

Research article

Energy security and competition over energy resources in Iran and Caucasus region

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Abstract: Energy security as a dominant factor in international stability is of great importance for major economies. The global energy market with its current level of supply and demand relies on energy sources in the Middle East, Caucasus, Central Asia and Russia. After the Fukushima disaster nuclear powers in Europe view renewable energy sources as a serious alternative. Europe's energy vulnerability has deteriorated due to the Russia-Ukraine conflict. However, renewable energy sources are not large enough to replace nuclear power completely. This trend will continue with climbing demand especially in the natural gas sector as clean energy. In this research, Caucasus and Iran are considered the main sources and routes for energy transmission to the global market, including Europe. Caucasus plays a key role in bridging Europe and Asia. Also, Iran is an alternative for energy transmission to Europe after lifted sanctions. As part of the European active supply diversification policy Iran has capacity to reduce Europe's energy dependency on Russia. However, changes in US new administration America First Policy is harmful for the EU's energy security. Caucasus aims to catch a large share of the European energy market since the Baku-Tbilisi-Ceyhan pipeline has started operations and Iran is also trying to expand its market to become a sustainable source of energy for major consumers. Therefore, Iran and Caucasus are considered reliable energy suppliers for Europe. In this regard, we analyze the best motivation for changing the direction new suppliers' energy policies towards Europe and suggest alternative solutions to compete with rival countries in order to enhance energy security.

Keywords: energy resources; energy security; oil and gas; Caucasus; Iran

Abbreviations:

b/d	barrels per day
bcm	billion cubic meters
BTC	Baku-Tbilisi-Ceyhan
BTE	Baku-Tbilisi-Erzrum
CO ₂	Carbon dioxide
CPC	Caspian Pipeline Consortium
EC	European Community
EU	European Union
HHI	Herfindahl-Hirschman Index
JCPOA	Joint Comprehensive Plan of Action
LPG	liquefied Petroleum Gas
MoUs	Memorandums of understanding
mn t/yr	million tons per year
Mtoe	Million tons oil equivalence
NATO	North Atlantic Treaty Organization
OPEC	Organization of the Petroleum Exporting Countries
RSC	Regional Security Complex
UK	United Kingdom
UN	United Nations
USA	United States of America

1. Introduction

Energy, as a fundamental component of modern society and life, has a direct impact on human activity and it plays a critical role in socioeconomic development. Energy is deeply embedded in each component of mankind's development [1–4]. Reliable and sustainable energy supply is therefore a fundamental condition for economic development and growth. It has also become essential for the smooth functioning of modern economies [5].

Increasing global energy demand, concerns about energy security such as availability of fossil fuels and the dependency on them, anthropogenic emissions of greenhouse gases and environmental degradation caused by energy generation from fossil fuels has stimulated debates about the future efficacy of fossil fuels [6–9]. A legal definition of energy security is still in the process of being formulated and others [10] have contributed to this definition by stating it as a condition in which a nation and all, or most of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risks of a major disruption of services.

There are two new issues which put secure energy supply into question. First, global climate change has already started and its catastrophic consequences are increasing. The main reason for this is the growing consumption of fossil fuels. Second, the profound transformation of the energy market—the consequences of severe growth in demand, the state-monopolistic approach of countries with raw materials, shareholder value oriented strategies of private energy companies and the looming exhaustion of oil reserves—has given rise to a situation in which satisfying demand is a

matter of constant anxiety. On the other hand, the remaining oil and gas reserves are concentrated in politically unstable regions. The renewed focus on energy security is driven because of exceedingly tight oil markets and high oil prices. But it is also fueled by the threat of terrorism, instability in some exporting countries, geopolitical rivalries and countries' fundamental need for energy to increase their economic growth.

However, the uneven distribution of energy supplies among countries has led to significant vulnerabilities [5]. According to the International Energy Agency, 95% of the global economy is affected by the decisions of 5 or 6 states in the Middle East which are facing ethnic problems, political crises, terrorism, corruption and authoritarianism [11]. Among others, Saudi Arabia and Iran play a major role in the energy security of the world [12]. With this background there is renewed anxiety over whether there will be sufficient resources to meet the world's energy requirements in the decades ahead.

Energy security as a dominant factor of international stability is of great importance for major economies. Changes in energy policy in Europe in the aftermath of the Fukushima disaster and Europe's deteriorating energy vulnerability situation due to the Russia-Ukraine conflict have led to continuous increase in demand especially in the natural gas sector as clean energy. In this research, Caucasus and Iran are considered the main sources and routes for energy transmission to the global market, including Europe. Caucasus aims to catch a large share of the European energy market through its Baku-Tbilisi-Ceyhan pipeline. Iran is also trying to expand its energy supply market. Therefore, Iran and Caucasus are considered reliable energy suppliers for Europe. This research analyzes the motivation for changing the direction of the new suppliers' energy policies towards Europe and suggests ways to compete with rival suppliers in order to enhance market shares and improve general energy security. Examining Joint Comprehensive Plan of Action (JCPOA) and its possible effect on regional energy security and computation of energy security index for selected economies in EU for the period 1980–2014 could be considered as our contribution compared to previous literature. Due to conflict between Iran and Western powers, previous researchers didn't consider Iran as an important player in the region and its role in the regional energy security. Also, there is no analysis regarding the effect of JCPOA implementation on European energy security.

