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Natural gas reserve/production ratio in Russia, Iran, Qatar and Turkmenistan: A political and economic perspective

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HIGHLIGHTS

- Russia, Iran, Qatar and Turkmenistan are the top four countries with the highest natural gas reserves.
- *R*/*P* ratios of Russia, Iran, Qatar and Turkmenistan are presented in this study.
- Change of *R*/*P* ratio has been associated with the political and economic events of the countries are being analyzed.
- The effect of political and economic changes on the ratio of natural gas *R*/*P* has been proposed.

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ABSTRACT

In this study, changes in natural gas reserve/production ratio (*R*/*P*) of the four countries having the highest natural gas reserves (Russia, Iran, Qatar, Turkmenistan), the importance of which increases in the world market each day due to developing technology and the demand for clean energy, has been analyzed depending on the economic and political developments in national and international fields. Change of *R*/*P* ratio depending on years has been displayed on graphics from different sources and these alterations have been tried to be associated with such issues as natural gas agreements in history, handover of political authority, economic crises etc. Therefore; it has been put forward whether or not political and economic changes of the countries are factors on the amount of natural gas production and the discovery of new reserve fields with the addition aim of providing a general overview on natural gas market.

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1. Introduction

Natural gas, applied in the world since mid twentieth century and the importance of which increases in energy market every day, is one of three main forms of fossil fuel in the world, along with coal and petroleum (Kakaee and Paykani, 2013). Natural gas is composed of hydrocarbon gas mixtures, predominantly methane, in changing amounts as well as ethane, propane and butane. (Victor et al., 2006). Among fossil fuels, natural gas is the one which emits the least carbondioxide per unit energy and the carbon density of which is less than the others. These positive characteristics enabled natural gas to penetrate effectively in the industrial market, especially local and commercial heating (MIT, 2011). Moreover, it is essential to develop low-carbon energy sources quickly in order to secure energy supply safety in the world and stem the tide of global climate change (Geng et al., 2014).

Natural gas reserves in the world are highly valued and their value is expected to increase in the future (Geng et al., 2014). It is stated that natural gas reserve of the world proven in 2013 is 185.7 trillion cubic meters and reserve/production ratio is 55.1 (BP, 2014). Especially the countries possessing reserves want to increase their shares in energy supply in order to derive benefit from the advantages of natural gas. On the other hand, other countries need to import in order to increase natural gas usage (Siddiqi, 2002). According to 2013 data, global natural gas ranking changes in different sources, but the first countries having natural gas reserves in the world are Iran, Russia, Qatar and Turkmenistan (BP, 2014; OPEC, 2014). Natural gas reserve ratios of these countries, according to BP and OPEC, are seen in Fig. 1. Natural gas reserve amounts of the same countries are displayed in Fig. 2.

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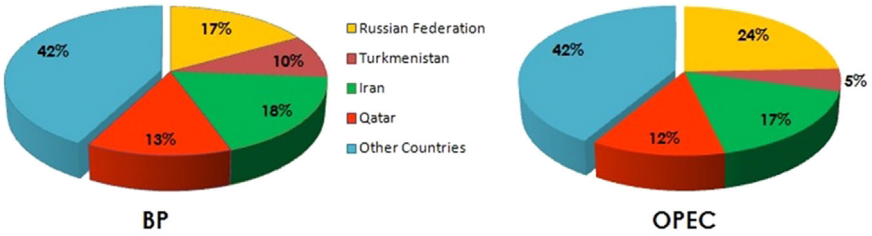
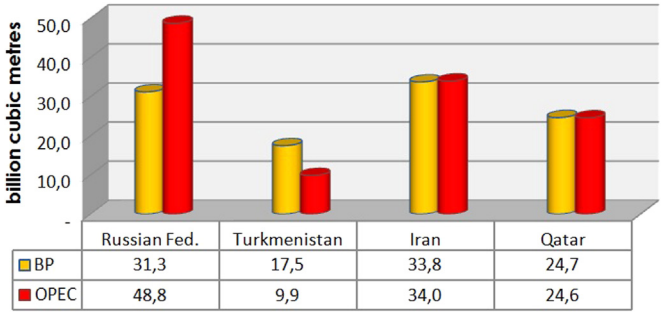


Fig. 1. Natural gas reserve ratio of world.



	Russian Fed.	Turkmenistan	Iran	Qatar
BP	31,3	17,5	33,8	24,7
OPEC	48,8	9,9	34,0	24,6

Fig. 2. Natural gas reserve quantities.

Reserve–production ratio (R/P) is closely related with the changing trend of production speed experimentally (Zhan, 2000). Proven reserve and available production ratio (R/P) is an indicator commonly used to assess the ability of a country to produce any material (for example; natural gas) which is not renewable for a long period as well as the status of local, regional and worldwide natural energy and mine sources (Siddiqi, 2002; Feygin and Satkin, 2004). When reserves remaining at the end of a specific year are divided by the production in that year, this ratio shows for how many years these reserves will survive, provided that production continues at the same level (BP, 2014). When talking about the problems of natural gas supply, it is beneficial to know R/P ratio for the near future (Siddiqi, 2002). "Reserves are considered proven if economic producibility is supported by either actual production or conclusive formation testing" (OPEC, 2014). Occasionally there are circumstances in which R/P ratio is not practical. Although R/P ratio indicates the regional differences between reserves and products, calculations regarding how long petroleum and natural gas will survive or when their usage will be limited are inaccurate (Seljom and Rosenberg, 2011). Reserve–production ratio (R/P) is not sensitive to increasing demand and decreasing production ratio. While net production amount during a long period can reflect reserve estimations, it is not possible to estimate when a specific date is used in a specific timeframe (Owen et al., 2010). While countries dealing with natural gas export fulfill their own needs, they also want to know how much energy they will export for the following decade. R/P ratio is not practical for estimation studies (Siddiqi, 2002).

