs until 2036 and covers 600 bcm) and a settlement was reached in July 2012 (E.On, 2012). This entailed a retroactive revision of the price from Q4 2010 onwards and steadied E.On's economic outlook, as can be seen in Figure 9 (Idem).

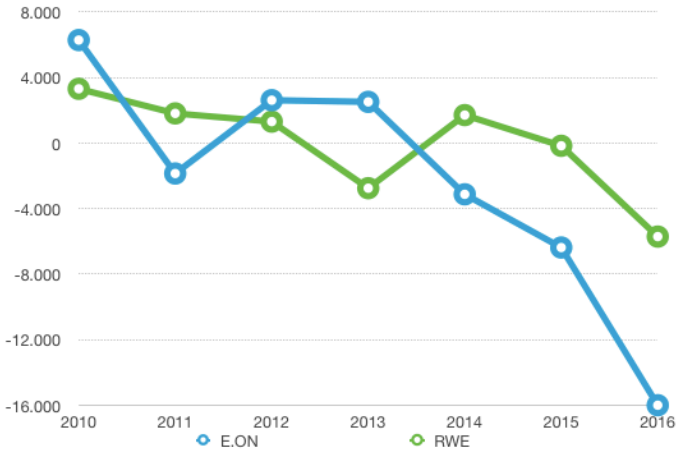

Figure 9. Net Income E.On & RWE (€ in millions), *Source: E.On (2011); (2013); (2015); (2016a)*; RWE (2011); (2013a); (2015); (2016)**; graph by author.*

* E.On separated its conventional energy generations into a new holding (Uniper) as per January 1st, 2016 but retained its (gas) retail operations)
** RWE separated its renewable energy generation, power grid and retail operations into a new holding (Innogy SE) as per April 1st, 2016.

In 2013, after booking a hefty loss in 2012-2013, RWE followed suit and filed a claim at the Vienna Court of Arbitration to have the price as well as the pricing-mechanism of its long-term contracts revised. RWE won the case and was rewarded a price revision backdated to Q2 2010 as well as a revision of the pricing-mechanism to include a bigger share of gas-to-gas indexation (RWE, 2013b). This was the first instance that Russia's preferred pricing mechanism for gas (based on oil prices) was changed due to external pressure (Andresen, 2013). As can be seen in Figure 9, there was a direct positive effect visible in RWE's economic outlook.

E.On filed suit again in 2016, claiming that even with the effect of a lower oil price, in order to hedge its future economic viability, further changes were needed. It was again rewarded damages, including further price revisions and back-payments (Reuters, 2016; E.On, 2016b).[13]

In short, these court cases show us that even though Russia managed to maintain its market share in Germany, it could not do so without altering its usual strategy. The urgency to do so is underlined by the other problems we highlighted. As the projected golden future of gas and RES did not materialize and energy efficiency is actually (slowly) narrowing the market for gas, it is crucial that gas remain competitive *vis a vis* other possible back-up fuels. With its long-term contracts, take-or-pay clauses and oil-indexed prices, this is becoming increasingly hard for Russia.

To conclude this section, we can state that the effect of RES on Russia's gas market and strategy is twofold. One the one hand, it need not impact exports negatively as gas and RES are at no point mutually exclusive. On the other hand however, we see that the positive developments as they might have been expected have not materialized either. This is mostly due to the contractual structure Gazprom abides by: through this, Russia negates the advantage of gas' flexibility. That the effect of this is considerable is shown by the court cases between E.On, RWE and Gazprom; these forced a part of the control over the exports out of Gazprom's – and by proxy the Russian state's – hands. This indicates that the effect of increased RES usage on Russia's strategy is much bigger than the effect on the market as such. Similar to the effects of the globalization of gas, we see here that in order to maintain its position, Russia will have to let go some control (i.e. move away from its mercantilist *modus operandi*) in order to establish a model that is more beneficial to

[13] The exact specifications of the settlement were not published, but E.On announced that is would have a positive effect on its cash flow to the amount of €800 million (E.On, 2016b).

its consumers as well. This would indicate a forced turn to a more liberalist worldview; one based on mutual benefits as opposed to zero-sum gains.

IV.iii Lower Prices for Longer

The last global development we will discuss in relation to the Russian gas export market and strategy is the continuously lower oil – and in the case of oil-indexation – gas price, for which Goldman Sachs coined the phrase 'lower for longer' in 2015 (Goldman Sachs, 2015). After the oil price rebounded from the 2008 financial crash, when it dropped from a historical $148 per barrel (bbl) to under $40/bbl, the price of both Brent (used for the European basin) and WTI (used for the North American basin) stabilized between $75 and $100/bbl (World Economic Forum, 2016). In June 2014 however, another drop set in and prices recalibrated between $40 and $60, with the beginning of 2016 as an outlier with prices as low as $28/bbl (see Figures 10 and 11) (Bloomberg, 2017).

