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List of Acronyms

Mtoe Million tonnes oil equivalent

TPES Total primary energy supply

IEA International Energy Agency

toe Tonnes of oil-equivalent

b/d Barrels per day

EMRA Energy Market Regulatory Authority

MENR Republic of Turkey Ministry of Energy and Natural Resources

bcm Billion cubic metres

mcm million cubic metres

BOTAŞ Petroleum Pipeline Corporation (which is the state-owned crude oil and natural gas pipelines and trading company in Turkey)

BTE Baku-Tbilisi-Erzurum Natural Gas Pipeline

TANAP Trans-Anatolian natural gas pipeline

BTC BAKU – TBILISI – CEYHAN MAIN EXPORT CRUDE OIL PIPELINE

TP Turkish Petroleum (was founded in 1954 with the responsibility of being involved in hydrocarbon exploration, drilling, production, refinery and marketing activities as Turkey's national company)

LNG Liquefied natural gas

KRI Kurdish Region of Iraq

SGC Southern Gas Corridor

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ABSTRACT

According to the 2016 energy consumption statistical data, Turkey's total primary energy supply is 137.9 Million tonnes oil equivalent (Mtoe). The total share of Oil (41.2 Mtoe) and natural gas (37.9 Mtoe) constitutes 57.36 percent of Turkey's total primary energy consumption. On the other hand, the ratio of domestic crude oil production to the total consumption was realised as 6.4% in 2015, the ratio for natural gas is 0.8%. When the total energy consumption of the oil and gas imports are considered, Turkey’s oil and gas policies have a major impact on their energy security. In this study, Turkey's oil and gas policies are thoroughly examined in terms of energy security and a focus is placed on the potential risks. The study consists of three main parts. In the first chapter, statistical information about the general energy situation of Turkey is provided. Additionally, the literature on energy security has also been reviewed in this section. In the second chapter, Turkey's oil and natural gas policies are thoroughly examined in the context of energy security. In the third chapter, the risks that could affect Turkey's energy security are discussed.

Turkey’s Energy Security in the Context of Oil and Gas, and Risks

INTRODUCTION

Starting from the period of the oil crises in the 1970s, imported energy supply, especially in oil dependent countries, has been the most important issue in the global security of energy supply. Since then, the concept of ‘foreign oil’ has deeply affected the energy policies of import-dependent countries (Peker, 2014). This was due to energy export/import relations being used as a ‘political weapon’ and was also influenced by the sensitivity of the global economic system. Initially, the most important concerns of countries were the potential costs of the interruption of supply associated with excessive dependency. However, today, new concerns regarding energy security have emerged (Ediger and Berk, 2011). In contrast, contemporary challenges regarding energy security go beyond the supply of oil and cover more comprehensive topics; for example, energy security deals, energy policy issues related to ensuring fair access to modern energy, and environmental issues. Therefore, the concept of energy security that was superficially handled in classic studies has become a subject of intense re-examination (Cherp and Jewell, 2014).

Turkey is one of the countries that is dependent on imports for its energy requirements and suffers from this economic and strategic burden of oil importing (Ediger and Berk, 2011). According to the 2016 energy consumption statistical data, Turkey's total primary energy supply is 137.9 Million tonnes oil equivalent (Mtoe). The total share of Oil (41.2 Mtoe) and natural gas (37.9 Mtoe) constitutes 57.36 percent of Turkey's total primary energy consumption (BP, 2016). In addition, the ratio of domestic crude oil production to the total consumption was realised as 6.4% in 2015. In the year 2015, the ratio of Turkey's domestic natural gas production to its consumption was the lowest of the last decade, at 0.8% (TP, 2016). When the total energy consumption of the oil and gas imports are considered, it is evident that Turkey's oil and gas policies have a major impact on their energy security. In this study, Turkey's oil and natural gas policies have been examined under three main topics in the context of energy security (Ediger and Berk, 2011), (Esen, 2016), (Karagöl et al., 2016).

1: Increasing domestic oil and natural gas production.