In this study, the insufficiency of R/P ratio mentioned above will not create any obstacle because there will be no estimation about the natural gas status of the countries or no determination such as import or export needs of the countries. In this study, the world's top leading four countries having natural gas reserves namely Iran, Russia, Qatar and Turkmenistan are examined handled. Natural gas reserve–production ratio (R/P) changes depending on the economic and political developments of these countries in national and international fields are analyzed. At the end of the research, the effect of political and economic changes of the countries on the ratio of natural gas reserve/production is put forward.

2. Methodology

In this study, the world's top leading four countries having natural gas reserves namely Iran, Russia, Qatar and Turkmenistan are examined handled. Data for the study is based on data of national and international petroleum companies, civil institutions, national authorities and academic studies. The methodology suggested accordingly is structured as in Fig. 3. After determining the first four countries in terms of natural gas reserves, political events of these countries occurred since 1991 are analyzed and important events are highlighted in the tables. Accordingly, reserve/production ratio of the countries has been analyzed and displayed in the graphics. Then, the effect of political events on reserve/production ratio is associated in annual basis and this is discussed to reach a conclusion.

3. Political events in country

Energy resources are affecting one of the main factors in terms of international relations and foreign policy strategies in the 21st century. In this context, it can be said that countries determine their international actions through their stimulation of having energy, securing the safety of energy logistics and establishing control over world energy resources (Sevim, 2012). Reserve/production ratio of natural gas, the most important energy resource of the aforementioned four countries, can change because of the effect of these strategies. Even if the countries determine these strategies, political events within the process can also affect reserve/production ratio. It is important to analyze political events of the countries in order to realize these effects.

3.1. Russian federation

During 1991–2014, also called the Post-Soviet period, the Presidents played important roles in shaping the foreign policy of Moscow against Central Asia (Burkov, 2014). Russia faced a serious economic collapse in terms of economy after the fall of communism. While Yeltsin was in the administration, he made important reforms in the field of economy. A wide privatization program was carried out during 1993–1994 and this program reappropriated the shares in many companies from the state to the directors and workers of the companies as well as to the people. By the middle of 1994, approximately 70 percent of the Russian economy was in the hands of in private companies. Russia managed to stabilize the ruble in 1995, through the support of International Monetary Fund, it was too difficult to apply these reforms. It has become a cliche´ that the results for Russia output decreased substantially in the 1990s. In accordance with the official Goskomstat statistics, the percentage of Russian GDP per capita decreased about 39 percent in terms of real trade between 1991 and 1998, the years of Gorbachev is departure and when the economic progress resumption of initiation beginning (Shleifer and Treisman, 2005). However, serious crisis starting in August 1998 stopped this stabilization process and inflation went up to 85%.