Figure 10. & 11. Prices of Brent crude & WTI crude (in $ of last five years), *Source: Bloomberg (2017a).*

The cause of this relative drop is relatively simple: there is a glut in the market (World Economic Forum, 2016). Where the 2008 drop was almost entirely caused by

a drop in demand, both record production and lowered demand are currently putting pressure on the oil price (World Bank Group, 2016). On the production side, the biggest causes are US shale oil production and record outputs in Canada and Russia and Iran. In the US, the development of the shale oil industry has significantly decreased its import dependency, whilst in 2016, it was the biggest oil producer globally at 12354 thousand barrels per day (kbpd) (BP, 2017). Between 2010 and May 2017, its net imports have dropped from 9,441 to 4,474[14] kpbd (U.S. Energy Information Administration, 2017). Secondly, Canada and Russia are both producing at record levels, having reached a 2016 average of 4460 kbpd and 11227 kbpd respectively (Idem). Moreover, the lifting of the Iranian sanctions in 2015 has reinvigorated production there, which grew by 18% between 2015 and 2016, reaching an average of 4600 kbpd (Idem).

Moreover, as of now there is no indication that this oversupply will decrease soon. This is mainly because the decentralization of oil production due to the development of unconventional resources such as shale oil (mainly in the US) and tar sands (mainly in Canada) has decreased the ability of traditional 'oil arbiter' OPEC to control prices. Hence, despite the fact that after 18 months of overproduction, OPEC finally agreed on production cuts in order to push the price back up in December 2016, prices barely reacted (Bloomberg, 2017; Wingfield & Dodge, 2017). This deal entailed a reduction of global production by 1.8 million barrels per day and was signed by all OPEC members bar Libya and Syria, as well as 11 non-OPEC members, including Russia and Kazakhstan (Wingfield & Dodge, 2017). However, in addition to the fact that major players such as the US and Canada were not included and did not curb production either, many of the signatories to the deal did not cut production sufficiently (Idem; U.S. Energy Information Administration, 2017). Indeed, from the bigger producers, neither Russia nor Iraq decreased managed the proposed cuts, whilst Kazakhstan actually increased its production (Wingfield & Dodge, 2017). Furthermore, as the US shale oil industry is notoriously fast in scaling production up or down, we have seen a pattern evolve in which the slightest rise in prices immediately increases US domestic production, which in turn depresses the price again (Cunningham, 2017). These developments are not only indicative of a major change on the oil market (i.e. less power for OPEC) but also of the fact that the supply

[14] 5 month average.

glut will not be easily fixed; without a group arbiter, all producers will want to protect their market share and maximize their profits at a low price, rather than curb production in an attempt to increase prices and run the risk of being overtaken by other producers (World Bank Group, 2016).

On the demand side, there is also little indication of the fact that a quick fix is possible. The drop in demand (growth) is mostly coming from China, Japan and Europe. In the Chinese case, the slowdown of economic growth led to a decrease in oil demand growth, which was further exacerbated by the fact that its oil storage facilities reached near capacity in mid-2016, further decreasing its demand (World Economic Forum, 2016; Bloomberg, 2016). In Japan, the energy consumption has been decreasing for four years in a row, whilst the initial upswing in oil consumption after the 2011 nuclear stop has evaporated with the return to nuclear power (Rogers, 2016). Lastly, in Europe demand hit an all time low in 2015 amidst slow economic growth, an upswing in biofuel usage and increasingly successful energy efficiency policies (Eurostat, 2016c; World Economic Forum, 2016; World Bank Group, 2016). All in all, these are not issues that will quickly be dissolved. The economic outlook for all three powers is relatively bleak: Chinese economic growth is projected to decrease progressively hereafter whilst Japan and Europe will continue to feel the pressure of its aging populations and slow growth rate (OECD, 2014). Moreover, Japan is set to reintroduce most of its nuclear capacity over the next few years, whilst also implementing stringent energy efficiency measures (Rogers, 2016). Similarly, the previously discussed energy efficiency measures in the EU will also certainly have an effect on oil demand (European Commission, 2017a).

