

University of Economics, Prague

International Business



“Oil and Gas Industry in Russia”

Bachelor Thesis

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Declaration:

I hereby declare that I am the sole author of the thesis entitled “Oil and Gas Industry in Russia“.
I duly marked out all quotations. The used literature and sources are stated in the attached list of references.

In Prague on

Signature

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Introduction

Russia is one of the main energy suppliers in the world. For recent years, in the rankings carried out by Energy Information Administration (Official Energy Statistics from the U.S.

Government), it has been among three largest producers of oil and gas separately. Therefore, Russia is making a valuable contribution to the global energy sector. The aim of this paper is to examine the role of oil and gas industries in the economy of the Russian Federation.

Nowadays Russia is facing an economic crisis and, at the same time, the oil and gas prices are very low after the drop in 2014, which makes it the most relevant time to identify the significance of the energy sector for Russian economy. It is much easier to recognize the problems of the economy and its causes when it is in a recession rather when it is growing. That is why I have chosen this topic. I want to describe problems and benefits that energy sector brings to the economy and determine main threats and opportunities for oil and gas industries.

The paper is organized as follows. In chapter 1, I will start with the basic overview of the economic situation in Russia with the emphasis on oil and gas industries, to give a reader a clear picture of what position it holds in the World economy. The macroeconomic indicators and the current account will be analysed. In this chapter, I want to outline Russian revenues from exporting gas and oil. At the same time, I will consider such questions as the dependence of Russian rouble on oil prices; Dutch disease and its relevance to Russian economy. Further, in Chapter 2, I will focus precisely on the energy resources of Russia, the list of companies operating in the energy sector; and the comparison of Russian mineral reserves with other world fuel and energy producers such as US, Saudi Arabia, Canada, Iran and other. The perspectives of the development of Oil and Gas industries also will be mentioned.

In chapter 3 two Global markets will be overviewed– Oil market and Gas market, with its basic figures such as aggregate demand and supply, prices, biggest consumers and suppliers. I will examine the reasons of fall of prices for crude oil in 2014 and its influence on World economies (in particular on Russian economy). Furthermore, I will outline current trade partners of Russia in both markets: gas and oil. The last paragraph of this chapter will be dedicated to recent trends in the energy sector.

I will sum everything up in the conclusion and give clear comments on the material presented in this paper. The estimation of the role of Oil and Gas industry in Russian economy will be presented.

1. General economic overview of Russia

The Russian Federation, once an efficiency driven economy, started to recover from the World Economic Crisis of 2008 and develop into the direction of innovation driven economy, however, it faced a new crisis that threw it back and revealed the weak spots of the economy. It has a big potential and opportunities to grow because the country is the biggest in the world in population with population of 143.8 million people¹, full of natural resources (which will be considered in further chapters) and its location is perfect to do business with most of the countries all over the world. The government of the country has to focus on the problems that the Russian Federation is experiencing, solve them and make sure that it will never occur again. One of those problems is clearly the strong confidence in natural resources production and neglecting of the other industries of economy.

1.1. Macroeconomic analysis with emphasis on oil and gas industries

The Russian federation is ranked as 10th biggest economy in the world by GDP, with 1,860,598,000,000 of US dollars, which is almost ten times smaller than USA economy, biggest in the world, with 17,419,000,000,000 US dollars GDP.² Nowadays Russia is suffering from an economic crisis and its GDP annual growth rate in third quarter of 2015 was -4.1 percent.³ In the Graph 1, representing annual GDP growth rate, it is visible that after July 2014 the GDP growth rate started to fall. The current crisis brings many negative impacts on Russian economy; it can easily be put into the same row with the crises of 1998 and 2008. Talking about currency, rouble devaluated by nearly 100% in the end of 2014.⁴ Currency depreciation of this size is never beneficial for the country, even though the exports of Russia theoretically should become more attractive to the foreign countries, if adding the high inflation that Russia is experiencing now, the consequences are quite pessimistic. First of all Russian population cannot afford the same amounts of imports anymore, and at the same time there is no substitutes produced in Russia, because many spheres of economy are not highly developed. By the same reason Russian producers cannot offer anything special to the world market. Altogether, these problems lead to rising prices and inflation in the country. The development of inflation can be seen in Graph 2. According to the World Bank Economic Indicators, the CPI increased from 7.8% in 2014 to

¹ Russian Federation. *World Bank* [online]. [cit. 2015-09-14]. Available at: <http://data.worldbank.org/country/russian-federation>

² Gross domestic product 2014. *World Development Indicators database* [online]. Washington, D.C.: World Bank, 2015 [cit. 2015-09-14]. Available at: <http://databank.worldbank.org/data/download/GDP.pdf>

³ *Russia - GDP Growth Rate* [online]. [cit. 2015-09-14]. Available at: <http://ieconomics.com/russia-gdp-growth-rate>

⁴ *USDRUB* [online]. IECONOMICS [cit. 2015-09-14]. Available at: <http://ieconomics.com/usdrub>

15.5% average annual inflation in 2015.⁵ Besides high inflation, real wages started to decrease. It can be seen in Graph 3. In 2014 real wage annual growth rate started to be negative. Preliminary data for 2015 is even worse.⁶ Thus, what we are having, is that prices in the country are constantly going up, but at the same time people are earning less. This mixture is the worst for the GDP growth, which slows it down even more, since it influences the main component of the real output of the country – Consumption. Population of the Russian Federation does not spend as much as before and moreover tends to save. IMF projects negative GDP growth in 2016 of -1.8% and small recovery in 2017 is estimated at 0.8%.⁷

It is worth to mention that the Russian Federation has relatively low external debt; according to Central bank of Russia in July 2015 it was nearly 521.6 billion USD, which represents approximately 28 percent of country's GDP.⁸ This information enables investors to predict if the country has an ability to pay back its debts in future, so it plays an important role in taking decisions and measuring risks. Nevertheless low External Debt of the Russian Federation did not prevent Foreign Direct Investments to drop rapidly in the third quarter of 2014 to negative numbers. FDI continued being negative until the end of 2014. It is not surprising, because most of the investors do not find it beneficial to invest into the country that is in recession, in addition it is very risky. In 2015 FDI returned to positive figures and showing a positive trend, however, comparing to the same period of 2014, before the crisis, investments are considerably smaller. On the Graph 4 we can see that the difference between FDI to Russia in second quarter of 2014 and in 2015 is more than fourfold. It is important to mention that FDI started to decrease slightly before the economic crisis; it could be due to the position of Russia concerning Ukrainian Crisis and sanctions implemented against Russia by EU and USA.

After the overview of all these Macroeconomic indicators separately, I would like to put them all together now, to sum up this part of my paper. The Russian Federation is facing economic crisis from the middle of 2014. Today it has negative GDP growth, with a little tendency to recover; the unemployment and inflation are high comparing to the before-crisis rates; the real wages are decreasing; the Foreign Direct Investments are low. The only positive aspect is that the external debt of Russia during these hard times for the country's economy remains relatively small.

⁵ Inflation, consumer prices (annual %). *World Bank Economic Indicators* [online]. Washington, D.C.: World Bank [cit. 2016-04-14]. Available at: <http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG/countries/RU?display=graph>

⁶ Living standards of people: Real wage growth. *Federal Statistical Service of Russia* [online]. Moscow, 2015 [cit. 2015-09-14]. Available at: http://www.gks.ru/free_doc/new_site/population/uov/uov_12kv.htm

⁷ *World Economic Outlook: April 2016* [online]. International Monetary Fund. Washington, D.C.: International Monetary Fund, Publication Services, 2016 [cit. 2016-04-14]. ISBN 978-1-47554-372-8. Available at: <http://www.imf.org/external/pubs/ft/weo/2016/01/pdf/text.pdf>

⁸ Russia - Government Debt. *IECONOMICS* [online]. [cit. 2015-09-18]. Available at: <http://ieconomics.com/russia-debt>

The year 2014 started very promising for Russia – in February the Winter Olympic Games took place in Sochi. This event drew a lot of positive attention to the country. However, later on Ukrainian crisis, involving more and more parties into the problem, was first in the chain of misfortunes for the Russian Federation that followed further. Of course it was a position of Russian government and certain actions regarding Ukraine that led to the implementation of sanction against Russia from European countries, USA and others. I am mentioning sanction, because there exists an opinion of the minister of economic development of the Russian Federation, Alexey Ulyukayev, that economic crisis in Russia of 2014 consists of three main components, which are: the structural crisis of the economy, the rapid decline in oil prices and finally the impact of Western economic sanctions.⁹

It is interesting that in the Russian media the biggest attention is given to the Western sanctions. This is not surprising since it is the outside impact, the suitable argument for government to excuse its own errors and mistakes in managing the country. Western sanctions are presented by mass media in Russia as a huge impact on the economy, on which government cannot influence strongly. There are no doubts that sanctions play some role in the overall picture of crisis in Russia, but I would like to focus on two other components of crisis in Russia, which are more connected with the energy sector: structural crisis and the drop of the oil prices. Structural crisis is the less lighted part of the economic crisis by mass media in Russia, since it reflects the poor management of the government. However it is the biggest and most important component of all three, the core of the economic crisis of 2014. The structural crisis of the Russian economy is basically the result of the surviving after the financial crisis of 2008-2009. Many issues were not solved entirely and some were just neglected and did not get enough attention. The essence of the problem is the following: when the world oil prices increased, the economy of Russia experienced changes in its structure in the direction of energy resources extraction and the decline in other industries. The innovations and new technologies were presented only in the energy sector and no development occurred in agriculture, services, machinery, chemicals and etc. However it was crucial at least to keep them up and not let their prosperity to decline. When oil prices stopped increasing and even fell slightly in 2012 all the neglected industries mentioned before, especially agriculture revealed its weaknesses. The situation is similar to Dutch disease, but the theory on Dutch disease is presented later in the thesis. Unfortunately there is no quick recovery of degraded industries. To overcome this "vicious circle" serious efforts are required,

⁹ Interview - Alexey Ulyukayev, minister of economic development of Russia. *Vedomosti Newspaper* [online]. Moscow, 2014 [cit. 2015-10-03]. Available at: <http://www.vedomosti.ru/newspaper/articles/2014/12/18/etot-shtorm-mysami-i-gotovili-aleksej-ulyukayev-ministr>

especially in the field of technology development and innovation.¹⁰ If we look at the Graphs 5 we will see that Russian economy mainly recovered from the crisis of 2008 by virtue of the growth in prices for oil in 2009. It was an outer influence that helped to get out of the recession, so government allowed itself not to focus on solving the problems entirely, but just relied on one sector of the economy - energy. In a sense Russian economy “got lucky” to get such a huge help from the outside, setting Russian government free from finding the way for the country out of the crisis, and the biggest misfortune is that government took it for granted. I will talk about this attitude further in this paper, so we will consider it more in detail. The structural crisis started to show its rudiments already in 2012, and it is visible on the Graph 5, the GDP growth rate started to decrease, so did the oil prices. The warnings were disrespected and as a result the structural crisis reached its apotheosis in 2014, when combined first with Western sanctions and finally with the sudden drop of the oil prices.

As we can see, structural crisis is an internal problem and it must to be solved by the government of Russia. It is in the power of Kremlin to put an end on the issue, take responsibilities and carry out a series of actions, instead of trying to blame all the external influences. First of all there is the problem inside the country that must to be solved and there has to be drawn a proper attention to it.

The third component of the economic crisis in Russia (drop of oil prices) is presented by mass media the same as the sanctions – as something external on which Russian government cannot influence either. It is correct that Russian Federation cannot influence the world oil prices and the position of Russia on the international oil market will be presented in the third chapter of this paper. Thus on the first glance it is an external influence, but if we think more precisely, we will understand that adaptation and formulation of the prices, perception and further actions according to them are in the responsibilities of the Russian government. I will explain why the proper attitude to the world oil prices is so important for Russian economy later in this chapter, but now I will focus on Current account of the Russian Federation.

1.2. Current Account

The Russian Federation is running a current account surplus. In 2014 Russia exported goods for 497,763,000,000 USD and imported for 308,026,000,000 USD, as a result having

¹⁰ *Half a year of decline and a month of timeout* [online]. National Research University High School of Economics, 2015 [cit. 2015-10-02]. Available at: https://www.hse.ru/data/2015/07/23/1086000098/KGB_97.pdf

189,737,000,000 USD positive Trade Balance.¹¹ It is visible from the Graph 6 and Graph 7, that from 1994 until nowadays Russia has been exporting more than importing. But more important is to know what goods exactly Russia exports and what it imports; and what are the main trade partners of Russia. The graphical overview of export and import structure is presented in Graph 8 and Graph 9.

In 2013 The Oil and Gas together represented nearly 66 percent of all exports with 179,000,000,000 USD for Crude petroleum, 87,000,000,000 USD for Refined petroleum and 70,700,000,000 USD for Gas¹². As other goods Russia exported: metals (8.6%), chemical products (5.1%), coal (4%), precious metals (3.2%), machines (2.7%) and so on, straying, noteworthy that weapons represent only 0.085% of whole exports from Russia. On the other hand, there is much more variety in goods imported to Russia. More than the fourth of all Imports are machines (computers, broadcasting equipment, engines, telephones, etc.), 16% is transportation (cars, planes, trains, boats, parts, etc.). Additionally, almost 15% of imports are foods (animal products, vegetables and foodstuff). From analysing exports and imports it is worth to presume that Russia does not dispose many industries, or if it does, they are developed poorly (which brings us back to the structural crisis), thus, it is necessary to purchase many goods from foreign markets. In my opinion there is nothing bad about specializing on some industry and import something on which the trade-partner country is specializing. Nevertheless, Russia imports foods for the value of 42,400,000,000 USD, having in dispose the large territories to grow vegetables, raise cattle and produce its own food products. Not using all the advantages of Russian territories, sounds like a problem to me. Besides most of the natural resources Russia is exporting are crude, it means that Russia does not have the industry to refine all of it, and sell more expensively. Even in the sector on which Russia specialize the most and tries to develop largely, there is still a lack of technologies and innovation; we will come back to this issue in the chapter “Energy sector” and take a precise look at it later in the paper.

The graphical presentation of Russian export destinations are presented in Graph 10. In general EU is the main destination of Russian exports. In 2013 around 57% of total exports were imported from Russia to EU countries, 21% went to Asia, 15% to CIS countries, 6% to North and South Americas and 1% to other countries – the data is presented in Graph 10. If talking more precisely, the main importers of Russian goods are Netherlands and China with more than 8% and 7% share of total Russian exports correspondingly, Germany and Italy stand next (each

¹¹ External trade of Russia in goods. *Central Bank of Russia* [online]. Moscow, 2015 [cit. 2016-04-15]. Available at: http://cbr.ru/statistics/credit_statistics/print.aspx?file=trade.htm

¹² Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2015-10-02]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

representing more than 5% of total exports), than Ukraine, Belarus, Poland, Japan (each representing around 4% of total exports) and other countries such as Kazakhstan, Turkey, South Korea, Great Britain, France and so on (less than 3.5% of total export each). In terms of import, Germany holds 14 % of goods imported to Russia and China has 15 % - these are the largest trade partners with total export and import turnover 75,000,000,000 USD for Germany-Russia and 86,000,000,000 USD for China- Russia.¹³ We considered the current account of Russia before the crisis of 2014.

The current account surplus for the whole 2015 amounted to 69.6 billion dollars - an increase in annual terms by 19%. Imports tend to decline faster than exports and this can contribute to current account growth even more by the end of 2015 and be higher than in 2014. The other factor of the growth of current account is the deficit reduction on the balance sheets of wages and investment incomes. The trade surplus for the whole 2015 is 111.9 billion USD decreasing by 41% comparatively to the same period in 2014. Goods exports amounted to 341.5 billion dollars, while imports – 193 billion dollars. Exports of crude oil dropped by 42.7 % to 69.6 billion dollars, reflecting exactly the same decline as in oil prices. Exports of petroleum products decreased by similar percentage (42%), while natural gas decreased to a lesser extent (24%). Hence, the trade balance decreased mainly under the impact of falling of oil prices, and it was partly compensated by the fall of import of goods. Dynamics of the Trade balance structure of Russia are represented in the Table 1.

Table 1: Current account statistics for 2014 and 2015 (million USD)

Indicator/period of time	Jan.- Dec. of 2015	Jan.- Dec. of 2014	Change in % for the period
Current account balance	69 564	58 319	+19 %
Trade in goods and services balance	111 902	189 737	-41%
Export of goods	341 467	497 763	-31%
Crude oil	89 588	153 888	-42%
Petroleum products	67 453	115 875	-42 %
Natural Gas	41 844	55 240	-24%
Import of goods	192 954	308 026	-37%

¹³ Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2015-10-02]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

Source: Balance of Payments of the Russian Federation (Analytical Presentation). *Central Bank of Russia* [online]. Moscow, 2016 [cit. 2016-04-15]. Available at: http://cbr.ru/statistics/credit_statistics/print.aspx?file=trade.htm

1.3 Revenues from exportation of gas and oil

Revenues from exportation of gas and oil represent 17.7% of the total GDP of Russian Federation – 330,246,400,000 US Dollars. This is a significant part of the whole revenues of Russian Federation. The GDP growth rate, which I mentioned in the first chapter, started to fall few months after the Oil prices dropped in September 2014. The national currency also started to depreciate during the same period. Taking into account information, that oil and gas exports represent 66 % of Russian total exports, it is obvious that Russia relies on production of natural resources largely. At the same time, Russia does not produce enough of oil and gas to be able to influence market prices by increasing or decreasing supply how it does OPEC. It leads to high risks, because fluctuations on the oil market, for instance, impact Russian economy.