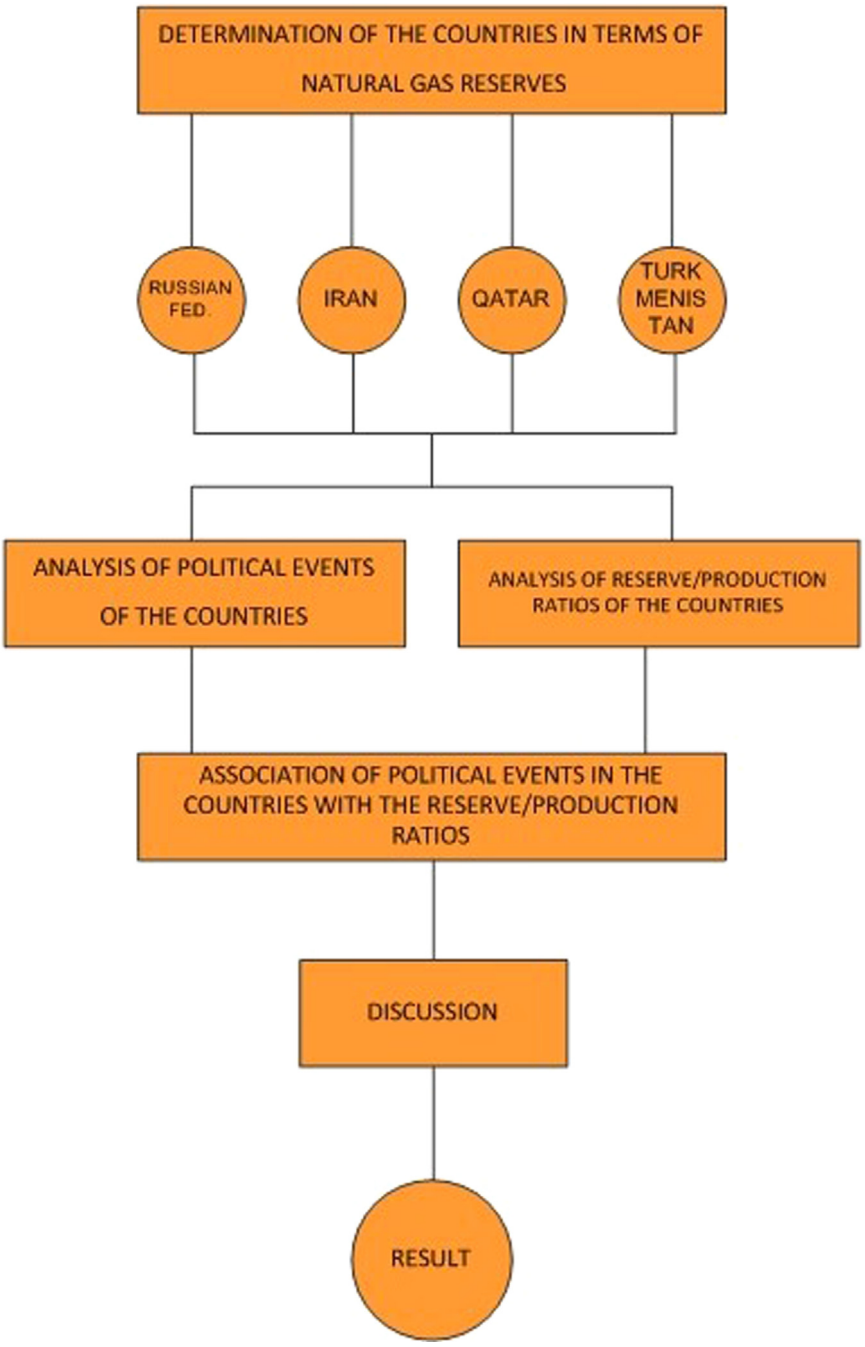


Fig. 3. Methodology of the study.

Vladimir Putin was elected as the President in the elections held on 26th March, 2000 (Mikail, 2007). Although economic problems were seriously felt in Putin period, there was a new Russia in world stage (İvanov, 2001). Russia signed a natural gas agreement with Turkmenistan for 25 years in April 2003 in order to develop economically and to strengthen its relationships. In accordance with the agreement, Russia guaranteed that it would purchase natural gas of 2 trillion cubic meters of natural gas from Turkmenistan until 2028 (Alkan, 2011). In the same year, petroleum prices increased as a result of USA's occupation in Iraq and so the demand for natural gas increased as well. This case seriously contributed to the strengthening of the Russian economy. Russia's contradictory and complex policy between 1997-2003, even though partly, brought to a successful conclusion for Russia in Putin Period (Stulberg, 2005). With the agreement signed in 2005 regarding the passing of Central Asia gas through Uzbekistan and Kazakhistan, Putin prevented any potential alliances of these countries which could exclude Moscow as well as the intervention of Turkish Republic in Russia's energy policies (Kamalov, 2006). However; Russia entered into a recession period in 2009. GDP of the country decreased by 7,9% in the same year because of the negative effects of the global crisis (Marketwatch, 2010). This recession period began to abate by 2010 with the help of the positive effects of an austerity package applied. When Ukrainian Government refused to sign Ukraine-European Union Partnership Agreement in November 2013, a civil rebellion occurred (BBC, 2013). When Russia annexed Crimea in March 2014 and conflicts continued in East Ukraine, Russia's military expenses gradually began to increase (Kalotay, 2015).In 2015, falling oil prices, coupled with western sanctions over Russia's support for separatists in

eastern Ukraine have hit the country hard. The government cut its growth forecast for 2015, predicting that the economy will sink into recession (BBC, 2013).

3.2. Iran

Rafsancani was the President of Iran in the years when the Cold War concluded. Rafsancani read the conditions after 1990 well, on behalf of Iran, and initiated new expansions in foreign policy, especially outside the Middle East Region, in accordance with the Iranian power and capacity. When considering that 1997, the power period of Hatemi, brought the year when globalization effects intensified and spread, it can be thought that Hatemi determined a political discourse which would make a profit or the least loss for Iran in the globalization process (Sarıkaya, 2012). Turkmenistan has been supplying 5.9 billion m^3 of natural gas at a price of 40 $ to Iran since 2001. In late February 2004, Total from France, Peronas from Malaysia and Iran's National Petroleum Company signed an investment agreement for 2 billion dollars, through their co-investment, on Pers LNG to be completed in 2009. In accordance with this project, it was planned to extract liquefied natural gas of 10 million tons annually in the Persian Region. Despite the rapid increase in domestic consumption, Iran focused on increasing natural gas export. Within this frame, Zhuhai Zhenrong Co. of China signed an agreement in 2004 which guaranteed the purchase of 110 million tons of LNG from Iran for 25 years (DEİK, 2012). Ahmedinejad, regarded as a radical candidate, became the President in the elections of 2005 (Samii and Phil, 2005). When the nuclear weapon concerns which emerged in 2002 combined with Ahmedinejad's anti-West attitude in discourse level, United Nations Security Council made six separate decisions against Iran between 2006 and 2010, four of six which included economic sanctions against Iran. (UN, 2015). USA regarded the UN Security Council decision as insufficient and unilaterally initiated further new sanctions. The most concrete attempt against Iran's nuclear program was “Comprehensive Sanctions against Iran” dated 1 July 2011, targeted the energy and banking sectors. It was approved by Obama Administration on the grounds that Iran was amassing funds for nuclear armament. This package included not only American companies but also energy and banking sectors of all other countries making business with Iran (İşeri, 2012). These new sanctions implemented in January 2012, in addition to UN Embargos going on since 2006, dealt a major blow to the Iranian economy (Patterson, 2013).

