



## Prospects of Development of the Oil Industry in the Global Economy and in the Regional Economies

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### ABSTRACT

This article analyzes global and regional development perspectives of the oil business. This study uses statistical, financial methods, as well as comparative approach to analyze modern state of the oil industry in the world and oil industry markets in various regions (OPEC, OECD, Russia, etc.). Results show that current situation in the oil market is characterised by domination of those factors, which will facilitate maintenance of relatively low oil prices. The study develops oil market regulation model. This model takes into account the following main factors: (i) Energy sector development strategies of developing countries, (ii) Geopolitical uncertainties, (iii) Difficulties in forecasting the international geopolitical situation, (iv) Competition for energy sources, (v) The main regulators, which influence both the activity of oil companies and the markets generally.

**Keywords:** Oil Industry, Regional Oil Economy, Global Oil Economy

**JEL Classifications:** Q40, Q41, Q47

### 1. INTRODUCTION

The multiple-valued trend is observed in the global energy market during the last few years. On the one hand, certain last year's data may be considered as the disappointing information (in a certain degree). During the period from 2016 to 2018, growth of the total energy demand has increased. However, increment of growth of energy consumption has decreased. Consumption of coal has increased for the first time during four previous years, carbon dioxide emissions have increased following three consecutive years of small or zero growth. However, in the opinion of the researchers, who analyse the last trends in the world energy market, such unconventional results, which are observed during the last few years, reflect (in the first turn) influence of the short-term cyclic factors, but not influence (in its entirety) of the long-term structural forces, which determine transformation of the energy market. The world gross domestic product (hereinafter to be referred to as "the GDP") has been growing in accordance with

the pace, which is below the average levels. This fact was due to the weakness of the power-consuming industrial sector. Volume of production in certain most power-consuming sectors in China has been significantly reduced. It is not possible that these factors will be maintained in future. However, there is the positive trend as follows: Many structural forces, which determine transformation of the energy market, had continued to exert influence upon the global energy market. This fact has reflected as maintaining the stable increase in utilisation of the renewable energy sources and utilisation of natural gas (Al Ahram, 2016; Althaqeb, 2017; BP, 2017).

Focusing attention on the oil industry, it is possible to state that reduction in supplies of oil would be reasonably occurred following several years of the oil oversupply. It is possible that it is yet difficult to imagine this situation taking into account increase in oil production in the USA and growing sense of optimism within the entire oil sector during the last few years. Generally speaking, it is

worth to note the following: In 2019, industry feels itself much better than, for example, a year ago. This fact has resulted in revival of the market level of oil prices. Following the moment, when volumes of Brent oil production were limited in the range of prices from 40 up to 50 U.S. Dollars per barrel, at the present moment, level of oil prices exceeds 70 U.S. Dollars per barrel. It is possible to acknowledge the fact that this sphere of activity is recovered following very low prices during the last few years, following reallocation of portfolios of assets of the leading world oil corporations, as well as following increase in productivity of operation of these corporations (Burger et al., 2016; BP, 2017; Bp.com, 2018).

At the same time, the International Energy Agency (IEA) states that there is possibility of reduction in supplies towards the end of 2020. Most recently, several top managers (Directors General of “Total,” “Eni,” and “Saudi Aramco” corporations) have made predictions concerning such possibility in the end of this decade. Because of oil demand grows (while investments into many large-scale projects were delayed during the course of economic recession), potential proposition is becoming smaller and smaller. Petroleum companies will have to increase production of oil, and there is a risk that certain companies may try to keep up the pace with all their strength (IEA, 2017; Oil and Gas Global Industry Guide, 2018; Davos, 2019).

Of course, the main problem is connected with the internal volatility in the energy sector. Manufacturing companies need time in order to overcome caprices of the oversaturated or undersaturated markets. In addition, they must also fight against the pace and scales of transfer to the energy, which is produced from non-fossil (alternative, renewable) sources of fuel. Faced with these uncertainties, oil and gas companies must develop stable strategy in order to decrease these risks. Moreover, the issues of legal regulation of the turnover of energy resources are no less important on the scale of the entire international community (Inshakova et al., 2019). In the immediate future, these companies must maintain discipline of capital and concentrate attention on increase in productivity, as well as in utilisation of new technologies. In the longer term, they must transform their asset portfolios into the profitable portfolios against the background of possible occurrence of low prices. Moreover, they will need to find relevant methods in order to ensure stability of their portfolios in future, as well as to ensure their safety in the conditions of transfer to the new world, which is characterized by low level of emissions of carbon dioxide (Alessandro and Seiermann, 2016; Ibrahim et al., 2018; Maalel and Mahmood, 2018).

As concerns situation in Russia, in 2018, this country has been able to increase production of oil and export of oil and natural gas up to the record-breaking level. In principle, this success was achieved at the expense of development of the LNG projects, as well as due to growth in demand for natural gas in Europe. Export of oil has been supported by relaxation of arrangements within the framework of the OPEC+. In the first half of 2019, situation in the oil industry is not the same successful. For the most part, it is connected with beginning of implementation of new restrictions (Eder et al., 2018; Morozov et al., 2018; Davos, 2019; Finam.ru, 2019; Katkova, 2019).

There are forecasts concerning occurrence (in 2040) of key four macro-trends, which would play the leading roles in the oil and gas branch, as follows. Increase in demand for primary energy sources due to change in social and demographic factors; increase in energy efficiency; increase in the cost of oil production (Kvon et al., 2019); growth of the non-traditional production of natural gas in the Northern America. With respect to the uncertainty factors, which will exert influence upon the world geopolitical situation up to 2040, it is possible that there will be two main ways of development of further events (Barrows, 2018).

One of these ways is as follows: Sharpening of political situation in various regions of the world. This way can aggravate commercial relations and cause decrease in production of material values. It is possible to state that such situation is “the stagnation in the conditions of conflict” (Burger et al., 2016; Bollen and Rojas-Romagoza, 2018).

Another way is policy of peaceful co-existence, which creates conditions for economic prosperity in future. This policy is characterised by the stable growth, which is accompanied by the following factors: Integration of the world markets; conclusion of multilateral agreements between countries; completion of current negotiations within the framework of the World Trade Organisation (WTO) (Eder et al., 2018).

As concerns the last events in the sector of energy consumption, global consumption of energy was caused by revival of China, which is the largest world consumer of energy beginning from 2009 (Liu et al., 2018). By the way, China has no its own sufficient energy reserves. By the end of 2018, consumption of energy in China has been increased by two times as compared with the level of consumption 2 years ago. This fact was caused by high industrial demand. This demand has compensated three previous years, which were characterized by the following factors: Low energy consumption, increase of energy efficiency in industry, and national policy, which was aimed at decarbonisation of economy (Hong and Hsu, 2018).

In addition, it is worth mentioning that consumption of energy has also increased in the majority of Asian countries, such as India, Indonesia, Malaysia, or South Korea. Economic growth has also caused growth of energy consumption in Europe (for example, in Germany, France, Italy and Turkey, while economic growth has decreased in Great Britain), in Canada and in Russia (the end of the 2-year economic recession).

Consumption of energy in the USA has been remained stable for the second consecutive year due to (to a certain degree) decrease in demand for electric power, as well as due to increase in energy efficiency. This situation has restored following 2 years of reduction in Brasilia, but demand for electric power has decreased in Mexico and Argentina (Yearbook.enerdata.net, 2019).

Finally, certain positions, which will be stated by the largest oil extraction companies of the world, will exert influence upon further development of the oil-and-gas extraction industry as well. In accordance with the data of the OPEC, as of year-end

2018, member countries of this organisation own 85% of all known oil reserves in the world. Even in spite of the fact that there exist many uncertainty factors, the largest oil extraction companies of the world still are players of great importance. In the course of formulating plans for the future, it is necessary to take into consideration such important factors, as role of the OPEC member countries, as well as to take into account revival of production capacities in Mexico. Consequently, the OPEC countries and Mexico would continue to occupy positions of the largest suppliers of these natural resources. Nevertheless, there exists a whole number of uncertainty factors in the market. The OPEC has already repeatedly intervened in the processes of supplies and purchases by imposing embargo on the export of oil or, vice versa, by creating oversaturation of market with oil (as it was made, for example, in December of 1980.), thus provoking decline in oil prices (Lazko, 2019).