The rest of this study is organized as follows. Section 2 discusses the importance of Iran in energy security. Section 3 gives details of energy supply and demand. The issues of energy security as a driver of alternative energy sources with a focus on the Iran and Caucasus region are discussed in Section 4 while Section 5 looks at energy resources. Section 6 discusses Iran's isolation and its implication for regional security. The final section provides a conclusion.

2. Iran's Importance in Energy Security

This section focusses on literature which has studied Iran's importance in the energy security of the world. Iran's potential contribution to Europe's energy security with emphasis on energy cooperation between Tehran and Brussels is assessed [13]. According to his study progress in energy cooperation between Iran and the European Union (EU) is likely to remain conditioned on reaching a compromise on allegations regarding Iran's nuclear program. Europe's reluctance to invest in Iran's hydrocarbon sector has provided great commercial opportunities for companies from other countries to make lucrative profits. According to the author, European (and American) technology is needed to fully utilize Iran's oil and gas deposits. Therefore, the development of these reserves will contribute

to European and global energy security. This will also facilitate Europe's efforts to diversify suppliers and thereby reduce its heavy dependence on Russia.

Iran's role in energy security at the regional and global levels is studied [14]. According to her, under pressure from the United States which aims at the global isolation of Iran, the country has turned its eyes to Europe and China to meet its energy demands and has become a fruitful partner for Russia. Several factors such as neglecting Iran's legal rights in the Caspian Sea and lack of attention to the economic and political advantages of energy transmission through the country favor Russian policies. According to this study it is obvious that due to an idealist approach in its foreign policy Iran has lost the opportunity to play an effective and constructive role in energy security at the regional and global levels. The study suggests that Iran's unique geographical location between the Caspian Sea and the Persian Gulf is still usable and will serve Iran diplomatically. Also, despite the fact that opportunities were not seized, the ongoing regional and global developments continue to bring new opportunities. These opportunities can be exploited by realistically evaluating the situation on the basis of national interests which benefit supplier and consumer nations.

There is a need for infrastructure which will make it possible to supply an unlimited amount of energy from the South Caspian/Persian Gulf region to Europe, which is not completely available [15]. Why isn't there a major pipeline from the South Caspian region to Europe which could be fed from all South Caspian and Persian Gulf states? This study gives political issues as the main reason for this. Private investors will not risk building a pipeline which might be disputed due to US sanctions against Iran. Also America's attitude towards Iran is especially frigid because of Iran's nuclear project and because Iran is allegedly destabilizing the situation in Iraq and beyond. The United States prevents Tehran and individual European investors' plans to transit Iranian energy resources via Turkey to the EU. However, Russia, alongside with the Caspian Sea Region gas suppliers and the Middle East account for about 90% of total global natural gas reservoir [16]. Therefore, the critical role of Iran and Caucasus Region cannot be ignored by Europe.

3. Energy Supply and Demand in Europe

In the last two decades Europe's dependency on natural gas has significantly increased as natural gas has become a main source of energy. This dependency on natural gas emerged as a result of the EU's intergovernmental restrictions on CO₂ emissions, high emissions from coal-based generators and various obstacles in the rapid development of renewable energy [17]. In 2009, about 26% of the primary energy consumption of all 27 EU member states was of natural gas. With an annual growth rate of 2.7%, the total gas demand is projected to rise to 43% of primary energy consumption by 2030 [17].

3.1. Possible alternative energy sources for Europe

Currently, about 50% of the European natural gas is imported by pipeline from outside the continent where the dominant supplier is Russia [16]. Also, 32% of traded crude oil in Europe was sourced from Russia from 2015. European policymakers are trying to reduce their dependency on energy imports by enhancing renewable energy, developing energy efficiency and energy technologies. It is forecast that renewable energy production in Europe and Eurasia will increase to 330.7 Mtoe in 2035 compared to 115.5 Mtoe in 2013 [18]. However, this trend is declining for oil

production as estimates show that oil production levels will decrease to 803.3 Mtoe in 2035 as compared to 834.8 Mtoe in 2013 [19].

EU receives energy supplies from a number of countries around the world such as Norway, Russian, Central Asia, Caucasus and the Organization of Petroleum Exporting Countries (OPEC). EU works actively with these countries to get the best deals possible to increasingly diversify its energy sources and to prevent disruptions in supply. In future, additional energy demand from China and India should be met in competition by these sources as well.

Norway is the world's third largest exporter of oil and gas after Saudi Arabia and Russia. In 2012, it accounted for about 31% of all EU's natural gas imports and 11% of its crude oil imports. Another energy source for EU is Russia as more than 40% of Europe's imported natural gas through pipelines comes from Russia [18]. Ukraine and Belarus' gas supply dependency on Russia is 74% and 100% respectively.

A number of individual EU countries are heavily dependent on Russia particularly for natural gas (European Commission)¹. This dependency leaves them vulnerable to supply disruptions, whether caused by political or commercial disputes and infrastructure failures. For instance, a 2009 gas dispute between Russia and the transit country of Ukraine, left many EU countries with severe shortages². The Russia-Ukraine gas crisis not only illustrated to European states how strong their dependency is on Russian gas, but also emphasized the need to diversify their main energy supply sources as the flow of gas from Moscow can be unstable [20].