3.3. Qatar

Although Qatar declared its independency in 1971, it only recently became a recognized player in international arena, mostly on account of its economic power derived from national its ample energy resources. Qatar gained strategical importance with the increase of worldwide natural gas usage since the end of Cold War (Diriöz, 2009). Qatar's big north field, the discovered in 1971 is the largest non associated gas field in the world. However, natural gas production did not begin until 1991 because of Qatar's geographic location which is remote to markets, flamed technical feasibility studies and financial problems (İbrahim and Harrigan, 2012). After production began in 1991, Qatar expanded as a LNG exporter and began exporting LNG in 1997 (EIA, 2014a, 2014b, 2014c). A new foreign capital law was enacted in 2000 which aimed to make the investment environment more practical (Sönmez, 2011). With the visit of George W. Bush to Qatar in 2003, diplomatic initiatives started, cooperation was established in order to increase Gulf security and large economic connections were established, especially in hydrocarbon, between Qatar and the United States of America (U.S. Department of State, 2014). Qatar and the USA signed an agreement in November 2005 in the amount of 14 billion dollars establishing the biggest liquefied natural gas refinery in the world (Akdoğan, 2006). Today, the only project which enables the transfer of Qatar gas through pipelines is the Dolphin Project. This project plans the transfer of Qatar LNG to United Arab Emirates and Oman through pipelines. Dolphin Energy obtained the right to bring North Field natural gas to Abu Dhabi and Dubai for 25 years in accordance with its agreement with Qatar Petroleum (Açıkel, 2011). Qatar continued to develop its natural gas reserves and attempted to pave the way for private and foreign investment in the global economic crisis in 2008 and was able to maintain its dominance in the petroleum and natural gas sector (Gulfbase, 2015). In 2010, an LNG sales agreement was signed with Conocophilips for 2 million tons and another PetroChina for 3 million tons annually (Qatargas, 2015). In 2010, 5 LNG fields started production, each with a capacity of 7,8 million tons annually. Qatar Petroleum, with its 56 ships, has established one of the largest tank fleets in the world in order to bring the produced LNG to the target markets (Oxford Businnes Group, 2010).

3.4. Turkmenistan

Turkmenistan became an independent country on 25 December, 1991 after the disintegration of the Soviet Union (Victor et al., 2006). Turkmenistan is a country gaining importance in the new international environment shaped after 1991 because of its rich natural resources and strategic geographic location (Alkan, 2006). The political regime in Turkmenistan has a frame shaped by an authoritarian interpretation of Turkmen traditions. Its political institutions are structured around the personality of Saparmurat Niyazov and this has deeply affected the political developments of Turkmenistan and has made the country poor and isolated from the outer world (Anceschi, 2010). After the period following independence in 1991, important improvements were observed in the country's economy and foreign trade balance due largely to the exportation of natural gas with world prices.

In 1996, economic reforms began to be applied in agriculture, foreign trade and exchange rate regime through the executive order of the Presidency (Lerman and Brooks, 2001). The prevention of Turkmen natural gas exportation by Russia in 1997–1998 made the country's foreign trade and investment financing difficult. (Konca, 2011). Following the assassination attempt against Niyazov on 5 November 2002, a constitutional amendment was passed in 2003. These amendments generally aimed at strengthening Niyazov's authority and facilitating his usage of all state power against his rivals (Alkan, 2006). A bilateral security and cooperation agreement was signed with Russia in January 2003 in which it was agreed that Russia would assist especially in mutual intelligence support and intelligence organization structuring (Eurasia Insight, 2003). A natural gas agreement was then signed between the two countries, valid until 2028 and Russia's control over Turkmen natural gas was strengthened (Torbakov, 2003). At the end of 2003, another important development occurred in the new process with the signing of a natural gas contract for 25 years with Russian ZAOZarit Consorsium for a new field located near the Iran boundary in the Caspian Sea (Blagov, 2004). China and Turkmenistan gave the signals in 18th January that they would sign an agreement in 2006 Spring regarding natural gas sales between to countries. Moreover; China guaranteed that it would purchase 30 billion cubic meters gas from Turkmenistan annually starting in 2009 (Blank, 2006). After Niyazov's death in 2006, within a period up less than 4 years, Turkmenistan became a more compliant society with the world (Anceschi, 2010). In February 2007, Gurbanguly Berdimukhammedov was elected President after a controversial election (Richardson, 2013). On July 17, 2007, China National Petroleum Corporation (CNPC) signed a production

sharing agreement to explore and develop gas fields on the right bank of the Amu Darya River with the Turkmen State Agency for Management and Use of Hydrocarbon Resources and a natural gas sale-and-purchase agreement with Turkmengaz. According to the agreements, Turkmenistan will export 30 billion cubic meters of natural gas to China annually for 30 years. In August 2007, the Amu Darya project was launched on the issuing of the exploration and development license by President Gurbanguly Berdymukhammedov (CNPC, 2015). In 2009, natural gas exportation to China began through the new pipeline and the pipeline capacity to Iran was increased in 2010, so natural gas exportation was faciliated (EIA, 2014). New natural gas fields have been discovered and reserves have continued to increase as from 2012 on (CNPC, 2015).