In the end, the research questions addressed in this study are as follows:

- To perform analysis of the main aspects and spheres of influence of the world policy and regional policies (for the case of Russia) upon the market conditions, prices, and total level of volatility of the oil market;
- To assess state of the oil market;
- To reveal prospects of development of the Russian oil industry in the regional economies and in the global economy, as well as to perform analysis of these prospects;
- To perform scenario analysis of development of the oil branch;
- To develop total model of the market on the basis of results of the scenario analysis, as well as on the basis of forecasts and structure of the oil industry in the regional scale and in the global scale.

## 2. METHODS

### 2.1. Research Design

Taking into account active development of the renewable energy sources, which are already in significant competition with traditional energy sources (such as coal, oil, and natural gas) at the present moment, author of this article has decided to focus his attention on the forecasts in the oil market, on analysis of situation in the oil industry, as well as on investigation of changes in the competition between traditional and alternative sources of fuel.

Before embarking on the detailed analysis of the oil market, it is necessary to consider main factors, which exert influence upon the oil industry and which set the trends (drivers) for the oil industry development, for development of competition, as well as for changes in the conjuncture of the oil market in its entirety.

It is worth to note that there are several essential factors in the oil industry:

- Vectors of development of the developing countries in the energy sector. Within the next few years, this factor will determine whether economic growth in China will continue and whether India will be successful in the beginning of fulfilment of its role as the world driver of economic progress. In addition, there remains another problem: Whether this low

economic growth, which is characteristic for the oil industry at the global level, will be transformed into the pervasive phenomenon.

- Geopolitical uncertainties, which at the present moment are already manifested in the social instability in the developing countries, many of which play important roles in the oil and gas branch, taking into account the fact that the greater part of the strategic petroleum reserves is situated in the developing countries (the United Arab Emirates, Russia, Iran, Iraq, Kuwait, Saudi Arabia, Venezuela, Qatar, Indonesia, Libya, Algeria, Nigeria, Ecuador, Gabon, etc.)
- Difficulties in prediction of the international geopolitical situation, which has been additionally exacerbated by the position, which would be taken by the USA in the global arena, as well as whether the USA will be successful in maintenance of its unofficial position of the international regulator.
- Competition between energy sources, which was already discussed above and which is manifested as the process of the sufficiently multiple-valued nature. Despite the success and preferential position that have been achieved already, new fuel technologies have not yet been fully established and proved themselves as economically profitable technologies. In addition, it should also be noted that there is no any systemic policy in order to encourage transfer to utilisation of these technologies. Two alternatives of development of events are possible. In the first case, which we hereinafter will refer to as “the grey vector of development,” dependency of economy from the traditional sources of energy (among which fossil fuels will be the leaders in the market of primary energy sources) would continue to remain. As concerns “the green vector of development,” we will observe the situation, where alternative renewable sources of energy and more environmentally friendly sources of energy will occupy their place in the general world energy structure (Katkova, 2019).

Generally speaking, while considering these factors, it should be noted that changes in the conjuncture of the oil market and in the geopolitical courses of the countries, which play their strategic roles in the world oil market and in the regional oil markets (alliances, arrangements, agreements, or, vice versa, for example, price confrontations, etc.), exert influence upon the vectors of development of the developing countries in the energy sector. For many years already confrontation is taking place between the “oil” regions of the OPEC and “oil” regions of the OECD in order to benefit from various advantages and growth in revenues from oil sales, as well as with the purpose of restriction of influence of the competitor upon the world market conditions (prices) for each of competitors. In addition, countries of the North Atlantic region (the USA, Canada), Russia, China, and India, which is a relatively new player in the market (which, however, have already stated its positions and which strengthen them with every passing year), exert great influence upon the oil market.

Let us consider influence of these factors in more detail in the subsequent sections.

### 3. DATA ANALYSIS

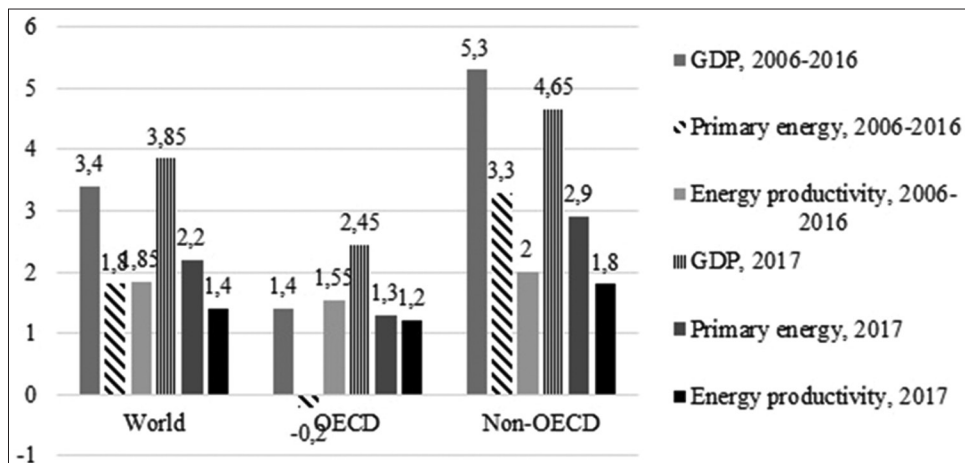
During the last few years (from 2016 to 2018), trend of economic growth is observed within the OECD region, and this fact has exerted influence upon growth of the world demand for energy: By 2.2% in 2017 as compared with 1.2% in the previous (2016) year (Figure 1). This parameter has exceeded the average level for 10 years, which is equal to 1.7%. At the same time, this fact has also reflected a slight deceleration in the increase in the energy consumption (or in the energy efficiency): Quantity of energy, which is needed for manufacture of the unit of product. Despite of the unusually strong growth within the OECD region, the vast majority of growth of the world energy consumption has been ensured by the developing countries – approximately at the level of 80%.

Majority of analysts states that flows of oil production and consumption of oil have achieved the equilibrium state (in its

entirety) in 2016-2017. However, reserves have remained at the record high level. The OPEC countries along with 10 countries, which are not the OPEC member countries and which are headed by Russia (sometimes this group of countries is referred to as “the Vienna Group of 10”), have begun to implement their reductions in oil production (these countries have promised to implement such reductions earlier) in order to accelerate adjustment of energy reserves. However, these processes were accompanied by accumulation of the American dense oil, thus threatening to compensate consequences of reduction in oil production.

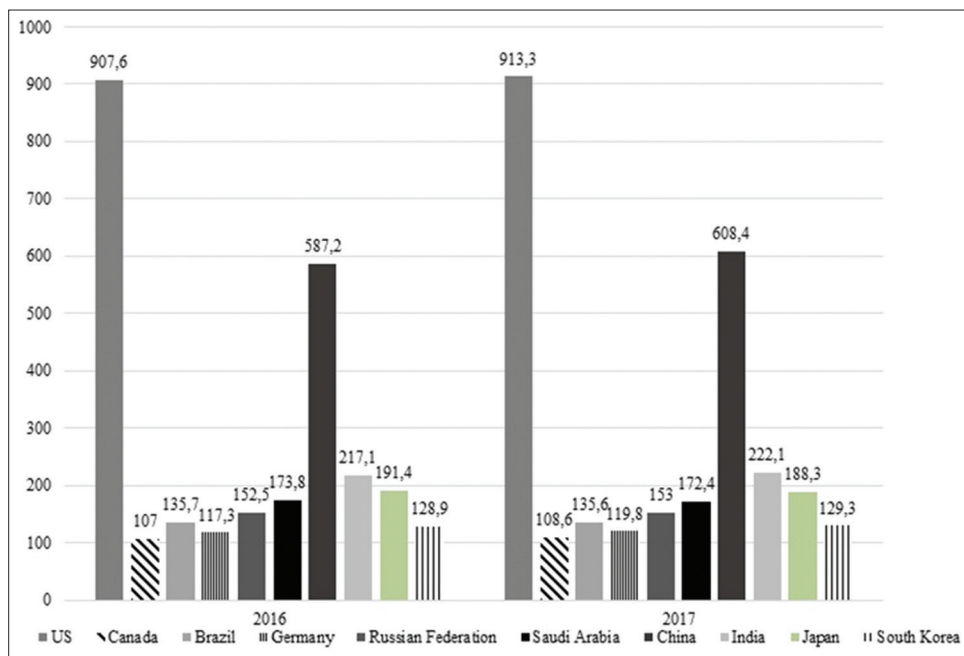
As concerns energy consumption, in 2018, oil demand has increased by 1.7 million barrels a day (mb/day), and it has essentially exceeded the 10-year average value, which is equal to approximately 1.1 mb/day. In order to compare and assess the recent strength of demand for oil, it is necessary to pay attention to the fact that average growth during previous 5 years is at the

