

ANALYSIS OF THE PRODUCTION, CONSUMPTION, AND PRICES OF CRUDE OIL

Veselin Mitev¹

¹ *University of Mining and Geology "St. Ivan Rilski", 1700 Sofia, E-mail: www.ves_mitev@abv.bg.*

ABSTRACT. The report presents world production and consumption of crude oil in the period between 1997 and 2016 and the forecast of the American Information Administration for 2017 and 2018. World crude oil reserves in 2015 are presented according to data provided by OPEC. The change in average crude oil prices for the period 2004 ÷ 2017 and in the monthly average prices for the period January 2007 ÷ May 2017, according to OPEC, are also analysed. The International Energy Agency's long-term forecast for world consumption and for the change in crude oil prices by 2040 is presented. Key factors exerting influence on crude oil prices are outlined.

Keywords: world production and consumption of crude oil; crude oil prices; key factors influencing crude oil prices.

АНАЛИЗ НА ПРОИЗВОДСТВОТО, ПОТРЕБЛЕНИЕТО И ЦЕНИТЕ НА СУРОВИЯ ПЕТРОЛ

Веселин Митев¹

¹ *Минно-геоложки университет „Св. Иван Рилски“, 1700 София, e-mail: www.ves_mitev@abv.bg.*

РЕЗЮМЕ. В доклада е представено световно производство и потребление на суров петрол за периода 1997 ÷ 2016 г. и прогноза на Американската Информационна Администрация за 2017 и 2018 г. Представени са доказаните запаси от суров петрол за 2015 г. по данни на ОПЕК. Анализирани са изменението на средногодишните цени на суровия петрол за периода 2004 ÷ 2017 г. и на средномесечните цени по данни на ОПЕК за периода Януари 2007 ÷ Май 2017 г. Представена е дългосрочната прогноза на Международната агенция по енергетика за световното потребление и изменението на цените на суровия петрол до 2040 г. Изведени са основните фактори, оказващи влияние върху цените на суровия петрол.

Ключови думи: световно производство и потребление на суров петрол; цени на суровия петрол; ключови фактори, влияещи върху цените на суровия петрол.

Introduction

Forecasting output, consumption and prices of crude oil has been carried out since the middle of the 20th century. Dozens of world, national and branch agencies and organisations all over the world prepare and periodically update their own medium-term, long-term and super long-term forecasts for the production, consumption and prices of this important energy raw material.

Along with the production and consumption of crude oil, prices are also affected by change of volume of the proven geological reserves of this raw material.

World production and consumption of oil

The best known institutions that make and update their forecasts for the production, consumption and prices of energy sources, and of crude oil in particular, are two: the American Energy Information Administration (US EIA) and the International Energy Agency (IEA). The latter currently has members from 29 countries.

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 production and consumption for the period between 1997 and 2016 together with the American Information Administration forecast for 2017 and 2018. The graph is made according to data provided by the American Information Administration (US EIA, 2017).

The data presented in Fig. 1 shows that production and consumption of crude oil over the last twenty years has increased by about 33%. At some points, production exceeded consumption and at others it was the opposite. These temporary surpluses and market deficits were offset by the change in commodity stocks of this raw material over the years.