Turkey, spends 60 billion dollars per year to supply approximately 70% of its energy needs. Therefore, for Turkey, increasing the production of domestic oil and gas is one of the most important methods to improve energy security (Kisacık and Kaya, 2017).

2: Supplier and Route Diversity

Turkey is in a geographical position (within short distances) to reach 70% of the world's proven oil and natural gas reserves. Turkey's attempts at increasing the number of countries from which it imports oil and natural gas plays a vital role in terms of improving the country's energy security level (Bilgin, 2011).

3: Turning Turkey into an energy hub.

Modelling Turkey to become an 'ENERGY TRADE HUB' draws attention to the country's most important oil and gas policy. This is because the country will gain economic benefits through large tax incomes from conducting energy transfers, and they will easily obtain the support of any Western countries that have their energy supply through the same lines as Turkey, in case of any potential political crises that threatens the continuity of the energy supply (Arcuri, 2013). In addition, it is important to increase Turkey's price security, resources and route diversification (AKBAŞ and ÜRÜN, 2016).

The study consists of three main parts. In the first chapter, statistical information about the general energy situation of Turkey is provided. Additionally, the literature on energy security has also been reviewed in this section. In the second chapter, Turkey's oil and natural gas policies are examined in the context of their energy security under the three headings given above. In the third chapter, the risks that could affect Turkey's energy security are discussed.

SECTION 1

1.1. ENERGY SECURITY

Energy security emerged as a political problem in the beginning of the 20th century due to its connection with the supply of oil for military purposes. The first academic inquiries into energy security occurred in the 1960s, and the importance of the issue was realised on a global scale with the oil crisis in the 1970s. In the late '80s and '90s, the academic interest in energy security declined after the stabilization of oil prices and the removal of political embargoes (Goldthau, 2011). In the 2000s, it became an important issue again with the growing demand in Asia, the insufficiency of the gas resources in Europe, and the pressure to reduce the carbon emissions of energy systems (Cherp and Jewell, 2014).

There are many energy security definitions in the literature, but the exact meaning of energy security varies from country to country. The definition of energy security for energy producers is the ability to sell natural resources in safe, long-term and attractive markets, often supporting their own economies. For large industrialised economies, it is the ability to maintain the continuous supply of energy that drives their economies and supports a high and growing quality of life. For poor counties, it is a vital component on the road from poverty; it is the desire to transmit the necessary energy to their citizens for them to be able to satisfy their basic requirements. In such countries, lighting and electrical power are vital in meeting the basic needs of people. In addition, energy availability increases the productivity and income of the working population, improves their health and education levels, and helps them to connect to the global market (World Bank, 2005).

According to the IEA, energy security is the "availability of uninterrupted energy sources for reasonable prices". Energy security has many aspects: While long-term energy security focus on timely investments to supply energy in line with economic developments and sustainable environmental needs, short-term energy security deals with the ability of the energy system to react at the same rate to sudden changes in the supply-demand balance (IEA, 2014),

It can be said that the meaning of energy security differs according to the countries' energy dependency and level of economic welfare. Having said that, concepts such as availability, sufficiency, affordability, welfare, energy products (or supplies) and interruptions are commonly mentioned in the definition of energy security (Kocaslan, 2014). Figure 1 shows the components of energy security.