Figure 1: Growth in GDP and energy, 2006-2016/2017

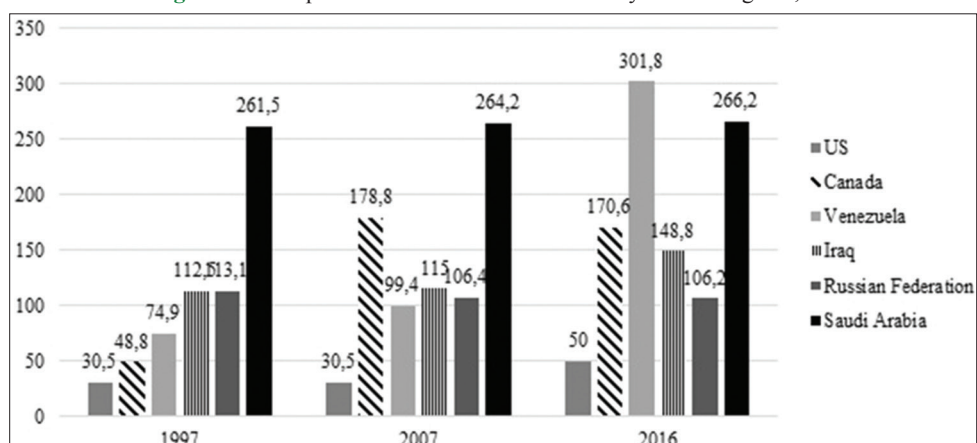


Source of information: (Www.bp.com, 2017)

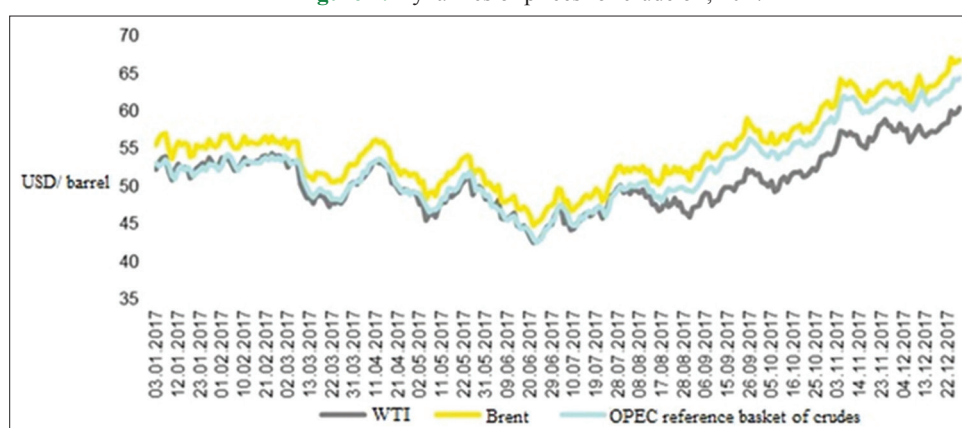
Figure 2: Global oil consumption by benchmark countries, 2016-2017



Sources of information: (Www.bp.com, 2017; Yearbook.enerdata.net, 2019)

**Figure 3:** Total proved oil reserves in the world by various regions, 1997-2016

Sources of information: (BP, 2017; Bp.com, 2018)

**Figure 4:** Dynamics of prices for crude oil, 2017

Sources of information: (OPEC.org, 2017; Oil and Gas Global Industry Guide, 2018)

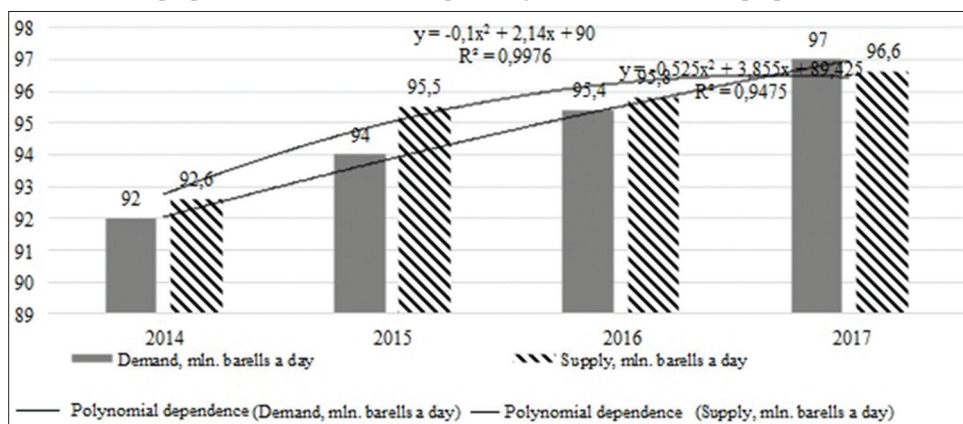
highest level following the moment of growth of the inventory cycle during the period from 2006 to 2007. Demand for oil in 2017 has been continued to be encouraged by oil importers, which were receiving returns due to the unforeseen decrease in prices. During this same period of time, notable increase in prices (as compared with the average decrease during previous 10 years) was observed both in Europe (0.3 mb/day), and in the USA (0.2 mb/day). Growth in China (0.5 mb/day) was approximately equal to its 10-year average value. However, there were also certain indications that increase from the low oil prices can begin to weaken. Growth in the consumer fuel consumption, which is subject to changes in the oil prices (especially, prices of petrol) to the most extent, has slowed down in 2017. On the contrary, demand for diesel fuel has restored (this process was facilitated by acceleration of the industrial activity, Figure 2).

Specialists state that it is possible to see influence of reduction in the oil production as the growth in the oil proposition during the period of time from 2017 to 2018. At the aggregate level, growth of production in 2017-2018 (by 0.6 mb/day) was similar to the growth in 2016. However, nature of this growth has changed quite sharply. Following growth by 1.6 mb/day in 2016, production of the OPEC member countries and other member countries of the Vienna Group of 10 has decreased by 0.9 mb/day in the previous year, during which reduction in production has occurred. On

the contrary, following decline in oil production in 2016, oil production by the countries, which are not member countries of the Vienna Group of 10, has increased by 1.5 mb/day (headed by the USA) and decreased in Lybia (this country was not participant of the Vienna agreement). The Vienna Group of 10<sup>1</sup> has set the goal of reduction in oil production almost by 1.8 mb/day as compared with the reference month (October 2016). In the course of implementation of reduction in the oil production, this parameter has been exceeded substantially: In April 2018, volumes of reductions were equal to almost 2.5 mb/day. For the most part, the main source of this process and further development of this situation were concentrated in Venezuela, where economical and political crisis has caused decline in oil production almost by 700 thousand barrels a day (thousand b/day). This decline has substantially exceeded the targeted reduction by 100 thousand b/day in Venezuela. To a lesser degree, this decline was exceeded in the Saudi Arabia and Angola. This decrease in the oil production has been facilitated increase in the pace of decline in oil reserves down to the more normal level in 2017 (Figure 3). Due to this reduction, daily oil consumption has exceeded volume of oil production during the greater part of 2017. As a result, commercial

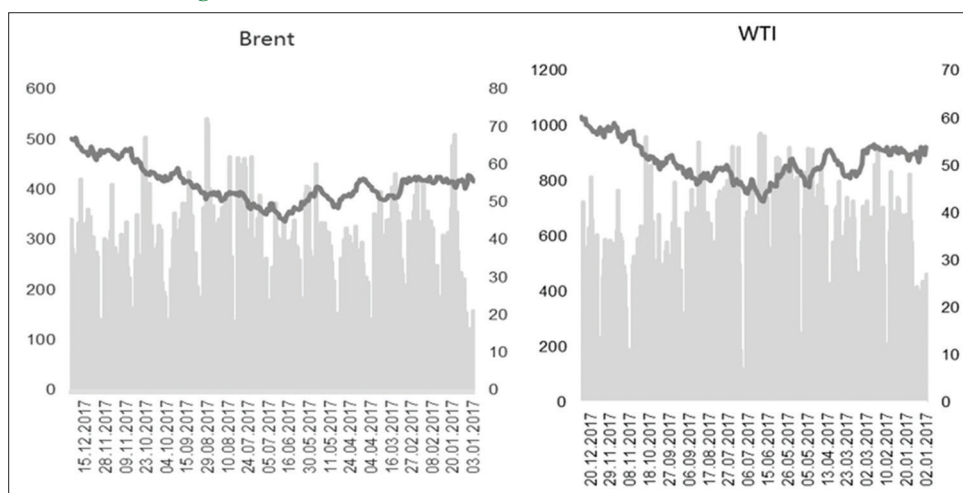
<sup>1</sup> This is in reference to the Vienna agreement between the OPEC member countries and the OPEC partners, which are not member countries of this organisation (OPEC+), concerning reduction in oil production as a counterbalance to the policy of the USA.