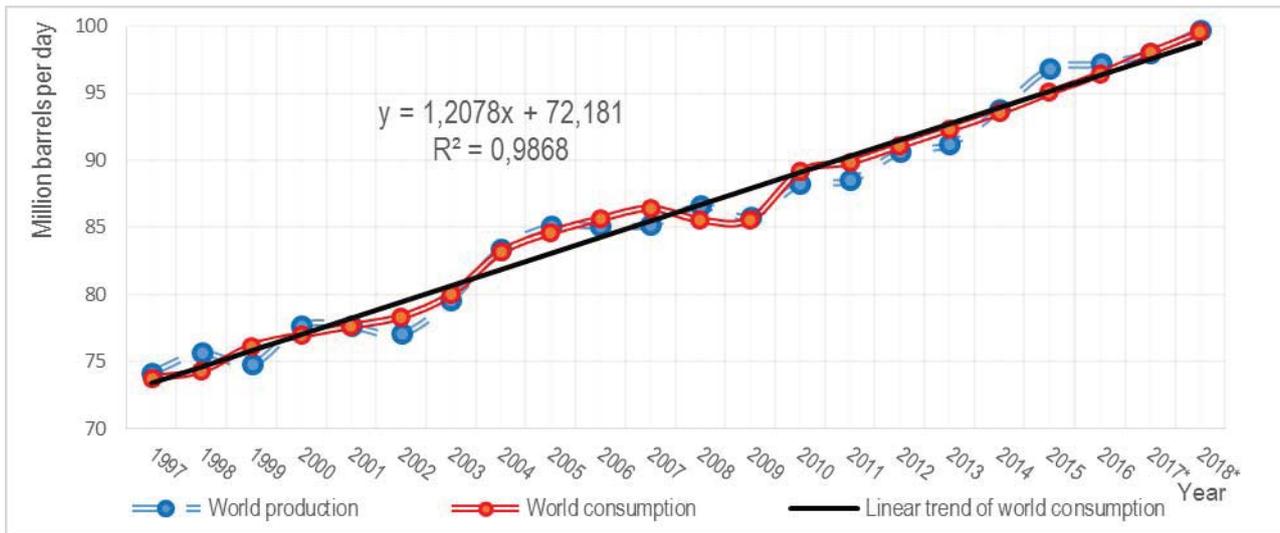


Fig. 1. World production and world consumption of crude oil per day for the period between 1997 and 2016 and the trends for 2017 и 2018

According to data provided by OPEC, in 2015, oil production by the organisation amounted to 31.8 million barrels per day. According to data by the US IEA, world oil production within the same year was 96.8 million barrels per day. This shows that OPEC member states account for about 32.85% of world oil production.

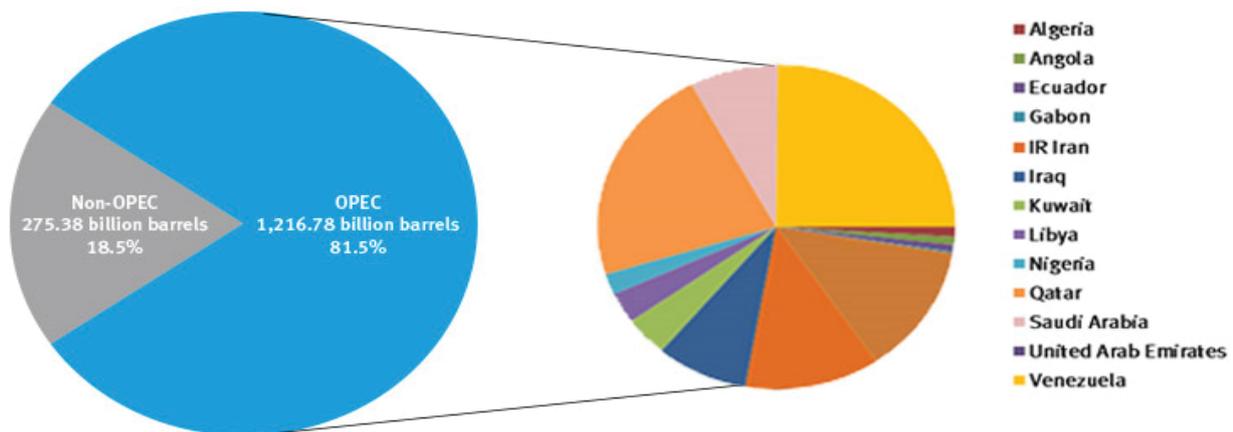
The US IEA forecast for 2017 and 2018 points to an increase in oil production and consumption of up to 99.8 million barrels per day in 2018, which is an approximate annual average production growth of about 1.0%.

The linear trend of world consumption during the period analysed, as shown in Fig. 1, has been one of growth and is characterised by a very high determinant coefficient of 0.9868.