Revenues from the export of gas from Russia in January-September 2015 amounted to 31,314,600,000 USD, which is 29.7% less than the same period of 2014, according to data of the Federal Customs Service. Russia for the first nine months of 2015 exported 131.5 billion cubic metres of gas (down 2.8% compared with January-September 2014). Graph 11 represents total revenues from exporting gas from year 2000.

Revenues from exports of crude Oil for the same period decreased by 42.7 % compared to the same period last year, to \$ 69,576,700,000 USD. In January-September this year, Russia exported 179.929 million tons (8.13% more compared to the same period of 2014). The increase in volume is necessary to compensate the drop in prices for oil.

Concerning Oil products, the revenues from its export decreased by 40 % in first three quarters of 2015 comparing to the same period in 2014, to 54,026,700,000 USD. The volume meanwhile increased by 6 % from 123.4 million tons to 131 million. From 2009 there was a rising trend in both: revenues and volume. But by the end of 2015 revenues will stop to grow, even though the volume will increase even more.

As I mentioned before it is impossible for Russian government to influence market prices of oil, but it is possible to adapt to these prices. And the greatest mistake of Russian economy is the planning of the State Budget. The problem is that the Budget was formed and planned according to the prices of oil around 100 \$ per barrel. Around 50 % of the entire Budget is reflected by revenues from natural recourses. Thus when the price of oil falls – the budget of the country decreases. To compensate government of Russia simply uses the depreciation of the rouble.

Until the fall of the rouble from 36 RUB per 1 USD to 40 - 45 and the collapse in December to 50 – 52 RUB per USD, followed by a blockage to the current values of all the revenue of the federal budget was about - 375 billion USD; or 2568 dollars per year per each of the 143.5 million Russians. It is if we divide 13.5 trillion roubles to the average USD/RUB rate of recent years (36 RUB per 1 USD). Each citizen can claim to 2054 USD with the exchange rate of 45 RUB/USD, to 1849 USD with the exchange rate of 50 USD/RUB, eventually even much less with nowadays rates.

1.1 Rouble dependence on oil prices

The dependence of Russian currency on the oil prices is well illustrated by the Graph 13. From 2014 when Oil prices started to decrease – rouble depreciated too, showing almost 100 % correlation. When 1 USD cost 30 - 35 roubles, the price of oil was around 100 – 140 USD per barrel. When 1 USD cost 60 – 70 roubles, the price of oil was around 50 – 70 USD per barrel. Thus, there is a dependency between oil price fluctuation and exchange rate of rouble.

Academic paper on dependence of Russian rouble on oil price by Gedek (2013) examined the relationship between change in oil prices and exchange of rouble to USD. The results for period 2004-2013 show strong relation. Rising oil prices during the years lead to Russian currency appreciation, which even became stronger after 2008 crisis. The paper said that Russia has symptoms of Dutch disease which I will describe in the next part of this Thesis.

1.2 Symptoms of Dutch Disease in Russia

First it is important to say what Dutch disease means. The name was created by Corden and Neary in 1982 and 1984. It means that when a country discovers natural resources, exports them in large quantity and prices for them are high, its currency appreciates and other industries start to produce less. There are several ways how it happens. When oil price grows, more workers and capital are needed in oil sector. Workers will move from other industries to oil. Workers in service industry also move and it leads to increasing prices for non-tradable goods and services. Overall it results in country's currency appreciation. Another way is when high oil prices lead to high profits in oil industry. Later on more domestic services and goods are demanded. People demand more domestic services and it means higher wages in service industry. It also leads to currency appreciation and drop in manufacturing output because workers go to the industry with higher wages – services.

Symptoms of Dutch disease are real appreciation of domestic currency, slow growth of manufacturing, fast growth of service sector and raising overall wages in the country. There are many papers that analyse if Russia has Dutch disease symptoms. For example, Oomes and

Kalcheva (2007) say that Russia has Dutch disease, even though it does not have all symptoms. They say that real appreciation of currency, slowing down manufacturing, growing services and wages are presented, but they can also be results of other factors like transition effect of the economy or improvement of political sphere. As I mentioned before, Gedek (2013) also confirms that Russia has symptoms of Dutch disease, because its currency moves with oil prices. It is not surprising, because Russia exports mostly natural resources. It is also a problem for the government and economy. Countries that have Dutch disease usually have low economic growth if compared to other developing countries like India or China. Dutch disease leads to slow economic growth, because manufacturing sector is not competitive and innovative. When oil prices are high, more resources are concentrated in the oil sector. Such resources are capital and workers. And manufacturing sector lacks these resources. Another reason is that there is fight for natural resources and it leads to poor political environment. It also can result in corruption and rent-seeking. We can clearly see it in Russia. Manufacturing is underdeveloped, but production of oil and gas is the main export good for Russia.

2. Energy Sector

According to BP Statistical Review of World Energy, Russian Federation possesses 17.4% share of the world's proved Gas reserves, 17.6% share of the world's proved Coal reserves and 6.1% of the world's proved Oil reserves. It is clear that Russian Federation holds the position of one of the biggest supplier of fuels in the world. Government significantly relies on energy sector because it is the largest element of the Russian economy and as was said before around 50% of the entire budget is based on extraction and export of natural resources. In this chapter we will acquaint with different aspects of one of the most profitable and important sector of Russian economy.

2.1 The Gas industry

The main objectives of the gas industry are exploration, extraction and processing of natural gas; supply through pipelines; production of synthetic gas from coal and shale. Gas is used in a variety of industries and public utilities. The origins of the gas industry can be attributed to the 18 century, times when people began to extract gas from coal to illuminate cities in France and the UK. In pre-revolutionary Russia (19th century) gas was produced in small volumes, and lean gas (natural gas that contains a few or no liquefiable liquid hydrocarbons i.e. provides less energy) was produced at small factories from coal. The extraction from the earth's interior started only in the forties of the 20th century in Saratov¹⁴, the town at the south-east of the European part of Russia.

Since 1970s the extraction of gas takes place in Siberia – territory that holds largest quantities of natural gas in its interiors. Today more than 90% of natural gas is produced in Western Siberia, including 87% - in the Yamalo-Nenets and 4% - in the Khanty-Mansi Autonomous Okrugs. The largest gas fields are located there: Urengoy, Yamburg, Zapolyarnoe, Medvezhye, etc. estimated reserves of natural gas in the region account for over 60% of all the country's resources. The map of all the main gas basins in Russia is represented on the Picture 1 in Appendix.

Other gas-producing areas are allocated in Ural mountains (Orenburg field possesses more than 3% of total gas produced in Russia per year), Northern region with Vuktylskoe gas field. There are resources of natural gas in the Lower Volga (Astrakhan gas condensate field), in the North Caucasus (North of the Stavropol Krai, Kuban-Azov deposits), the Far East (Ust-Vilyui, Tungor, Sakhalin Island). Offshore waters of the Arctic Sea and the Sea of Okhotsk are considered as

¹⁴ Historical chronology of gas industry in Russia. *Mosgas* [online]. Moscow [cit. 2015-10-15]. Available at: <http://www.mos-gaz.ru/history/industry-russia/>

potential areas of gas production in future. Meanwhile the offshore extraction already runs in Barents sea on the North of the country and in Kara Sea that washes the Yamal Peninsula (Leningradskoye, Rusanovskoye and Shtokmanovskoye gas deposits). These relatively small gas extraction points that are allocated all around the country, can seem to be not very important, but all together they unite into sizeable 10% of total production of gas in Russia. Mostly they operate to provide with gas local regions where they are situated in, which is crucial in terms of inner economy of Russia, because it has the widest territories in the world. Therefore the question of the gas supply and security inside the country is solved well. This approach also implements significant savings from the logistic aspect, since there is no need to lay extra pipes all around the country, which would be obviously costly in the country of such size. To imagine the volume of gas produced in one of these relatively small gas fields, let's consider Orenburg field, which was mentioned above. 3% share of total production of gas equals to 17.361 billion cubic metres. This amount of gas would be enough to supply twice Czech Republic, which consumes 7.5 billion cubic metres of natural gas per year.¹⁵

2.1.1 Gazprom

In Russian gas industry reigns supreme, Gazprom, the world's largest gas producing company, one of the most important natural monopolies of the country. It provides 69% of Russian gas production, rest of the gas is produced by much smaller companies such as OAO Novatek, Northgas, SIBUR and their subsidiary companies. Nevertheless Gazprom possesses some shares in all of them or outbids the gas that they produce. Hence the trend goes so that sooner or later there will remain only one gas producing company in Russia – Gazprom. It has the world's richest natural gas deposits; share of Gazprom in the world gas reserves is 17%, in Russian reserves - 72%. Gazprom provides nearly 12% of global gas production. Worth to mention that controlling interest of Gazprom shares holds Russian government. Basically when we talk about gas industry in Russia, we can refer to Gazprom, because it is engaged into all gas production activities in the country on every stage: from exploration of new deposits, extraction, transportation, storing, processing to sale of gas. It is the only company in Russian Federation that produces and exports Liquefied Natural Gas (LNG). Additionally company is operating in other different sectors of the economy: oil industry, production of heat and electric powers, banking and media. Gazprom owns the most extensive gas transmission system in the world (more than 170 000 km). In terms of size of Russia the monopoly in gas industry seems to be the best solution for the transportation of gas – it eliminates most of supply chain problems.

¹⁵ *BP Statistical Review of World Energy June 2015* [online]. 2015 [cit. 2016-01-15]. Available: <https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>

In wider terms Gazprom, by its gas producing operations, supports many enterprises of the domestic industry, and also contributes to their development. Even in times of economic crisis Gazprom ensures orders for contractors on traditional material and technical resources. The company also invests heavily into creation of equipment and machinery of new generation. For example, Gazprom financed restructuration of a series of enterprises developing aircraft engines in Ural region on which basis, they started producing gas pumping units and power plants. As a result, this activity saved jobs and provided workload for large companies in the region, such as NGO Iskra, AO Perm Motors, AO Aviodvigatel.

By investing into development of the metallurgical enterprises Gazprom creates the conditions for the production of high-quality large-diameter pipes, which are mostly imported abroad. This increases the competitiveness of Russian pipes around the world. At the same time it should be noted that the cooperation with specific companies and Gazprom are held in the frameworks of cooperation agreements with the regions of Russian Federation with Gazprom, hence it corresponds with socio-economic interests of the region as a whole. Gazprom signed an agreement on mutual cooperation with 31 regions of Russia. Within the framework of these agreements are: gasification of regions; the introduction of energy saving technologies; loading of companies with orders. Another important fact is that prices on gas that Gazprom provides to households are 35 % lower than the prices for industrial consumers, which depending on the region fluctuate between 0.05 to 0.14 dollars per cm.

In fact we can see the natural monopoly that does not abuse its powers but even vice versa: due to its size and capabilities Gazprom pulls behind itself other industries and supports their development, that reflects on the whole economy of the country. That is to addition that Gazprom itself corresponds 8% of GDP of Russian Federation. The company is remaining its structural unity, is constantly evolving and is operating in the interests of its shareholders, in the interests of the economy and industry of the country.

2.1.2 Gas deposits in Russia and in the World

According to BP Statistical Review of World Energy, by 2014 around 63% of total proved natural gas reserves are owned by five countries. Altogether there is 187.1 trillion cubic metres of proven gas resources in the world.

Fifth place - the United States. About 60% of its gas reserves are concentrated in four states: Texas - 29.5%, Wyoming - 12.9%, Colorado - 8.5%, Oklahoma - 8.4%. The total volume of reserves of the United States is 9.8 trillion cubic metres i.e. 5.2% of world's total. Significant reserves of gas lay in Louisiana (7.6% of total in the United States), New Mexico (5.7%),

Arkansas (4.0%), Alaska (3.3%), Utah (2.7%), Pennsylvania (2.6%) and West Virginia (2.2%). From 2012 to 2014 new basins of gas were discovered and American proved reserves increased by 15 %, even though US companies produce the biggest amount of gas in the world. It seems that North America still has a potential of new deposits, which are essential for American economy. I am going to come back to discussion of the USA later, since its production and consumption of gas play valuable role on the gas market.

Fourth place is held by Turkmenistan. Proven gas reserves in that country equal to 17.5 trillion cubic metres, i.e. 9.3% share of world's total. Natural gas is a mainstay of the economy of Turkmenistan, export of which represents a large part of government's revenues. State pinned high hopes on a project called Nabucco – pipeline meant to connect Azerbaijan and Turkmenistan with EU countries. This project is frozen, because of the Turkmenistan inability to give a guarantee to fill this pipe with gas in future. In total the country is lacking of innovation and technologies to produce sizeable quantities of gas. Its current production is relatively low, and the industry requires investments.

Third place - Qatar. Gas reserves - 24.5 trillion cubic metres, i.e. 13.1% world's share. It has the third largest natural gas reserves in the world after Russia and Iran. Qatar due to its location specializes on liquefied natural gas - 13 technological lines operate for its production in the country. All factories are based in the city of Ras Laffan. The first LNG plant was put into operation in 1996 by Qatargas, and the first exports began in 1997. Qatar has access to all three major regional gas markets: European, North American and Asian. It exports more than 80% of the total gas production. This country is one of the main competitors of Russian Federation on the gas market and I will discuss the specifics of this competition further in this work.

The Russian Federation is ranked second in total proved gas reserves with 32.6 trillion cubic metres, i.e. 17.4 % of total world's reserves. From 2013 to 2014 there was more than 4 % increase, proving Gazprom's success in exploration of earth's interior of Russia. Since one of the major problems of the industry is calculation and evidence of gas deposits, the question of amounts of gas in Russia remains open. For instance, Gazprom only itself claims to possess around 36 trillion cubic metres of gas in its deposits.¹⁶

First place is held by Iran, with proven reserves of 34 trillion cubic metres of gas, i.e. 18.2% of total reserves in the world. Nevertheless production of gas in Iran can barely fulfil the consumption of the country. Iran only exports gas to Turkey in small quantities, other

¹⁶ Oil and gas reserves. *Gazprom* [online]. Moscow [cit. 2016-02-15]. Available at: <http://www.gazprom.ru/about/production/reserves/>

destinations are inconsiderable because the sanctions that the USA and Europe implemented against this country after the Iranian revolution and war with Iraq. Even though an agreement was reached on Iran's nuclear program recently, therefore energy companies are looking forward to lifting of the sanctions, which will allow them to go back to Iran and produce gas there. The development of gas industry in Iran will take time, as well as instability in the region and controversial foreign policy of Iran may complicate or even postpone that process. Graph 15 in Appendix represents shares of proved gas deposits in the world.

2.1.3 Present extraction. Transportation. Pipelines. Future projects.

In terms of production Russia is also ranked second with 578.7 billion cubic metres extracted in 2014. It represents 16.7% of total production around the world. The first place in gas production in the world, as was mentioned earlier, holds the USA with 728.3 billion cubic metres, i.e. 21.4 % of the worlds'. Notable is that from 2013 to 2014 production of Gas in the USA grew by 6.1%, meanwhile in Russia it dropped by 4.3%. Nevertheless the USA hardly represents a significant threat on the market of gas, because around 94% of all produced gas, US uses to fulfil its huge consumption, and it is not enough, that's why it even imports the remaining part from Canada. Generally USA and Canada represent one single supply chain of gas in Northern America with total consumption of 863.6 billion cubic metres with pipelines laying from North-West through the middle of the continent to the North-East. The Picture 2 in Appendix illustrates this. Basically USA could not be able to provide itself with enough of gas without Canada, or even if it could – the resources would be exhausted much quicker. As the gas consumption in the USA grows, the production should follow the trend. However, according to estimations by the BP, the gas reserves in North America will be exhausted in 12-13 years in case no new gas deposits are discovered. US exports to Mexico, relatively small amount of gas – around 20 billion cubic metres. Gas trade in North America is rather focused at retransportation. The gas flow between the USA and Canada equals to 96.4 billion cubic metres. 74.6 billion are transported from Canada to the USA, while 21.8 billion are transported back across the same border as the Canadian pipeline extends through the border with the USA. Such united pipeline system eases the process of gas transportation. Such transportation of gas allows Canada to supply gas to its Eastern parts.

The Russian Federation is the second most important producer of gas in the world, with extraction of 578.7 billion cubic metres in 2014. Such extensive gas production was reached during 1980-1990s, when it increased from 229 billion cubic metres in 1980s to 577 billion in 1990s as can be seen in the Graph 16 in Appendix. The gas production since 1990s has stayed at the level around 600 billion cubic metres. As can be seen in the Graph 16, gas production

volume of Russia has been rather close to the USA. However, since 2010 the gas production in US started to grow significantly. On the other hand, Russia was the largest exporter of natural gas in the world in 2014, according to US Central Intelligence Agency.¹⁷

The Russian Federation is followed by Qatar as the third largest producer of natural gas in the world, with production equaling to 177.2 billion cubic metres or 5.1% of the world gas production. On the other hand, it is more than three times lower than the Russian production. The gas production has also grown by 0.4% between 2013 and 2014. The fourth largest gas producer is Iran. The country produces slightly less of gas than Qatar - 172.6 billion cubic metres or 5% of the world gas production. Though, the growth rates for production are much higher - 5.2% between 2013 and 2014. Potentially, Iran can exceed the gas production by Qatar in the future. The fifth most important producer of natural gas is Canada, with production of 162 billion cubic metres, which comprises 4.7% of the world gas production. As it was noted previously, Canada and Iran are focused at domestic demand satisfaction, not export, while Qatar supplies around 58% of its gas production in the form of liquid gas. Graph 17 in Appendix represents shares of gas production in the world.