3.2. Importance of Iran and Caucasus for Europe energy security

Iran has the highest natural gas reserves in the world (34 trillion cubic meters of natural gas). This amount is sufficient to satisfy current EU natural gas demand for 90 years. Despite this rich natural endowment, the country has not yet translated this potential into reality. Paradoxically, its natural gas production continues to be barely sufficient to satisfy its domestic demand. The Iranian natural gas industry most likely will remain focused on the domestic market, and on limited amounts of export within the region. In the aftermath of the nuclear deal, Iran is set to concentrate its energy strategy on the development of the oil sector. In this framework, more natural gas might be utilized for reinjection into oil fields in order to sustain growing oil production and exports. Iran will try to use its natural gas resources to improve the competitiveness of its economy, through a larger share of power generation based on cheap natural gas, and through further investments in natural gas-fueled vehicles, in a move to reduce the domestic consumption of oil, which could thus be freed-up for exports³.

Iran had a successful 2016 to capture a share of the European energy market. The bulk of international sanctions targeting Iran were lifted by JCPOA in January 2016 and the country's crude export to Europe has soared to 497,323 bbl/day during 2016 compared to 111,880 bbl/day during the sanction period (1st July 2012 to 31st December 2015). Table 1 shows the crude Iran's oil exported to Europe by destination. These figures could be considered as an indication for supply diversification made by European countries after JCPOA implementation on 16th January 2016.

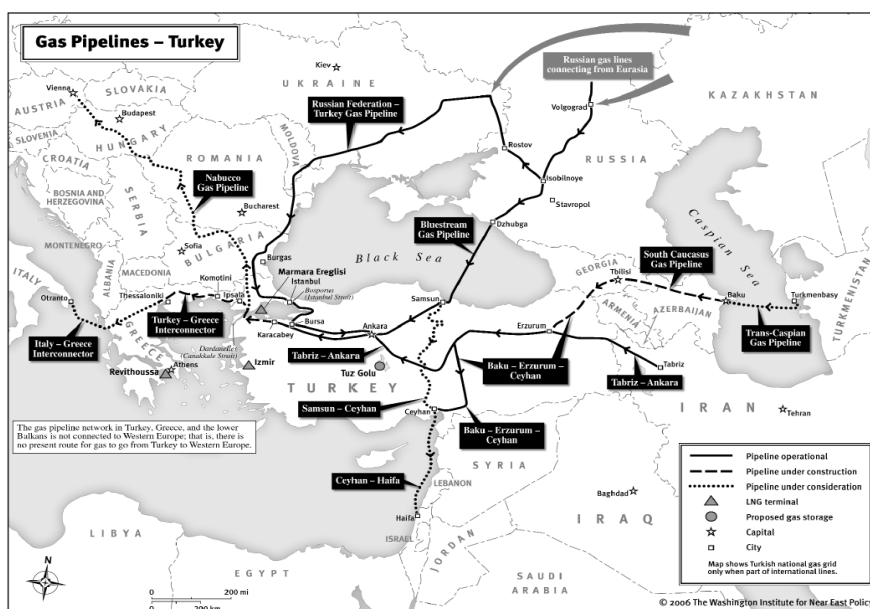
¹ <https://ec.europa.eu/energy/en/topics/imports-and-secure-supplies/supplier-countries>.

² European Commission, <https://ec.europa.eu/energy/en/topics/imports-and-secure-supplies/supplier-countries>.

³ <http://bruegel.org/2015/10/iran-a-new-natural-gas-supplier-for-europe/>

Table 1. Crude oil exported to Europe by Iran after JCPOA (bbl/d).

	Sanction period, 2012–2015	Post sanction period 2016
Austria	-	8,307
Bulgaria	-	1,617
France	-	138,224
Greece	-	56,880
Hungary	-	2,725
Italy	2,569	53,413
Netherlands	-	8,690
Poland	-	8,344
Spain	-	55,522
Romania	-	16,427
Turkey	109,311	138,699
UK	-	8,473
Total	111,880	497,323

**Figure 1.** Alternative energy transmission routes for Europe [21].

Countries in Central Asia and Caucasus are rich in natural resources including oil and gas that can help EU diversify its energy supplies. Recognizing this potential EU has been participating in the development of their energy sectors. It has signed memorandums of understanding (MoUs) with Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan. These MoUs outline steps for further energy cooperation with these countries. The 12 countries that make up OPEC also provide EU with around 40% of its total crude oil imports. Of all OPEC countries, Saudi Arabia, Libya and Nigeria are the biggest individual suppliers, each having delivered over 8% of the EU's total oil imports in 2012. EU meets OPEC annually at the ministerial level to discuss a variety of issues including the promotion of more stable oil prices and transparent markets.

In response to energy security concerns, the European Commission (EC) released its Energy Security Strategy in May 2014. The strategy aims to ensure a stable and abundant supply of energy for European citizens and their economy (European Commission)⁴. The energy supply situation in Europe has deteriorated due to the Russia-Ukraine conflict. Therefore, Iran and Caucasus are considered reliable alternative energy suppliers for Europe.