Crude oil reserves

According to data provided by OPEC, about 81.5% 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 2016 are presented in Fig. 2.

OPEC share of world crude oil reserves, 2016



OPEC proven crude oil reserves , at end 2016 (billion barrels, OPEC share)

Venezuela	302.25	24.8%	Kuwait	101.50	8.3%	Qatar	25.24	2.1%	Gabon	2.00	0.2%
Saudi Arabia	266.21	21.9%	United Arab Emirates	97.80	8.0%	Algeria	12.20	1.0%			
IR Iran	157.20	12.9%	Libya	48.36	4.0%	Angola	9.52	0.8%			
Iraq	148.77	12.2%	Nigeria	37.45	3.1%	Ecuador	8.27	0.7%			

Source: OPEC Annual Statistical Bulletin 2017.

Fig. 2. OPEC share of world crude oil reserves, end of 2016.

The OPEC countries account for about 81.5% of the global geological reserves, with approximately 69.0% of the global reserves in the Gulf region.

In 2016, the proven crude oil reserves were estimated to be 1492.16 billion barrels. With the current world consumption, those will be sufficient for about a period of 40 years. The most significant stocks are in the following countries: Venezuela - 302.25 billion barrels (24.8%), Saudi Arabia - 266.21 billion barrels (21.9%), Iran - 157.20 billion barrels (12.9%), Iraq - 148.77 billion barrels (12.2%), Kuwait - 101.5 billion barrels (8.3%), UAE - 97.8 billion barrels (8.0%), etc. (see Fig. 2.).

Analysis of the change in crude oil prices

The price of crude oil depends on both its quality and location, and, likewise, on a whole set of geopolitical and economic factors. It should be pointed out that oil price has been significantly dynamic within the past and the current centuries.

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. Then came a period of downs and ups. February 2016 saw a 30-year bottom 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 has increased oil output to 4 million barrels per day. At the same time, however, in compliance with the OPEC agreement, Tehran should not exceed the level of 3.79 million barrels per day. Iranian oil company leader Ali Kardor has voiced his confidence that the export of raw materials is going to reach 3 million barrels a day by the end of 2017. He has 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 during 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 has 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 is preparing a second list of foreign companies that will be eligible to tender for oil extraction from localities in Iran.

Fig. 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.

