ANALYSIS OF THE DEMAND, SUPPLY, AND PRICES OF CRUDE OIL

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ABSTRACT. The report presents world demand and supply of crude oil for the period 1997-2018 and the forecast of the US Energy Information Administration for 2019 and 2020. World crude oil reserves at the end of 2017 are presented according to data provided by OPEC. The change in average crude oil prices for the period 2004-2018 and in the average monthly prices for the period January 2007 − May 2019, according to OPEC, are also analysed. The US Energy Agency's long-term forecast for the world consumption and for the change in crude oil prices by 2045 is presented. Key factors influencing crude oil demand, supply, and prices are outlined.

Keywords: world demand and supply of crude oil; crude oil prices; key factors influencing crude oil prices

АНАЛИЗ НА ТЪРСЕНЕТО, ПРЕДЛАГАНЕТО И ЦЕНИТЕ НА СУРОВИЯ ПЕТРОЛ

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РЕЗЮМЕ. В доклада е представено световно търсене и предлагане на суров петрол за периода 1997-2018 г. и прогноза на Американската информационна администрация по енергетика за 2019 и 2020 година. Представени са доказаните геоложки запаси от суров петрол към края на 2017 г. по данни на ОПЕК. Анализирано е изменението на средногодишните цени на суровия петрол за периода 2004-2018 г. и на средномесечните цени по данни на ОПЕК за периода януари 2007 − май 2019 година. Представена е дългосрочната прогноза на американската информационна агенция по енергетика за световното потребление и изменението на цените на суровия петрол до 2045 година. Изведени са основните фактори, оказващи влияние върху търсенето, предлагането и цените на суровия петрол.

Ключови думи: световно търсене и предлагане на суров петрол; цени на суровия петрол; ключови фактори, влияещи върху цените на суровия петрол

Introduction

Forecasting the demand, consumption, and prices of crude oil has been carried out since the middle of the 20th century. Dozens of world, national, and branch agencies, banks and organisations all over the world prepare and periodically update their own medium-term, long-term, and super long-term forecasts for the demand, supply, and prices of this important energy raw material under the conditions of a highly dynamic marketplace and of a volatile economic and political situation.

Along with the demand and supply of crude oil, prices are also affected by the change in volume of the commodity stocks and by the chance in the proven geological reserves of this raw material.

World demand and supply of oil

The two most prestigious institutions that make and update their forecasts for the demand, supply, and prices of energy sources, and of crude oil in particular, are: the US Energy Information Administration (US EIA) and the International Energy Agency (IEA). The latter currently has members from 30 countries and 8 associate members.

S&P Global Platts is another popular source in terms of the latest news concerning the market information on oil, natural gas, electrical energy, shipping transport, oil products, metals, and agro-cultures. The agency's website releases analyses and forecasts that support sales and facilitate investment decisions. Oil and natural gas quotations published by the agency generally serve as benchmarks in determining the current and futures prices of crude oil.

Fig. 1 introduces the change in world crude oil demand and supply for the period between 1997 and 2018 along with the US Information Administration forecast for 2019 and 2020. The figure is made according to data provided by the US EIA, 2019.

The data presented in Figure 1 shows that demand and supply of crude oil over the past twenty-two years has increased by about 33.1%, or by an annual average of 1.5%. At some points, demand has exceeded supply, and at others, it has been the opposite. Over the years, these temporary surpluses and market deficits have been offset by the change in commodity stocks of this raw material.