The major problems of the gas industry remain transportation and storage of this source of energy. Gazprom has the world's largest gas transmission system. Its main part of the Unified Gas Supply System (UGSS) of Russia. UGSS is a unique technological complex, which includes mining, processing, transportation, storage and distribution of gas in the European part of Russia and Western Siberia. UGSS provides a continuous cycle of gas supply from the wellhead to the final user. The total length of the gas transport system in Russia is 170,000 km as mentioned earlier. UGSS is controlled and monitored from the Central Operations and Dispatch Department of Gazprom. Transport volumes for 2014 amounted 627.5 billion cubic metres of which 33.2 billion cubic metres were shifted from underground gas storage facilities. For exporting of gas Russian federation has accesses to Europe through Ukraine, Belarus and Baltic Sea. Gas pipelines such as North Stream, Yamal – Europe-1, Blue Stream and etc. (the pipelines map is presented in Appendix – Picture 3) in total can supply around 257 billion cubic metres per year to Europe. The problematic part of the whole system is that to reach main export destinations of Europe it is required to transport gas through Ukraine, which pipelines capacity amounts to 147

¹⁷ US Central Intelligence Agency. Country Comparisson: Natural Gas - Exports. [online] [2016/04/07] (Available at: <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2251rank.html>)

billion cubic metres per year.¹⁸ Due to recent political aspects the Russian Federation nowadays is seeking other routes.

Speaking of new Russian gas projects, they are focused either at development of liquefied natural gas (LNG) or export of natural gas to other countries and gasification of domestic regions.

LNG projects include expansion of Sakhalin 2 LNG plant with the construction of the third production train.¹⁹ Sakhalin 2 is the first Russian LNG plant. In 2015 10.8 million tons of LNG were produced within the plant. The expansion is estimated to cost \$5-7 billion. Secondly, Russia is planning to construct LNG plant in Yamal to develop the Yuzhno Tambeiskiy field. The Yamal project was launched at the end of 2013 by Novatek, Total and CNPC jointly and requires investment of \$20 billion.²⁰ The first phase of operation is projected for 2017. The annual output is expected to be 16.5 million tons of LNG to European and East Asian markets. Thirdly, Framework Agreement of Cooperation between Rosneft and Alltech Group has been signed with regard to Pechora LNG project in 2014.²¹ The project assumes development of two fields in Nenets autonomous district, gas-transport infrastructure, gas treatment plant and construction of LNG plant with investment of around \$6.6 billion. The launch date is projected for 2018. The estimated annual production of LNG is around 4 million tons. Fourthly, Gazprom's Baltic LNG project has been renewed since it was terminated in 2008. In 2013 Gazprom and the Leningrad Region have signed Memorandum of Understanding and Cooperation on the project. The required investment is estimated to be \$9-12 billion, according to LNG Congress, Russia. The launch date is projected for late 2018. The plant capacity will amount to 10 million tons of LNG per year with the potential expansion to 15 million tons.²² Moreover, Vladivostok LNG project by Gazprom in the Pacific area has been postponed by

¹⁸ Consulting services of Natural gas sector of Russia, [online] (Available: http://www.eegas.com/fsu_r.htm)

¹⁹ Gazprom. *Sakhalin II*. [online] [2016/04/07] (Available at: <http://www.gazprom.com/about/production/projects/lng/sakhalin2/>)

²⁰ LNG Congress Russia. LNG projects. Vostock Capital UK Ltd., LNG Congress Russia [online] [2016/04/07] (Available at: <http://www.lngcongress.com/lng-projects?lang=en>)

²¹ Pechora LNG. (2014). Press release: Rosneft and Alltech Group signed a Framework Agreement of Cooperation with Regard to Pechora LNG Project. [online] [2016/04/07] (Available at: <http://www.pechoralng.com/press-area/press-releases/265-2014-05-23.html>)

²² Gazprom. Baltic LNG. [online] [2016/04/07] (Available at: <http://www.gazprom.com/about/production/projects/lng/baltic-lng/>)

Gazprom.²³ The project was mainly intended for the Japanese market. However, the company decided to focus at cooperation with China.

Projects in natural gas export are mainly directed at two markets: Europe or Far East and East Asia. European projects include Nord Stream 2 as well as Turkish Stream. Nord Stream 2 project has been under discussions by Gazprom and its customers.²⁴ The double pipeline system will be built similarly to Nord Stream 1, with the aim to access European market. However, no additional information was disclosed. The project is said to be far from a commercial agreement. Turkish Stream project has been suspended when relations between Russia and Turkey worsened.²⁵ The pipeline is supposed to go across the Black Sea directly to Turkey. The Memorandum of Understanding on Constructing the Turkish Stream Gas Pipeline was signed in 2014 by Gazprom and Turkish Botas Petroleum.²⁶ The pipeline capacity was projected to equal 63 billion cubic metres of gas.

Projects targeted at Far East and East Asia includes Power of Siberia with China, for which construction has already started.²⁷ The project is constructed by Russian Gazprom and Chinese CNPC. The contract was signed for annual gas supply of 38 billion cubic metres for 30 years from Russia to China. The total supply is over 4 trillion cubic metres. The project launch date is planned for 2018. The investment cost is estimated to be around \$77 billion. Other projects also include exploration of Kovyktinskoye field as well as gasification development in Eastern Russia.²⁸

2.2 The Oil Industry

The main area of extraction and further production of oil in Russia is Western Siberia. Oil was found in Russia relatively early – at the end of 17th century; in 1745 the first refinery was built in Ukhta, at that time crude oil was extracted from the bottom of rivers. Later, in 1846 the first oil well was drilled near Baku and the Caspian Sea (Russian Empire territories of that time). Nobel brothers and the Rothschild family have played huge roles in the development of the oil

²³ Radnedge, S. (2015). Gazprom is postponing construction of the Vladivostok LNG plant on the country's Pacific Coast. Gasworld, UK. (Available at: <http://www.gasworld.com/vladivostok-lng-plant-construction-shelved/2007743.article>)

²⁴ Nord Stream 2. Nord Stream 2 Builds on Proven Success. [online] [2016/04/07] (Available at: <http://www.nord-stream2.com/our-project/pipeline/>)

²⁵ TASS. (2015). Turkish Stream pipeline construction project suspended — Russia's Energy Minister. [online] [2016/04/07] (Available at: <http://tass.ru/en/economy/841295>)

²⁶ Gazprom. Turkish Stream. [online] [2016/04/07] (Available at: <http://www.gazprom.com/about/production/projects/pipelines/turkish-stream/>)

²⁷ Gazprom. Power of Siberia. [online] [2016/04/07] (Available at: <http://www.gazprom.com/about/production/projects/pipelines/ykv/>)

²⁸ Gazprom. Eastern Gas Program. [online] [2016/04/07] (Available at: <http://www.gazprom.com/about/production/projects/east-program/>)

industry. In the 1960s Soviet Union became second in the world by the volume of hydrocarbons produced; it caused a fall in prices of oil produced on Middle East, which was one of the reasons for the creation of OPEC. In 1965 was discovered huge oilfield in the Western Siberia - Samotlor field, estimated as 14 billion barrels of oil in its deposits. This amount of oil nowadays would be enough for supplying whole Germany (largest consumer of oil in the EU) for more than 16 years, according to current consumption. With the development of the oil industry in Western Siberia of Soviet Union production increased rapidly: from 7.6 million barrels per day in 1971 to 9.9 million barrels per day in 1975. Till nowadays, the region remains a major oil production centre of Russia: Khanty-Mansi Autonomous Okrug produces about 60% of the annual volume of oil in Russia. During the Soviet Union period the oil extraction was intensified through extensive drilling of existing fields, but not exploration of new fields. In 1988 Soviet Union achieved unprecedented amount (11.4 million barrels per day), most of which was extracted in Western Siberia. But Soviet Union did not have enough technological equipment further.

After Soviet Union dissolved, domestic demand for oil decreased. Drilling was falling and maintenance of oil drill holes was not provided, because Russia had financial problems. Decrease in volume of oil extraction stopped only in 1997. After dissolution of Soviet Union, the government demonopolized and privatized companies in oil industry. It lead to large vertically-integrated oil companies. Each of these companies usually does the full cycle of extraction and refining from exploration to selling to final consumer. Oil companies have to work in difficult conditions: badly explored during Soviet Union drill holes or hard-to-extract deposits. With current speed of extraction proven reserves should be enough for 50 years, but the future is in new technologies, because they can allow extracting oil from deposits that were impossible to use before.

The main territory for oil extraction is Western Siberia, same for gas industry. Its exploration started in 1964. There is the largest oil field in Russia and sixth largest in the world – Samotlor field.²⁹ Main advantages for extraction in Western Siberia are structure of explored deposits and special content of elements in oil. There are other large oil fields – Priobskoe, Lyantorskoe, Feodorovskoe and Vankorskoe. Before Western Siberia was explored Volga region was the main territory for oil. It includes a large deposit – Volgo-Uralskoe. Volga region is however more than three times smaller in production volumes than Western Siberia. North Caucasus is the oldest and most explored region in Russia, but they are mostly used. There are large deposits in East Siberia, but they are yet not used. Russia is only exploring the fields there, which can become the

²⁹ Samotlor Oil Field. *Oil Voice* [online]. UK [cit. 2015-09-25]. Available at: <http://www.oilvoice.com/well/Samotlor-Field/b74e617cbaf4.aspx>

most important in the future. Large deposits also lie under Arctic shelves in Barents and Kara seas, but it will be difficult to explore and extract oil there. Geologists are also exploring island Sakhalin. The main problem in the regions is that they lie far away, climate there is harsh and infrastructure is not sufficient. Not only domestic, but international companies (ExxonMobil, Shell and BP) work in the areas too. The map of oil fields in Russia is shown in Picture 4 in Appendix.

As I mentioned, Russian oil companies are large and vertically-integrated. They provide the whole cycle of oil exploration and extraction. There is no monopoly in the oil market if it is compared to gas industry. Largest oil companies ranked by oil production volume in 2014 are Rosneft (1.5 billion barrels), Lukoil (707 million barrels), Gazprom Neft (482 million barrels), Surgutneftegas (447 million barrels) and Tatneft (193 million barrels).³⁰ Rosneft is a state-owned gas and oil company. It is active in almost all oil territories in Russia (Western and Eastern Siberia, Far East, Arctic shelves). Rosneft has one of largest proven reserves of oil (22.8 billion barrels). It will be enough for 25 years.³¹ Rosneft also has 13 refineries in Russia and operates in other countries. The second largest company is Lukoil. It extracts 17.8% of all Russian oil production.³² It operates in four regions in Russia (South, Ural, Volga and North-Western). Its proven reserves in Russia in 2010 were more than 15 billion barrels. Thirdly, Gazprom Neft is part of Gazprom company, which is partly held by the government. It has four refineries in Russia and operates in Europe too. Main refineries in Russia are in Moscow, Omsk and Yaroslavl. The fourth oil company is Surgutneftegas. It extracts 13% of all Russian oil production volume.³³ The fifth largest oil company in Russia is Tatneft. It extracts 8% of all Russian oil production.³⁴ Its main territory is Tatarstan.

2.2.1 Oil deposits in Russia and in the world

According to BP Statistical Review of World Energy, by 2014 around 67.6% of total proved oil reserves are owned by six countries. Altogether there is 1.7 trillion barrels of proven oil resources in the world. Main oil reserves by country are shown in Graph 18.

The Russian federation is ranked 6th disposing 103 200 million barrels (MMbbl) which represent 6.1% of total proved world reserves of oil. From 1994 the proved reserves of Russia declined by

³⁰ The 5 Biggest Russian Oil Companies. *INVESTOPEDIA* [online]. [cit. 2015-10-02]. Available at: <http://www.investopedia.com/articles/markets/100515/5-biggest-russian-oil-companies.asp>

³¹ Rosneft. *Oil Catalog* [online]. [cit. 2015-10-02]. Available at: http://www.oilcatalog.ru/stat/502_stat.html

³² Lukoil. *Oil Catalog* [online]. [cit. 2015-10-02]. Available at: http://www.oilcatalog.ru/stat/867_stat.html

³³ Surgutneftegas. *Oil Catalog* [online]. [cit. 2015-10-02]. Available at: http://www.oilcatalog.ru/stat/366_stat.html

³⁴ Tatneft. *Oil Catalog* [online]. [cit. 2015-10-02]. Available at: http://www.oilcatalog.ru/stat/1835_stat.html

10 %, demonstrating that the country has not been discovering any new deposits for the last 20 years.

Fifth is held by Iraq, with 150 000 million barrels of oil deposits, i.e. 8.8% share of total world's proved reserves. On the fourth place there is Iran, with 157 800 million barrels of oil deposits, i.e. 9.3% share of total world proved reserves. These two countries are valuable members of OPEC and they contribute significantly into world's total oil supply.

Third is Canada with 172 900 MMbbl of oil deposits, i.e. 10.2% share of total world's proved reserves. This country indeed does not use the great potential in oil production that it possesses. Canada can be considered as one of the further threats and competitors for the Russian Federation in the world oil market.

Second – Saudi Arabia with 267 000 MMbbl of oil deposits, which is equal to 15.7% of total world proved reserves. Saudi Arabia is one of the main competitors of Russia in oil production. Its extraction is higher than of Russia's. The main problem here is that Russia does not have that much oil reserves as Saudi Arabia. Iran and Iraq have together 300 MMbbl, but it is not being extracted.

On the first place is Venezuela and it has 298 300 MMbbl and 17.% of total world oil reserves. It does not use its reserves that extensively. Its production is lower than Mexico's and almost 4 times lower than of Russia. The growth in production is also slow (1.1%). Also OPEC countries altogether have 1.216 trillion barrels of oil deposits, which is by far larger than in Russia.

2.2.2 Present extraction. Transportation. Pipelines. Future projects.

In terms of production of petroleum and other liquids Russia is the third largest producer after Saudi Arabia and US in terms of barrels daily. On a daily basis the Russian Federation produces 10.8 million barrels daily. Saudi Arabia extracted 11.5 million barrels daily, while the USA produced 11.6 million barrels. In terms of daily production in barrels, US has the first place in 2014 and Saudi Arabia – second. The fourth largest producer when we consider barrel production is Canada. It produces 4.3 million barrels daily. What is important is that they are experiencing fast growth (7.9%). After Canada is China, with similar production to Canada (4.25 million barrels daily). But their growth is small. Main threat are OPEC countries altogether, because they have 41% share in oil production and extract large amount of 36 million barrels daily. But their oil production slightly decreased between 2013 and 2014 (-0.3%). Main oil producers in terms of barrels daily are shown in Graph 19 and in terms of tones in Graph 20 in Appendix.

But when we consider annual production in tones, Russia is the second largest oil producer after Saudi Arabia and before US, thus, Saudi Arabia is the main competitor in terms of oil production for Russia. In 2014 Saudi Arabia produced 543.4 million tones of oil and had 12.9% of market share. Their oil production is growing slowly, by 0.9%. The main threat is that they consume very small amounts of oil - 142 million tones. It means that they export large share of oil they extract, 392.4 million tones i.e. around 70%. Another threat for Russia is that Saudi Arabia also holds bigger reserves of oil, more than 2.5 times bigger. Nowadays when oil prices are falling, OPEC actually increased their production. It contributed to decrease in oil prices, because these countries have large market share in the world. OPEC produce 41% of all oil in terms of million of tones. Higher production was combined with lower demand for oil, which put oil prices low.

Russia has the second place in terms of annual oil production with 534.1 million tones in 2014. The difference between Russian and Saudi Arabian production is not that big. Russia also has 12.7% of total market share in oil production, but it can barely impact the world prices of oil. Strength of Russia is that it also consumes small amounts of oil – 148 million of tones. The difference between production and consumption is 386.1 million of tones, which is only 6.3 million tones less than for Saudi Arabia. But Russian oil production grows slower (0.6%) than Saudi Arabian (0.9%). It is unlikely that Russia will exceed the production by Saudi Arabia in the future, especially because export of oil and gas high-technological equipment from Western countries is restricted due to sanctions. And Russia imports most of its equipment from EU and USA. As Alexander Khloponin – Russia’s Deputy Prime Minister, said it is hard to find new suppliers of equipment for offshore oil production.³⁵ It can threat future Russian oil production.