Now that we have assessed the extent of the current oil price glut, we arrive at the question of what effect it has on the Russian gas export market and strategy. In short, we can divide this into two major effects: a decrease of the gas export price and a lack of revenue to invest in upstream development. Although the subsequent consequences of these effects might seem inherently negative, we will show that the reality is actually quite complex. Firstly, lower gas export prices actually lean towards a positive effect for both the market and strategy. The lack of revenue, in turn, will present Russia with great difficulties as it prohibits domestic financing of investment, but its effects are trumped by the effect of the sanctions regime, which actually enhances the Russian mercantilist strategy, even though the market will inherently suffer.

As we discussed in the previous chapter, the majority of Russian gas exports are still based on long-term contracts with oil-indexed prices which means that the recent downturn in oil prices has also caused a significant decrease in Russian gas export prices. To illustrate, the average German import price came down to around $5 per million British thermal units (mmBtu[15]) in 2016 from almost $10/mmBtu in 2014 (BP, 2017). This has had two discernible results for the Russian gas market and strategy, both of which are relatively positive. Firstly, there is a correlation between the drop in prices and increased exports. In the aforementioned German case this resulted in a +7.5 bcm change between 2014 and 2016 (Idem; BP, 2015). This correlation is confirmed when we look at Russia's total exports to Europe, which are up by 18.3 bcm since the oil price crash (Idem). Clearly, there are many factors at play here, and assuming that it is anything more than a correlation would be to forgo on the political and strategic elements of the gas market. Indeed, in chapter IV.i we assessed that price-levels are not the EU's first concern when it comes to its imports from Russia. In the long term, it will be more than low prices that decide Russia's fate in the EU gas market. Nevertheless, it does seem that as long as it is able to maintain these highly competitive prices – which, considering the intensity of the current oil glut, might be for quite some time – it will be somewhat easier for Russia to maintain its market share *vis a vis* still relatively expensive LNG supplies (especially when one considers the relatively higher added cost of LNG infrastructure construction per purchased mmBtu now) (Rogers, 2015). Thus, and although only a strategy change could truly solidify its position, lower prices might actually prove to be mildly positive for the Russian gas market in the medium term.

Secondly, lower prices due to oil-indexation could enhance Russia's strategy in terms of maintaining its preferred contractual structure. As we assessed in section IV.ii, there was a lot of protest against these expensive and inflexible long-term gas contracts when the oil price was high. Although lower prices do not compensate for all the disadvantages of these contracts (mostly in regards to their inflexibility), it is considered by some that lower prices will curb the enthusiasm of importers to further decouple gas prices from oil (Marten & Jimenez, 2015). Indeed, as long as oil prices remain low, consumers are guaranteed lower gas prices if they remain working on the

[15] A British thermal unit are a traditional measure of heat intensity that is defined by the amount of energy needed to heat one pound of water by one degree Fahrenheit and which is commonly used in gas pricing.

base of oil-indexation. Again, this effect can only be deemed mildly positive as the Russian contractual strategy knows more pressure points and there is no indication that gas-to-gas hub pricing – although more expensive currently – is inherently more expensive than oil-indexed pricing.

Despite the relatively positive consequences for the Russian gas market and strategy described above, there is another important effect to be taken into account: a lower oil price – and subsequently lower gas prices – result in less income for the Russian state. As already assessed, the Russian state relies heavily on the income of fossil fuel exports. However, natural gas revenues have been decreasing steadily since the crash of the oil price: from $59.9 billion (or 22.3% of the budget) in 2014 to $30.6 billion (or 6.7% of the budget) in 2016 (Simola & Solanko, 2017). Although Russia might be able to withstand a $29.3 billion drop in revenue, when we consider the corresponding losses in revenue from oil exports (from $131.7 billion in 2014 to $52.1 billion in 2016) it should become clear that the effect of lower fossil fuel prices is a major concern to Russia.

When we look at the drop in revenue in relation to the gas market and strategy, there is one thing that stands out: it has decreased the capacity to make upstream investments. Although this applies to all producers of course, it is especially challenging to Russia due to three reasons. Firstly, and as we assessed before, the fields Russia is currently producing from are depleting. Secondly, the majority of its fresh reserves are either still complete virgin fields or located in the Arctic Circle, which are both very costly to develop. Lastly, Russia is currently under sanctions, strongly limiting their ability to attract foreign funds.