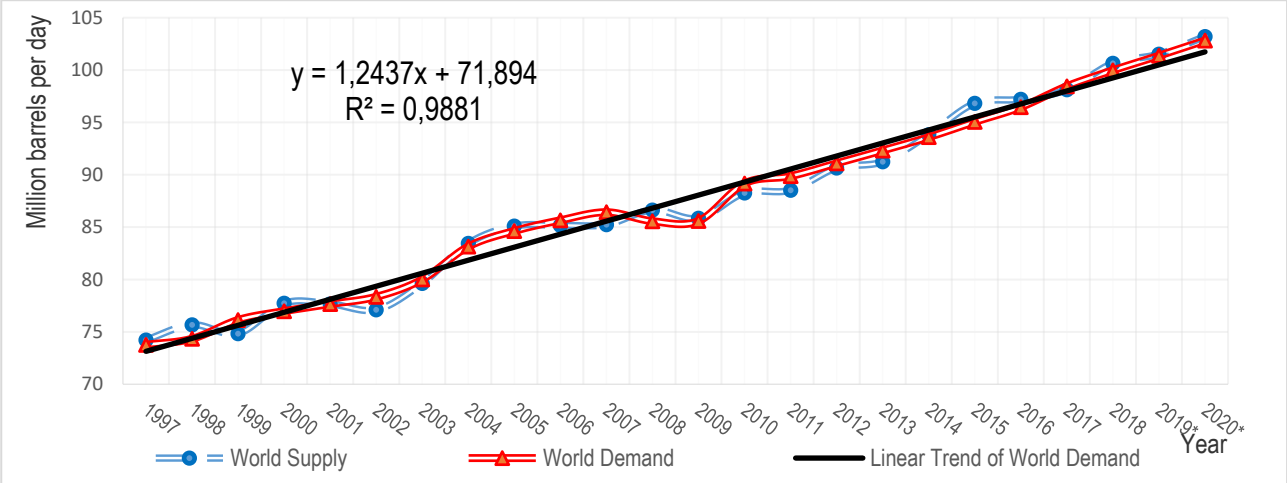


Fig. 1. World production and world consumption of crude oil and other liquids per day for the period 1997-2018 and projection for 2019 and 2020

Kovacheva-Ninova and Velev (2018) conclude that: "in general, after the 1970s, oil consumption has doubled, and the consumption of natural gas has risen almost 9 times."

According to data provided by OPEC, in 2018, oil supply by the organisation amounted to 38.29 million barrels per day. According to data by the US IEA, world oil supply within the same year was 100.66 million barrels per day. This shows that the OPEC member states account for about 38.04% of the world oil production.

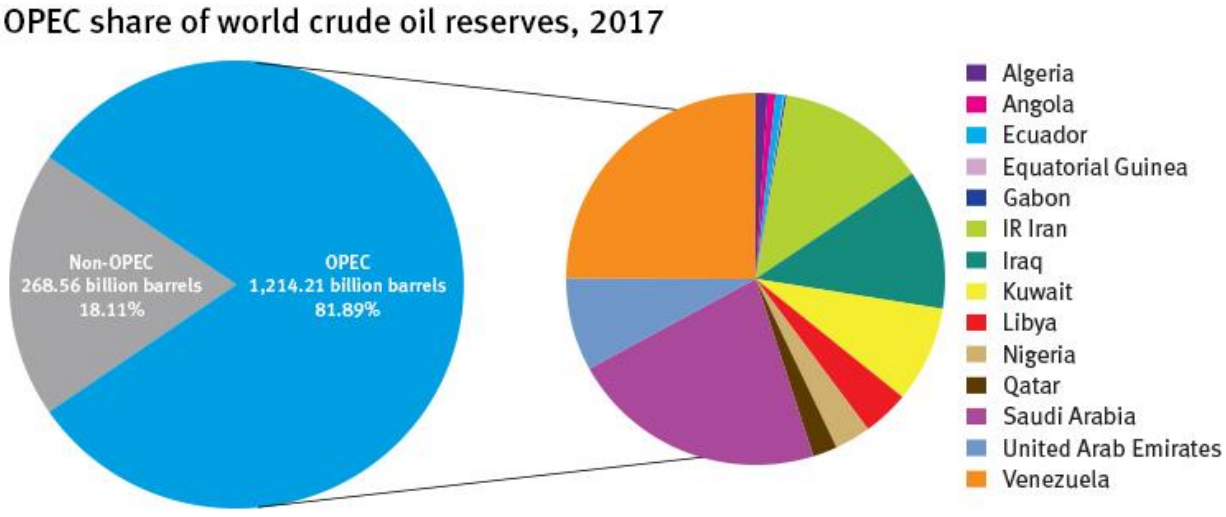
The US IEA forecast for 2019 and 2020 points to an increase in oil demand and supply of up to 101.52 million barrels per day in 2019 and of up to 103.21 million barrels per day in 2020, which is an approximate average annual production growth of about 1.3%.