4. *R/P* ratio in country

R/P ratios represent the length of time that remaining reserves would last if production were to continue at the previous year's rate. It is calculated by dividing remaining reserves at the end of the year by the production in that year. Proved reserves of natural gas are generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. World proven natural gas reserves at the end of 2013 stood at 185.7 trillion cubic meters (tcm), sufficient to meet 55.1 years of global production. Proved reserves grew by 0.2% relative to end-2012 data. Iran (33.8 tcm) and Russia (31.3 tcm) hold the largest proved reserves as of 2013 (BP, 2014).Proven natural gas reserves of the mentioned countries are displayed in Fig. 4 and Fig. 5, in accordance with OPEC and BP sources. Fig. 6 and Fig. 7 show natural gas production amounts in accordance with the same sources.

4.1. Russian federation

Including natural gas, the energy sector plays a vital role in Russian economy (Paltsev, 2014). Russia possesses 23% of the natural gas reserve in the world and with 20% of world production, exporting 30% of the gas which it produces (Söderbergh et al., 2010). The Russian dominance in gas transit and poor access to alternative markets have set a low value on Central Asian gas (Cobanli, 2014). Gazprom is responsible for produces 75% of Russian natural gas production. Other producers depend on the pipelines of Gazprom for gas transportation. While monopolization of Gazprom's of pipeline exportation continued at the end of 2013, the other countries were allowed for LNG exportation (Paltsev, 2014).

4.2. Iran

Iran has the second largest natural gas reserve in the world after Russia and is one of the leading countries in the usage of natural gas in fuel-injection engines. Iran has 17% of the proven natural gas reserves in the world. (Kakaee and Paykani, 2013; EIA, 2014). Despite being the fourth largest natural gas producer, Iran's consumption increasing faster than its production, a tendency is which caused at a higher rate natural gas imports to be higher than exports, except for 2010. There are two main reasons for low production ratio in Iran, the primary reason being the fact that foreign investors cannot approach Iran due to their economic sanctions. Secondly, the majority of Iranian natural gas reserves are located in marine spaces, so it is difficult and expensive to operate them (Heidari et al., 2013; Energy Balance, 2008). The South Pars natural gas field is the largest hydrocarbon upstream project currently being developed in Iran and continues to encounter delays. South Pars, located offshore in the Persian Gulf, holds roughly 40% of Iran's proved natural gas reserves. It is currently being developed mostly by Iranian companies as most international companies have withdrawn (EIA, 2014).

4.3. Qatar

Qatar with the third largest proven natural gas reserves, has the highest ratio of liquefied natural gas (LNG) exportation (EIA, 2014). Qatar obtains a substantial ratio of natural gas from North Field facilities of Ras Laffan located 75 km offshore. Qatar uses its energy advantage by converting it into marketing through natural gas pipelines and natural gas derivatives. These are LNG, liquid fuels produced from natural gas and petrochemical products. These sources are managed by “Qatar Petroleum” (QP). Qatar has approximately 15% of total natural gas reserves in world and the its natural gas is heavily available in the offshore North Field (Koçgündüz, 2011).

4.4. Turkmenistan

The fourth biggest country having natural gas reserves in the world is Turkmenistan (BP, 2014; OPEC, 2014). Turkmenistan's main exports are especially natural gas, which it sells to Russia, petroleum and other petroleum based products (Kane et al., 2007). Turkmenistan provides numerous advantages in terms of reserves within Europe, transportation safety and net returns (Bilgin, 2003; Bilgin, 2007). With its vast gas reserves, Turkmenistan's export potential is huge, though substantial investments are needed to increase production. The country's large gas reserves are becoming increasingly important for Eurasian energy importers (Europan Commission, 2014).

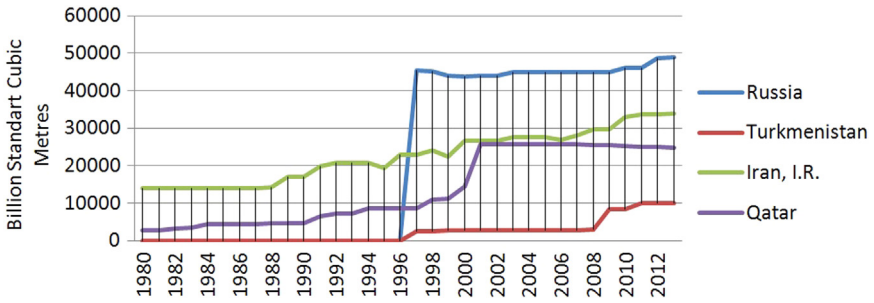


Fig. 4. Proven natural gas reserves by country (OPEC).

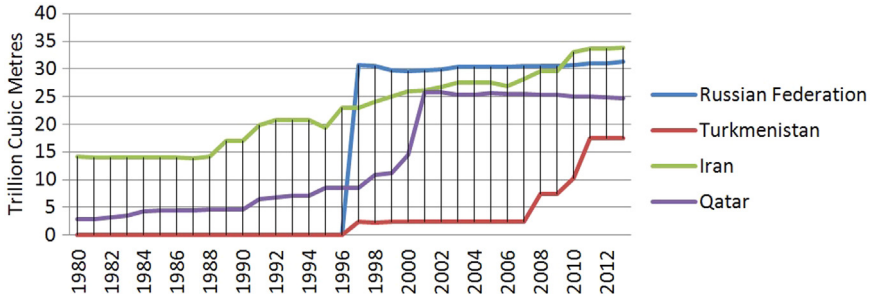


Fig. 5. Proven natural gas reserves by country (BP).