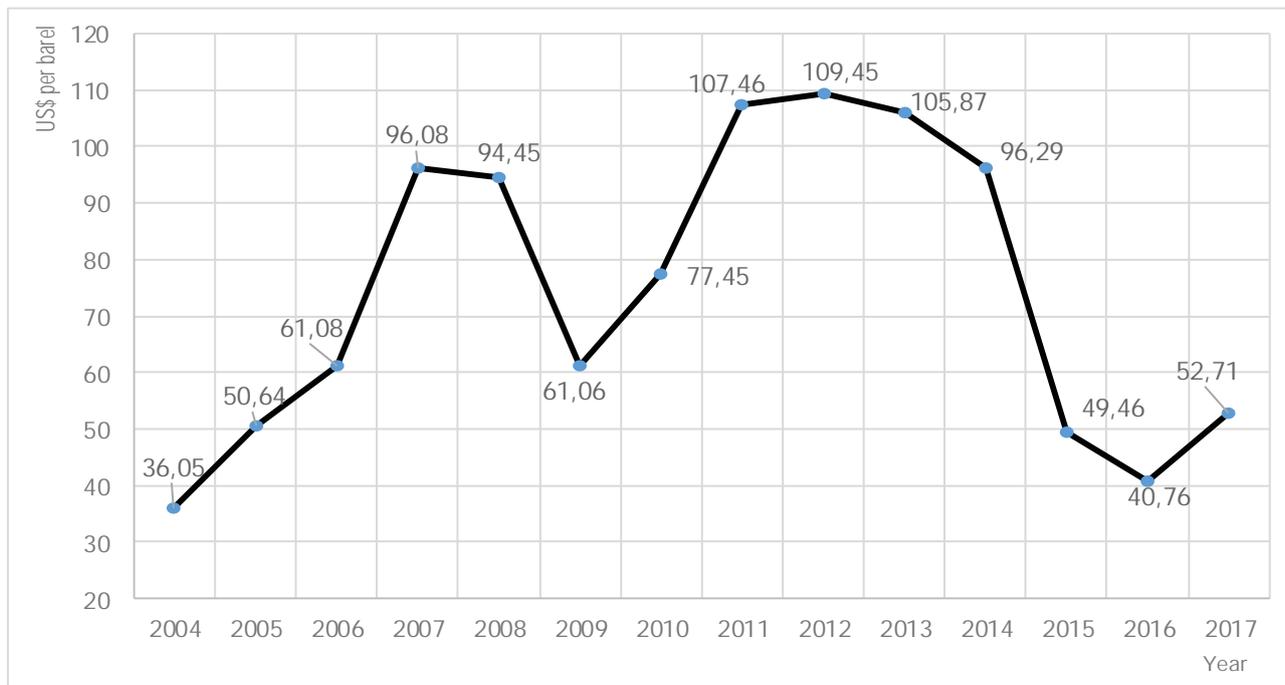


Fig. 3. Annual crude oil prices for the period 2004 - 2017

As can be seen from the data in Fig. 3, the average annual crude oil prices for the period between 2004 and 2017 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 to 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 oil in the next few months of 2017.

According to Kaloyan Staikov of the Institute for Market Economics (IME) "it is difficult to say unequivocally since there are balanced factors for the movement of prices on the oil markets in both directions" (Petkova, 2017). The direction of oil flows has changed following the OPEC agreement of November 2016. OPEC does not expect a rebalancing of the oil market before the second half of 2017.

Statkov also explains that commerce in recent months has been affected by OPEC communications, but the main factor for oil prices has been the commodity stocks. They still outpace consumption, and it is precisely the consumption that will determine, whether the price will go up or down in future.

Estimates for 2017 suggest a slowdown in the economic growth of such countries as China, as well as a rather unclear situation for Europe. "This pushes prices down", Staikov said.

Another significant factor is US President Donald Trump. He has promised incentives for the US economy, which raises the value of the US dollar. The more expensive US currency always results in cheaper oil. In addition to the policy of increasing interest rates, which the Federal Reserve has already announced, US investment will be stimulated, but the US currency will also be made more expensive. This factor also presses the oil price down.

According to Ivan Ivanov, Chairman of the Commission for Energy and Water Regulation (KEVR), the oil price rise was not going to be long-term. The effects of the OPEC decision would be forgotten as early as the spring of 2017. He predicted that the reduction in raw material quantities on the market caused by the freezing or limiting yields in the countries of the organization would very quickly be replaced by oil from US shale fields.

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 increased by more than 33%. It is 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, the growth rates of the individual sectors of the economy, the growth of the population of the planet, the amount of explored and proven deposits of underground natural resources, and 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 in 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 2016, the largest exporters in terms of value were the Gulf countries and Russia.

The International Energy Agency (IEA) predicts for global consumption of oil and other liquid fuels to range from 90 million barrels a day in 2017 to 100 million barrels a day in 2020 and to around 121 million barrels a day in 2040.

In its annual report for 2016 (U.S. EIA, 2016), the International Energy Agency predicts that the change in crude oil prices for the 20 years to come will vary within the limits shown in Fig. 4.

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;
- coordination of efforts and actions to overcome possible energy crises in the world economy, etc.