As shown in Fig. 1, the linear trend of world demand during the period analysed has been one of growth and is characterised by a very high determinant coefficient of 0.9881and a correlation coefficient of 0.9940, respectively.

According to Kovacheva-Ninova and Velev (2018), at the beginning of the third millennium, humanity has not only continued but has even strengthened its energy dependence on primary hydrocarbon raw materials and this raises issues of current and long-term effect.

Proven geological reserves of crude oil

According to data provided by OPEC, about 81.89% of the proven geological reserves of crude oil throughout the world are in the oil fields located on the territory of the OPEC member countries. The data as of the end of 2017 are presented in Figure 2.



OPEC proven crude oil reserves , at end 2017 *(billion barrels, OPEC share)*

Venezuela	302,81	24,9%	Kuwait	101,50	8,4%	Qatar	25,24	2,1%	Gabon	2,00	0,2%
Saudi Arabia	266,26	21,9%	UAE	97,80	8,1%	Algeria	12,20	1,0%	Equat. Guinea	1,10	0,1%
IR Iran	155,60	12,8%	Libya	48,36	4,0%	Angola	8,38	0,7%			
Iraq	147,22	12,1%	Nigeria	37,45	3,1%	Ecuador	8,27	0,7%			

Source: OPEC Annual Statistical Bulletin 2018.

Fig. 2. OPEC share of world crude oil reserves, at the end of 2017

The OPEC countries account for about 81.89% of the proven global geological reserves, with approximately 67.03% of the global reserves in the Gulf region.

At the end of 2017, the proven crude oil reserves were estimated to be 1482.77 billion barrels. With the current world demand, those will be sufficient for a period of about 40.6 years. The most significant stocks are in the following countries: Venezuela − 302.81 billion barrels (24.9%), Saudi Arabia − 266.26 billion barrels (21.9%), Iran − 155.60 billion barrels (12.8%), Iraq − 147.22 billion barrels (12.1%), Kuwait − 101.50 billion barrels (8.4%), UAE − 97.8 billion barrels (8.1%), etc. (see Fig. 2).

Analysis of the change in crude oil prices

The price of crude oil depends on its quality, as well as on its location, and, likewise, on a whole set of geopolitical, economic and market factors. It should be pointed out that oil price has been significantly dynamic both in the past and in the present century.

As a result of the global financial and economic crisis of 2008-2009, oil prices plummeted sharply to reach record levels of US$ 131.22 per barrel in July 2008. This was followed by periods of downs and ups. February 2016 saw a 30-year bottom level of US$ 29.61 per barrel. Since then, oil prices have been marked by fluctuations and in June 2017, it was US$ 44.58 per barrel.

World oil prices in the period from January to May 2017 climbed against the background of the new US sanctions against Iran.

Brent oil has risen by 0.35% reaching US$ 57.01 per barrel in March 2017. The Iranian national oil company increased oil output to 4 million barrels per day. At the same time, however, in compliance with the OPEC agreement, Tehran was not to exceed the level of 3.79 million barrels per day. Iranian oil company leader Ali Kardor voiced his confidence that the export of raw materials was going to reach 3 million barrels a day by the end of 2017. He also pointed out that in December 2016 Iran reached a record rate of petroleum product export for Europe amounting to 900 thousand barrels a day. In late November 2016, at its meeting in Vienna, OPEC decided to reduce oil production to 32.5 million barrels a day. It was then claimed that in the first half of 2017, the members of the cartel would reduce the average daily yield by nearly 1.2 million barrels. An exception was made for Iran since international sanctions against this country had only recently been lifted.