The third largest producer of oil is United States with 519.9 million tonnes in 2014. They have 12.3% of total world oil production. Their production was growing in 2014 by 15.9%. It is the fastest growth rate of oil production. USA meanwhile creates itself new opportunities, enters new markets (the Shale revolution is a perfect example for that). But US is not a competition for Russia, because it consumes much higher amount of oil. United States consumed 836.1 million tones in 2014, therefore, they actually import a lot of oil from other countries. They have the largest share in oil consumption (19.9%) and it is even higher than in China (12.4%). Oil consumption in US is slowly growing too. The fourth largest producer of oil is China, but if we compare Chinese production to Russian, it is small. China extracts only 211.4 million tones and it is 2.5 times smaller than Russian. It actually consumes 520.3 million tones and their

³⁵ Russia admits lack of technologies for offshore oil production. *Russia beyond the Headlines* [online]. Moscow: Rossiyskaya Gazeta, 2015 [cit. 2016-04-15]. Available at: https://rbth.com/business/2015/09/28/russia_admits_lack_of_technologies_for_offshore_oil_production_49605.html

consumption even grows (3.3%). China is an important partner for Russia. Both countries cooperate in oil and gas trade, but it will be covered later on. The fifth largest producer of oil is Canada. They extract almost same amount as China (209.8 million tonnes). But as I mentioned, they are experiencing fast growth. It is possible that Canada will outrun China in production in the future. Nevertheless Canada consumes only half of oil it produces, which means it supplies oil to US. Canada is actually the most important supplier of oil for US with 43% of total US oil imports in 2015, while Russia did not have a large share.³⁶

Russia exports both crude and refined petroleum, but crude one is exported more (35% to 17% of total export).³⁷ There are around 40 oil refineries in Russia, largest of which is operated by Rosneft. Other refineries belong to Lukoil, TNK-BP and other companies. Many other refineries are smaller and older. For domestic and international transportation of oil Russia has large network. State-owned company Transneft operates most of them. It transports more than 90% of all oil extracted in Russia and around 80% of Russian crude oil export. Length of their pipeline network is around 48 thousand kilometres. Most of oil exported is transported by pipelines (around 84%), while the rest – by trains and marine.³⁸ Main destinations for oil export are Europe and Asia, but Europe is dominant. Major crude oil pipelines are Druzhba and Baltic Pipeline System 1. Druzhba has the highest capacity of 2 million barrels per day and is one of the longest of around 4 000 kilometres length. It is the oldest too, operating since 1964. There are several other pipeline systems connected to Druzhba. One of them is Baltic Pipeline System 1 with capacity of 1.3 million barrels per day. It leads to Primorsk Port on the Gulf of Finland. Baltic Pipeline System 2 is another pipeline connected do Druzhba. It has capacity of 0.6 million barrels per day. Easter Siberia-Pacific Ocean pipeline (ESPO) is going to China and it is a relatively new system. It has capacity of around 2 million barrels per day and is even longer than Druzhba (around 6 000 kilometres). Besides pipelines there are ports that are used as export outlets. There are around 20 of them, some of them are situated on the Gulf of Finland (Primorsk and Ust-Luga), black Sea (Novorossiysk) and close to Asian countries (Kozmino).³⁹ Pipeline map is shown in Picture 5.

³⁶ Canada provides record-high share and amount of U.S. crude oil imports in 2015. *US Energy Information Administration: Today in Energy* [online]. Washington, D.C.: US Energy Information Administration, 2016 [cit. 2016-04-15]. Available at: <https://www.eia.gov/todayinenergy/detail.cfm?id=25772>

³⁷ Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2016-04-15]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

³⁸ Geography of oil in Russia. *Rosneft* [online]. Moscow [cit. 2016-04-15]. Available at: <http://www.mirnefti.ru/index.php?id=217>

³⁹ Russia: Analysis. *US Energy Information Administration: Beta* [online]. Washington, D.C., 2015 [cit. 2016-04-15]. Available at: <https://www.eia.gov/beta/international/analysis.cfm?iso=RUS>

In terms of new projects there is lower number of them in oil industry. European market is already entered and there is developed pipeline network for oil transportation. I already mentioned that there are two main destinations of oil export (Europe and Asia). Europe is dominant for Russia, because it is close and has pipeline links with Russian regions where oil is produced. But demand for oil in Europe is falling and in 20 years oil export to Europe is said to be 50% less than in 2010,⁴⁰ which is not good for Russia. There are several reasons for such negative situation. Firstly, there is large supply of oil in Middle East, especially OPEC countries and their production is growing. OPEC countries also have very large reserves like I have said. Second reason is that the EU aims at environment. For example, they try to decrease emissions and go for biofuels. There is rising popularity of renewable energy sources like wind mills and others. Because of these reasons Russia is going to focus on Asia – mainly China. To do it Russia started to focus in eastern regions for oil exploration and extraction. For example, Eastern Siberia is one of them, which I have mentioned before. There are large oil deposits in Eastern Siberia, Sakhalin region and Arctic shelves. But projects there require a lot of capital and special equipment. Because of sanctions Russia lacks both. We will see in the future how Russia will solve these issues. China can be one option. Cooperation between Russia and China in energy industry increased after sanctions. China is planning to invest into gas pipelines. Rosneft sold 10% equity stake in Vankor field – important oil field in Siberia in 2014.⁴¹ Another investment is for oil supply from Russia to China over 25 years. The deal is estimated to equal to \$270 billion.⁴² There are also two Eastern pipelines that are planned for 2016: Zapolyarye-Purpe and Kuyumba-Taishet, but they may be delayed because of lack of investment.

⁴⁰ MAKAROV, I. A. et al (2014). Global and Russian energy outlook to 2040. Moscow: Energy Research Institute of the Russian Academy of Sciences, Analytical Centre for the Government of the Russian Federation, 2013.

⁴¹ Rosneft and CNPC Signed a Framework Agreement on the Purchase of 10% Share Stake of Vankorneft. *Rosneft* [online]. Moscow: Rosneft, 2014 [cit. 2016-04-15]. Available at: <http://www.rosneft.com/news/pressrelease/09112014.html>

⁴² Rosneft's \$270 Billion Oil Deal Set to Make China Biggest Market. *Bloomberg* [online]. New York: Bloomberg L.P., 2013 [cit. 2016-04-15]. Available at: <http://www.bloomberg.com/news/articles/2013-06-21/rosneft-s-270-billion-oil-deal-set-to-make-china-biggest-market>

3. International energy markets

3.1 World oil market

Oil is the main energy form and makes more than 30% of total energy consumption.⁴³ Demand for oil is rather inelastic in terms of prices and in terms of income, but income elasticity of demand is higher in developing countries than in developed.⁴⁴ World oil market is characterized by demand and supply. World oil demand in 2014 was growing by 1 million barrels daily and it was estimated to be like it in 2013.⁴³ Growth in demand happened because of decreasing oil prices and increasing economic growth rates in the world as the world is still recovering from global financial crisis in 2008. Also demand in developing countries, especially India, grew, but consumption in OECD is still falling. In OECD only US had improved its demand for oil (growth of 0.09 million barrels daily), while in Europe and Asia Pacific there was negative development (-0.18 million barrels daily). Situation in US was said to be because of cold weather during winter in 2014. In case of Europe it experiences decline because of higher efficiency standards, focusing on alternative energy forms in transportation and slower economic growth than expected. Demand in non-OECD countries like China was growing by 1.23 million barrels daily and China had the fastest growth (0.40 million barrels daily). World oil demand is connected with economic growth too. World economy was growing similarly to 2013 and 2012 by 3.3%. Developed countries had improving economic situation, but economic growth in emerging countries like China and Brazil was slower. China still has high growth rates if compared to other countries and Russia too. In 2016 oil demand is expected to stay flat.⁴⁵

In terms of world oil supply it increased too and was growing by 2.2 million barrels daily, which is higher than demand growth. It was mainly affected by US output because of US shale revolution. It means usage of new technology like horizontal drilling and hydraulic fracturing. It allows US to produce more oil and gas. They reached 9.32 million of barrels daily in the end of 2014. I mentioned that US consumes much more and their demand is growing, which means that is still has to import oil. But as US produces more, it also buys less. I see it as a downward pressure for oil prices and a threat for Russian export. OPEC decided to keep extraction same as previously (around 30 million barrels daily), even though oil prices dropped in 2014. There was a panic among these countries, but still they do not want to decrease their production. Russian

⁴³ Key World Energy Statistics: 2015 [online]. Paris: International Energy Agency, **2015**(1) [cit. 2016-04-20]. Available at: http://www.iea.org/publications/freepublications/publication/KeyWorld_Statistics_2015.pdf

⁴⁴ Understanding Crude Oil Prices. *National Bureau of economic research* [online]. Cambridge: National Bureau of economic research, 2016 [cit. 2016-04-16]. Available at: <http://www.nber.org/digest/mar09/w14492.html>

⁴⁵ *Oil Market Report from 11th March 2016*. Paris: International Energy Agency, 2016, **2016**(3).

production stayed at same level too. In terms of oil prices there was a drop to the end of 2014, but I will describe it separately later.

3.1.1. Main consumers

In terms of crude oil and petroleum products import there are five largest countries: US, China, Japan, India and South Korea. They can be seen in Graph 21. Majority of world oil imports go to Asia and Pacific (43%) and Western Europe (23%). First largest crude and refined oil importer is US with demanded amount of 8.74 million barrels daily or 14%, but because of shale revolution its import was decreasing since 2010 (on average 7%). US imports mostly crude oil (85%), not refined one. Another important point is that USA actually imports most of oil from Canada and Middle East as I already mentioned. Second is China with 7.14 million barrels daily or 11%. China's demand for oil grew since 2010 (on average 5-6%). As its economic growth started to slow down, importation can decrease in the future, but still China's growth rate is high. Third is Japan with 4.31 million barrels daily or around 7%. Japanese imports were fluctuating around 4.5 between 2010 and 2013, but decreased in 2014. India buys almost same amount (4.26 million barrels daily) and imported amount was growing quickly between 2010 and 2013, but slower in 2014. In the future I think India will become more important as a consumer than Japan. Fifth main importer is South Korea with 3.36 million barrels daily. Its import grows slowly, while Singapore – fast. Singapore imports almost similar amount (3.17 million barrels daily), but imports grew by 2.7%, faster than Korean. In the future Singapore may outrun South Korea in demand for oil products.

Speaking about crude oil, 64% of import of all oil products is made by it. Major importers are US, China, India, South Korea and Japan (Graph 22 in Appendix). US imports 7.39 million barrels of crude oil daily, but amount was decreasing on average by 7% since 2010. Second largest crude oil importer is China with 6.19 million barrels daily. Here Chinese import was growing fast since 2010 (on average by 6-7%). Third is India with 3.79 million barrels daily, but it does not grow so fast (0.3% between 2013 and 2014). Fourth largest importer of crude oil is South Korea, but again its growth in import of crude oil is slow (0.8% between 2013 and 2014). Fifth is Japan with 3.24 million barrels daily, however its import of crude oil fell in 2014 by 5.8%.

In terms of refined petroleum main importers are Singapore, the Netherlands, US and Japan. First is Singapore with 2.39 million barrels daily, while its demand for it grew between 2010 and 2014. Second largest importer of refined oil is the Netherlands with 1.8 million barrels daily, but oppositely it is experiencing decline in demand for foreign products of 3%. Third is US with

1.36 million barrels daily, but the amount was decreasing since 2010 as USA increased production of these products. Fourth is Japan with only 1 million barrels daily and falling import volume. Other countries do not have large imports of petroleum products so I will not mention it.

3.1.2. Main suppliers

In terms of crude oil and petroleum products export top five countries are Saudi Arabia, Russia, USA, United Arab Emirates, and Kuwait as it can be seen in Graph 23. Saudi Arabia produces more than 8.14 million barrels daily and 12.3% of world export, but it was falling between 2012 and 2014. Decrease in export of crude oil and petroleum products in 2013-2014 was around 2.7%. Saudi Arabia is focused at crude oil export. Second largest exporter is Russia with daily transport of 6.67 million barrels or 10% of the world. Russian crude oil and petroleum product export also fell during 2013 and 2014, but overall was growing since 2012. Russia supplies both crude and refined oil, but crude is dominant (around 72%). What is important is United States, third largest exporter. It supplies 4.18 million barrels daily and its export was growing since 2010. Between 2013 and 2014 its export rose by 15.8%. In December 2015 US actually lifted its ban on crude oil export, which was present for around 40 years, because the country increased its production in 2014 and 2015.⁴⁶ It can affect oil market in 2016 and later greatly, though, US is focused at export of refined petroleum, but not crude one. United Arab Emirates are fourth largest supplier, but its export is much lower (3.26 million barrels daily) and it was falling between 2013 and 2014. Fifth largest supplier is Kuwait with 2.75 million barrels daily, but its supply also dropped by 4%. It is closely followed by Canada (2.74 million barrels daily) and Iraq (2.53 million barrels daily). Export from Canada was actually growing since 2010 and increased by 6% between 2013 and 2014. In future Canada will probably or has already outrun Kuwait. But again Canada and US have strong partnership in trade of energy. Canada has been supplying most of its oil to US. OPEC countries account for 41% of world crude and refined petroleum exports.

Crude petroleum makes 60% of total crude and refined oil export. In terms of crude oil top five countries are Saudi Arabia, Russia, Iraq, United Arab Emirates and Canada (Graph 24 in Appendix). As I said Saudi Arabia exports almost only crude oil (around 88%). The volume is 7.15 million barrels daily. Russia is at the second place with 4.49 million barrels daily. Russian supply of crude oil was falling since 2010 on average by around 2%. Third largest exporter of crude oil is Iraq, but the difference with Russian export is large. It supplies 2.5 million barrels

⁴⁶ U.S. Lifts The Ban On Crude Oil Exports: When Might It Matter For Producers? *Forbes: Business* [online]. New York: Forbes Media, 2016 [cit. 2016-04-16]. Available at: <http://www.forbes.com/sites/woodmackenzie/2016/01/19/us-lifts-the-ban-on-crude-oil-exports-when-might-it-matter-for-producers/#5129369b328d>

daily and it was growing since 2010 on opposite. Fourth is United Arab Emirates with less than 2.5 million barrels daily, but its volume fell in 2014. Lastly, Canada exported 2.27 million barrels daily in 2014. Importantly its supply was increasing fast since 2010 (on average by 11%). Important to mention Venezuela, because its oil supply increased by almost 30% between 2013 and 2014 and reached almost 2 million barrels daily. OPEC countries altogether are responsible for 56.5% of total world crude oil export.

Russia also exports petroleum products. It is ranked as second largest exporter after US. US supplied 3.8 million barrels daily and it was growing quickly since 2010 (on average 13.5%). With US shale revolution it will probably increase more. Russia supplied only 2.18 million barrels daily, which is close to Netherlands (2.13 million barrels). Other country exporting petroleum products is Singapore (1.77 million barrels daily). OPEC accounts for only 17% in world export of refined oil.

Major trade movement happens from Middle East and Russia. From Middle East oil and refined petroleum flow to China, Japan, Indonesia other Asian countries; US and Europe. Largest oil movement from Middle East goes to Indonesia (237 million tons), China (171.7 million tons), India (171.1 million tons), Europe (101.6 million tons) and USA (93 million tons). From Russia oil mainly flows to Europe (296.4 million tons). Speaking of US, it exports some oil to South America (63.7 million tons).

3.1.3. Current trade partners of Russia on the market

Russia has two main markets for crude and refined petroleum – European and Asian. I already mentioned that Europe is a dominant one, because pipeline network was developed as first. Also the market is also bigger, but Asian one is growing fast. In the future Russia will probably export more to the Asian market, because European demand for oil is falling.

Russian crude oil export in 2013 was \$179 billion. In terms of crude oil more than 70% of Russian export flows to the EU and only 24% went to Asia in 2013. Out of European countries major trade partners in crude oil are the Netherlands (15%), Germany (9.9%) and Poland (9%). In Asia these are China (10%), Japan (5.2%) and South Korea (3.5%). North America account for 1.3% and only 0.82% is for US. Largest importers of crude oil from Russia are the Netherlands, China, Germany, Poland and Japan (Graph 25 in Appendix).

Petroleum products are exported from Russia in value of \$87 billion in 2013. Distribution in terms of refined oil is a bit different. 59% of exported petroleum products go to Europe, 26% - Asia and 12% - North America. In the EU main importers are Netherlands (11%), France (5.6%),

Italy (5.6%), Belgium and Luxembourg (5.5%) and UK (5.2%). In Asia these are Turkey (5.2%) and China (4.8%). Almost all exports to North America aim at US. Largest importers of refined petroleum are Netherlands, US, France, Italy and Belgium-Luxembourg (Graph 26 in Appendix).

Russia also imported \$2.6 billion of refined petroleum in 2013. 81% of it came from Europe. It can mean that Russia exports crude oil to other countries and later imports same oil, but refined back. However, most of it was imported from Belarus, Russian close partner.⁴⁷

3.1.4. Oil price drop of 2014

Oil price fluctuation is shown in Graph 27 in Appendix. Oil price started to fall in the second half of 2014. In the beginning it was around 108 USD per Barrel (Brent Spot monthly average), but in September it declined to 97 USD per Barrel, in October – 87.43 USD per barrel, in November – 79.44 USD and in December – 62.34 USD per Barrel. Oil price in December was actually was only 57% of average 2013 oil price. So oil price drop started around autumn 2014. Oil price in 2015 was actually even lower. It was developing between 38 and 64 USD per Barrel. Lowest (38 USD per Barrel) was in the end of 2015. In 2016 trend does not show improvements.