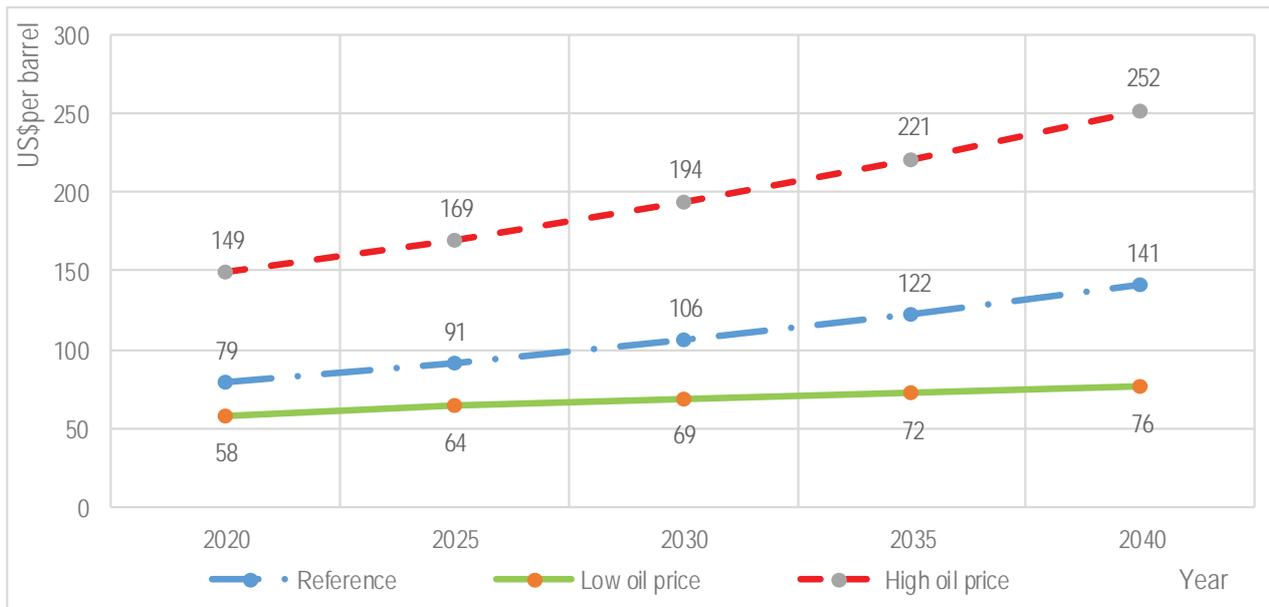


Fig. 4. Expected crude oil prices according to IEA

In the present century, the world trade 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 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 said. According to analysts at Morgan Stanley Bank, the American shale industry is the "obvious winner" of OPEC's decision.

Shale producers in the USA will be stimulated by oil prices in the range of at least US\$ 50 to US\$ 60 a barrel, rendering an account of sustained growth for several years to come, Citigroup Bank reports.

Although lowering yields to 32.5 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 2017, Morgan Stanley Bank pointed out. With a yield of 33 million barrels a day, rebalancing will only have effect in the second half of 2017, though "supply outside OPEC may put this moment at risk," the bank stated in its report. It also said 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.

Fig. 5 shows the change in the average monthly crude oil prices for the period between January 2007 and February 2017. The figure is based on OPEC Backed Price.

From January 2014 to January 2016, there was a significant drop of up to \$ 27.25 per barrel. Since the beginning of last year to date (i.e. June 2017), the price of crude oil has almost doubled to US\$ 44.58 per barrel.

The reason for the rise in oil prices is the statement by the Saudi Arabian Energy Minister that all OPEC and non-OPEC participants have agreed to extend their agreement for a further nine months.

It is interesting to know who will profiteer from the low prices. "Cheap oil is profitable for consumers."

According to Radev (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. In the long terms, oil prices are influenced by the following factors: the economic growth of the global economy; population growth; the change of proven geological reserves; regional military conflicts; OPEC production regulations and the cartel agreements to limit mining and to impose import quotas for member states over certain periods of time; internal military conflicts; the security of crude oil supplies for oil refineries; the imposing of an embargo and of import 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.