OPEC allowed the Islamic Republic to increase oil production by 90,000 barrels per day to a level of 3,797 million barrels per day. Nigeria and Libya were also allowed not to reduce yields, Russia's Information Agency (TASS) recalls. Iran has summarized the results from an auction held on 15 February 2017, wherewith the Russian Gazprom and Lukoil companies participated, that concerns the development of oil fields, Reuters reported. The Iranian National Petroleum Company has prepared a second list of foreign companies that would be eligible to tender for oil extraction from localities in Iran.

Figure 3 shows the change in the average annual crude oil prices for the period 2004-2017. The graph in Figure 3 is based on OPEC Backed Price.

As can be seen from the data in Figure 3, the average annual crude oil prices for the period between 2004 and 2019 are characterised by extremely high dynamics.

From April 2009 to December 2014, there was a steady rise in crude oil prices. By the beginning of September 2010, they rose by about 2.5 times, bringing about an increase in production costs in all sectors of world economy.

No estimate can be given as to the direction of the price of crude oil in the next few months of 2019.

Crude oil rose by about 40% between January and April 2019, boosted by the contraction in yield among OPEC members and their partners, as well as due to US sanctions against Iran and Venezuela. The performance of China's industrial activity in April 2019 was weaker than expected and this also lowered the prices of "black gold". The surge in US production has exerted additional influence on oil prices, and OPEC will offset most of the shortfall following the US sanctions against Iran. However, analysts say that the market remains tight.

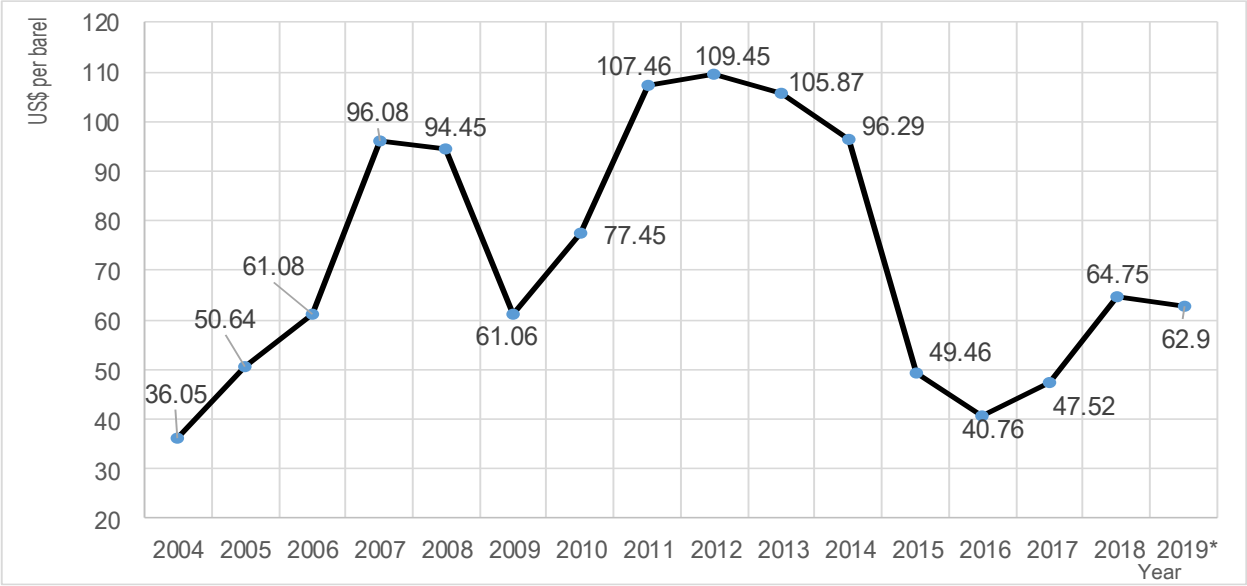


Fig. 3. Annual crude oil prices for the period 2004 - 2019

The performance of China's industrial activity in April 2019 was lower than-expected and this, too, has lowered crude oil prices. Many factors affect the crude oil trade. One of them is related to the concern about global economic growth due to the intensification of the trade dispute between the US and China.