Reasons for drop are speculated as following: slower economic growth in some economies and oversupply of oil. First, economic growth in 2015 was only 2.4% and was lower than in 2014,⁴⁸ because of decline in developing economies. For example, in China economic growth decreased more to 6.9% from around 7-8% before. China is a large economy and its slowdown can reflect on the world. Low economic growth in China is happening because of reorientation from manufacturing to consumption. Secondly, supply of oil on the market is too high. Again because China is growing less, it needs less resources. US shale oil revolution lead to US producing more oil for its own consumption. Thus USA started to import less oil from other countries like Middle East. Another point is that OPEC refused to decrease its production. Altogether it resulted in oversupply of oil. So demand is decreasing because of China, but supply is same or even higher. Because of these factors oil price is falling.⁴⁹

⁴⁷Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2016-04-19]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

⁴⁸ Report section. *World Bank* [online]. Washington, D.C.: World Bank, 2016 [cit. 2016-04-19]. Available at: <http://www.worldbank.org/en/publication/global-economic-prospects>

⁴⁹ HEINBERG, Richard. *The Oil Price Crash of 2014* [online]. 2014 [cit. 2016-04-19]. Available at: <http://www.postcarbon.org/the-oil-price-crash-of-2014/>

3.2. World gas market

Natural gas represents around 21% of world total primary energy supply.⁵⁰ Natural gas is said to have more environmentally-friendly aspects among all other fossil fuels and its importance is growing. There are large natural gas resources available in the world. As International Energy Agency sees it, there is “Golden Age of Gas” scenario and it will continue for several decades.⁵¹ Another trend is increasing importance of Liquefied Natural Gas (LNG), because this form is easier to transport and there is growing number of factories for its production.

World gas market can be characterized by demand and supply. World demand for gas in 2013 was 1 036 billion cubic metres.⁵² Demand will increase later on, because of higher economic growth and low prices. World gas demand is expected to grow on average by 2% each year from 2014 to at least 2020, but it is lower than average growth rate during last 10 years.⁵³ There are some reasons for it. First is that in OECD countries there is slower electricity growth rate and also rising importance of renewable sources. Second cause is that gas and oil prices were fluctuating. Oil and gas sources are substitutes so with low oil prices countries can focus more on oil consumption and less on gas. Another way of oil price influence on demand for gas is that it decreases investment by oil and gas companies into new technologies. Thirdly, several developing countries have lower economic growth than projected and, thus, will demand less energy sources like for example China and Brazil.

In terms of supply it was around 1 037 billion cubic metres in 2013 if we talk about dry natural gas.⁵⁴ Growth in supply of gas should follow increase in demand. It grew by 1.6% during 2014, but it was slower than during last 10 years (2.5%). Fastest growth was in North America, because US new technology in oil and gas extraction allows it to reach unconventional gas sources. Lower rates of growth are also connected with slower economic growth in some countries, especially developing, what I already described. Another point is that with lower oil and gas prices, companies start to invest less into new ways of production. Importantly, LNG exports will increase soon, because there is number of projects for LNG plants in USA and other countries. LNG supply will increase and it will probably lead to lower prices for it, but LNG plants require large investment. So it can lead to lower LNG plants launched later on.

⁵⁰ Key World Energy Statistics: 2015 [online]. Paris.: International Energy Agency, 2015(1) [cit. 2016-04-20]. Available at: http://www.iea.org/publications/freepublications/publication/KeyWorld_Statistics_2015.pdf

⁵¹ International Energy Agency. World Energy Outlook 2011, International Energy Agency: Paris, France, 2011.

⁵² *Annual Statistical Bulletin 2015: OPEC*. Vienna: Organization of the Petroleum Exporting Countries, 2015, 2015(1). ISSN 0475-0608.

⁵³ *GAS Medium-term market report 2015: Executive summary*. Paris: International Energy Agency, 2015, 2015(1).

⁵⁴ *Annual Statistical Bulletin 2015: OPEC*. Vienna: Organization of the Petroleum Exporting Countries, 2015, 2015(1). ISSN 0475-0608.

3.2.1. Main consumers

Around 40% of world import of natural gas goes to Western Europe and around 30% - Asia and Pacific. Major importers of natural gas are Japan, Germany, USA, China and Italy (Graph 28 in Appendix). It is interesting that in demand for oil, no European countries were placed in top five. First is Japan with 124 billion cubic metres or around 12% of the world and its demand is growing. It is the largest LNG importer and is said to make 37% of world demand for LNG during 2012 and 2014. Most of LNG is coming from Australia (21%), Qatar (18%) and Malaysia (17%). Russia represents only 10%.⁵⁵ Japan has limited resources and shifted to natural resources as energy source after Fukushima nuclear incident, but the government is planning to come back to nuclear energy. Second is Germany with 105.5 billion cubic metres (10% of world imports of natural gas). The growth rate for German imports is 10%, which is quite high. On the other hand, it is projected to decline as total natural resource consumption. Most of its gas comes from Russia (39%), Norway (35%) and the Netherlands (22%). It has no LNG plants and imports mostly through pipelines. Third is US with 76 billion cubic metres, but imports were falling since 2010 on average by 8%, while production was increasing. USA uses new method for unconventional gas extraction, but still it is a net importer of natural gas. The difference is around 33 billion cubic metres, which can decrease in the future. What is important is that US started to export LNG in 2016.⁵⁶

3.2.2. Main suppliers

There is little correlation noted between production levels and reserve volumes.⁵⁷ Major exporters of natural gas are Russia, Qatar, Norway, Canada and the Netherlands (Graph 29 in Appendix). First is Russia with 195 billion cubic metres, but the amount is more than 12% less than it exported in 2010-2013 annually. Though, Russian market share is still large (19% of the world export of natural gas). Second is Qatar with 123 billion cubic metres. The amounts of exports were increasing since 2010, but stayed flat during 2014. Most of natural gas is in the form of LNG. Qatar is the largest exporter of LNG in the world, which allowed it to become second important exporter of natural gas in the world. Exports of LNG are projected to increase further on. Its main customers are Japan (27%), South Korea (24%), India (14%) and China

⁵⁵ Japan: Overview. *US Energy Information Agency* [online]. Washington, D.C., 2016 [cit. 2016-04-20]. Available at: <https://www.eia.gov/beta/international/analysis.cfm?iso=JPN>

⁵⁶ U.S. exports of LNG mark a turning point in the market. *CNBC* [online]. New Jersey, 2016 [cit. 2016-04-20]. Available at: <http://www.cnbc.com/2016/02/25/us-exports-of-liquified-natural-gas-mark-a-turning-point-in-the-energy-market.html>

⁵⁷ *Global natural gas markets: Overview* [online]. Washington, D.C.: US Energy Information Administration, 2015, 2014(1) [cit. 2016-04-20]. Available at: https://www.eia.gov/workingpapers/pdf/global_gas.pdf

(12%).⁵⁸ Third largest exporter of natural gas is Norway with 107 billion cubic metres. Its supply was fluctuating during 2010, but the trend is unclear. It managed to increase its production after 1993 thanks to exploration of new fields. Importantly, Norway exports around 95% of all its natural gas production, which mostly goes to the EU in form of dry and liquefied gas. Norway has a pipeline network in Europe and it allows it to supply EU countries. Pipelines connect Norway directly with France, UK, Belgium and Germany. It also has LNG processing facilities. Norway satisfies around 20% of European demand in natural gas.⁵⁹ Fourth largest exporter of natural gas in the world is Canada with 79 billion cubic metres. Canadian supplies of natural gas were decreasing since 2010 on average by 4% annually. Its production of conventional gas is decreasing, but unconventional – increasing. Canada supplies its natural gas to the US, but also imports small amount from US to Central Canada. Canada does not have network of LNG plants. Even if it starts to focus at overseas export of LNG, it will take several years to develop LNG infrastructure.⁶⁰ Fifth is the Netherlands with 59 billion cubic metres. Its supplies increased from 2010, but in 2014 there was small fall. The Netherlands also have pipeline systems and they are directly connected to UK, Germany and Belgium. There is a transport hub for LNG in the Netherlands too.

3.2.3. Current trade partners of Russia on the market

Almost all Russian export of natural gas is in the gaseous form. The export of natural gas was equal to \$70 billion in 2013. Similar as in case of crude and refined petroleum Russia is focused at two markets: European and Asian, but with dominant European market. More than 86% of it went to European countries, including Ukraine and Belarus and only 14% - Asia. Largest importers of natural gas from Russia are Germany, Turkey, Italy, Belarus and Japan. Germany is by far the most important trade partner with 19% of total Russian natural gas export. Second is Turkey with 13%, third – Italy 11%, then Belarus – 9% and Japan – 6%. Ukraine imports around same amount as Japan. Interesting is that China does not import large amount of natural gas from Russia, but it will probably change in the future with new pipeline deals.⁶¹

3.2.4. China as a future partner

In 2010 China imported only 16 billion cubic metres. Economic growth in China was slowing down to 7% in 2014, but the rate is still impressive. High economic growth usually results in

⁵⁸ Where does Qatar export Natural gas, liquefied to? (2013). *OECD Atlas* [online]. 2016 [cit. 2016-04-20]. Available at: http://atlas.media.mit.edu/en/visualize/tree_map/hs92/export/qat/show/271111/2013/

⁵⁹ Norway supplies more than 20% of Europe's natural gas needs. *US Energy Information Administration* [online]. Washington, D.C., 2014 [cit. 2016-04-20]. Available at: <https://www.eia.gov/todayinenergy/detail.cfm?id=16311#>

⁶⁰ Natural gas. *National energy board of Canada* [online]. 2016 [cit. 2016-04-20]. Available at: <https://www.neb-one.gc.ca/nrg/ststc/ntrlgs/index-eng.html>

⁶¹ Russia: Analysis. *US Energy Information Administration: Beta* [online]. Washington, D.C., 2015 [cit. 2016-04-20]. Available at: <https://www.eia.gov/beta/international/analysis.cfm?iso=RUS>

high energy consumption. Most of its energy need China satisfies with coal (around 66%). Another important energy source is oil (20%), while natural gas makes around 5%. The government started to focus at the environment and set targets to increase non-fossil fuel energy consumption to 15% by 2020 and 20% by 2030.⁶²

China also produces natural gas in amount of 128 billion cubic metres and production was rising since 2010 on average by 8%. It increased by 15% in 2014, but it is not enough to satisfy its need. China is the fourth largest importer of natural gas with 56 billion cubic metres in 2014 and growth rate in import of 8%. Its imports were growing during 2010-2014 period quite fast. China imports natural gas mostly in the form of LNG from other Asian countries like Turkmenistan (36%) and Qatar (30%). Russia is responsible only for 0.04% of total Chinese import of natural gas.

Chinese consumption of natural gas is projected to rise in the future, but it is unclear with which rate. On one hand, its economy is still growing, which should lead to higher demand for energy. The government started to focus on the environment too, so gas is an option as it is more environmentally friendly than coal and oil. On the other hand, coal is much cheaper. China also is increasing its own production of natural gas.

Russia started to focus at Asian markets when economic sanctions were implemented by the European Union, especially Chinese one. I already noted that Russia and China concluded several agreements to cooperate in energy trade. One of them is Power of Siberia, which estimated price is \$400 billion. It is constructed both by China and Russia. The agreed supply is 38 billion cubic metres during 30 years annually with total of 4 trillion cubic metres. It should be launched in 2018. The project is a main step towards relations in natural gas trade between Russia and China. If the project is finished, Russia can become one of the most important trade partners in terms of natural gas. There are large reserves in Eastern Siberia, which can be connected to Chinese route.

3.3.Trends in the energy sector

Future development in the energy market depends on many factors like geopolitics, economic performance of countries, technological progress and focus on sustainability. In general global energy consumption worldwide is growing. It actually almost multiplied between 2014 and 2015. It is projected that energy usage of the world will grow by one-third by 2040 because of India, China, Africa, Middle East and South East Asia. China will have energy demand twice as

⁶² China: Overview. *US Energy Information Administration* [online]. Washington, D.C., 2015 [cit. 2016-04-20]. Available at: <https://www.eia.gov/beta/international/analysis.cfm?iso=CHN>

big as in US by 2040. It will become the largest consumer of oil and even larger than EU in terms of gas market by 2030s, but it can be influenced by policy changes in efficiency and renewable energy like I mentioned earlier. What is important is India. It has highest growth in energy demand and actually many people (around 240 million) do not have access to electricity, which can mean further growth. India will have fastest growth in global coal use and oil demand (will reach 10 million barrels by day) by 2030. Energy consumption of OECD countries was falling since 2007, especially in the EU and Japan. By 2040 usage by EU will decrease by 15% and by Japan – 12%.⁶³ Energy usage is falling in OECD countries because of demographic and structural economic development and stricter regulations in energy efficiency.

Share of fossil fuels in energy mix is falling because of environmental attitudes and increase in renewable resources usage. The costs of renewable resources were falling too. Share of non-fossil fuels is now 19%, but it will reach 25% in 2040. The trend of decarbonisation is quite clear in the EU. Share of renewable sources in energy mix can reach 50% in 2040. Japan is turning its focus back to nuclear power too. But the trend can be influenced by fossil fuels' prices too, like low oil and gas prices.

Demand for oil can actually increase in 2020 because of developing countries, but US, EU and Japan will have lower imports and consumption of oil. In case of US it started shale revolution and in the future will import much less of oil and gas. Actually energy imports and exports will be probably balanced already in 2028.⁶⁴ It is a threat for other exporting countries, because there will be more supplied oil which US does not need. But costs for oil production in USA are growing and it can lead to slower growth in production. There can be two ways how oil prices will develop. Oil prices can reach \$80 per barrel or \$50 per barrel in 2020.⁶³ It depends on supply side, especially OPEC. If OPEC decides to lower output, oil prices can increase faster. Another point is that there is decreasing upstream investment in oil industry because of low oil prices. Companies invest less in new technologies and equipment because they do not have enough money. It can lead to declining production after 2020. Nevertheless, supply side is going to influence the price mainly.

Natural gas is the only fossil fuel form that will grow in terms of demand, because it is used in many ways to produce electricity and also from renewable sources. Consumption will grow by

⁶³ *World energy outlook: Executive summary* [online]. Paris: International Energy Agency, 2015, **2015**(1) [cit. 2016-04-22]. Available at: http://www.iea.org/publications/freepublications/publication/WEB_WorldEnergyOutlook2015ExecutiveSummaryEnglishFinal.pdf

⁶⁴ *Annual energy outlook 2015: with projections to 2040* [online]. Washington, D.C.: US Energy Information Administration, 2015, **2015**(1) [cit. 2016-04-22]. Available at: [http://www.eia.gov/forecasts/aeo/pdf/0383\(2015\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2015).pdf)

50% by 2030 because of China, India and Middle East. There will be more LNG factories like, for example, new projects in Russia, but I already mentioned that oil and gas companies invest less now. Some LNG projects can be postponed or cancelled because of it. Chinese demand can be only satisfied with new deals, which need more capital. For example, new gas pipelines or LNG deliveries can be established.

Stricter efficiency regulation can decrease growth in energy demand too. Sustainability focus is often developed internationally like during UN climate change conference, or Europe 2020 goals and UN 2030 Development goals.⁶⁵

⁶⁵ *World energy outlook: Executive summary* [online]. Paris: International Energy Agency, 2015, **2015**(1) [cit. 2016-04-22]. Available at: http://www.iea.org/publications/freepublications/publication/WEB_WorldEnergyOutlook2015ExecutiveSummaryEnglishFinal.pdf

Conclusion

In the second half of 2014 and 2015 there was a recession in the Russian Federation. It is mainly because of Russian structural problems, which were not addressed and solved entirely before. The main problem is dependence on export of natural resources. I mentioned empirical works that actually show that Russia has Dutch disease. It means that Russia exports mostly natural resources and when prices fluctuate, Russian Rouble also changes. Other industries suffer and lack development. During 2000s Russia benefited from high oil prices. Government and companies' industries had high revenues. It allowed investment in projects and capital. Energy sector in Russia can be called a mixed blessing. On one hand, high commodity prices provide capital. On the other hand, Dutch disease symptoms are present.

Russia has one of the largest reserves of natural resources in the world, but there are other countries that have even more and which do not use them in full potential yet like some OPEC countries. Russia is one of the leading exporters of oil and natural gas in the world. It is mainly focused on European market thanks to well-developed infrastructure network, but European energy consumption is decreasing. The EU countries refocus towards environmentally-friendly sources like renewables. They also strictly regulate energy efficiency, which decrease energy usage. From economic sanctions in relation to Ukrainian sanctions the Russian Federation started to look at Asian markets (mostly China). Asian energy market except for Japan is growing. Despite economic growth slowdown in China, it still has very high rates. China can become even twice as big as US in energy consumption in the future. Russia agreed on several projects like Power of Siberia. It is building pipeline network now. China can become major customer in energy, but it will not happen soon.

Threats in Russian oil and gas industries include OPEC countries and USA. US invented new methods of extraction. It allowed USA to increase its production fast. USA can start importing less and less natural resources in the future. It means that oil and gas for US from Middle East can go to other countries like the EU. More oil and gas in the market can lead to oversupply and lower prices. OPEC countries also refused to decrease output. They have large reserves, bigger than Russian, and export volumes. Because of oversupply Russia can lose market share. Russia is dependent on European market, but the EU can start supplying more from Middle East also because of recent geopolitical issues.

Because of low prices for oil and gas Russian companies do not have a lot of revenues for investment into new technologies and projects. The West used sanctions on high technology in

oil and gas exploration and services and against some Russian companies. It can lead to slow development of Russian companies in oil and gas. I also mentioned that Russia depends on European market, but there are many issues with it. In my opinion, it should start focusing on Asian market like China and India. But it needs investment and cooperation, which is difficult because of current economic and geopolitical situation.