Figure 1 illustrates the importance of Iran and the Caucasus region as the main alternative sources of energy for Europe.

4. Energy Security: A Driver for Alternative Energy Sources

Energy security is affected by different factors including high oil prices, dependency on oil imports, depletion of oil fields, political instability in major oil exporting countries, disputes between transition countries and exporters and any disruption in energy supply. The level of security is estimated by the risk of supply disruptions or the costs incurred due to lack of security. The oil market is not considered a competitive market because more than 70% of the total crude oil reserves are located in OPEC [16]. There are some geopolitical regions around the world which are energy sources. The most important ones include the Persian Gulf and the Caucasus region. There are many exporters in these regions which are sustainable sources of energy as they have huge sources of oil and gas. But some of them have suffered from political instability and military conflicts. Caucasus and Iran are considered as major sources of energy and alternative routes for energy transmission to the global market, especially to Europe.

4.1. Energy security in Europe's major economies

Germany, Italy, UK and France are among the European countries which are members of G-7 and are considered major economies. They were also the largest importers of natural gas in Europe in 2014–2015. They imported 104.0, 50.2, 29.0 and 35.9 billion cubic meters (bcm) respectively of natural gas in 2015. Russia is the main source of natural gas transmission to Europe. We assessed energy security as a key factor of sustainable development for these countries by applying the Herfindahl-Hirschman Index (HHI) to measure the level of energy security. We calculated HHI of fuel-mix concentration for Germany, Italy, UK and France for 2000–2015. The results are given in Figure 2.

Our findings show that the selected countries had HHI above 2000, indicating that these countries were highly concentrated in the use of fossil fuels as part of their primary energy consumption.

We also derived a security index to measure the energy security index for some EU countries (see Table 2). This index was estimated by the World Bank based on net energy imports (as percentage of energy use) that are estimated as total energy use less domestic energy production [22]. Table 2 shows that in particular Germany, Spain and Italy were highly dependent on importing energy. It should be noted that UK was a net exporter in 1990 and 2000, but this situation changed in 2010.

⁴ <https://ec.europa.eu/energy/en/topics/imports-and-secure-supplies/supplier-countries>.

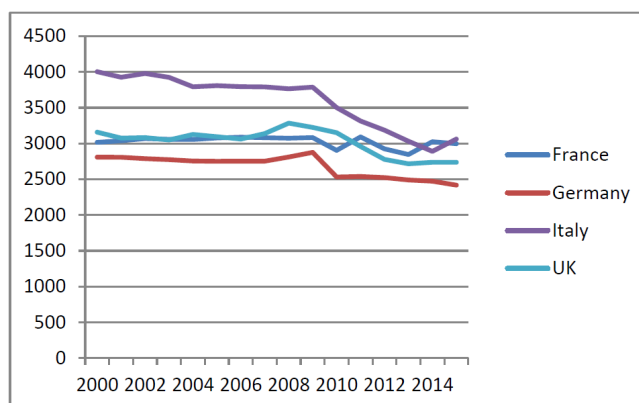


Figure 2. The Herfindahl-Hirschman Index of energy security for major economies in Europe during 2000–2015 [16].

Table 2. Energy security index of selected economies in EU (1980–2014) [22].

Country	1980	1990	2000	2010	2014
Germany	48.03	46.99	59.82	60.67	60.89
UK	29.41	-1.01	-22.21	26.7	39.6
Spain	76.7	61.6	74.1	73.05	69.96
France	72.57	50.06	48.13	48.07	43.58
Italy	84.79	82.73	83.58	82.65	75.38
Sweden	60.16	37.11	35.82	35	29.27

High dependency on energy imports suggests that policymakers in EU have to find alternative sources of energy to replace Russia with more reliable supplier countries. Energy security or security of supply is related to three dimensions: availability, affordability and sustainability. Iran and the Caucasus region have great potential to serve as alternative sources of energy for Europe. Considering the conflicts in Caucasus and the dispute between Iran and the western powers balanced energy security for all countries in the region is required. If there is lack of security for a country compared to the countries in its neighbourhood we cannot expect any cooperation. Any political instability, competition over energy resources or a dominant position in the region may lead to an unstable situation. If there is security cooperation, it should be applied to all parties. Otherwise an unbalanced situation will emerge. International cooperation from all parties is required to convert an Energy Security Complex to an Energy Security Community.

4.2. Caucasus, strategic crossroads

Caucasus is a valuable energy enhancing region due to its location at the crossroads between Europe and Asia. The region also possesses an important supply of energy [23]. Integration of this region into the world market is significant for economic growth in these countries [24]. In this context, Azerbaijan, Georgia and Turkey constructed energy transportation routes in Caucasus in the early 1990s to link these countries to Europe and Asia [25]. In particular, the development of the Baku-Tbilisi-Ceyhan (BTC) oil pipeline and the Baku-Tbilisi-Erzurum (BTE) link Azerbaijan,

Georgia and Turkey to Europe and Asia [26]. It should be noted that Turkey and Georgia are only transit routes while Azerbaijan and the countries located on the east side of the Caspian Sea like Turkmenistan, Kazakhstan and Uzbekistan are energy suppliers.