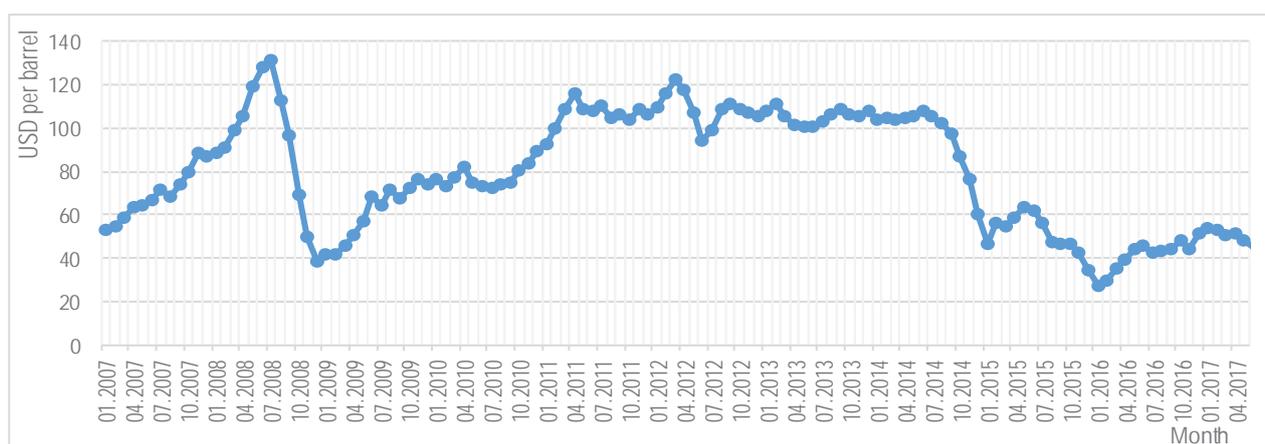


Fig. 5. Average monthly crude oil prices according to OPEC data for the period January 2007 ÷ May 2017.

Conclusion

Crude oil production and consumption in the period between 1997 and 2016 has grown by about 33%, from 75 million barrels per day in 1997 to 97 million barrels per day in 2016.

The U.S. IEA forecast for 2017 and 2018 is for oil production and consumption to increase to the level of 99.8 million barrels per day in 2018, which is about 1.0% average annual output growth.

Average annual crude oil prices during the period 2004 ÷ 2017 are characterised by extremely high dynamics, which is mainly due to temporary surpluses or deficits in the stock volume.

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 terms, 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.

References

- Петкова, Д. Трудните прогнози за цената на петрола през 2017 г. Инвеститор.бг. (Petkova, D., Trudnite prognozi za cenata na petrol prez 2017, Investor.bg.) – <http://www.investor.bg/surovini/365/a/trudnite-prognozi-zacenata-na-petrola-prez-2017-g-230756/> (accessed 30 May 2017)
- Радев, Ю. Обзор на глобалния нефтен пазар 2015 г. Български газов център, 2016. (Radev, Y., Obzor na globalnia neften pazar 2015, Bulgarski gazov centut, 2016.) - http://bgc.bg/upload_files/file/BGC-2015,%202012.pdf (accessed 20 May 2017).
- Annual Energy Outlook 2016 with projections to 2040, U.S. Energy Information Administration, Energy Information Administration, August 2016. – [https://www.eia.gov/outlooks/aeo/pdf/0383\(2016\).pdf](https://www.eia.gov/outlooks/aeo/pdf/0383(2016).pdf) (accessed 30 May 2017).
- Annual Energy Outlook 2017 with projections to 2050, U.S. Energy Information Administration, 2017. – <http://eia.gov/outlooks/aeo/pdf/0383%282017%29.pdf> (accessed 6 June 2017).
- OPEC Annual Statistical Bulletin, OPEC, 2016.
- OPEC Annual Statistical Bulletin, OPEC, 52nd edition, 2017.
- OPEC Backed Price – http://www.opec.org/opec_web/en/data_graphs/40.htm. (accessed 22 June 2017).

The article is reviewed by Prof. Dr. Desislava Kostova and Assoc. Prof. Dr. Juli Radev.