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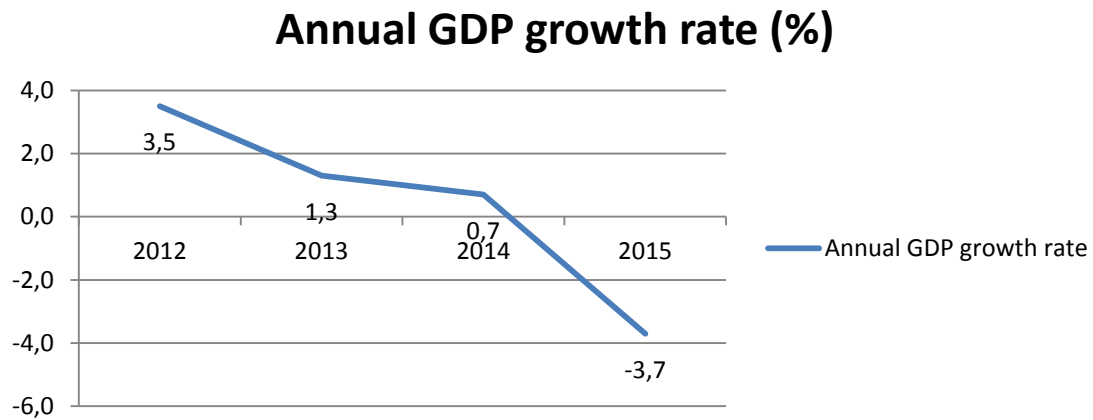
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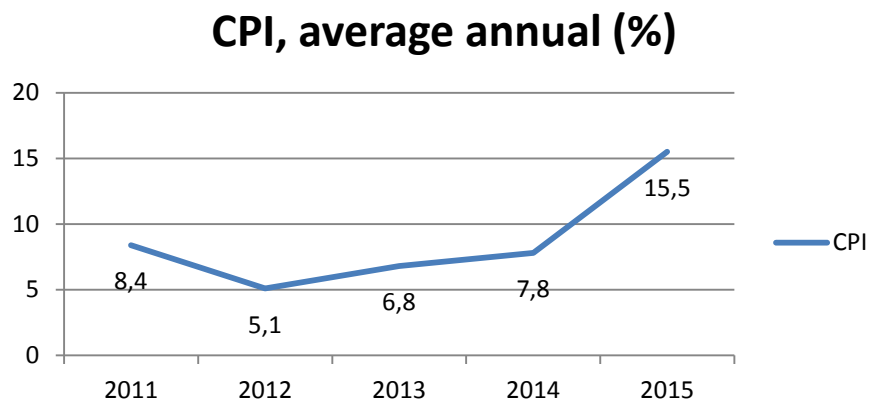
Appendix:

Graph 1: Annual GDP growth rate in Russia for 2012-2015



Source: Annual GDP: Indices of volume in % to the previous year. *Federal Statistics Service of Russia* [online]. Moscow, 2016 [cit. 2016-04-15]. Available at: http://www.gks.ru/free_doc/new_site/vvp/vvp-god/tab3.htm

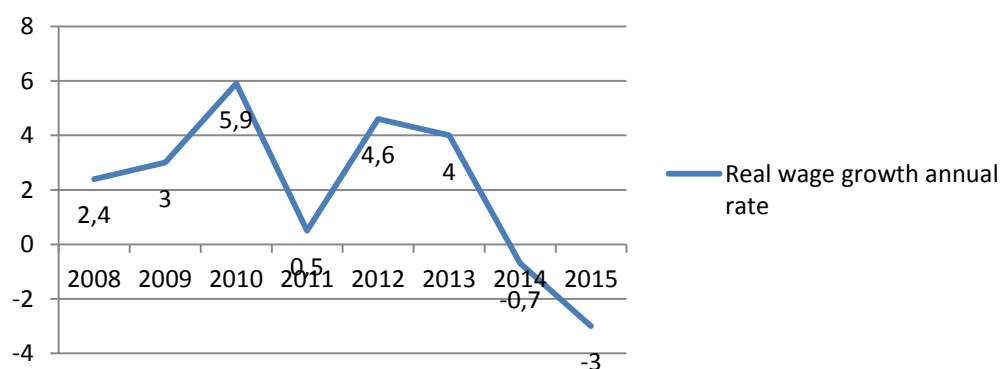
Graph 2: Average annual CPI in Russia for 2011-2015



Source: Inflation, consumer prices (annual %). *World Bank Data* [online]. Washington, D.C.: World Bank, 2016 [cit. 2016-04-15]. Available at: <http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG>

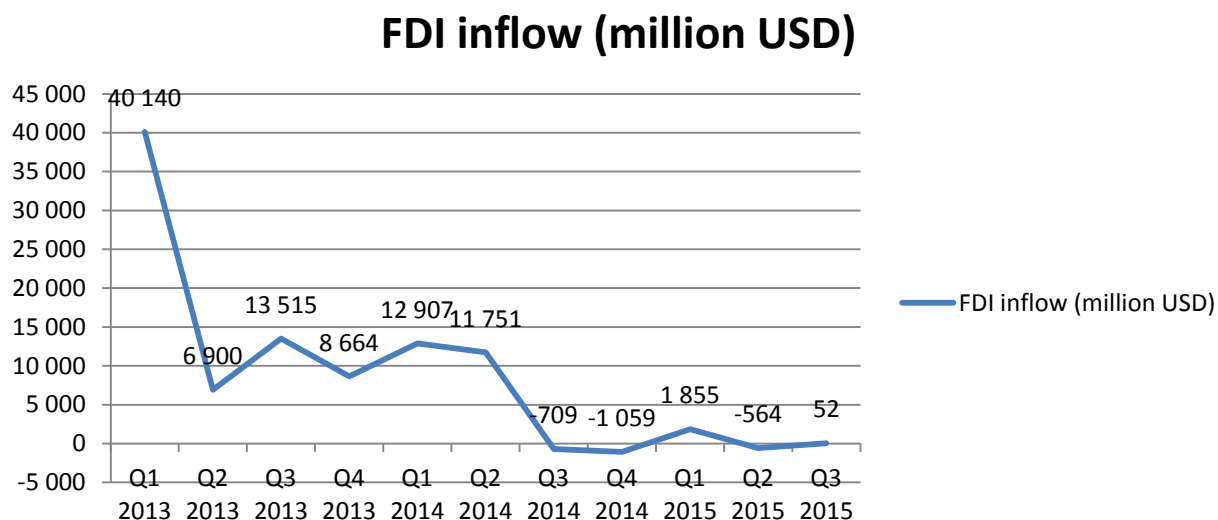
Graph 3: Real wage annual growth rate in Russia for 2008-2015

Real wage growth annual rate (%)



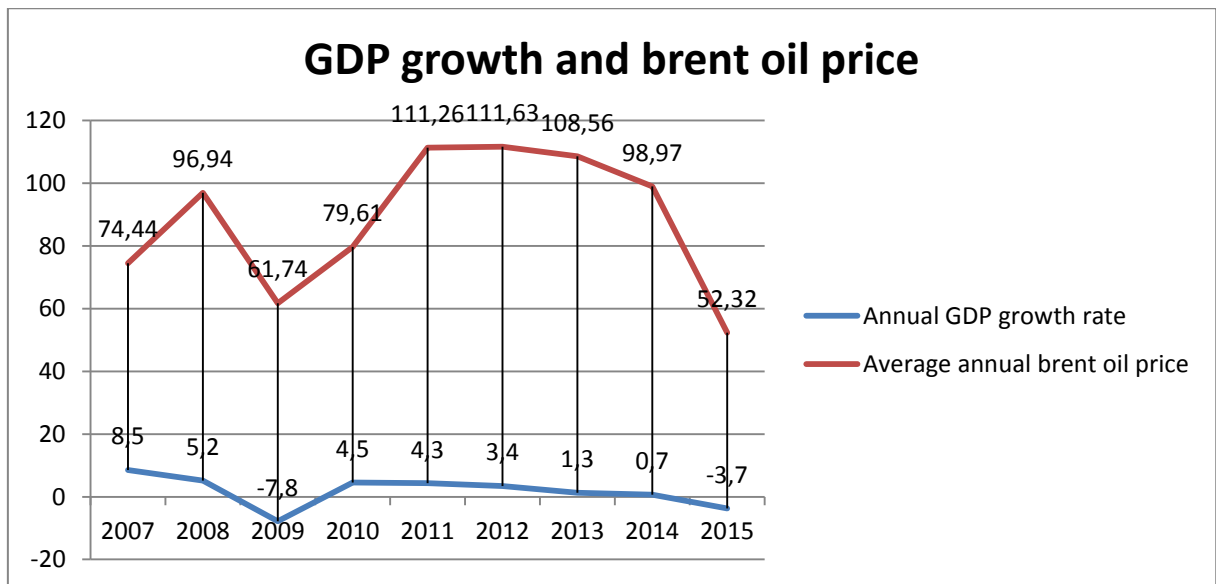
Source: Real disposable income of population in the Russian Federation. *Federal Statistics Service of Russia* [online]. Moscow, 2016 [cit. 2016-04-15]. Available at: http://www.gks.ru/free_doc/new_site/population/uov/uov_12kv.htm

Graph 4: FDI inflow in Russia for 2013-2015 (million USD)



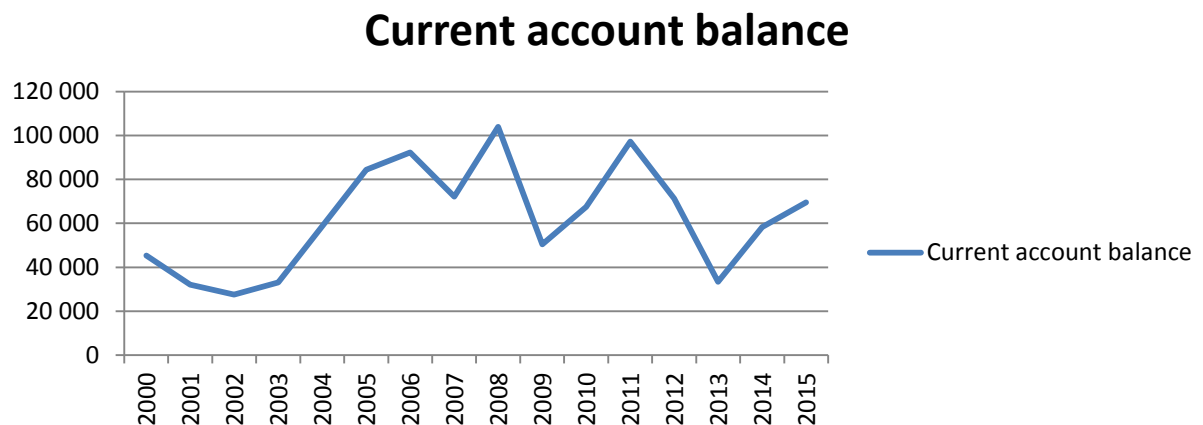
Source: Foreign Direct Investment in the Russian Federation: Flows broken down by Instrument and Country. *Central Bank of Russia* [online]. Moscow, 2016 [cit. 2016-04-15]. Available at: <http://www.cbr.ru/Eng/statistics/?PrId=svs>

Graph 5: Annual GDP growth rate in Russia (%) and average annual Brent oil price (USD per barrel) for 2007-2015



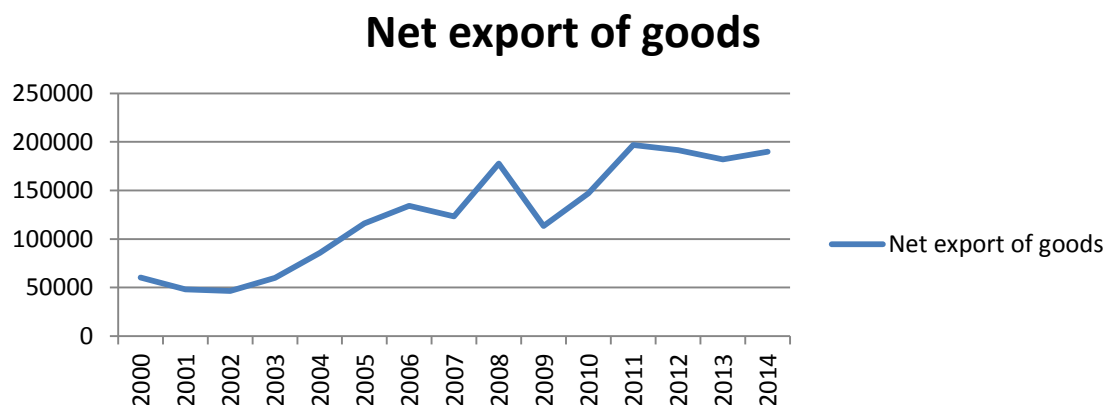
Source: GDP growth (annual %). *World Bank Data* [online]. Washington, D.C.: World Bank, 2016 [cit. 2016-04-15]. Available at: <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>

Graph 6: Current account balance in Russia for 2000-2015 (million USD) (BPM6 methodology)



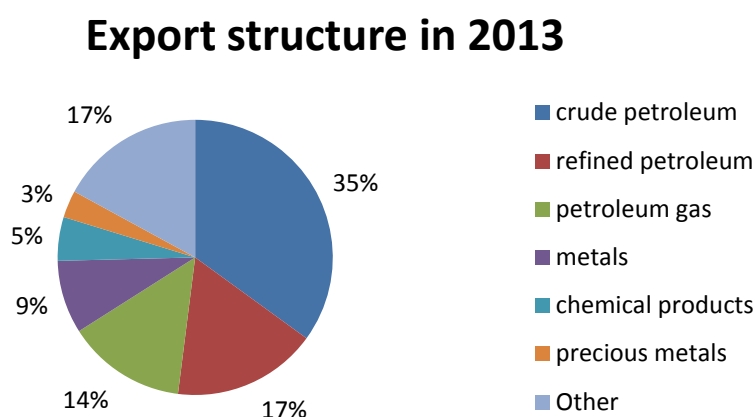
Source: Balance of Payments of the Russian Federation in 2000-2015 (Standard components). *Central Bank of Russia* [online]. Moscow, 2015 [cit. 2016-04-15]. Available at: <http://www.cbr.ru/Eng/statistics/?PrId=svs>

Graph 7: Net export of goods in Russia for 2000-2014 (million USD)



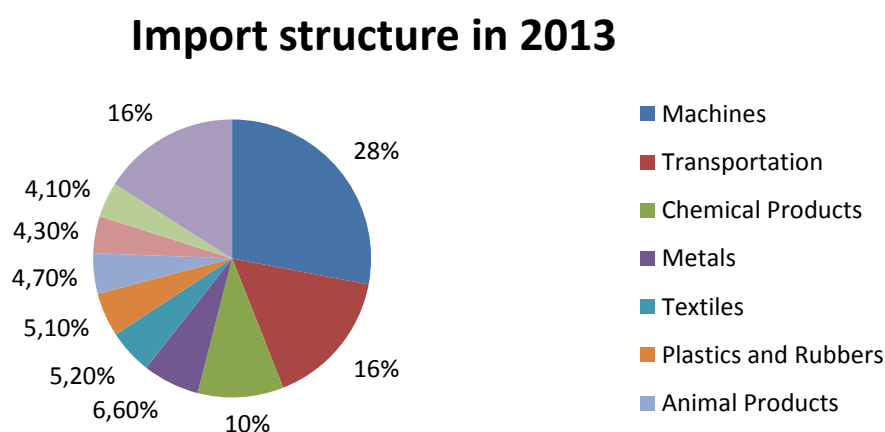
Source: External trade of Russia in goods. *Central Bank of Russia* [online]. Moscow, 2015 [cit. 2016-04-15]. Available at: http://cbr.ru/statistics/credit_statistics/print.aspx?file=trade.htm

Graph 8: Export structure of Russia in 2013 (%)



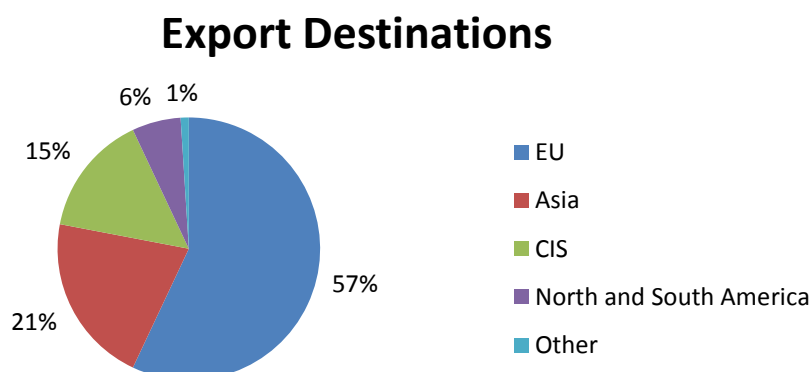
Source: Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2015-10-02]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

Graph 9: Import structure of Russia in 2013 (%)



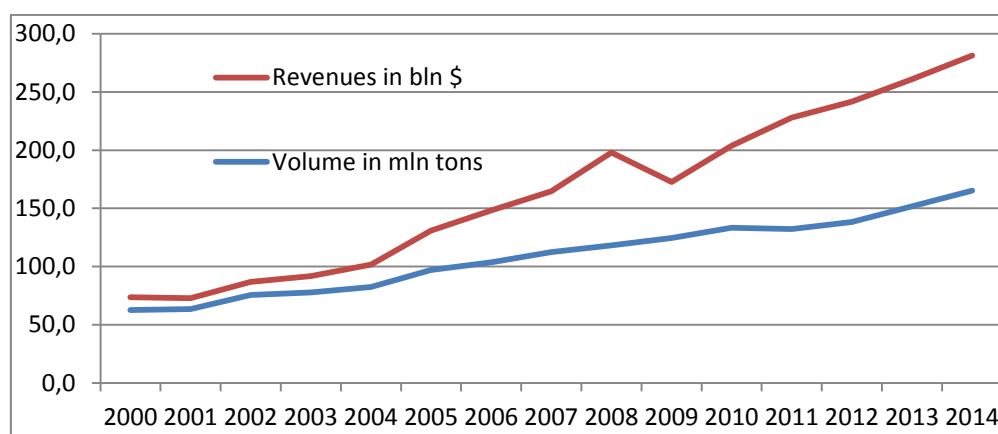
Source: Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2015-10-02]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