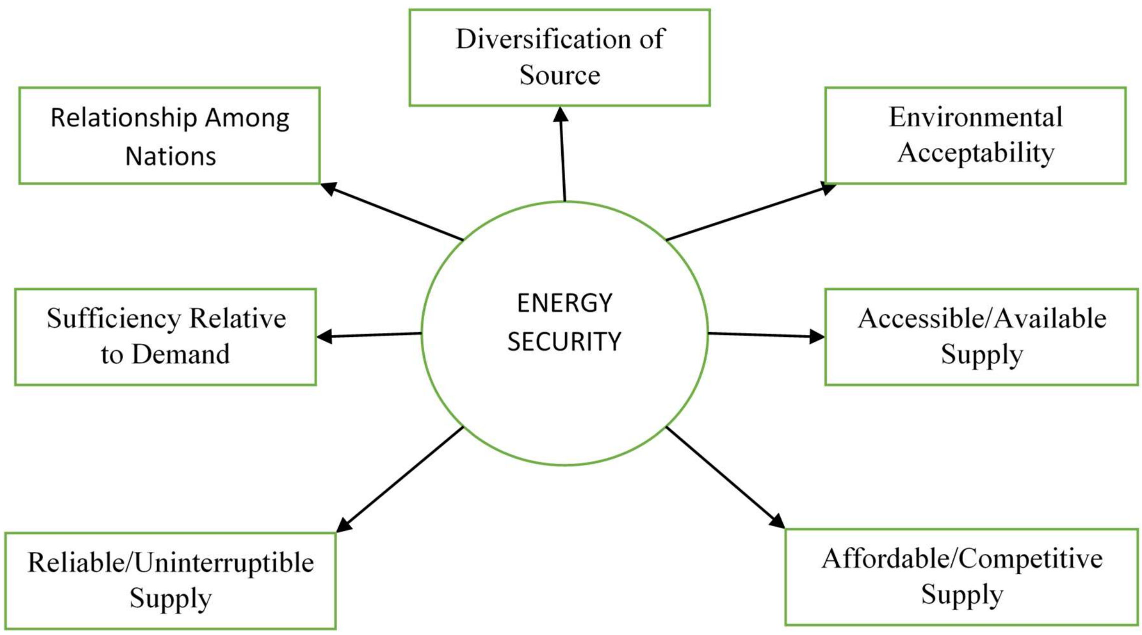
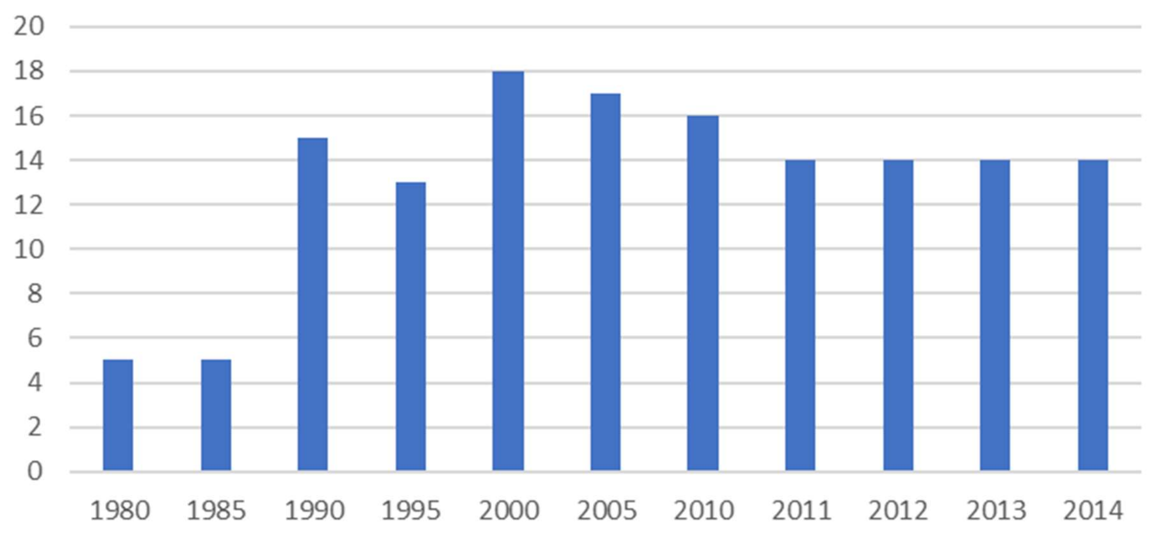