The BTC pipeline transits oil from Baku in Azerbaijan to Tbilisi in Georgia and Ceyhan in Turkey. Its construction started in 1998 and the pipeline was completed in 2005 [27]. The US had been pushing hard for BTC as the first pipeline specifically designed to export Caspian oil out of the region without going through Russia. It can transport 1 million barrels of oil a day from Azerbaijan via Georgia to the Turkish port of Ceyhan. Alongside BTC runs the BTE (or South Caucasus) gas pipeline through which Turkey imports gas from Azerbaijan. The BTE pipeline is used for transferring natural gas from Baku in Azerbaijan to Tbilisi in Georgia and further to Erzurum in Turkey. The construction of the BTE gas pipeline started in 2004 and was finished in 2007 [26].

The Caspian Pipeline Consortium (CPC) is a consortium and a major export pipeline to transport crude oil from the Kashagan and Karachaganak fields in Kazakhstan to the Novorossiysk on Russia's Black Sea coast. CPC will complete the expansion plan of this crude export route and raise the capacity to 67 mn t/yr by the end of 2017 from 52 mn t/yr [28]. The CPC route is expected to transport 65.7 mn t/yr of crude this year of which more than 80% is sourced from Kazakhstan and the balance is supplied by the Russia. The most important parameter in the geopolitics of Caspian Region and Caucasus is control of oil and gas transition. Energy transportation through BTC, CPC or any possible pipeline would affect the region from different point of views including; energy perse (China), economic implications (Turkey, Iran, and the oil companies), a way to gain influence and/or prevent others from doing so (the USA and Russia) [29].

Long-distance, cross-border pipelines are important to expand energy security and make an alternative to the many vulnerable checkpoints along the sea transportation routes [30]. However, it is important to note that the construction of energy transportation routes has circumvented Armenia and Russia, which in turn, has shaped the economic, social and political integration in the Caucasus region [31]. In recent years, independent of the central Government of Iraq, the Kurdistan region of the country has completed the construction of pipelines linking the region's oil and gas fields to Ceyhan in Turkey and Iranian energy supply routes with daily exports of more than 500,000 barrels of oil [32].

4.3. Iran, a geopolitical energy supplier

Another alternative route for energy transmission to Europe with capacity to significantly reduce its energy dependency on Russia is Iran. The Russian Federation, which performs as a global player, is accused of taking advantage of the dependency of other countries by cutting off energy resource exports in order to reach its political aims. Also, the recent energy crisis between Russia and Ukraine has threatened European energy supply. Therefore, it has forced European countries to double their efforts to diversify their energy resources and energy transportation routes. Developments in the aftermath of the collapse of the Soviet Union along with the independence of its former republics in Caucasus and Central Asia have hastened the importance of Iran in the northern part of Hormuz Strait in the Persian Gulf [15].

On the other hand, Iran is located between two strategic energy reserves of the world-Caspian Sea and the Persian Gulf, and it enjoys a unique situation. Besides Iran also borders Central Asian countries through its neighbor Turkmenistan and it has also become a fruitful regional partner for the

Russian government in the post-Soviet Union era [33]. According to an announcement by European politicians Iran's role in energy supply to Europe is becoming more important [15].

Iran is the world's third and OPEC's second largest oil exporter with a share of 15% in the Persian Gulf and 6% in the world oil market. Iran exports about 3,000,000 barrels of petroleum products per day, which is 1.3% of the total world exports. Iran exports liquefied petroleum gas (LPG) and distillate fuel oil. Iran is also the main importer of petroleum products in the Persian Gulf region. The country is ranked among the top countries that have many natural resources such as crude oil and natural gas. Its oil and gas are allocated 44% and 54% of the total energy share respectively [34]. For over ten years Iran produced approximately 3.5 million barrels of oil per day (b/d) (currently 5% of the world production) with a rather narrow variance of less than 0.3 million b/d. Slightly more than 2 million b/d of production is available for exports. Iran is the fourth largest oil producer (behind Saudi Arabia, the US and Russia) and the fourth largest oil exporter (behind Saudi Arabia, Russia and Norway). Its reserves are larger than those of the US and Russia but smaller than those of Saudi Arabia and of Iraq [15]. The oil and gas extracted from the Kurdistan region is used mainly for domestic consumption, while that from the north and south is exported.

Based on this discussion it is reasonable to state that Iran could be a candidate for changing EU's energy portfolio in a positive way. Iran with its large resources presents a new solution to the serious issue of security in the supply and sustainability of energy sources. This alternative seems promising as the current issues between Iran and the western powers are in the process of being solved through the recent agreement in Vienna on 14 July 2015. However, Iran's isolation and preventing international oil companies from investing in its oil and gas industry together with the country's reduction in the production of crude oil may hurt global energy security. In other words, the effect of the sanctions which have been imposed on Iran will influence the world energy market both in the short- and the long-term. The negative impact of these sanctions can be extended from a national to a global level in the future [35].