**Figure 5:** Demand and proposition in the oil market; pace of growth in demand and proposition from 2014 to 2017, mb/day<sup>2</sup>



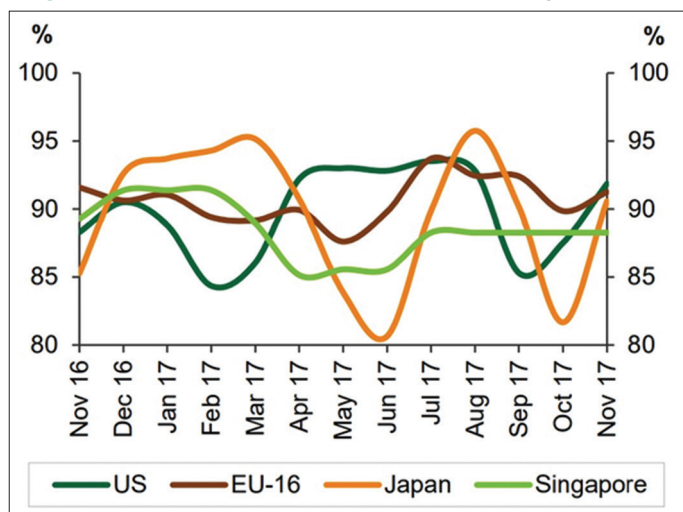
Sources of information: (BP, 2017; Bp.com, 2018; Author’s calculations)

**Figure 6:** Price for crude oil and volumes of trades in 2017, U.S. Dollars<sup>3</sup>



Sources of information: (BP, 2017; Bp.com, 2018)

**Figure 7:** Overall utilisation of refineries in various regions in 2017<sup>4</sup>



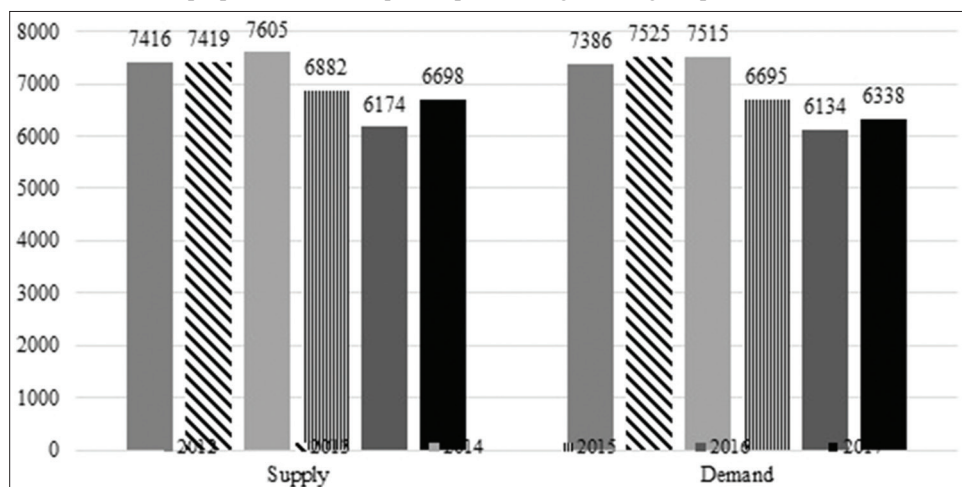
Source of information: (OPEC.org, 2017).

energy reserves of the OECD have decreased approximately by 150 mb/day in 2017. In March 2018, volume of these reserves was in correspondence (in principle) with the original moving-average parameter for 5 years (in accordance with the data, which were published by the Vienna Group of 10).

As we can see in Figure 3, volume of oil reserves has essentially increased in Iraq, Canada, and Saudi Arabia. Processes of mergers and acquisitions of assets by the transnational corporations all over the world have exerted the greater influence upon this increase.

In addition, it is also worth to note that consequences of reduction in oil production would be more essential, provided that there would be no reaction in respect of the scarce oil from the part of the USA, as well as in respect of the liquefied natural gas, volumes of production of which have increased almost by 2 mb/day following October 2016. Indeed, pace of this second wave of growth in the USA is connected with scarcity of oil, which was observed during last 1.5 years (or approximately during this period of time), is comparable with the rapid growth, which has been observed in 2012-2014, although oil prices during these years were essentially higher. The rapidity and scale of the OPEC activities mean that this organisation still has the ability to smooth temporary hindrances in

2 Annual Report, 2017, OPEC: [https://www.opec.org/opec\\_web/static\\_files\\_project/media/downloads/publications/AR%202017.pdf](https://www.opec.org/opec_web/static_files_project/media/downloads/publications/AR%202017.pdf)  
 3 <http://ru.investing.com/commodities/brent-oil-historical-data>  
 4 OPEC Monthly Oil Market Report. 20 December 2017 – Argus Media

**Figure 8:** Demand for and proposition of the liquefied petroleum gas during the period of time from 2012 to 2017, 1000 tons<sup>5</sup>

Sources of information: (Oil & Gas Global Industry Guide, 2018; The world energy outlook, 2018)

the market of oil. However, relatively rapid reaction from the part of the USA strengthens restrictions in respect of the OPEC power. If OPEC will try to confront with the more permanent changes or structural changes in the market, there exists the growing risk that these actions will be rapidly mitigated by the response reaction of the American oil industry.

In analysing changes in the sphere of oil refining, it should be noted that increase in the throughput capacity (in combination with the continuing decrease in availability of the refined petroleum products in the markets of the Latin America) has made it possible to broaden the economic space for the oil-processing plants (refineries) in the USA and in Europe following decrease in this space in 2016. Increase in quantity of the oil-processing plants along with another year of weak growth of production capacities has stimulated increase in consumption of the refined petroleum products up to the highest level during previous decade. Financial parameters of efficiency of the world oil-processing branch have increased as well. This process was facilitated by: Consequences of the Hurricane Harvey; high utilisation rates; decrease in production stocks down to more normal level (IEA, 2017; Oil and Gas Global Industry Guide, 2018).

Generally speaking, it can be said that Asia is the leading regional consumer of oil, coal, renewable energy sources, and hydroelectric power, while Northern America is the leading regional consumer of the nuclear-generated electric power and natural gas. Asia dominates in the worldwide consumption of coal: Almost three quarters of the world consumption (74.5%). Share of Asia in the coal market has been rising steadily beginning from 1965, when it was only equal to 17% of the coal consumption. However, this share has achieved the level of 50% in 2001.

Taking into account growing importance of the alternative sources of energy, to date oil still remains to be the dominating fuel in the world, share of which is equal to slightly more than one third of the total energy consumption.

As concerns the total cost of the market for petroleum products, this parameter is estimated at the level of 1977.1 billion U.S. Dollars in 2017, that is, by 26.8% greater as compared with 2016.

At the same time, it is expected that total cost of the oil market will be equal to 2,627,400 million U.S. Dollars in 2022. Average annual pace of growth will be equal to 5.8% during the period of time from 2017 to 2022.

As of 2017, volume of the energy consumption in the market is equal to 54,100 mb/day. As it is expected, volume of the oil market will achieve the level of 59,400 mb/day by the end of 2022, while the average annual pace of growth will be at the level of 1.9% during the period of time from 2017 to 2022. Such forecast is explained by the expected global increase in prices for all commodities, especially for crude oil. The European market of oil and gas must return to level of growth during the forecasted period, because of price for oil will be stabilised due to reduction in supplies from the OPEC countries, as well as due to the sanctions, which were again imposed on Iran.