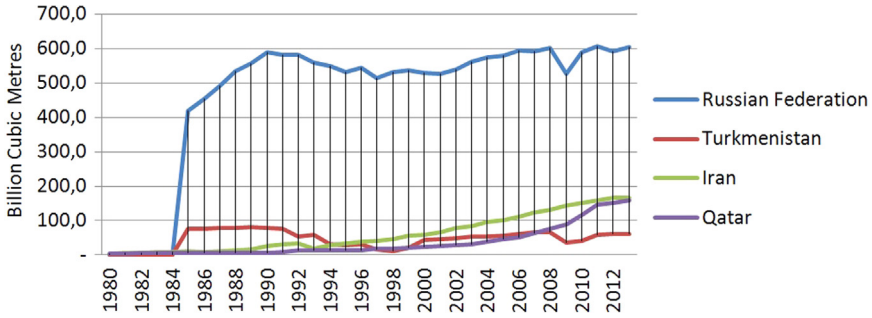


Fig. 6. Natural gas produced by country (BP).

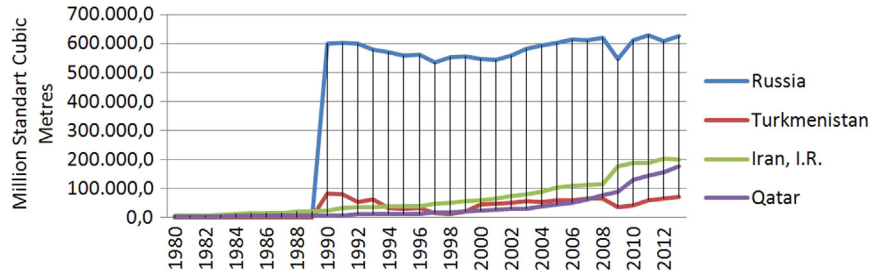


Fig. 7. Natural gas produced by country (OPEC).

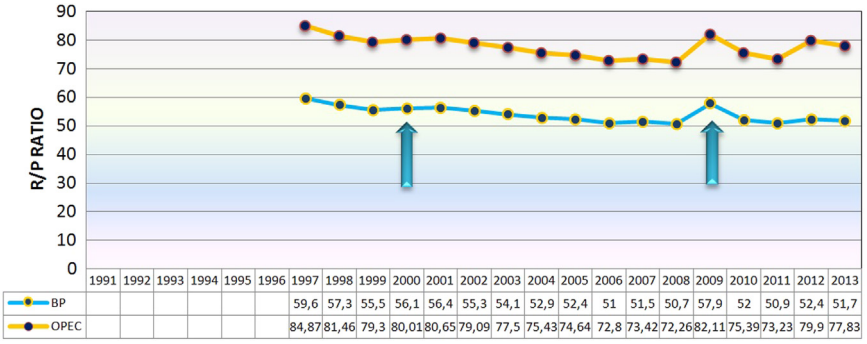


Fig. 8. Reserve/production ratio in Russian Federation.

5. Discussion

The tables (Tables 1-4) above which display the political and economic status of the countries were chronologically combined with the graphics of reserve/production and assessments were made by analyses.

A politically important process began in Russian Federation in 2000 and Vladimir Putin was elected as the President. From that date on, political authority process continued although there were different namings because of legislational structure. Especially with the power of Putin, Russia put its energy resources as an economic power and strategically used them to exert political power in the whole world, especially in the continental Europe. Natural gas production increased within years and *R*/*P* ratio rapidly decreased in this process (Fig. 8). It continued except for the global economic crisis in 2009. The fact that there was a struggle between Russia and EU to establish a power on Ukraine, which was important in natural gas transportation between Europe and Russia, and as a result, the fact that Ukraine was disintegrated, created economic and political problems in country and global wide. Events occurring after 2015 petroleum crisis caused a devaluation in the country's economy. Since petroleum and natural

Table 1
Political Events in Russian Federation.

Russian Federation	
Periods	**Events**
1991	Russia Federation was founded.
1994	Implementation of tight monetary policy through IMF support by the Central Bank
1995–1998	Macro economic stability process
1998	Serious economic crisis Shift from adjustable fixed rate to fluctuating exchange rate Increasing of inflation to 85 %.
2000	Vladimir Putin was elected as the President for the first time.
2003	Natural gas agreement with Turkmenistan. -Increasing petroleum prices after the occupation of Iraq and, as a result, tendency towards natural gas which is clean and easy to use.
2005	Putin's agreement regarding the passing of Central Asia gas through Uzbekistan and Kazakhistan.
2006	Agreement on the transfer of the usage of natural gas system and facilities within the boundaries of Uzbekistan and Kazakhistan to Russia.
2009	Because of deep recession period, GDP of the country decreased by 7,9 % because of the negative effects of global crisis.
2010	Recession period began to lose its effect.
2014	East Ukraine War began.
2015	Petroleum Prices decreased.

Table 2
Political Events in Iran.

Iran	
Periods	**Events**
1989	Rafsancani elected President.
1997	Muhammed Hatemi elected President.
2001	Gas import from Turkmenistan began.
2004	Pers LNG agreement was signed with France and Malaysia.-Natural gas agreement signed with Zhuhai Zhenrong Co., a Chinese state company.
2005	Ahmedinejad elected President.
2006	UN sanctions began to be applied.
2011	Sanctions against Iran began within USA concept.
2012	Second part of UN sanctions began.

gas had an important role in the country's budget, the decreases in the prices of petroleum and natural gas had a substantial effect on the country's economy.