Pressure for a drop in crude oil prices is also exerted the call by US President Donald Trump to OPEC and its leader Saudi Arabia for an increased produce. US sanctions have already halved exports of Iranian crude oil over the past year to less than 1 million barrels per day. In addition, due to the tightening of sanctions, deliveries to customers are expected to drop to half a million barrels per day in May 2019.

According to SPI Asset Management, OPEC will want to curb the rise of prices below levels that might distort demand.

Bank of America Merrill Lynch estimates that Iranian oil production will shrink from 3.6 million barrels per day in the third quarter of 2018 to 1.9 million barrels per day in the second half of 2019. However, the bank is expecting a "nearly balanced market" this year, as the OPEC and US produce will grow.

BNP Paribas predicts market growth by the third quarter of 2019, after which prices will become sensitive to the sharp rise in US exports as a result of the increase in pipeline and terminal capacities.

The Venezuelan crisis also violates the supply of crude oil. Crude oil extraction there has dropped to the 2003 level.

Oil prices have an impact on the price of natural gas in Bulgaria, albeit with a several-month delay. The reason is the formula used which takes into account the price of alternative fuels. The fact is that the gas market has changed in recent years. Extra sources are now available, not just the so-called "tubular" gas, and this forces the manufacturers to gradually become more considerate to their customers.

The World Trade Organization (WTO) contributes on a global scale to lowering trade barriers by means of: reducing duties, fees and other constraints; securing the uniformity of trade regulations by the introduction of international standards; overcoming conflicts of interest through the creation of mutually beneficial trading conditions. Its core business is founded on open trade that is based on commercial interests. WTO's policy is aimed at expanding market opportunities and promoting free competition.

Crude oil, natural gas and coal, whose prospecting and exploitation require significant investment and operating costs, are of strategic importance for the global energy balance. The total oil consumption over the past 20 years has increased by more than 33%. It has been the largest in industrialised countries, such as the USA, China, Japan, Germany, France, Italy and others. Research has shown that with an increase in economic activity in the world by 1%, global energy consumption increases by an average of 0.5%. It is expected that, in 2030, the quality of life of about 80% of the planet's population will depend heavily on the energy resources used.

Global demand and supply of energy carriers depends mainly on the development of world economy, on the growth rates of the individual sectors of the economy, on the growth of the population of the planet, on the amount of explored and proven deposits of underground natural resources, and on the mining and extraction facilities constructed in various countries. The main indicator for ensuring the world economy with energy raw materials is the ratio between the volume of proven geological reserves and the yield level.

Global oil trade covers their exports and imports both worldwide and in individual regions and countries. World market conjuncture is primarily determined by the impact of a number of economic and political factors. In 2019, the largest exporters in terms of value have been the Gulf countries and Russia.

The International Energy Agency (IEA) predicts for the global consumption of oil and other liquid fuels to range from 100 million barrels a day in 2019 to 105 million barrels a day in 2020 and to around 125 million barrels a day in 2040.

In its annual report for 2018 (US EIA, 2019), the US Energy Information Administration predicts that the change in crude oil prices for the 27 years to come will vary within the limits shown in Figure 4.