Growth of prices is caused (to a large extent) by the agreement of the OPEC countries to reduce oil production by 1.2 mb/day from the current level of 32.4 mb/day. Implementation of this agreement will make it possible to avoid approximately 1% of oil production in the global scale.

In 2017, revenue from sales of crude oil in the market of petroleum products was equal to 1,627.8 billion U.S. Dollars, that is, it was equal to 82.3% of the total cost of the oil market. In 2017, cost of the natural gas segment was equal to 349,600 million U.S. Dollars, that is, it was equal to 17.7% of the total cost of the oil market.

Change in demand for natural gas in the communal/municipal sector depends on weather conditions to a large extent. Mild winters may cause decline in demand for petroleum products, and vice versa. In addition, demand depends on willingness of many countries to reduce carbon dioxide emissions. Generation of electric power with the help of natural gas results in emissions of carbon dioxide, which are lesser by 50% as compared with generation of electric power with the help of coal.

5 OPEC Monthly Oil Market Report. 20 December 2017 – Argus Media

In 2017, general trend of the crude oil prices reflects growth (Figure 4). As compared with 2016, price for oil Brent (major crude oil in Great Britain) has increased by 23.8%, price for oil WTI (West Texas Intermediate oil in the USA) has increased by 17.4%, price for the OPEC reference basket of crudes has increased by 28.6% or by 11.67 U.S. Dollars up to the level of 52.43 U.S. Dollars as of year-end 2017.

Spot prices for crude oil (Brent, WTI, and Dubai) have increased by 10.41 U.S. Dollars, 7.55 U.S. Dollars, and 11.69 U.S. Dollars, respectively.

As we can see in Figure 5, in 2017, proposition of oil was equal to 96,510,000 barrels a day (hereinafter to be referred to as “mb/day”), that is, by 0.71% larger than in 2016. There are forecasts that in 2018 world demand for oil will be at the level of 98.8 mb/day. In 2017, market-based consumption was equal to 98.18 mb/day, that is, by 1.8% larger than in 2016.<sup>6</sup>

The OECD has made the greater contribution to increase in demand in Europe due to steady progress in the industrial sector. Particularly high demand has been observed on the part of the transportation sector. Economic growth has been also observed in the countries, which are not participants of the OECD.

Chinese growth in demand for oil was stable in 2017, because of petrochemical sector and transportation sector have continued their development in the steady and sustainable pace. It is expected that expansion of enterprises in the transportation sector will ensure the main part of growth in demand for oil. In accordance with the existing forecasts, growth in demand for petrochemical products is one of the most rapidly growing factors in the USA, China, South Korea, and in the countries of the Middle East.

In November, prices of the OPEC reference basket of crudes have increased by 10% up to 60.74 U.S. Dollars per barrel. Prices on futures of the crude oil continue to rise. Price for oil Brent at the Intercontinental Exchange (ICE) in London has increased by 5.22 U.S. Dollars (upon the average) up to the level of 62.87 U.S. Dollars per barrel, while price for oil WTI at the New-York Mercantile Exchange (NYMEX) has increased by 5.07 U.S. Dollars up to the level of 56.66 U.S. Dollars per barrel (Figure 6). That is, these facts reflect growth of the oil market and optimism in respect of the trend that the OPEC and other countries, which are not the OPEC member countries, will further develop adjustments of production, which will support and maintain the oil market.

As we can see in Figure 7, at the end of 2017, overall utilisation of refineries in the USA was equal to approximately 91.9%: This level corresponds to the volume of production at the level of 17.2 mb/day, that is, it is by 4.4% larger than in November 2016. In Europe, transactions, which are connected with oil refining, have continued to grow. As of November 2017, workload of the oil-processing plants was equal to 91.2%, that is, it corresponds to the oil production at the level of 10.6 mb/day. In November, overall utilisation of refineries

in Singapore was equal to approximately 87.7% upon the average (as in the previous month), while overall utilisation of refineries in Japan was equal to 90.6%.

From 2014 to 2016, decrease in demand for and proposition of the liquefied petroleum gas (hereinafter to be referred to as “the LPG”) were observed (Figure 8). In 2017, this situation has begun to change: Demand has increased by 8.4% and it was equal to 6,698 million tons, while proposition has increased by 5.9% and it was equal to 6338 million tons. The USA is the main exporter of the liquefied gases.

The Russian Federation, Saudi Arabia, UAE, Qatar, Algeria, and Nigeria are large suppliers of the liquefied petroleum gas as well. In addition, supplies of the LPG are made from the deposits, which are situated in the Northern Sea.

Furthermore, let us consider situation in the Russian oil industry, as well as state of the Russian oil market in more detail (The world energy outlook, 2018).

In 2017, oil production in Russia has slightly decreased due to necessity to perform obligations concerning restriction of oil production. As it was already stated above, these obligations were undertaken by Russia within the framework of the OPEC+ agreements. In accordance with the results of the tax manoeuvre, which was performed in the oil sector (structural reform of the tax system, which envisages step-by-step reduction in export duties for oil and petroleum products, as well as increase in the tax on extraction and exploitation of mineral resources<sup>7</sup>), oil refining depth has increased, production and export of the residual fuel oil have decreased, and export of the crude oil has increased. Products of the oil and gas sector are still equal to more than one half of the Russian export.

In 2017, oil production in Russia was equal to 546.8 million tons, or 99.9% as compared with the previous year (Tables 1 and 2). At the same time, production of gas (including natural gas, associated (casing-head) gas, and rich gas/gas condensate) has increased up to 704.1 billion cubic metres, and this level was registered as the historical maximum. Russia has essential potential for maintenance and increase of the achieved level of the oil and gas production. At the same time, the objective deterioration in the conditions of the oil and gas production is observed in the oil sector. Substantial part of the long-operated oil fields are now in the stage of the decreasing oil extraction, while new oil fields in the majority of cases are characterised by the worst mining-and-geological conditions and geographical parameters, while development of new oil fields requires increased capital expenditures, high operating costs, as well as high transportation costs. In order to compensate for decline in oil extraction at the long-operated oil fields it is necessary to

6 Oil - Statistical Review of World Energy, 2018, BP: <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review/bp-stats-review-2018-oil.pdf>

7 In accordance with the accepted parameters of the tax manoeuvre, marginal rate of the export duty on oil was decreased from 59% in 2014 down to 30% in 2017, while rate of the export duty on residual fuel oil was increased from 66 up to 100% of the rate of the export duty on oil. This tax manoeuvre has created incentives for modernisation of the oil-processing enterprises. In addition, this manoeuvre has caused changes in the number of the already existing trends



ensure development of new deposits in the regions, within which infrastructure is inadequate or where infrastructure is absent at all, as well as to ensure development of the reserves of the poor quality within the already well-developed regions.

In 2017, oil-refining depth has achieved the level of 81.0% for the first time. It is possible to note that during period of time from 2000 to 2014, that is, until the beginning of the tax manoeuvre, depth of oil processing was only equal to 71-72%, while this parameter achieves the level of 90-95% in the advanced industrial countries. During previous 3 years, production of the residual fuel oil in Russia has reduced by 33.7% (Table 2) (Finam.ru, 2019).

In the conditions of decrease in oil extraction, the Russian oil export has slightly reduced. In 2017, export of oil and petroleum products was equal to 401.0 million tons, that is, by 2.4% below the level of the previous year. During period of time from 2015 to 2017, implementation of the tax manoeuvre has resulted in the noticeable increase in the export of crude oil (by 13.1%), while export of petroleum products has decreased (by 10.0%). These facts are attributable mainly to the reduction in export of the residual fuel oil.

Dynamics of the Russian oil export over an extended period of time demonstrates the essential strengthening of export orientation of the oil sector (Table 3). Share of the net exports of oil and petroleum products in the oil production has increased from 47.7% in 1990 up to 73.1% in 2017. However, this fact is connected not only with increase in absolute volumes of exports, but also with essential reduction in the internal consumption of oil due to: Market transformation of the Russian economy; increase in efficiency of utilisation of oil; replacement of the petroleum products (of the residual fuel oil) with/by the natural gas.

At the same time, selling prices for oil and gas in the world market have essentially decreased during the last few years. Rapid growth of extraction of the shale oil in the USA, which has occurred due to utilisation of new technologies, has caused the stable excess of oil supply over oil demand.