5. Competition Over Energy Resources by Superpowers

Russia has had the will to dominate Caucasus and Central Asian countries since the collapse of the Soviet Union. There are some crucial parameters for this policy. First, Caucasus has huge sources of energy and it is considered a bridge between Russia and Europe. In fact, Georgia connects Caucasus to Europe and plays an important role in energy transmission to Europe. The challenges in Caucasus regional security after the Russia-Georgia conflict in August 2008 and explained some risks associated with the operating transit energy corridor in southern Caucasus is studied [36]. The conflict was considered a part of Russia's willingness to rebuild its former control sphere. The North Atlantic Treaty Organization (NATO) is interested in extending its borders to western neighboring countries of Russia including Georgia and Ukraine. By this argument energy resources and expansion of NATO borders could be seen as the main reason for the Russia-Georgia conflict. 'Subduing Georgia would cut the west's vital energy connection (the Baku-Tbilisi-Çeyhan pipeline) to the Caspian Sea and to Central Asia' [37]. Afterwards, Russia will be able to dominate energy flows from Azerbaijan.

The proven oil reserves in various section of the Caspian Sea are different and are estimated at 298.4 billion barrels (Including Azerbaijan, Kazakhstan, Turkmenistan, Uzbekistan, Russia and Iran),

corresponding to almost 17.5% of the total global proven reserves [16]. But if we consider the Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan segment it has 38.2 billion bbl of reserves. These figures make one doubt that Caucasus and Central Asia are major energy resources as compared to the Persian Gulf. The case is different when we consider Iran in our analysis because of its huge energy sources and geopolitical situation. The total reserves in Iran are estimated at 157.8 billion bbl which is more than Russia at 102.4 billion bbl and four times higher than Caucasus and Central Asian countries together. Therefore, the size of reserves in Caucasus and Central Asian countries together with Russia is not comparable with Iran. The high cost of oil exploration in Caucasus may not be economically beneficial as much as it is in Iran though. But the importance of the region in view of geopolitics, energy transmission and supply diversification cannot be insignificant.

The Baku-Tbilisi-Ceyhan and Baku-Supsa oil pipelines along with the Baku-Tbilisi-Erzurum gas pipeline have promoted the importance of Caucasus as an energy corridor between Asia and Europe. Russia's invasion of Georgia and unilateral recognition of Abkhazia and South Ossetia made a significant change in the Caucasus from a geopolitical point of view. Russia wanted to dominate Georgia in order to cut off Azerbaijan and Central Asian countries and consequently it was able to enhance its energy monopoly in Europe significantly [36]. Caucasus is like a magnetic field that Russia, Turkey and Iran are competing over with each other along with the United States and European Union. Russia was able to stop NATO's expansion into Caucasus by recognizing Abkhazia and South Ossetia [38].

Based on Henry Kissinger's thinking, capability and will are crucial variables in foreign affairs; although Russia was willing to dominate Caucasus countries but it did not have the capability [38]. Caucasus and Central Asian countries are strong enough to not be dominated by Russia. In this regard, Russia is being challenged by China and the western powers in this region. The geopolitical situation in Caucasus is important for Turkey because it is the connection point between Europe and Asia. Therefore, Turkey is going to develop its influence in this region. At the same time, Turkey competes with Russia and Iran for energy transmission to catch a share of Europe's energy market. Although Turkey does not have any energy resources but its role as an energy corridor to the west combined with a comprehensive investment program in refinery capacity are significant. The European Union relies on Russia, as it was the main source for 40% of its imported natural gas last year [16]. Therefore, European countries are looking for supply diversification through alternative routes such as Caucasus and Iran to improve their energy security.

6. Isolation of Iran and Its Implications for Regional Security

Energy security as a dominant factor in international political stability is critical for major economies such as the United States, European Union, China and India. Any supply disruptions or fundamental changes may affect these economies through price volatility. Global energy markets have been affected by political instability and military conflicts in North Africa, the Middle East and Caucasus during the last decade. The Middle East is a formation of a multi-polar Regional Security Complex (RSC) that Iran plays as a regional power. Therefore, it is not possible to ignore it as an important factor for making and re-establishing a balance in the region. The Middle East and Caucasus faced imbalances after the Iran revolution in 1979 and RSC needs to be built in these regions through new policies. Sanctions imposed on Iran because of the country's nuclear activities

targeted investments in oil, gas and petrochemicals, and exports of refined petroleum products. But in reality, Iran's political and economic isolation and the restrictions imposed on oil and gas field development can be considered a disruptive factor in global energy security.

Iran might have been an alternative energy source for EU when it faced a challenge with Russia regarding its intervention in Ukraine. However, EU lost this opportunity following Iran's isolation. After several rounds of nuclear talks between Iran and the western powers, UN sanctions were lifted on 16 January 2016. Consequently, Iran started increasing its oil production and exporting capacity in order to regain the market share that it had lost. Furthermore, Iran is going to introduce a new form of petroleum contracts in order to make them attractive for foreign investors. It is forecast that Iran will be a sustainable source of energy for the global market in the near future. Europe has the option to use the Iran-Turkey pipeline as an alternative for its natural gas transmission. But, Caucasus is another option available for exporting natural gas to Europe. In this regard, Caucasus has been the focus of attention of all parties including Europe, Russia, Turkey and Iran. Undoubtedly, Russia and Turkey are not interested in seeing enhanced regional importance for Iran.