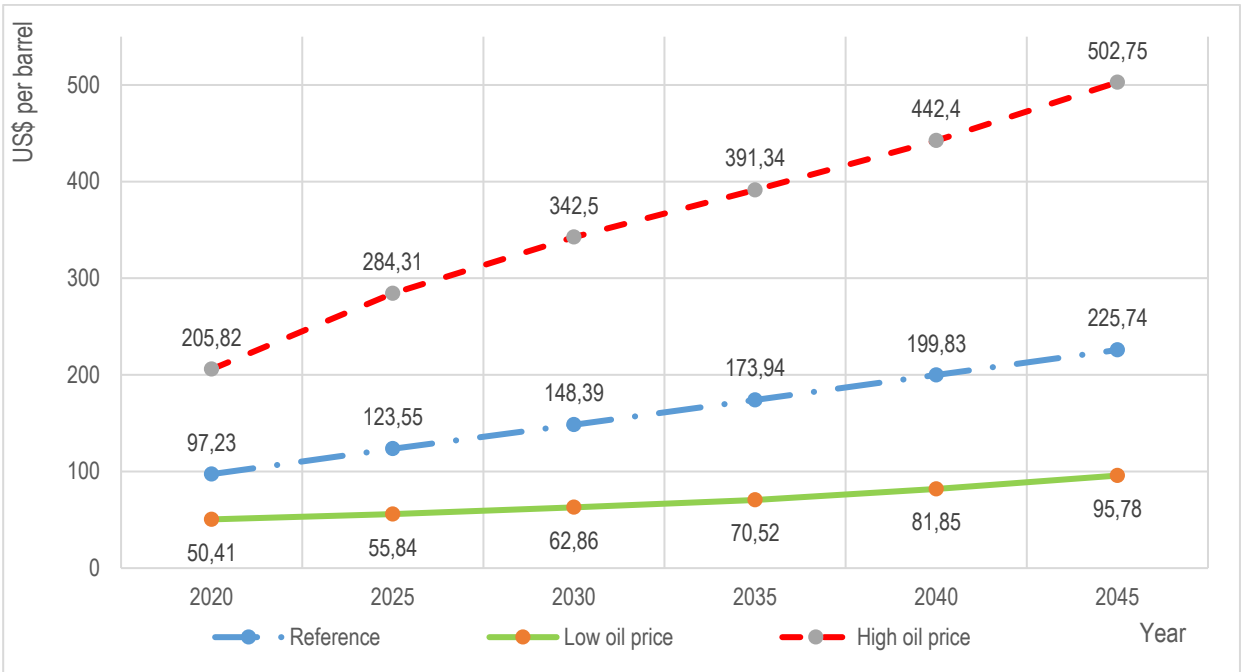


Fig. 4. Projection for crude oil prices according to US IEA, 2019

According to the IEA, the strategic development will be oriented towards solving the following priority tasks:

- exploitation of new oil and gas fields needed to meet the growing demand for energy raw materials;
- construction of new pipelines and gas pipelines to supply energy raw materials to consumers;
- expanding international cooperation to attract the necessary investments;
- improvement of extraction and processing technologies with a view to improving economic and environmental efficiency;
- developing long-lasting and mutually beneficial connections between countries producing energy resources and those consuming energy resources;
- stabilising the international markets for energy raw materials in order to ensure global consumption;
- intensifying the interaction while ensuring the required safety of the energy equipment and power facilities;
- coordination of efforts and actions to overcome possible energy crises in the world economy, etc.

In the present century, the global commerce in energy raw materials will continue to have clear geo-economic and geopolitical dimensions. Those are determined by the strategic interests of individual countries and, above all, of the industrially developed countries and are due to the great geographic diversity in the location of the world centres of production and of those of energy consumption in the world.

Should oil prices rise, this could boost US shale production and gain market shares at the expense of OPEC, Citigroup Bank experts say. According to analysts at Morgan Stanley Bank, the American shale industry is the "obvious winner" after OPEC's decision.

Although the lowering of yields to 36.5 million barrels per day does not immediately solve the supply problem, it can potentially lead the world oil market to rebalancing, which will be felt in the first half of 2019, Morgan Stanley Bank points out. With a yield of 38 million barrels a day, rebalancing will only have effect in the second half of 2019, though "supply outside OPEC may put this moment at risk," the bank states in its report. It also says the following: "The truth is that when production outside OPEC grows, the cartel will not be able to manage prices in the medium term."

The aim of all of these agreements is to raise crude oil prices in the short term, but this could hardly be achieved in the medium and long term.

Figure 5 shows the variation in the average monthly crude oil prices for the period between January 2007 and May 2019. The figure is based on OPEC Backed Price.

From January 2014 to January 2016, there was a significant drop to a level of US$ 27.25 per barrel. From early 2016 to October 2018, the price of crude oil rose almost threefold to a level of US$ 79.39 per barrel. Since then, until May 2019, there has been a slight fall to US$ 69.97 per barrel.