Although neither the exact depletion rate of the currently active fields nor the total amount of investment needed to develop its new reserves are public knowledge, it is generally assumed that Russia will need serious upstream investment soon in order to ensure sufficient exporting supplies (Boon von Ochsée, 2010; Konoplyanik, 2012; Stern, 2005). Before the decrease in revenue from fossil fuel exports, this would not have been a significant challenge. As it has done historically, investments could have been sourced domestically, whilst any required technology would have been readily available from the West at a certain price (Smeenk, 2010). Furthermore, if Russia had not been under sanctions, even a strong decrease of revenue might have been compensable; it would have just had to attract investment from abroad. In fact, in that case the argument could have been made that a decrease in revenue need not

impact the market per se but might have only had a significant impact on the Russian strategy. Indeed, conform Putin's thesis, the question would then have been whether Russia was too mercantilist and guaranteed too few ownership rights to attract foreign investment (Balzer, 2005; Olcott, 2004). Our conclusion in that case might have been similar to that of the previous two chapters: this change need not necessarily be negative to the Russian market, lest it alter its strategy in order to accommodate for the Western liberal paradigm better. However, the situation under the sanctions regime has altered the above scenario significantly. In fact, the situation has been reversed: instead of negative effects mostly pertaining to its strategy, they now pertain mostly to the market itself, whilst the strategy can remain unaltered.

When we look at the future of the Russian gas market in the light of dropping revenues and Western sanctions, we see quite a bleak picture. Firstly, the current sanction regime states that Western entities can 'no longer buy or sell new bonds, equity or similar financial instruments with a maturity exceeding 30 days', from – amongst other actors – any of the three major energy companies in Russia (Gazprom, Rosneft and Novatek), whilst loans can also not exceed a 30-day duration (European Union Newsroom, 2017). This has greatly exacerbated the negative effects of the current drop in revenues, as Russia can now neither raise such funds domestically *nor* source funds from abroad. This is further aggravated by the fact that between their own sluggish growth and the fact that it mostly concerns the development of fields destined for Western markets, Russia's Asian partners (i.e. China) have not been eager to invest in Russian upstream development either (De Jong, 2016). Moreover, even if Russia was able to gather funds for upstream development, the export of offshore technology or any technology designed for use in the Arctic is also sanctioned by the West, whilst there is no other partner that has access to this type of technology (Kuersten, 2015). When all put together, the subsequent inability to develop new fields as planned could lead to a 'generation of lost exploration', as a lack of development could lead to shortages in supplies in the future (Gurvich, 2015; Henderson & Grushevenko, 2017).

When it comes to Russia's strategy however, the combination of low fossil fuel revenue and sanctions has quite a different effect. As stated, it is a safe assumption that if Russia had not been under sanction, Western involvement in terms of investment would have been strong in the light of diminished fossil fuel revenue. As Western companies are no longer allowed to be involved in upstream development

in any meaningful way however, the associated effect of their involvement – such as demands on the guarantee of ownership and general hostility towards Russia's mercantilist policies – are no longer a concern. In fact, if Russia would be able to develop its new fields without Western involvement, it domestic strategy could remain unaltered indefinitely. In short, if one would only consider the strategic side of the matter, the negative effects of a decrease in revenue have actually been mitigated by the sanctions. Namely, as the increased dependency on Western partners that would otherwise have been expected could never materialize, Russia is still free to manage the development of its domestic market at will. The fact that the state is now supporting state-owned companies more openly than ever in terms of incentivizing the development of previously inaccessible reserves – such as Russian shale gas and oil wells in the Far North – underlines that the leadership appreciates the value of this idea (Financial Times, 2017b; Henderson & Grushevenko, 2017). However, one must also consider that despite Russia's best efforts, the market it now freely presides over will continuously be at great risk of stagnation without Western investments and technology, which might be considered less desirable than a strategy change.

The theoretical connotations of this change are more difficult to identify, as there is no directly discernible effect on the Russian strategy. On a more abstract and negative note however, one might argue that Russia is only in the current situation because it maintains a neorealist perspective of the world. After all, the sanctions are a result of Russia's actions against Ukraine, which were most certainly motivated by a desire to gain relative power against the West. In that case, the bleak outlook for its market could have been avoided if Russia had switched to a more liberal (and, in relation to the gas market, less mercantilist) strategy earlier, which would underline our previous assessments: in order for Russia to have a prosperous gas market, it must move towards liberalism.