Considering the tensions between Russia and Ukraine, it is clear that Russia is not viewed as a reliable sustainable energy source for Europe. But, Iran and Caucasus have enough capability individually or combined to be an alternative channel for energy transmission to Europe. In this regard, foreign investments and technology transfers are required for developing the oil and gas fields in Iran and for constructing the necessary energy transfer infrastructure. Also, Caucasian countries suffer from lack of energy infrastructure. Energy security is important both from the point of view of supply and demand. Therefore, it will be a win-win situation if major energy consuming EU countries undertake investments in energy supplier countries to build infrastructure, transmission and upstream and downstream facilities.

The military superiority of the US and the lack of a rival superpower to create a balance has led to replacement of global political space by a much more monolithic domination by the west. In the absence of an ideological challenger within or adjacent to the core, the Western powers in general and the US in particular, can impose much more demanding legal, social, financial, and political conditions [29]. Iran is considered as a regional power in Middle East and due to its critical role in views of energy security in the regional and global levels, its importance cannot be ignored. In order to convert an energy security complex to an energy security community, international cooperation among all parties is required. In our view, Western powers should take into account the fact that Iran can play a polar in regional stability and global energy security. Iran has a huge source of oil and gas and may be an effective alternative for Europe to achieve supply diversification in order to reduce its energy dependency to Russia. Therefore, international cooperation and performing JCPOA in case of Iran, may reduce the Iran-US conflict.

However, conservative policymakers in the United States supported by Israel and rival Arab countries in the Middle East have come up with additional impediments in rejoining Iran to the international community. It is clear that Iran has the will and the capability to play its role as a regional power in the Middle East. The country's open interventions in the security and stability affairs of Iraq, Syria and Yemen are evidence of its desire and capacity. Considering the geopolitics of Iran in the Middle East and its capabilities, it can be predicted that it will be a key factor in global energy security in the next decades as it has large energy reserves and a strategic position for energy transmission. Obviously, decisions made by Iranian policymakers and their interactions with western countries, particularly the United States, will be vital for this purpose.

7. Conclusion

There is a close relationship between diversifying the supply of energy sources and enhanced energy security. The Russia-Ukraine gas crisis not only illustrated to EU how strongly it is dependent on Russian gas, but also emphasized its need to diversify its energy supply sources. Iran and Caucasus are considered the main sources and routes for energy transmission to the global market, including to Europe. Security in Caucasus is affected by Russia's intervention in Georgia and the possibility of Armenia and Azerbaijan getting support from Russia, Turkey and Iran. Although NATO was interested in expanding its borders to include Caucasian countries but the Russia-Georgia conflict was an impediment in this. In the case of Iran, developing oil and gas fields, economic capacity and the country's international relations were significantly and negatively affected by the sanctions imposed against it by the United States and its European allies.

Conservative policymakers in the US supported by Israel and regional rivals like Saudi Arabia are going to keep Iran isolated after the lifting of UN sanctions. However, the geopolitical situation of Iran in the Middle East and its role as a regional power make achieving this target difficult. Russia is trying to rebuild the influence of the former Soviet Union but it does not have enough capacity to enforce this on states in Caucasus and Central Asia. The importance of energy transmission has converted Caucasus and Iran into a game of chess played by great powers like the US that have tried so as to bypass Iran and Russia by constructing the BTC pipeline. Considering Iran's geopolitics in the Middle East and its capabilities, it can be predicted that Iran will be a key factor in global energy security in the next decades due to its massive energy resources and strategic location for energy transmission. Caucasus too can be an alternative for natural gas transmission instead of Turkey. Therefore, the situation of Iran-Caucasus will be enhanced if this plan is realized in the future. International cooperation and performing JCPOA completely in case of Iran, may reduce parts of Iran-US conflict. Due to having a huge source of oil and gas, Iran has sufficient capability to serve as an effective alternative for Europe to achieve supply diversification in order to reduce its energy dependency on Russia. The combination of Iran resources and Caucasus as a corridor of energy supply could be a proper solution for enhancement of energy security in Europe. However, recent changes in US policy towards Iran is harmful for the EUs energy security.

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Conflict of Interest

All authors declare no conflicts of interest in this paper.

References

1. Halder P, Prokop P, Chang CY, et al. (2012) International survey on bioenergy knowledge, perceptions, and attitudes among young citizens. *Bioenerg Res* 5: 247–261.