Implementation of the OPEC+ agreement, which was already discussed above, has caused both decrease in the excessive supply of oil, and notable increase in the world price. Undoubtedly that these two facts have reflected in the level of price for the Russian oil (Figure 9).

**Table 1: Parameters of oil production and oil refining in Russia in 2010-2017**

No.	Parameters	2010	2011	2012	2013	2014	2015	2016	2017
1.	Extraction of oil, including gas condensate, million tons	505.1	511.4	518.0	523.3	526.7	534.0	547.6	546.8
2.	Primary crude oil processing, million tons	249.3	258.0	270.0	278.0	294.4	287.2	284.5	284.0
3.	Share of the oil refining in the volume of oil extraction, %	49.4	50.4	52.1	53.1	55.9	53.8	52.0	51.9
4.	Depth of processing of the petroleum feedstock, %	71.1	70.8	71.5	71.7	72.4	74.4	79.1	81.0

Sources of information: Russian Federal State Statistics Service (Rosstat), Ministry of Energy of the Russian Federation (Federal State Statistics Service, 2019; Ministry of Energy of the Russian Federation, 2019)

**Table 2: Parameters of production of oil and petroleum products in 2010-2017 (%) in respect of the level of 2016**

No.	Product	2010	2011	2012	2013	2014	2015	2016	2017
1.	Oil, including gas condensate	102.1	100.8	101.3	100.9	100.7	101.4	102.5	99.9
2.	Primary crude oil processing	105.5	103.3	104.9	102.7	104.9	97.3	98.7	99.8
3.	Motor gasoline	100.5	102.0	104.3	101.3	98.8	102.3	101.9	98.4
4.	Diesel fuel	104.2	100.3	98.7	103.1	107.4	98.9	100.2	101.4
5.	Residual fuel oil	108.5	104.6	101.6	103.3	102.0	91.1	80.2	90.7
6.	Natural gas	111.4	102.9	97.7	102.1	95.7	98.7	101.0	107.9

Sources of information: Russian Federal State Statistics Service (Rosstat), Ministry of Energy of the Russian Federation (Federal State Statistics Service, 2019; Ministry of Energy of the Russian Federation, 2019)

**Table 3: Dynamics of the world market prices for crude oil during period of time from 2010 to 2017, U.S. Dollars/barrel**

No.	Parameter	2010	2011	2012	2013	2014	2015	2016	2017
1.	Price of oil Brent, Great Britain	79.6	111.0	112.0	108.8	98.9	52.4	44.0	54.4
2.	Price of oil Urals, Russia	78.3	109.1	110.3	107.7	97.7	51.2	41.9	53.1

Sources of information: International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD)/International Energy Agency (IEA), Russian Federal State Statistics Service (Rosstat) (IEA, 2017; Federal State Statistics Service, 2019).

**Table 4: Cost and export ratio of production of the oil and gas sector in the Russian exports in 2017**

No.	Products	Exports, billion U.S. Dollars	As % to the total volume of the Russian exports
1.	Oil and gas sector, total	189.70	52.8
2.	Oil and petroleum products	151.55	42.2
3.	Oil	93.31	26.0
4.	Petroleum products	58.24	16.2
5.	Natural gas	38.15	10.6

Source of information: Federal Customs Service of Russia (Federal Customs Service of Russia, 2019)

Due to decline in the world prices for oil and gas during few previous years, share of products of the oil and gas sector in the Russian exports has reduced as well. In 2014, this share was equal to 65.2% (including oil and petroleum products – 54.2%, natural gas – 11.0%). In 2017, it was equal to 52.8% (including oil and petroleum products – 42.2%, natural gas – 10.6%) (Table 4). Nevertheless, volume of production of the oil and gas sector is still equal to more than one half of the Russian of export.

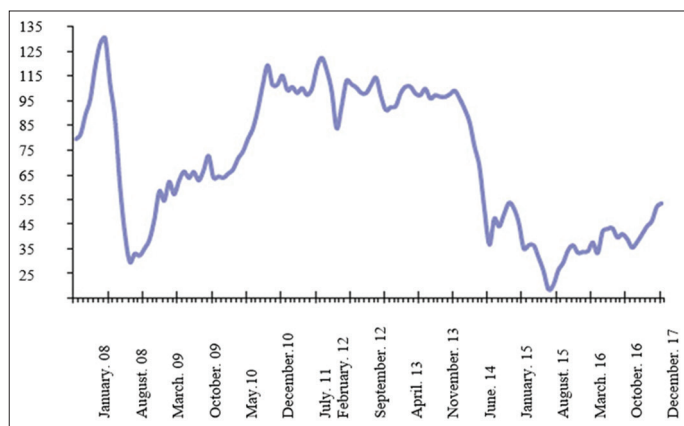
Over the longer term, growth of the world demand for oil will provide Russia with possibility to maintain and even increase current volumes of the oil exports, first of all, at the expense of supplies to China and other countries of Asia. At the same time, possibilities of development of the Russian oil sector will largely depend on the level of the world prices for oil (Burneft.ru, 2019; Finam.ru, 2019; Yearbook.enerdata.net, 2019).

#### 4. RESULTS

If one would consolidate and analyse the data obtained, then it will be obvious that the market of petroleum products is the complicated system, as well as that it is constantly changing. Each stage of the added-value creation has its own special features and it is characterised by the multifactority of influence. Figure 10 presents the generalised chain of creation of the value-added.

Prospecting of oil fields is the most risky stage in the chain of value creation. In the current conditions, such prospecting is performed with the help of the complicated technologies, which help to determine location and structure of deposits/oil fields. In accordance with the data of investigations, the average

**Figure 9:** Price for oil Urals during period of time from 2008 to 2017, U.S. Dollars/barrel



Source of information: Russian Federal State Statistics Service (Rosstat) (Rosneft, 2017; Federal State Statistics Service, 2019)

margin (added-value contribution) of this stage is equal to approximately 36%.<sup>8</sup>

Commercial oil-field development is performed following assessment of the economic potential of the oil field, and it is the most capital-intensive process of the entire value-added chain. Geological characteristics and weather conditions (as well as legislation of the relevant state in the sphere of conservation of nature and natural resources) are the main factors, which exert influence upon the cost of commercial oil-field development. Moreover, this stage is not only the most expensive stage, it also has the greater parameter of the value-added, which is equal to 41% upon the average.

Transportation of the extracted products is performed with the help of various methods: Pipeline transportation, road tank trailers or rail tank wagons, as well as oil-carrying ships. This stage is one of the simplest stages and cost of this stage is equal to 5% of the entire value-added process upon the average.

Processing of raw materials and their transformation into the finished products require essential amounts of the fixed capital and involvement of the experienced personnel. This stage is the second largest stage in respect of the expenditures in the process of creation of the added value and cost of this stage is equal to 13% upon the average.

Sale of the petroleum products (including the stage of marketing) is the final stage of the entire process and it requires availability of the network of petroleum storage depots and fuel filling stations. Total expenditures of this stage are low upon the average and this stage is not the capital-intensive process as compared with other processes. Upon the average, 5% of the value-added is created at the stage of sale and marketing.

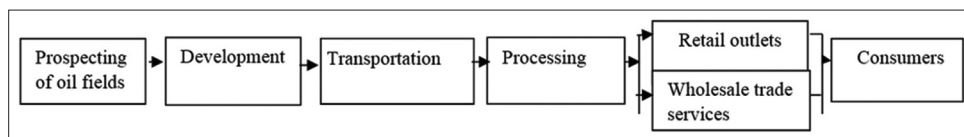
As a rule, companies of the oil and gas sector are large integrated players, which can confer economies at the expense of the scale of their transactions. Presence of such companies in the market increases level of competition. Despite of decrease in the oil advantages to the benefit of natural gas, crude oil is still the main consumer product in the worldwide scale.

Oil industry is divided by two main segments: (a) Oil prospecting, oil production, and refining of oil; (b) sale of petroleum products. Petroleum companies can be engaged in activity separately in one of these segments or they can be the player in both segments.