In conclusion of this section, we can state that the effect of 'lower for longer' is especially confounding in the Russian case. Especially in combination with the sanctions, it enhances the Russian strategy whilst the effect on its market is less negative than might have been assumed. However, in both cases the positive effects are to be taken with a grain of salt. Whilst the drop in prices has made both Russian gas and its contractual structure more attractive – surely a positive effect on both the market and strategy – we must not overlook the fact that there are many other

considerations to the European gas import model than pricing. These, in turn, are sure to outweigh this initial advantage in time if Russia would not change its strategy. Moreover, whilst the fact that the West could not step in in order to support Russian energy development in the light of lower prices might be a positive in terms of not affecting the Russian strategy in any way (no Western involvement means a free reign), the dangers of decreased funds and potential future shortages outweigh this whilst also indicating that neorealism is not beneficial to the Russian gas market.

V. Conclusion

In conclusion of this thesis, we must assess that the effects of the current changes in the global energy system on the Russian gas export strategy and market are remarkably uniform. To sum it up in one sentence, one can say that the way the current changes in the global energy system affect the Russian gas export market and strategy mostly pertain to the fact that with these changes, the mercantilist model of exports that they derive from their neorealist foreign policy paradigm is no longer sustainable.

In light of the current global changes, both the Russian gas market as well as the strategy behind it seem out-dated. The fact that the market structure has not significantly changed since Soviet times underlines this. Moreover, although an attempt was made to apply a more liberal strategy to it in the 1990s, Putin's mercantilist restructuring of the market in the 00's have created an unprecedented divergence between the Russian vision of the international gas market and that of its main exports market(s). Where its direct counterparts have been developing towards a more liberal, globalized and flexible gas market, Russia seems to have ignored the signs of the times, and continued to rely on for instance the need of high base load capacity, on the viability of long-term gas contracts with take or pay clauses and on the idea that Europe could never diversify away.

The current changes most certainly present a turning point in the Russian gas market and strategy though. The fact that the Russian leadership has also realized this is evident from the fact that it is trying to diversify its market through LNG and a focus on Asian infrastructure, and has even made a minor move towards liberalizing exports. However, at this point the question is not so much what Russia can actively do, but what Russia will be forced to do in order to be able to maintain its dominant position. In essence, it lost its position as a 'market maker' and became a 'taker' once the global energy market became more diverse and globalized. This need not mean Russia's position is the global gas market is inherently diminished however: with every global change that we analysed – bar the lower oil price, which has some specific connotations – we have seen that the Russian market need not be negatively affected *per se*, lest Russia is willing to revise its strategy.

When we look at the globalization of the gas market and the opportunity that this offers to the EU in terms of diversifying away from Russia, the need to adapt could not be clearer. As it are strategic considerations rather than price levels or

physical accessibility that take precedence in the EU's diversification strategy, Russia is effectively only left one choice: liberalize or lose market share. The fact that in order to shore up LNG production for the Asian market, Russia has already somewhat liberalized LNG exports, does not only underline the importance of further liberalization, but also shows that the Russian leadership is quite aware of the need to modernize, i.e. become more flexible and adapt to current (liberal) standards. If it would manage to do so, there is little indication of the fact that Russia would then not be able to maintain and gain a dominant role in both markets, albeit with less direct control.

In the case of RES, there is a even a stronger case to be made that any negative effects could not only be mitigated by adapting to a more flexible and liberal system, but could even be turned into a direct positive in all export markets that are RES heavy. If Russia could guarantee the competitiveness of its gas exports *vis a vis* other back-up fuels, whilst letting go of the idea that take or pay clauses are still realistic in a system without a consistent base load demand, there is ample opportunity for Russian gas to still take its place of honour next to RES as its most fitting complementary fuel. However, the need to alter its strategy is again strong in this case, since long-term gas contract *a la Russe* do not agree with systems heavy on RES.

More complex is the effect of the lower oil price. Essentially, this has proven to be a relatively positive development for Russia: exports went up and protests against its preferred contractual structure went down. When we look at the consequences of the decreased revenues from fossil fuels however, the story become more opaque. Firstly, it will have a guaranteed negative impact on its future market, as the combination of a lack of funds and the sanctions make development of new fields very difficult. Secondly however, due to an inherent lack of Western involvement as a result of the sanctions, Russia's strategy will not be affected at all. However, this 'benefit' is easily outweighed by the risk of potential future shortages, and essentially indicate that Russia should have moved towards a more liberal model a long time ago, as it were neorealist foreign policy measures that exposed its gas market to this much risk.

The compounded effects of the current changes in the global energy system have thus created a brave new world for one of its main actors. In its current shape and form, based on a neorealist perception of the world and subsequent mercantilist

economic vision, Russia will most certainly not be able to maintain its position as the world's most prominent gas exporter. If it would prove willing to reassess its strategy however, and adapt to the liberal and dynamic atmosphere of the new global energy system, the future of the Russian gas market might yet very bright.

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