The reason for the rise in oil prices has been the statement by the Saudi Arabian Energy Minister that all OPEC and non-OPEC participants have effected a settlement to extend their agreement on the production cutback. It is interesting who is going to benefit from such low prices. Cheap oil is beneficial to both consumers and OPEC countries. High oil prices would lead to an increase in shale production and petroleum production from petroleum sands, whereby the cos of extraction and processing is higher.

According to Radev (2016), what is characteristic of the current drop in global oil market prices is that it is caused by changes in both demand and supply. On the one hand, there is a boom in shale oil production in the United States, and on the other hand is the weak demand on the global market.

The major factors affecting demand, supply, and prices of crude oil are extremely diverse (Mitev, 2017). In the long term, oil prices are influenced by the following factors:

- the economic growth of the global economy;
- population growth;
- the change of proven geological reserves;
- international and regional military and political conflicts;
- OPEC production regulations and the cartel agreements to limit mining and to impose extraction quotas for member states over certain periods of time;
- the security of crude oil supplies for oil refineries;
- the imposing of an embargo and of import and export restrictions;
- climatic cataclysms;
- the effect of seasonality;
- the imposing of import duties and the like;
- world production and consumption of oil;
- market speculations;
- exchange rate fluctuations;
- intense competition, etc.

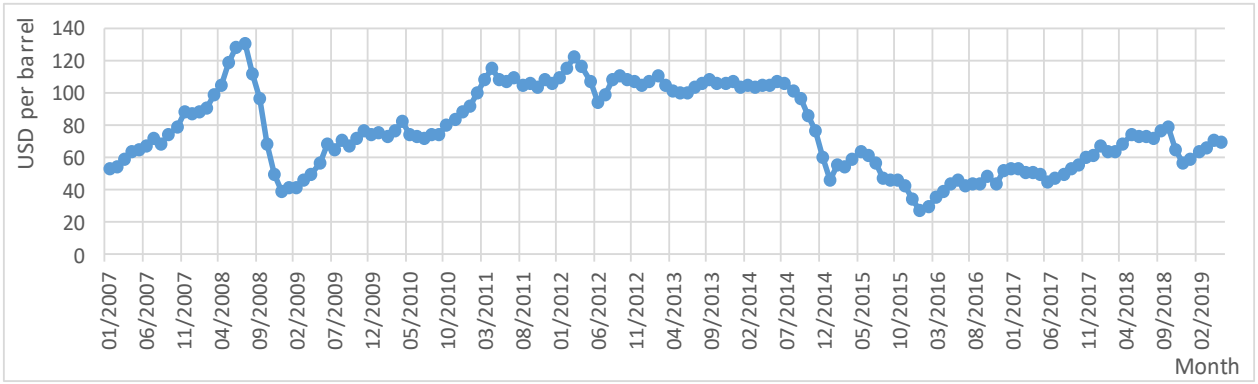


Fig. 5. Average monthly crude oil prices according to OPEC data for January 2007 ÷ May 2019

Conclusion

Crude oil production and consumption in the period between 1997 and 2018 has grown by about 33.1%, from 75 million barrels per day in 1997 to 100.66 million barrels per day in 2018.

The US IEA forecast for 2019 and 2019 is for oil production and consumption to increase to the level of 101.52 million barrels per day in 2019, which is about 1.5% average annual output growth.

Average annual crude oil prices during the period 2004-2018 are characterised by extremely high dynamics, which is mainly affected by temporary surpluses or deficits in the stock volume, but also by political and economic conflicts.

If oil prices are on the rise in the short term, shale production and other producers may be boosted to gain market share at the expense of OPEC. This would again push prices down.

In the long term, global demand, supply and prices of energy carriers depend on:

- the development of the world economy;
- the growth rates of the individual sectors of the economy;
- the growth of the population on the planet;
- the geo-economic and geopolitical situation;
- the amount of explored and proven geological reserves, and the constructed mining facilities in various countries.

Cartel agreements, on the other hand, have a rather short-term effect.

In general, after the 1970s, oil consumption has doubled, and the consumption of natural gas has risen almost nine times.

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