Figure 1*. Factors of Energy Security (Kocaslan, 2014).*

The energy security risk score is an indication of economic, political, social and environmental risks; it portrays the problems in the related areas. For this reason, economic, political, social and environmental improvements will positively affect the energy security risk score and vice versa. Turkey’s score was ranked 14th in terms of energy risk among the 25-large energy using countries in 2014 (Kocaslan, 2014). Appendix 1 shows the energy security scores of the 25-large energy using countries in 2014. This is a risk index, that is why the lowest (worst) rank is the highest numerical score and the highest (best) rank has the lowest numerical score (U.S. Chamber of Commerce, 2016). Turkey’s best energy security risk score was in 1985 with 777 points. More recently, Turkey has dropped back; its worst energy security risk score was in 2011 with 1,268 points (Kocaslan, 2014). In the 1980s, Turkey was one of the countries with the best risk scores in this group, and even rose to third place in 1984. However, in the second half of the 1980s, Turkey's risk score changed when it began to import liquefied natural gas to supply the natural gas needed by new gas-fired power plants. As a result, the country's risk ranking fell to 15 in 1990 from 3rd in 1984 (U.S. Chamber of Commerce, 2016). Figure 2 shows the energy security rankings of Turkey among the 25-large energy using countries, 1980-2014.

Figure 2. energy security rankings of Turkey between 25 large energy using countries, 1980-2014(U.S. Chamber of Commerce, 2016).



1.2.TURKEY'S ENERGY OUTLOOK

The energy supply in Turkey has been in an upward trend in the last 40 years to meet the rapidly increasing energy demand of the rapidly growing economy. Turkey's total primary energy supply (TPES) was 129 (Mtoe) in 2015, 54% more than the 84.2 Mtoe in 2005 (Figure 3). Turkey is heavily dependent on oil and natural gas imports, as only 24.8% of the energy supply is provided by domestic production. The amount of TPES per person is the lowest among IEA members with a value of 1.7 tonnes of oil-equivalent (toe). The average TPES per capita among IEA members is 4.5 (toe). Regarding GDP, the energy intensity of Turkey is much higher and Turkey is situated around the IEA average (IEA, 2016).

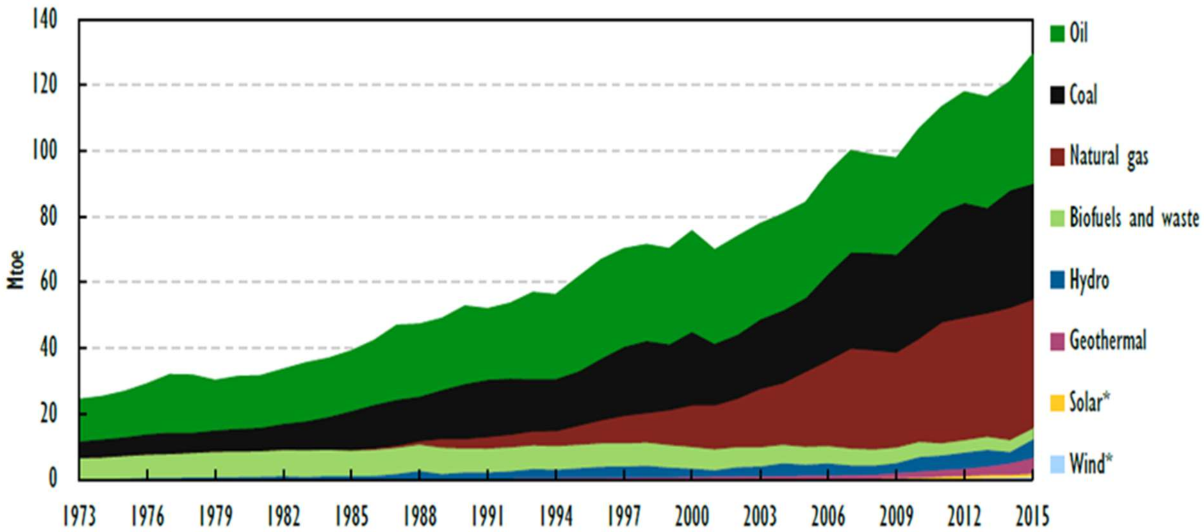


Figure 3. *TPES of Turkey, 1973-2015 (EIA, 2016).*

" Conversely, in 2015, Turkey's domestic energy production only covered 32.2 Mtoe or 24.8% of TPES; 51.1% of domestic energy was produced from fossil fuels, notably coal (41.8%, mostly lignite), oil (8.3%) and natural gas (1%) (Figure 4). Renewable sources constituted 48.9% of all domestic energy production, with biomass providing 10.1%, hydro 17.9%, geothermal 14.8%, solar 3% and wind 3.1%. According to the government, it is estimated that TPES will double to reach 222.4 Mtoe by 2020" (EIA, 2016, p. 23).