After the Gulf War, there was no substantial difference in R/P ratios in Iran, though there was a balanced decrease in R/P ratio. The reason why these ratios did not have sudden changes can be associated with the policies of the country's political authority. Rafsancani's expansions and steps to open diplomatic and economic relations brought economic stability to Iran. Although there were some fluctuations in the economy between 1996 and 1997 in the process of presidential change, it is now seen that stability was achieved after Hatemi became President in 1997, which was reflected on R/P ratios as indicated in Fig. 9. Although Iran draws a

Table 4
Political Events in Russian Federation.

Turkmenistan	
Periods	**Events**
1991	Turkmenistan anounced its independency.
1996	Economic reforms began in agriculture.
1997	Turkmen natural gas exportation prevented by Russia.
1998	Gas exports to Ukraine and Russia.
2001	Gas exportation to Iran began.
2003	Authoritarian administration strengthened. Natural gas agreement signed with Russia.
2006	Bilateral agreements signed with China. Niyazov passed away.
2007	Gurbanguly Berdimuhammedov elected President.- Natural gas agreement signed with China National Petroleum Corporation.
2009	Turkmenistan–China pipeline opened.
2010	Turkmenistan-Iran pipeline capacity increased.

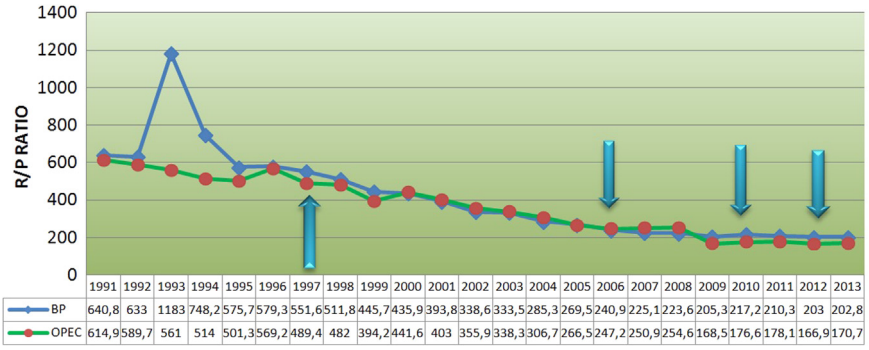
stability in R/P ratios, it is clear that it makes less production compared to other countries when natural gas amounts are taken into consideration. One of the reasons for this is the fact that a substantial part of their natural gas fields are located in marine space and there is no incentive for foreign investors yet. UN sanctions applied between 2006 and 2010, the sanction applied by the USA in 2011 and the UN embargo in 2012 are other reasons which have stifled production.

In Qatar, where natural gas production began in 1991, production increased between 1991 and 1992 in accordance with this, it is observed that R/P ratio decreased (Fig. 10). After, period of relative stability, production started to increase again with the help of the initiation of LNG exports in 1997. This caused a decrease in R/P ratio, as can be seen in Fig. 10. R/P ratio with an up-and-down process until 2000, increased again starting from 2000 and achieved its peak 2001. The reason for this is the new reserves found in those years. Discovery of new reserves and the acceleration of production in 2000 can be associated with the foreign capital law enacted in that year. After this law, the investment environment became more practical and foreign companies started to appear in the natural gas sector. Constant decrease in R/P ratio from 2000 until 2013 can be explained by the natural gas agreements signed by Qatar within the years and the direction of its investments in the energy sector, especially LNG. During this process, like the whole world, countries having control of natural gas and petroleum were affected by the global economic crisis in 2008. However, Qatar overcame this crisis unscathed by constantly developing its natural gas reserves and taking steps to increase foreign investment in its energy sector. This case is clearly displayed in Fig. 10 as reflected on natural gas R/P ratios of the country.

The prevention of natural gas exportation in Turkmenistan by Russia in 1997 caused a decrease in production in Turkmenistan between 1997–1998 coupled an increase in R/P ratios (Fig. 11). As a result of the natural gas agreements signed by Turkmenistan with

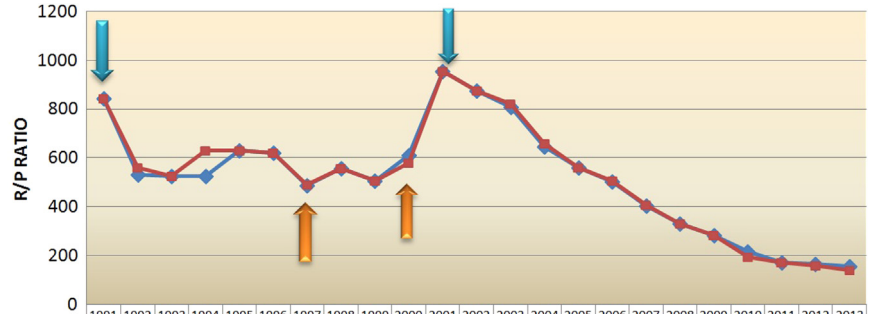
Table 3
Political Events in Qatar.

Qatar	
Periods	**Events**
1991	Natural gas production began.
1997	The first LNG export was made.
2000	A new foreign capital law was enacted and investment environment was made more practical.
2005	Qatar and the USA signed an agreement for 14 billion dollars in order to establish the biggest liquefied natural gas refinery in the world.
2007	A strategic energy initiative named Dolphin Pipeline began gas production.
2008-2010	LNG Sales agreements were signed with CNOOC for 2 million tons annually and with PetroChina for 3 million tons.
2010	5 LNG fields started production, each with a capacity of 7,8 million tons annually. Qatar Petroleum, with its 56 ships, established one of the biggest tank fleets in the world in order to bring the produced LNG to the target markets.