Global oil and gas market is characterised by availability of large diversified international companies with high share of vertical

<sup>8</sup> [http://www.petrostrategies.org/Learning\\_Center/oil\\_and\\_gas\\_value\\_chains.htm](http://www.petrostrategies.org/Learning_Center/oil_and_gas_value_chains.htm)

**Figure 10:** Process of production and implementation of petroleum products: Chain of creation of the value-added



Source of information: Compiled by the author of this article

integration of transactions in the spheres of oil prospecting, production, refining, transportation, and sale. Such structure of the oil market, as well as necessity of large investments in order to ensure commencement of operations in this market (at the stages of the oil prospecting and borehole drilling) decreases risks of occurrence of new players in the world market.

In 2014, there was large collapse in oil prices due to decrease in the balance of oil demand and proposition in the global market. During period of time from 2015 to 2016, oil and gas market has been continued this decline in oil production due to decrease in prices for crude oil. In 2017, growth of the oil market was observed due to regulation measures of the OPEC, as well as due to increase

in prices for crude oil. It is difficult to forecast future trends in the oil market due to high sensitivity of prices.

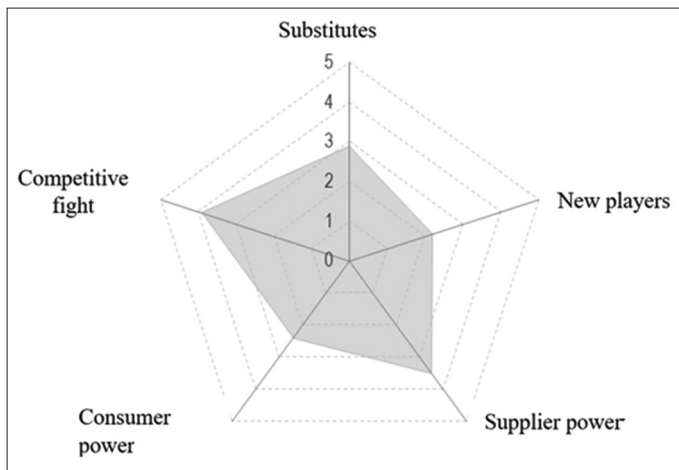
Substitutes in the oil and gas market can be considered from the following point of view: Introduction of alternative sources of energy, although this can cause changes in the structure of expenditures (Figure 11). High expenditures for the access to the oil market and barriers for the exit from the oil market intensify competition in the global market. Competition in the oil and gas market is strong throughout the world. Small quantity of large firms dominates in the market, but governmental influence ensures certain decrease of the high level of competition.

Powers of consumers and powers of suppliers are at the moderate level. Expenditures, which are connected with change of supplier, are low due to small differentiation. However, there exists relatively small quantity of large firms-suppliers in the market, therefore, their influence is being increased.

The threat of occurrence of new players is small, because of low differentiation and changes in the economic growth are compensated by scales and powers of the already existing firms.

Furthermore, let us perform the scenario analysis. Let us consider the main scenarios of development of the oil industry and of the world oil market, that is, let us determine their prospects in the global scale and regional scales over the next few decades (Figure 12).

**Figure 11:** Analysis of five forces of the world oil market, 2017

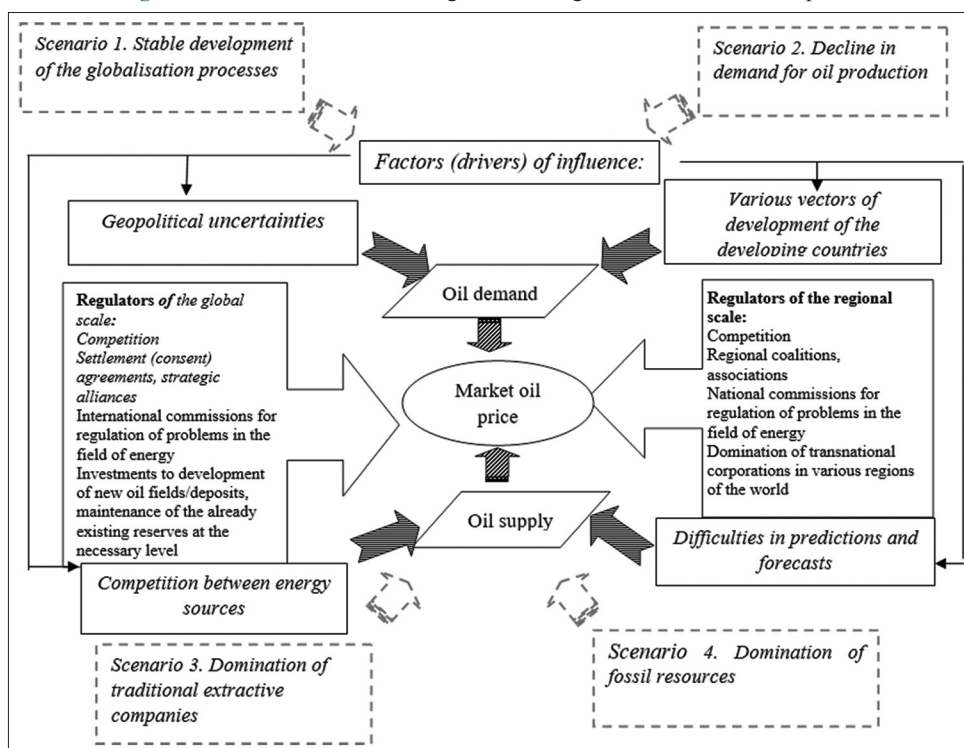


Source of information: Compiled by the author of this article for the oil market on the basis of M. Porter's 5 competitive forces model

#### 4.1. Scenario 1: Stable Development of the Globalisation Processes

In accordance with this scenario of development of events, relative geopolitical stability will be conducive to the economic

**Figure 12:** Scenario model of the global and regional oil market development



Source of information: The author's development

growth and trade cooperation between various countries. New alternative sources of energy will at last become economically feasible sources, demand for the alternative sources will increase, and companies will actively begin to utilise these alternative sources along with the traditional kinds of fuel. In this scenario, the stable growth dominates on the geopolitical axis, while green fuel dominates on the axis of competition of the energy sources.

Economic upturn will be ensured by the developing countries, which are in the more favourable demographic situation. India will become the driver of the world economy (instead of China) due to Indian investments in infrastructure. Mexico, Indonesia, Malaysia, Vietnam, Columbia, Brasilia, and Turkey will occupy the second place. These countries will utilise raw materials and fuel resources in order to maintain economic growth. As concerns the international situation, political tensions in the regions will decrease, while negotiations with the WTO will be completed following conclusion of multilateral agreements.

Demand for the sources of renewable and clean energy will increase due to the global changes in climate. Further enhancement and development of various programmes will be observed in order to limit emissions of carbon dioxide into the atmosphere. An increasing number of countries will be working actively in order to decrease level of environmental pollution.

Finally, new international market of the liquefied natural gas (LNG) will begin to develop due to growth of the LNG production in the USA, Australia, China, Argentina, and on the eastern seaboard of Africa.

#### 4.2. Scenario 2: Decline in Demand for Oil Production

In the case of development of this scenario, decrease in the oil share in the global energy mix/balance will be observed. Utilisation of the alternative energy sources will be increased, while demand for oil will decrease due to low economic growth, as well as due to introduction of technological innovations and wide utilisation of the alternative energy sources. Stagnation in the conditions of conflict will dominate on the geopolitical axis, while green initiative will dominate on the axis of competition of the energy sources.

Development of economy of China will slow down, while occurrence of new driver of progress among active developing countries is not expected. Internal crisis and recession in the developed countries will exert negative influence upon the revival of economic growth. All above-listed trends will result in the global stagnation along with the decline in demand for fuel and reorienting to the less expensive kinds of resources. Under such circumstances, market of the LNG sector will obtain new possibilities. At the lesser expenditures and at the greater volumes of supplies, natural gas will become the most viable alternative kind of fuel.

#### 4.3. Scenario 3: Domination of Traditional Extractive Companies

From the political point of view, this scenario is similar to the scenario 2: Political tensions will continue in a number of regions,

while economy of China and other active developing countries will remain in stagnation, and these facts will cause decrease in the world demand. The difference is in the fact that situation in the countries, which dominate today in the oil and gas market, will not be changed even in 2040. Oil will maintain strong and stable positions in the global energy balance. In accordance with this scenario, stagnation in the conditions of conflict will dominate on the axis of stable development of the globalisation processes, while the “grey fuel” will play the leading role on the axis of competitiveness of energy sources. The OPEC countries will continue to control and manage the world supplies, and they will not practically be subject to impacts from the part of the regional political conflicts.