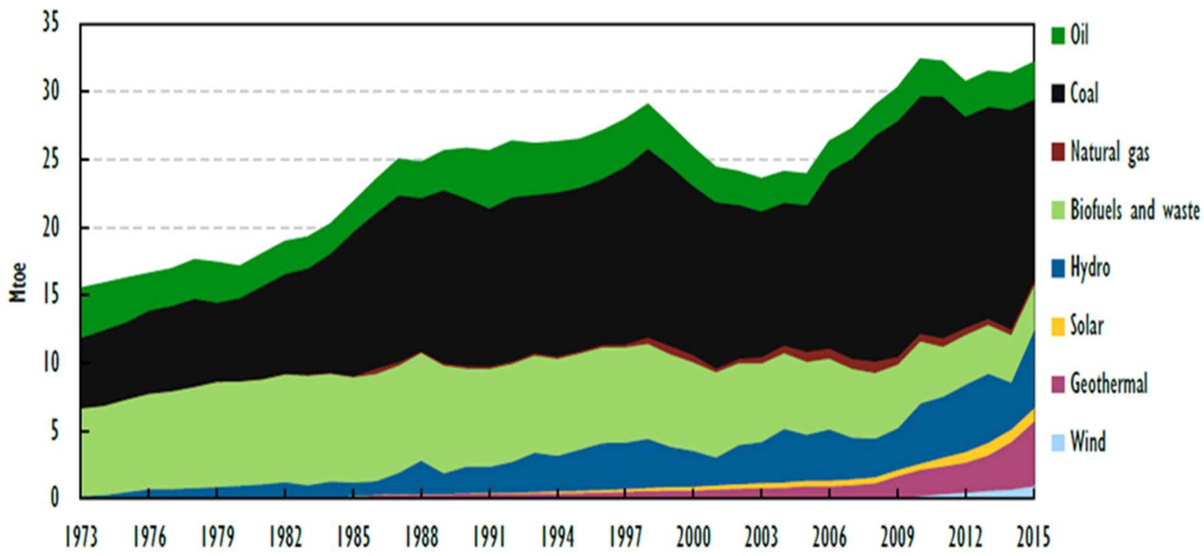
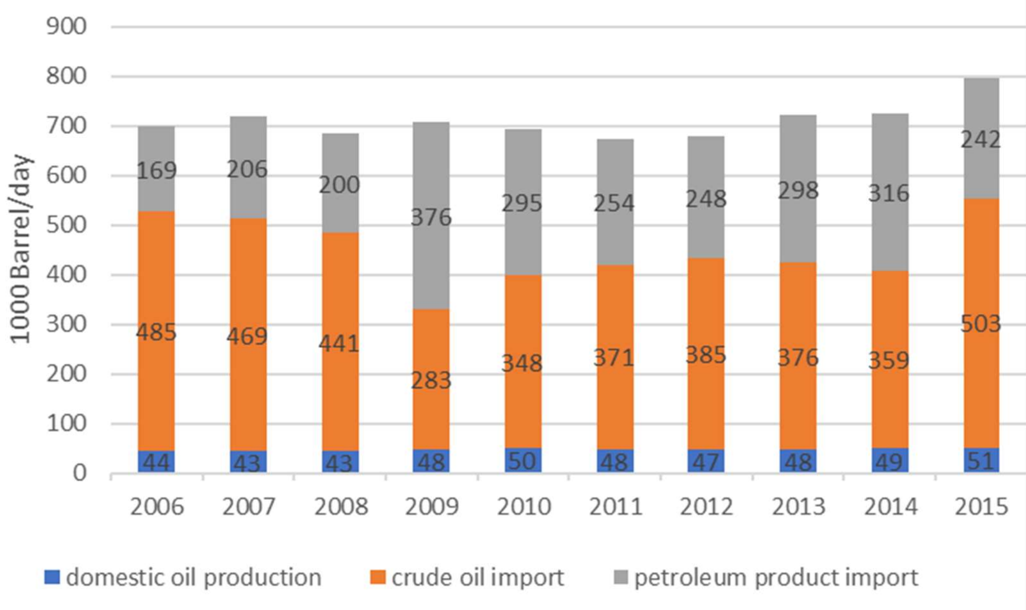