2. Hosseini SE, Andwari AM, Wahid MA, et al. (2013) A review on green energy potentials in Iran. *Renew Sust Energ Rev* 27: 533–545.
3. Nakata T, Silva D, Rodionov M (2011) Application of energy system models for designing a low-carbon society. *Prog Energ Combust Sci* 37: 462–502.
4. Tzanakis I, Hadfield M, Thomas B, et al. (2012) Future perspectives on sustainable tribology *Renew Sust Energ Rev* 16: 4126–4140.
5. Sigot M (2013) Energy security and the EU: between independency priorities, strategic vulnerabilities and sustainability needs. Master thesis, Program in Environmental Law, Stockholm University.
6. Bang HK, Ellinger AE, Hadjimarcou J, et al. (2000) Consumer concern, knowledge, belief, and attitude toward renewable energy: an application of the reasoned action theory. *Psychol Mark* 17: 449–468.
7. Cacciatore MA, Binder AR, Scheufele DA, et al. (2012) Public attitudes toward biofuels: effects of knowledge, political partisanship, and media use. *Polit Life Sci* 31: 36–51.
8. Schaeffer R, Szklo AS, Pereira de LAF, et al. (2012) Energy sector vulnerability to climate change: a review. *Energy* 38: 1–12.
9. Zyadin A, Puhakka A, Ahponen P, et al. (2012) School students knowledge, perceptions, and attitudes toward renewable energy in Jordan. *Renew Energ* 45: 78–85.
10. Barton B, Redgewell C, Ronnel A, et al. (2004) Energy security, managing risk, a dynamic legal and regulatory environment, Oxford University Press.
11. Halliday F (2005) The Middle East in international relations. *Contemp Rev* 10: 167–172.
12. Cordesman AH, Kleiber M (2006) CSIS: Asian conventional military balance. Available from: <http://www.comw.org/cmp/fulltext/0606cordesman.pdf>.
13. Bahgat G (2010) Iran's role in Europe's energy security: an assessment. *Iran Stud* 43: 333–347.
14. Koolae E (2011) Iran's role in energy security at regional and global levels. *Iran Econ Rev* 15: 95–115.
15. Moradi M (2006) Caspian pipeline politics and Iran-EU relations. *Unisci Disc Pap* 2006: 173–184.
16. BP statistical review of world energy (2016). Available from: <http://www.indiaenvironmentportal.org.in/files/file/bp-statistical-review-of-world-energy-2016.pdf>.
17. Kumar S, Kwon HT, Choi KH, et al. (2011) Current status and future projections of LNG demand and supplies: a global prospective. *Energ Policy* 39: 4097–4104.
18. BP statistical review of world energy (2015a). Available from: <papers/bp-statistical-review-world-energy-june-2015-3/>.
19. BP energy outlook 2035 (2015b). Available from: https://www.iamericas.org//presentations/BP_North_America.pdf.
20. Bilgin M (2009) Geopolitics of European natural gas demand: supplies from Russia, Caspian and the Middle East. *Energ Policy* 37: 4482–4492.
21. Barysch K (2007) Turkey's role in European energy security. Center for European Reform Essays. Available from: <http://www.cer.org.uk> (Accessed: 5 September 2016).
22. World Bank indicators (2016). Available from: <http://data.worldbank.org/indicator/EG.IMP.CON.S.ZS?>
23. De Haas M, Tibold A, Cillessen V (2006) Geo-strategy in the South Caucasus: power play and energy security of states and organizations. Netherlands Institute of International Relations Clingendael.

24. Wittich A, Maas A (2009) Country case study: South Caucasus. Regional cooperation in the South Caucasus. Available from: https://www.adelphi.de/de/system/files/mediathek/bilder/us_038_-_regional_cooperation_in_the_south_caucasus_1.pdf.
25. Petersen A (2007) Integrating Azerbaijan, Georgia, and Turkey with the West: the case of the East-West transport corridor. Available from: https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/media/csis/pubs/070910_petersen_commentary.pdf.
26. Chang CP, Berdiev AN, Lee CC (2013) Energy exports, globalization and economic growth: the case of South Caucasus. *Econ Model* 33: 333–346.
27. Bacik G (2006) Turkey and pipeline politics. *Turk Stud* 7: 293–306.
28. Argus News and Analysis, CPC expansion to be completed by year end (2017). Available from: <https://direct.argusmedia.com/newsandanalysis/article/1397465>.
29. Buzan B, Waever O (2003) Regions and powers: the structure of international security, Cambridge University Press.
30. İpek P (2006) The aftermath of Baku-Tbilisi-Ceyhan pipeline: challenges ahead for Turkey, Available from: <http://sam.gov.tr/wp-content/uploads/2012/02/PinarIpek.pdf>.
31. Cornell SE, Ismailzade F (2005) The Baku-Tbilisi-Ceyhan pipeline: implications for Azerbaijan, In: Starr SF, Cornell SE, *the Baku-Tbilisi-Ceyhan pipeline: oil window to the west*, Baku Press.
32. Auzer KA (2016) Institutional design and capacity to enhance effective governance of Iraqi-Kurdistan's oil and gas wealth. PhD thesis, Warwick Business School.
33. Koolae E (2011) Iran's role in energy security at regional and global levels. *Iran Econ Rev* 15: 95–115.
34. Tofigh AA, Abedian M (2016) Analysis of energy status in Iran for designing sustainable energy roadmap. *Renew Sust Energ Rev* 57: 1296–1306.
35. Heshmati A, Abolhosseini S (2016) European energy security: challenges and green opportunities. *Work Pap*, 1–21.
36. Kakachia KK (2011) Challenges to the South Caucasus regional security aftermath of Russian-Georgian conflict: hegemonic stability or new partnership? *J Eurasian Stud* 2: 15–20.
37. Brzezinski Z (2009) Russia must re-focus with post-imperial eyes. Available from: <http://tomweston.net/postimperial.pdf>.
38. Matsuzato K (2010) Cultural geopolitics and the new border regions of Eurasia. *J Eurasian Stud* 1: 42–53.



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