#### 4.4. Scenario 4: Domination of Fossil Resources

In accordance with the fourth scenario, the stable growth will again have the great importance on the geopolitical axis, while values on the axis of competitiveness of energy sources will move in direction of the “grey vector of development” of situation. Alternative sources of energy will not become economically feasible sources, while natural gas will not obtain worldwide spread and distribution. At the same time, quantity of sources of the fossil fuel will increase, and they will ensure meeting of the increasing demand of active developing countries along with the traditional prospecting of oil and gas deposits.

In the same way, as it was described in the first scenario, India will become the driver of the world economy due to making investments in infrastructure. Positive dynamics will be also observed in the developing countries, which are at the stage of industrialisation. Political stability in the global arena will create strong basis for the international cooperation and it will facilitate sale of commodities and services, which will cause increase in the world GDP level.

In the conditions of high demand, volumes of traditional oil production will remain at the high level; however, new sources of the fossil fuel will be found and obtained. Active development of the non-traditional reserves of oil will begin in the USA (oil of high-density collectors and shale oil). These reserves will make it possible to increase oil extraction within this country by 50% by the beginning of 2040<sup>th</sup>. Solving of the operational tasks, which are connected with oil prospecting at great depths, as well as with performance of work in unfavourable climatic conditions, will increase volume of proposition in the market. Therefore, this fact will also cause transnational expansion of oil companies of the active developing countries (such as, China, Brasilia, and India), as well as this fact will result in local developments of the largest American companies (Lazko, 2019).

Having generalised results of the analysis and analytical data, which were already obtained, let us develop the scenario model of development of the oil market in the regional scales and in the global scale. This model, in contrast to the already existing models, includes four key scenarios of development of the oil industry and oil market in the global scale and in the regional scales: Stable development of the globalisation processes (Scenario 1); decline in demand for oil production (Scenario 2); domination of traditional extractive companies (Scenario 3); domination of

fossil fuels (Scenario 4). It is worth to note that the first scenario is the most probable scenario. However, at the same time, demand for oil will begin to decrease in the course of time as well (at the expense of growth in demand, propositions, and consumption of the alternative (renewable) sources of energy). Furthermore, this model includes the factors (drivers), which exert influence upon the market. In addition, this model presents structural regulators, which determine market conditions of the oil market to a greater extent: International strategic agreements, alliances, national commissions for regulation of energy markets (including oil markets), as well as the most powerful regulator – competition (which, at the same time, is the driver of economic growth).

## 5. DISCUSSION

Taking into account four possible scenarios of development of events (these scenarios were described in the previous section), topical scientific discussion at the international communication platforms is centred (to a greater extent) around development “of the target scenario,” which includes a number of factors, which were already considered earlier. This scenario must be aimed at elimination of shortcomings, which were present in the previous variants. There are following forecasts in this scenario: As concerns the geopolitical arena of the world oil markets, armed conflicts and disputes between countries will remain at the regional level (Panfilova et al., 2019). Therefore, this fact will facilitate rapid economic growth, as well as increase in demand for sources of energy. New trade agreements will be concluded, negotiations at the level of WTO will not be delayed, while cooperation between various trading and economic blocs will be strengthened. The USA will maintain its geopolitical domination (Miremadi and Saboohi, 2018; Morozov et al., 2018; Lazko, 2019).

There are statements in many articles (which have been already analysed within the framework of this investigation) that several developing countries (such as India, Mexico, Indonesia, Malaysia, Vietnam, Columbia, Brasilia, and Turkey) will essentially increase their contributions to growth of the world economy. India will allocate funds for development of infrastructure and it will become the driver of the world economic development instead of China. These regions, as well as countries of the Middle East will ensure high demand for energy due to high pace of economic growth (Jordà et al., 2011; Comfort et al., 2018; Jonas and Kluge, 2018).

There are forecasts in the articles (within which attention is focused on the analysis of prices and market conditions) that volume of oil proposition will be great, however, the prices, which are still controlled by the OPEC member countries, will remain at the high level. Therefore (taking into account the information data, which contain analytical reviews and reports of the leading international statistical bureaux and organizations), during period of time from 2035 to 2040 confrontation between the OECD region and the OPEC region will continue, and share of the OPEC will be already equal to approximately 45-46% of oil production. Such price pressure will facilitate prospecting of non-traditional deposits (Hoffman, 2012; Alessandro and Seiermann, 2016; Effendi, 2019).

In addition, there are statements that volumes of the world of production of the crude oil will be increased by 1.5-2% per year

upon the average, while OPEC countries will demonstrate growth of parameters up to the level of 1.5-1.6%. This fact will make it possible to increase share of production of this organisation from the current level of 40-41% up to the level of 45-46% by the period of time from 2035 to 2040. In addition, it is worth to note that there are forecasts (among other key trends) concerning growth of volumes of oil production in the countries of the Middle East and countries of the Caspian region, as well as concerning growth of oil production in the Russian Federation. In accordance with the existing forecasts, economic recession of oil production will be observed in the African and Asian regions, while growth will be observed in other countries (for example, in the Latin America), and this growth would be relevant to the growth in the OPEC member countries (1.5-1.6%) (Bollen and Rojas-Romagosa, 2018; Comfort et al., 2018).

As concerns situation in the USA, specialists in the sphere of international finances and forecasting (these specialists are from the USA and Canada) state that if the USA wants to strengthen its position as the exporter, it have to utilise the deposits, which must ensure official need for energy sources for the entire country. By becoming exporters of natural gas, countries of the Northern America must seek markets of sale with more attractive prices. More and more extracted products are shipped by sea from the Gulf of Mexico to the countries of Asia. In accordance with the majority of forecasts, the USA will achieve maximum volume of oil production at the level from 9 to 11 mb/day by the period of time from 2022 to 2023 (Barrows, 2018; Bollen and Rojas-Romagosa, 2018; Hong and Hsu, 2018).

Generally speaking, many scientists and analysts have moved towards the consensus that volumes of development of the shale oils and gas deposits will be increased during the next few years. The USA, Russia, and China led the list of countries with the highest energy reserves of the non-traditional oil.

## 6. CONCLUSION

Having generalised results of the investigation, which were obtained, we can see that among the trends, which have been occurred during period of time from 2015 to 2018 and which are still exist till the end of the first half-year of 2019, it is necessary to separate the following trends: Increase in the depth of oil refining and decrease in production and export of the residual fuel oil; growth in export of crude oil, because of such export is more efficient for the state budget as compared with export of the residual fuel oil; decrease in the volume of oil refining.

As concerns the Russian sector, we can see (taking into account the results of the analysis, which were already obtained) that in order to ensure stable development of the oil sector, it is advisable to implement relevant measures of economic policy. These measures are described below. Completion of the structural reform of the tax system (Tsindeliani, 2016), which envisages step-by-step reduction in export duties for oil and petroleum products, all the way down to their complete abolition. Introduction of the special tax on additional revenue. Performance of the concerted action in order to maintain desirable level of the world oil prices along with the

OPEC countries and other oil producing companies. Broadening of the infrastructural possibilities of oil export in the Asian countries. Development of the import-substituting technologies in order to increase level of oil recovery, as well as in order to ensure development of the non-traditional energy reserves.

Consolidating the forecasted data, we can see that current situation in the oil market is characterised by domination of those factors, which will facilitate maintenance of relatively low oil prices. It is necessary to separate the following most essential factors: Availability of the essential reserves of the shale oil in the USA. In the cases, where level of the world oil prices will be higher than 60-65 U.S. Dollars/barrel, these reserves will be rapidly involved into extraction and production processes. As concerns Russia, in the cases, where low prices for oil will be established, possibilities of engagement of new deposits and non-traditional energy reserves to further development will be essentially limited, because of investments in the most high-cost projects will not be economically efficient (in the first turn, this conclusion is made in respect of the projects of development deposits on the Russian Arctic Seas shelf). Technological restrictions and sanctions, which were imposed on Russia by many developed countries, will also exert the restricting influence upon development of oil sector. These sanctions establish prohibition on supplies of equipment and technologies for development of deposits on the Russian Arctic shelf, for development of deep-sea deposits and deposits of the shale oil.

## 7. ACKNOWLEDGMENTS

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