Figure 4. *Turkey's domestic Energy production by source, 1973-2015(EIA, 2016, p. 23).*

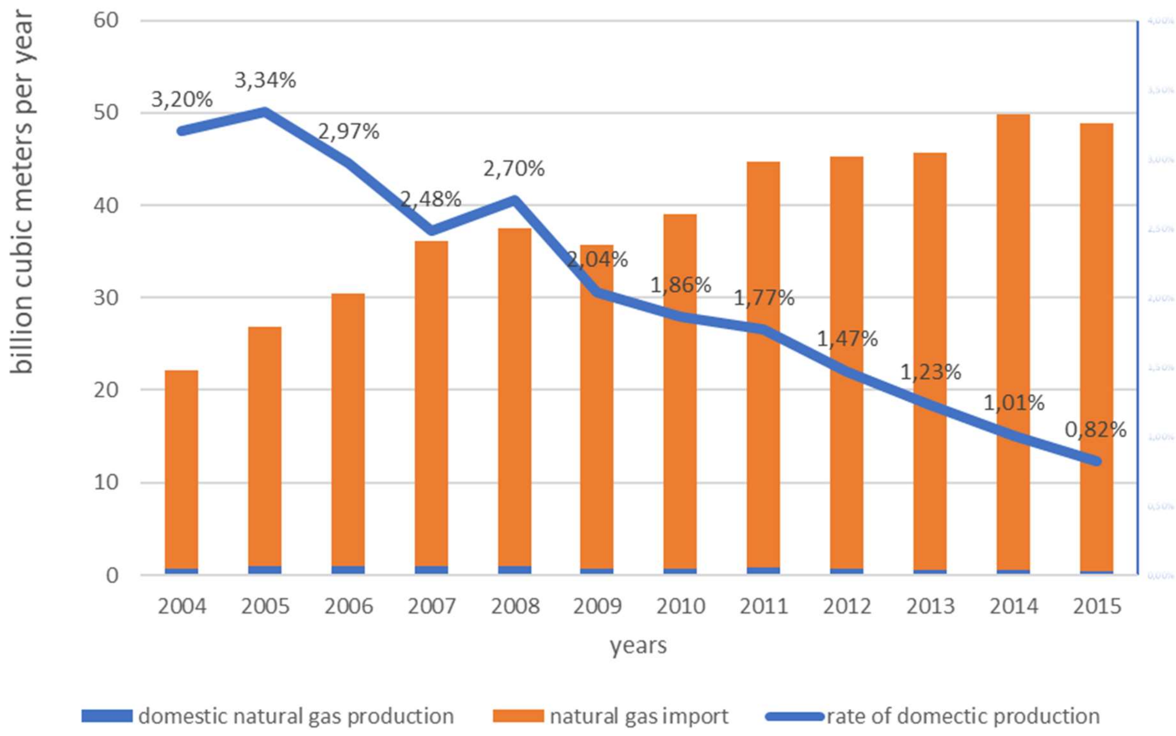
In 2015, daily production of crude oil was approximately 51 thousand barrels per day (b/d) in Turkey; conversely, 796 thousand b/d crude oil was consumed, import levels of 503 thousand b/d crude oil and 242 thousand b/d of processed goods were realised. Figure 5 shows that the ratio of domestic crude oil production to the total consumption was 6.4% in 2015 (BP, 2016).

Figure 5. Turkey's oil consumption and domestic production between 2006-2015(BP, 2016).



In the year 2015, the ratio of Turkey's domestic natural gas production to its consumption was the lowest of the last decade, at 0.8% (Figure 6). Natural gas production, which was up to 1 billion m3 in 2008, decreased to 398.7 million m^3 in 2015 (BP, 2016).