Graph 10: Destination for Russian export in 2013



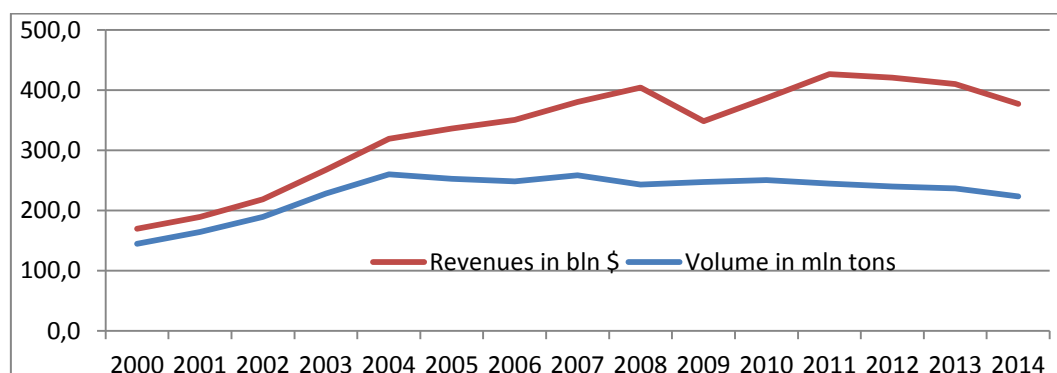
Source: Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2015-10-02]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

Graph 11: Revenues from gas export in Russia for 2000-2014 (billion USD)



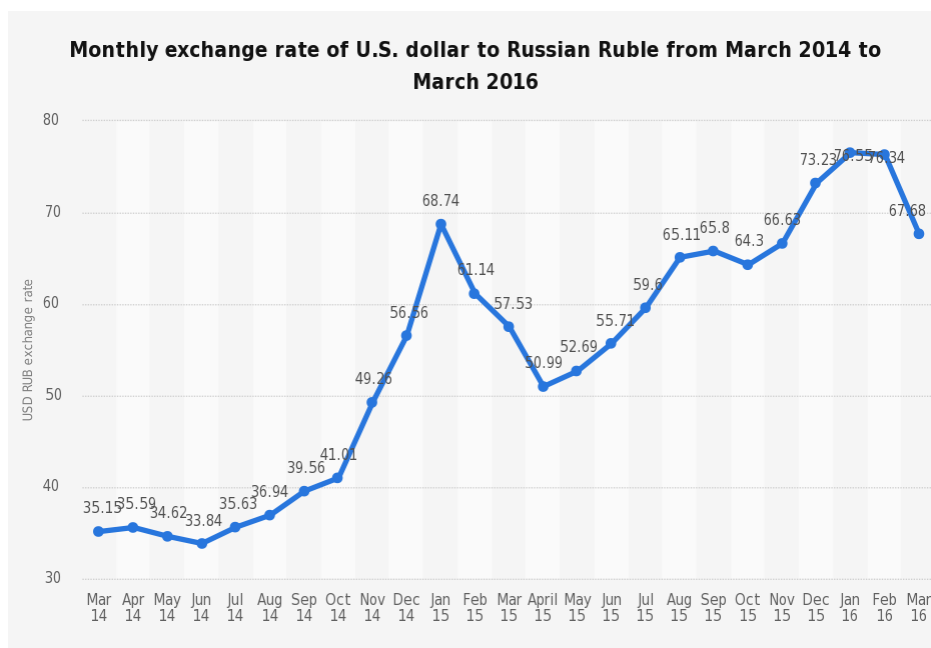
Source: Archive of results for external trade of the Russian Federation. *Federal Customs Service of Russia* [online]. Moscow, 2016 [cit. 2016-04-15]. Available at: http://customs.ru/index.php?option=com_newsfts&view=category&id=125&Itemid=1976

Graph 12: Revenues from export of crude oil (billion USD)



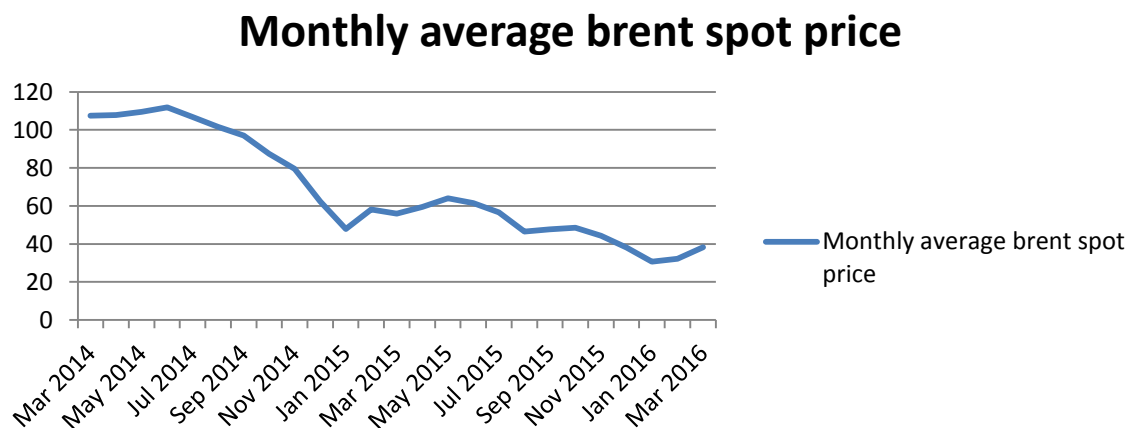
Source: Archive of results for external trade of the Russian Federation. *Federal Customs Service of Russia* [online]. Moscow, 2016 [cit. 2016-04-15]. Available at: http://customs.ru/index.php?option=com_newsfts&view=category&id=125&Itemid=1976

Graph 13: Monthly exchange rate of USD to RUB for 2014-2016



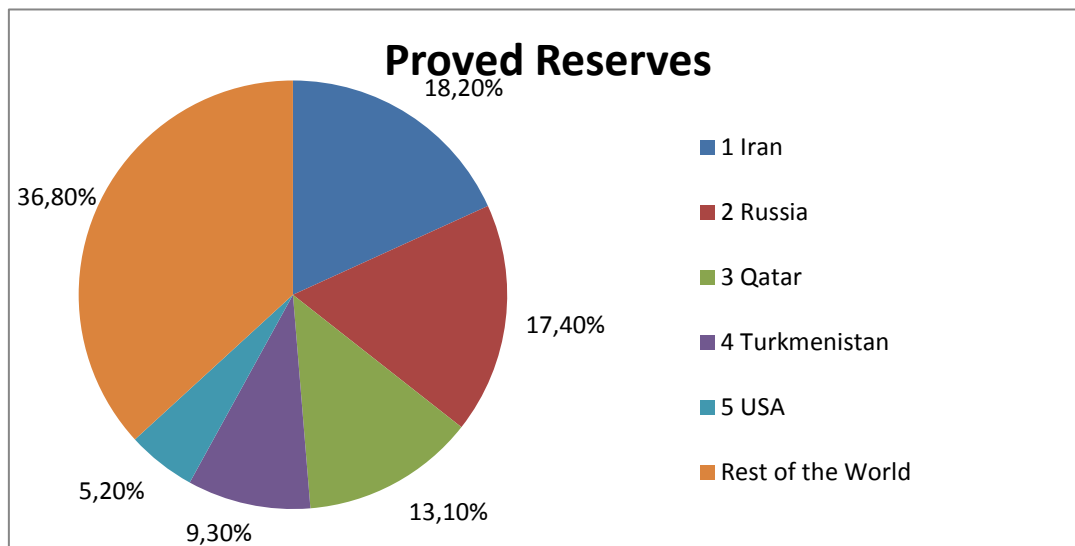
Source: Monthly exchange rate of U.S. dollar to Russian Ruble from March 2014 to March 2016. *Statista* [online]. 2016 [cit. 2016-04-15]. Available at: <http://www.statista.com/statistics/376232/usd-rub-exchange-rate-monthly/>

Graph 14: Monthly average brent oil price per barrel March 2014 – March 2016



Source: Europe brent spot price FOB: Monthly. *US Energy Information Administration: Petroleum & other liquids* [online]. 2016 [cit. 2016-04-15]. Available at: <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=brbte&f=m>

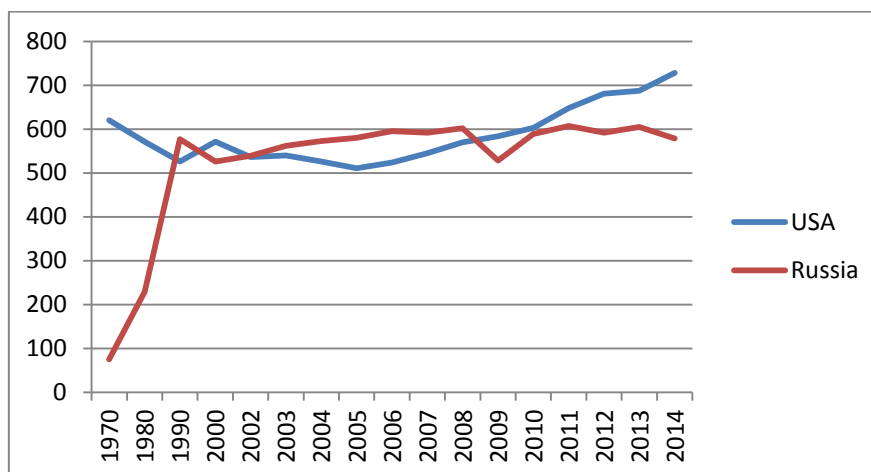
Graph 15: Proved reserves of gas



Source: *BP Statistical Review of World Energy June 2015* [online]. 2015 [cit. 2016-01-15]. Available:

<https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>

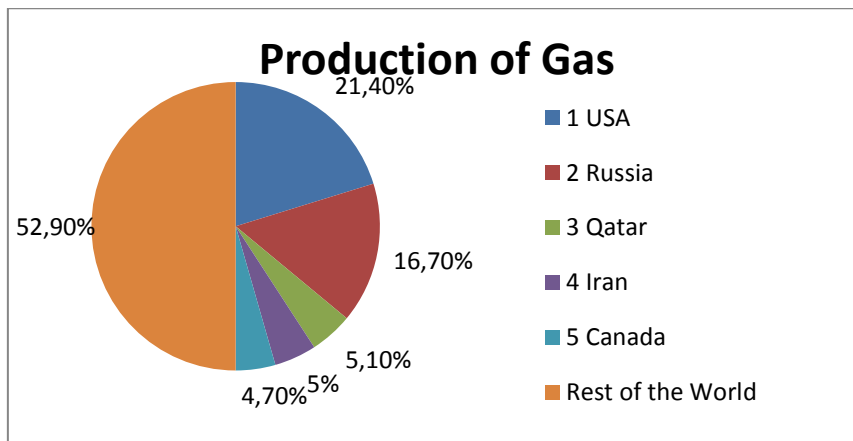
Graph 16: USA and Russian natural gas production



Source: *BP Statistical Review of World Energy June 2015* [online]. 2015 [cit. 2016-01-15]. Available:

<https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>

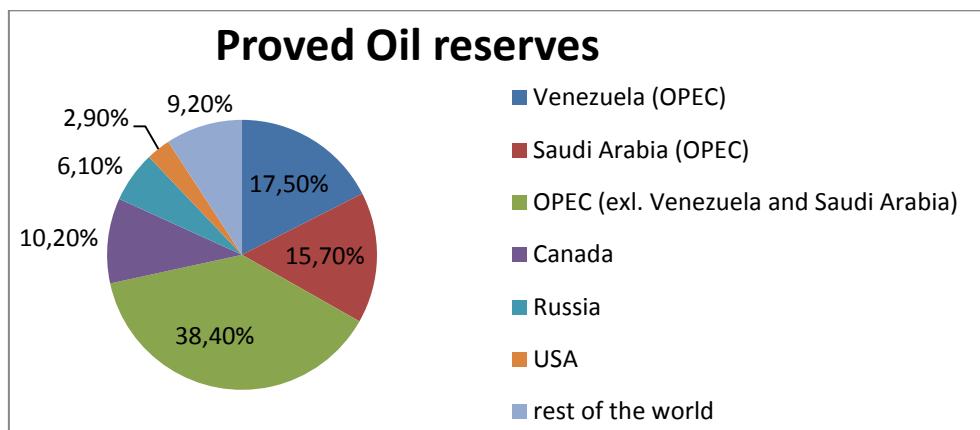
Graph 17: World production of gas by country in 2014



Source: *BP Statistical Review of World Energy June 2015* [online]. 2015 [cit. 2016-01-15]. Available:

<https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>

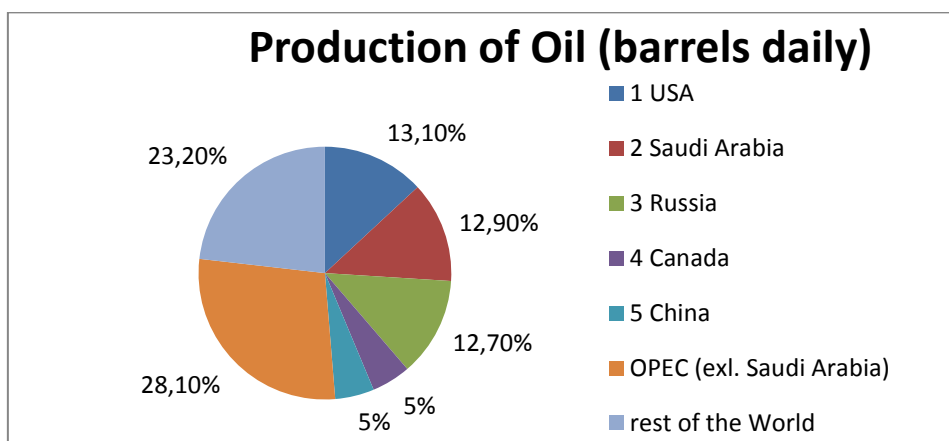
Graph 18:



Source: *BP Statistical Review of World Energy June 2015* [online]. 2015 [cit. 2016-01-15]. Available:

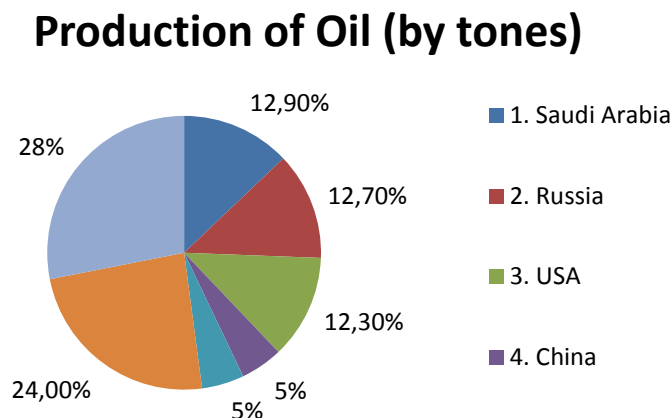
<https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>

Graph 19: World production of oil by country in 2014 (by barrels daily)



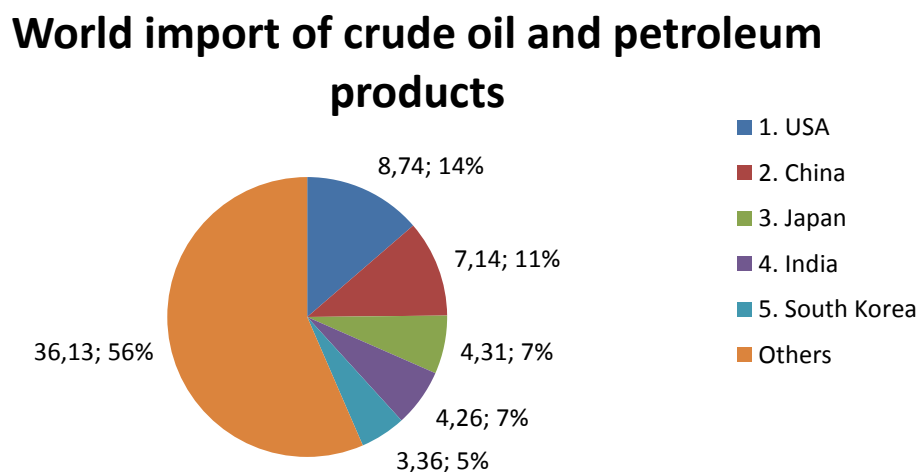
Source: *BP Statistical Review of World Energy June 2015* [online]. 2015 [cit. 2016-01-15]. Available: <https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>

Graph 20: World production of oil by country in 2014 (by tonnes)



Source: *BP Statistical Review of World Energy June 2015* [online]. 2015 [cit. 2016-01-15]. Available: <https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>

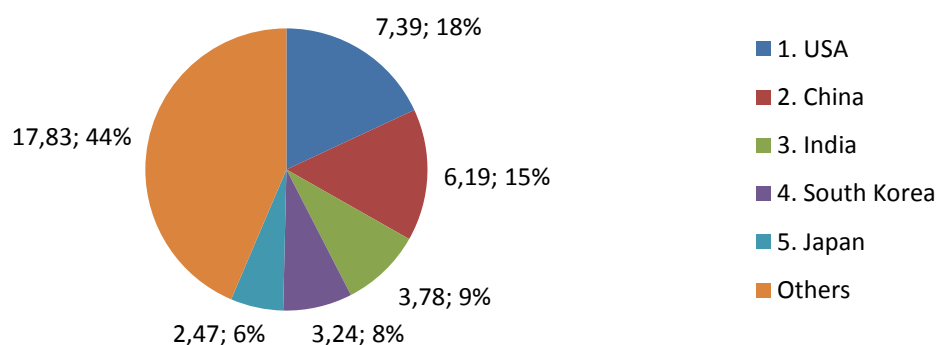
Graph 21: World import of crude oil and petroleum products by country in 2014 (million barrels daily)



Source: *Annual Statistical Bulletin 2015: OPEC*. Vienna: Organization of the Petroleum Exporting Countries, 2015, **2015**(1). ISSN 0475-0608.