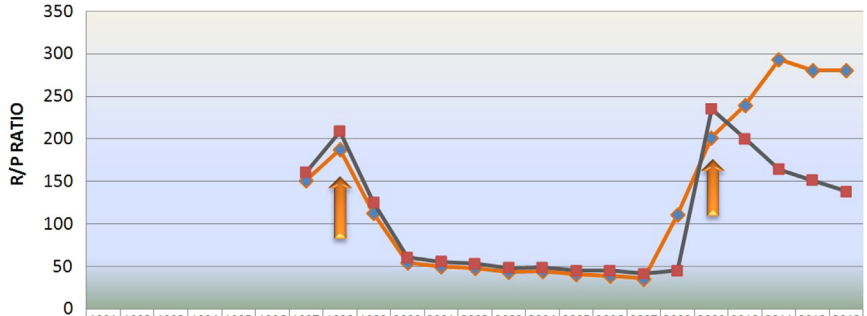
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
BP	640,8	633	1183	748,2	575,7	579,3	551,6	511,8	445,7	435,9	393,8	338,6	333,5	285,3	269,5	240,9	225,1	223,6	205,3	217,2	210,3	203	202,8
OPEC	614,9	589,7	561	514	501,3	569,2	489,4	482	394,2	441,6	403	355,9	338,3	306,7	266,5	247,2	250,9	254,6	168,5	176,6	178,1	166,9	170,7

Fig. 9. Reserve/production ratio in Iran.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
BP	842,1	531,7	525,9	525,9	629,6	620,4	485,5	556,7	506	609,4	954,9	874	807,1	647,5	559,7	503,8	402,9	329,5	283,6	214,6	172,4	165	155,7
OPEC	842,6	560,9	525,9	629,6	629,6	620,4	488,5	556,7	506	580	954,9	874	821,1	658,2	559,7	505,6	405,6	330,8	284,1	192,1	172,8	159,6	139

Fig. 10. Reserve/production ratio in Qatar.



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
BP							151,1	187,7	113,1	54,8	50,2	48,2	43,6	44,2	40,9	38,6	35,7	111,1	201,8	240	293,5	280,6	280,3
OPEC							160,5	208,7	125,3	60,78	55,68	53,39	48,28	48,99	45,34	45,19	41,48	45,38	235,2	200,4	164,1	151,5	138,4

Fig. 11. Reserve/production ratio in Turkmenistan.

Ukraine in 1998 and with Russia in 1999, exportation to these countries started and an increase in natural gas production and a rapid decrease in *R*/*P* ratio followed. Similarly, natural gas production to Iran started in 2001. When Niyazov strengthened his authority in 2003 through a constitutional amendment, close relationships with Russia were established and a natural gas agreement was signed, valid until 2028. Natural gas production continued to increase further buoyed by the agreement signed with China in 2006. A corresponding *R*/*P* decrease tendency continued until 2008. Niyazov's death in 2006, the election of Berdimuhammedov as the President in 2007, a production lag in 2008 attributable to the global economic crisis and finally the discovery of new proven reserves between 2008 and 2011 caused an increase in *R*/*P* ratio during that period (Fig. 11). Although OPEC and BP data indicate that reserves increased starting from 2008, their production data between 2010 and 2011 differ, accounting for the different outcomes in the graphic of *R*/*P* ratio.

6. Conclusion

Iran, Russia, Qatar and Turkmenistan, the top four countries with the highest natural gas reserves in the world, were examined in this study and the relationships between natural gas *R*/*P* ratios and political and economic changes in the countries have been analyzed. It has been observed that having natural gas reserves is important to become a leading power in the world policy, so natural gas reserve should be considered within the context of each countries goals, their relations with the other countries and achieving political stability.

The OPEC and BP data referred to during the study generally concur with each other, though there are a few cases where the data differ. Notably, proven natural gas reserves of Russia are higher throughout the process examined according to OPEC data. Moreover; proven natural gas reserves of Turkmenistan are higher between 2008 and 2011 in BP data compared to OPEC data.

When natural gas *R*/*P* ratios are analyzed in the context of all

the countries, the values of which are assessed, it is seen that Russian R/P ratio is clearly lower than those of the other countries. When 2013 BP values are taken into consideration, this value is 51.7 for Russia while it is 202.8, 155.7 and 280.5 for Iran, Qatar and Turkmenistan respectively. It means that proven reserve usage available in production is much higher than Iran and Qatar which have approximately the same reserves in Russia.

When considering that reserves are approximately stable between 2001 and 2013, the decrease in Qatar natural gas R/P ratio from 954.9 to 155.7 between these dates indicates that production has increased fivefold % 500. The change in R/P ratio can be an indicator that the political authorities of these countries may use their energy resources to exert project power from time to time. While the increase in production within R/P ratio brings a strengthening in cyclical structure, it may also bring a political strengthening in the global process.

One of the most important points to enable a production development is the fact that countries must have a technical infrastructure. Technological development, which is an important dimension of the energy, should be achieved under their own circumstances, or otherwise through the help of other countries. This case, which will be available in the political development of the countries from time to time, can be analyzed together with R/P ratio in other studies.

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