Figure 6. Turkey's oil consumption and domestic production between 2004-2015 (BP, 2016).



SECTION 2

In this section, Turkey's oil and natural gas policies have been examined under three main topics in the context of energy security.

2.1. INCREASING LOCAL OIL AND NATURAL GAS PRODUCTION

Considering Turkey's current reserves, it is not a country rich in oil or natural gas. Nevertheless, it is vital in terms of energy security to increase the rate of domestic production to total consumption by effectively using existing resources (Esen, 2016). In this context, the new Turkish Petroleum law was approved by the Turkish Grand National Assembly on 30 May 2013 and was published in the Official Gazette. The new law offers several privileges for investors such as tax reductions and convenience in money transfers. The main objective of this change was to increase the ratio of domestic production to total consumption by encouraging foreign and domestic investors (Özgür, 2016).

In 2015, Turkey's producible oil reserves were recorded as 334.5 million barrels. If no new discoveries are made, the remaining producible crude oil reserve has a life of about 19 years. Turkey's natural gas reserves were recorded as 3.7 billion m3 in 2015. The remaining natural gas reserves have a life of approximately 9.3 years. The majority of existing oilfields are aged, so well yields are gradually decreasing (TP, 2016). In this context, production increasing techniques applied in the fields are of great importance in terms of the efficiency of the wells. Within the scope of activities to meet the ever-increasing need for oil and natural gas from domestic sources, work has been carried out in recent years in the basins that have not been sufficiently explored, and especially in the marine areas of the Black Sea and the Mediterranean there has been great momentum. The Black Sea and Mediterranean Sea are considered to include potential hydrocarbon deposits. It is possible that those reserves may change the energy view for Turkey in future years (CEFTUS, 2016). The schematic view of license application map can be seen in appendix 2. "Green squares and red squares on the map show the exploration application areas on the land and offshore areas, respectively. Blue lines indicate the exclusive economic zone in the Black Sea. There is an agreement between Turkey, Russia, Ukraine, Romania, Georgia and Bulgaria regarding the Black Sea borders. There is still no consensus on the exclusive economic zones of the Mediterranean Sea between Turkey, Greece, Israel, Northern Cyprus, Southern Cyprus, Palestine, Egypt, Libya, Lebanon, and Syria; and of the Aegean Sea between Turkey and Greece" (Özgür, 2016, p.132).

In addition, work on the exploration and production of unconventional gas in Turkey continues in South-eastern Anatolia and the Trakya regions. In this context, related activities continued despite the low oil prices in 2015 (IEA, 2016).