Graph 22: World import of crude oil by country in 2014 (million barrels daily)

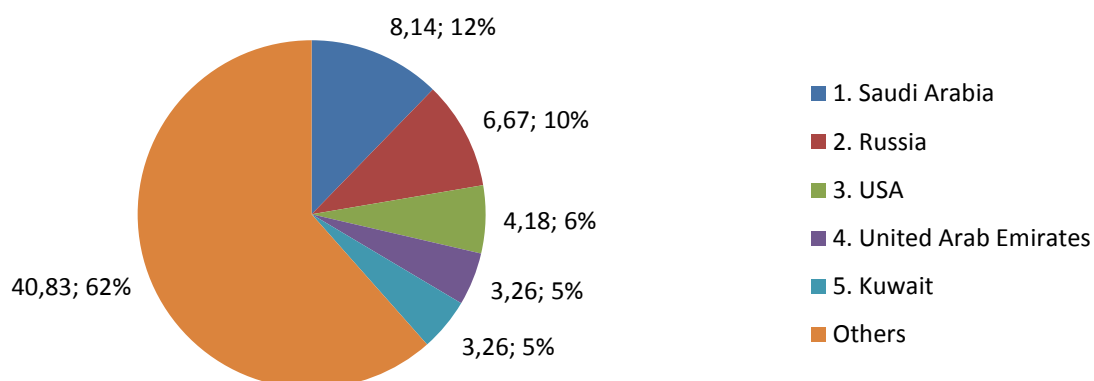
World import of crude oil



Source: *Annual Statistical Bulletin 2015: OPEC*. Vienna: Organization of the Petroleum Exporting Countries, 2015, **2015**(1). ISSN 0475-0608.

Graph 23: World export of crude oil and petroleum products by country in 2014 (million barrels daily)

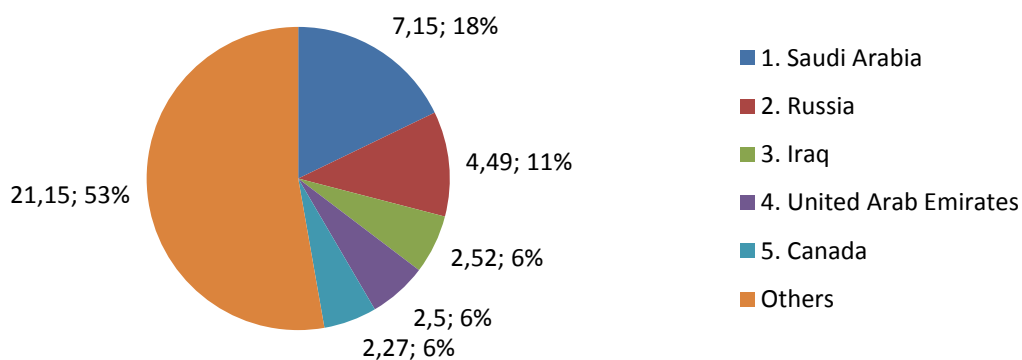
World export of crude oil and refined petroleum



Source: *Annual Statistical Bulletin 2015: OPEC*. Vienna: Organization of the Petroleum Exporting Countries, 2015, **2015**(1). ISSN 0475-0608.

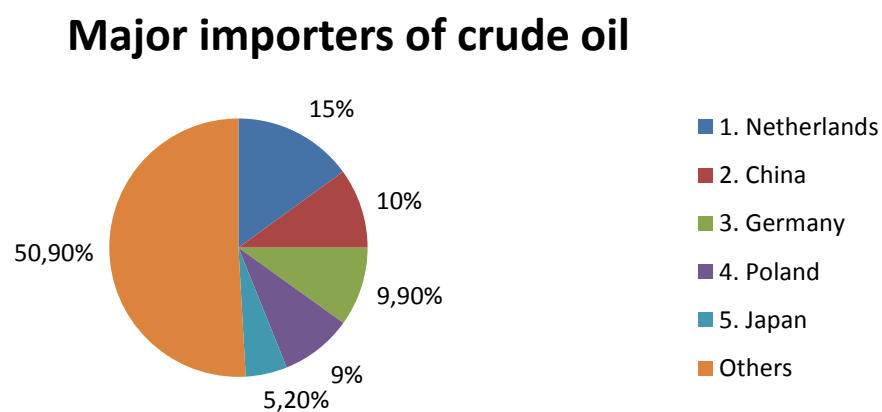
Graph 24: World export of crude oil by country in 2014 (million barrels daily)

World export of crude oil



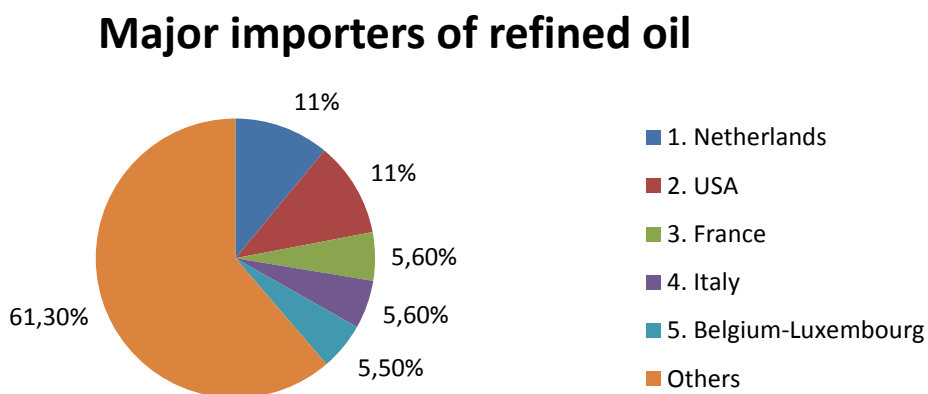
Source: *Annual Statistical Bulletin 2015: OPEC*. Vienna: Organization of the Petroleum Exporting Countries, 2015, **2015**(1). ISSN 0475-0608.

Graph 25: Major importers of crude oil from Russia in 2013 (%)



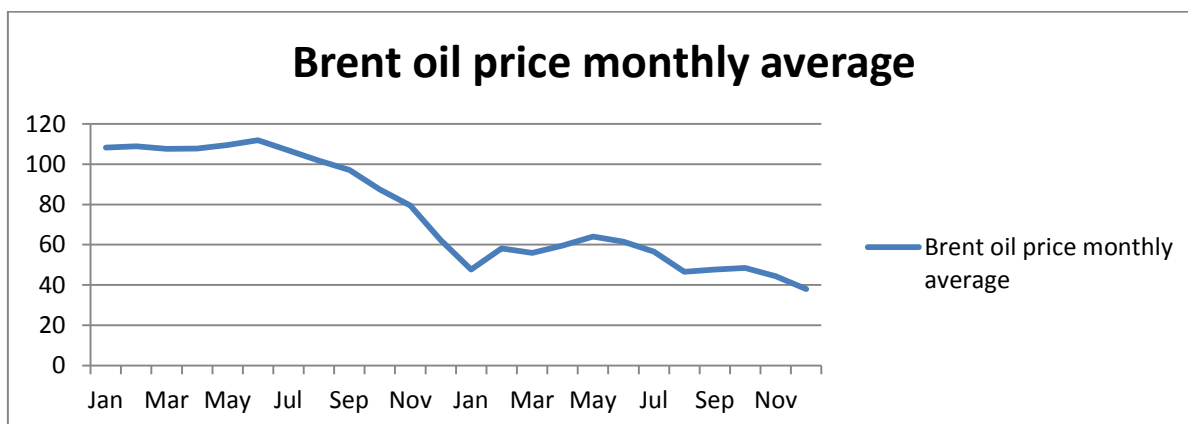
Source: Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2015-04-19]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

Graph 26: Major importers of refined oil from Russia in 2013 (%)



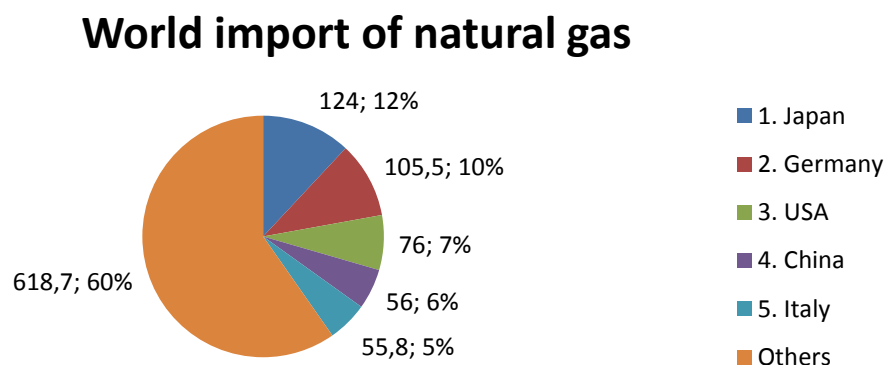
Source: Russia. *The Observatory of Economic Complexity* [online]. 2016 [cit. 2015-04-19]. Available at: <http://atlas.media.mit.edu/en/profile/country/rus/>

Graph 27: Brent spot oil prices; monthly average (USD per Barrel)



Source: Europe brent spot price FOB: Monthly. *US Energy Information Administration: Petroleum & other liquids* [online]. 2016 [cit. 2016-04-15]. Available at: <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=rbte&f=m>

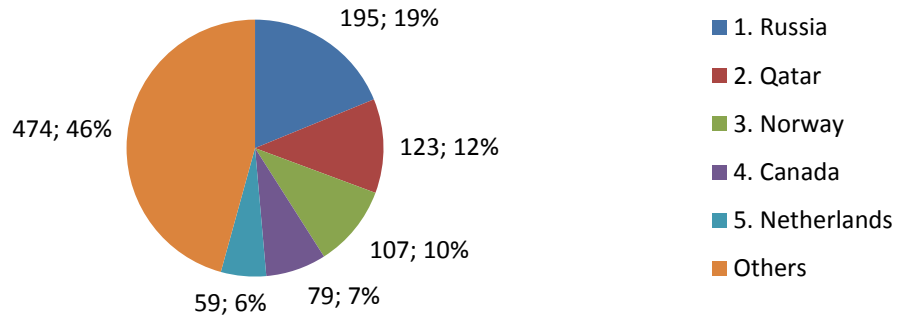
Graph 28: World import of natural gas by country in 2014 (billion cubic metres)



Source: *Annual Statistical Bulletin 2015: OPEC*. Vienna: Organization of the Petroleum Exporting Countries, 2015, **2015**(1). ISSN 0475-0608.

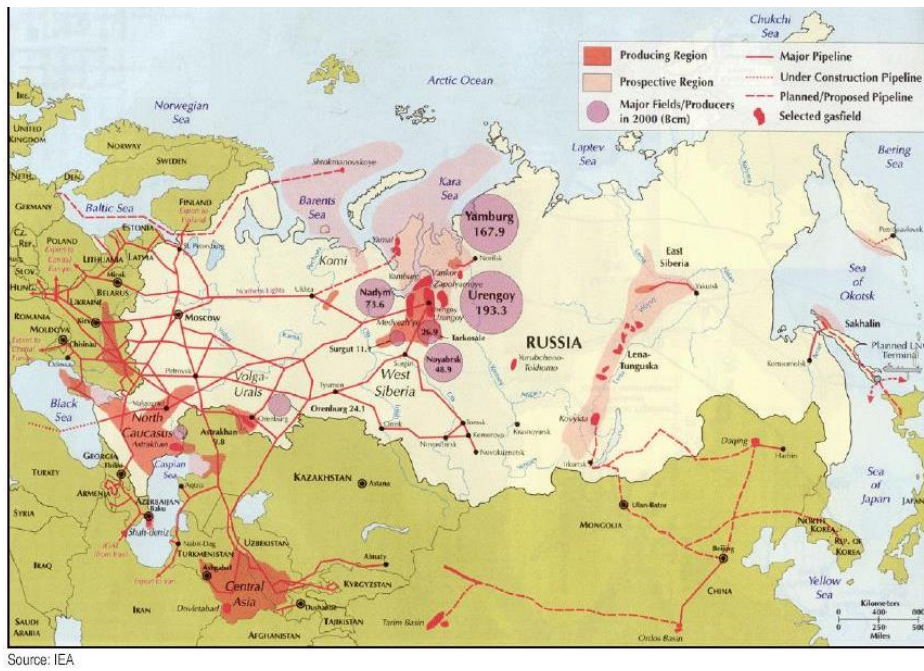
Graph 29: World export of natural gas by country in 2014 (billion cubic metres)

World export of natural gas



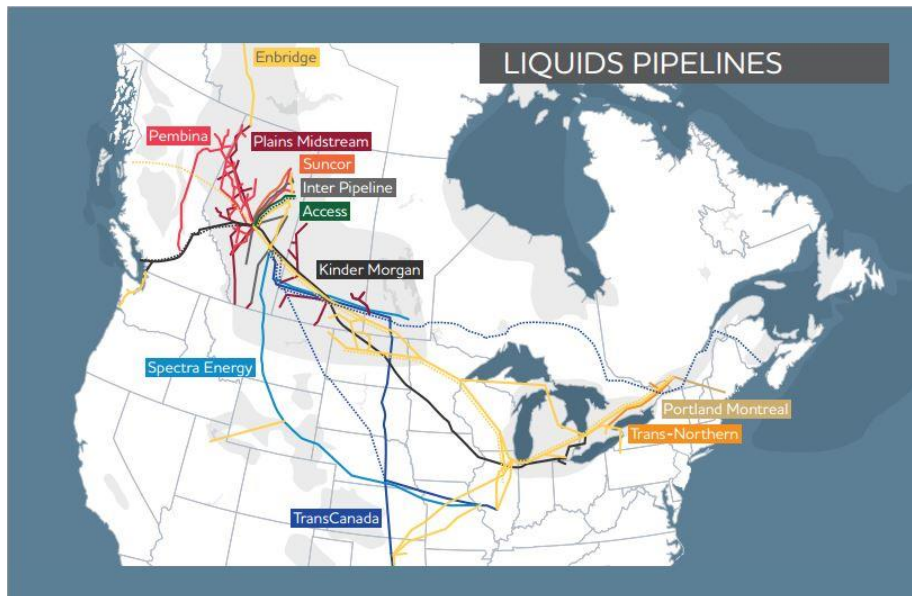
Source: *Annual Statistical Bulletin 2015: OPEC*. Vienna: Organization of the Petroleum Exporting Countries, 2015, **2015**(1).
ISSN 0475-0608.

Picture 1: Major Russia gas basins



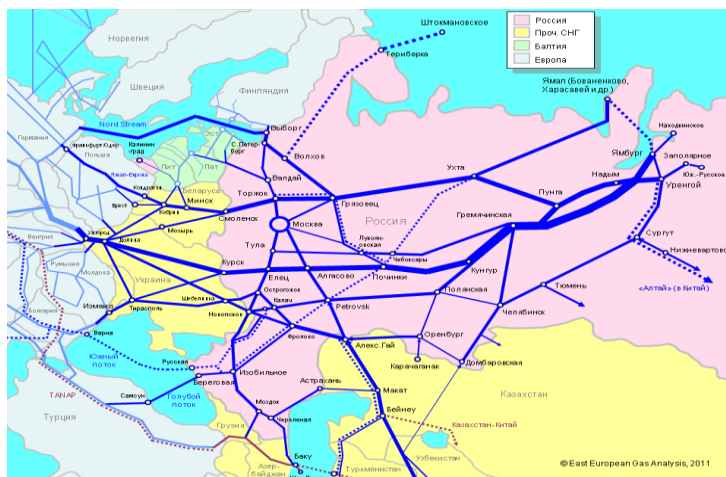
Source: Russia Energy Report. *Oil Peak* [online]. 2011 [cit. 2016-04-15]. Available at: <http://www.endofcrudeoil.com/2011/09/russia-energy-report.html>

Picture 2: Natural gas pipelines between USA and Canada



Source: Canadian Energy Pipeline Association (CEPA) liquids and natural gas pipelines maps. *Canadian Association of Petroleum Producers* [online]. Ottawa [cit. 2016-02-15]. Available at: <http://www.capp.ca/canadian-oil-and-natural-gas/infrastructure-and-transportation/pipelines>

Picture 3: Gas pipeline system in Russia



Source: Major Gas Pipelines of the Former Soviet Union. *East European Gas Analysis* [online]. 2011 [cit. 2016-02-15]. Available at: <http://www.eegas.com/fsu.htm>

Picture 4: Major oil basins in Russia