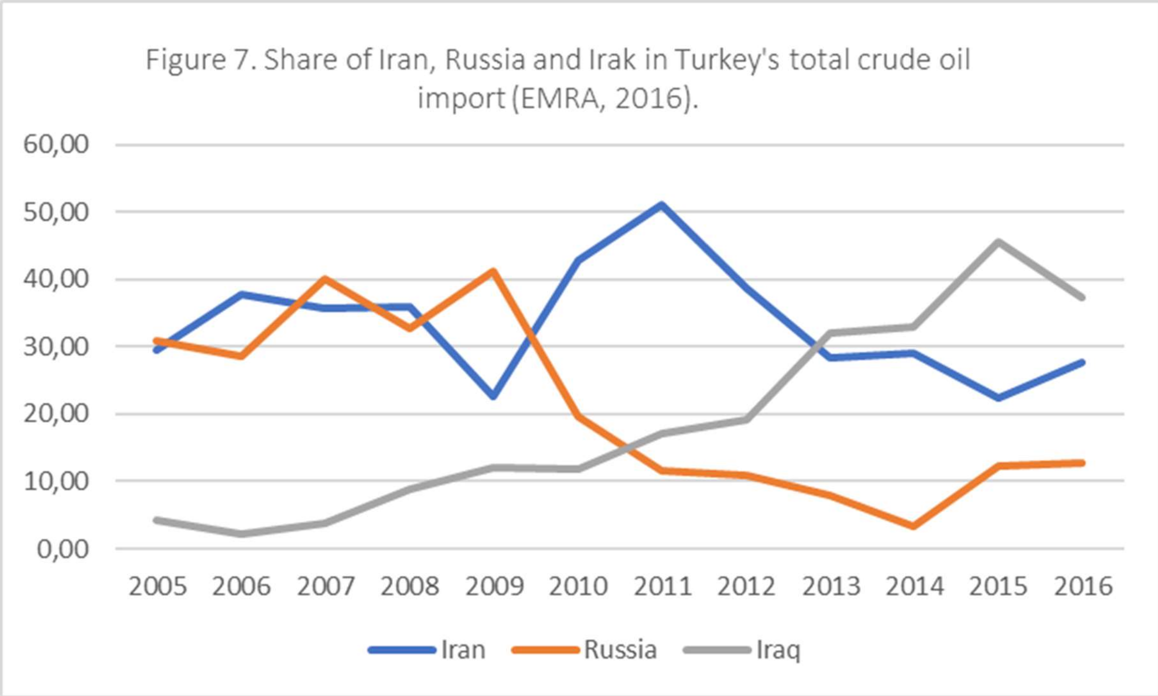
2.2. SUPPLIER AND ROUTE DIVERSITY

Appendix 5 shows Turkey's major oil and natural gas transit pipelines.

2.2. 1. Oil

Within the scope of energy security, one of Turkey's oil and gas import policies is to increase the diversity of sources of import as much as possible (Sevim, 2013), (Saka et al., 2016).

Appendix 3 shows the distribution of crude oil import quantities and percentages by country in 2005-2016. When this data is examined it is apparent that Turkey is largely dependent on Russia, Iran and Iraq for crude oil imports. Figure 7 shows the share of these three countries in total crude oil imports. In the last 10 years, Turkey has not been able to make any serious progress in the diversity of suppliers of crude oil. If the flow of crude oil to Turkey from these three countries is cut off for any reason, the Turkish government will have serious difficulties in meeting the current demand. In Chapter 3, a detailed analysis of these countries has been made.



Turkey should use existing oil infrastructures more efficiently and seek new infrastructure projects to make progress in supplier and route diversity.

2.2. 1.1. Turkey's Oil Infrastructure

Appendix 4 shows Turkey's Oil Infrastructure.

Port and refineries and storage activities

In Turkey, the import of crude oil and petroleum products is done through pipelines and tankers. While crude oil delivery is made by tankers for the Izmit and İzmir refineries, it is made by crude oil pipeline to the Kırıkkale and Batman refineries.

There are 11 major oil ports in Turkey. These are: Antalya, Mersin-Ata, Trabzon, Hopa, Izmir/Aliağa, Gemlik, Tekirdağ, Izmit, Iskenderun, Zonguldak, and Istanbul. In 2011, the total oil and petroleum product carrying capacity of the country in the ports was 5.9 million b/d (IEA, 2016).

Turkey has six refinery licenses and four operating refineries. The operating refineries (Izmit, İzmir, Batman and Kırıkkale) are operated by the Petroleum Refinery Operation (TÜPRAŞ), Turkey's largest industrial and refinery company. The total annual capacity of these refineries is 11 million tons (Mt/y). The table below shows the refineries and their capacities. The refinery project planned for Ceyhan, Adana has been cancelled with the rise of refinery capacities in the Middle East and Europe (IEA, 2016), (TP, 2016).

Also, the SOCAR company of Azerbaijan is developing the Star refinery project in Aliağa on the Aegean coast, which is planned to be operational by 2018. The refinery will have a processing capacity of 10 Mt per year and storage capacity will be 1.5 (mcm). In the project, SOCAR will have a share of 81.5%, and Turkey will have 18.5%(IEA, 2016).

Refinery	Processing capacity (Mt/year)	Storage capacity (mcm)	Ownership
İzmit	11	2.91	TÜPRAŞ
İzmir	11	2.42	TÜPRAŞ
Kırıkkale	5	1.38	TÜPRAŞ
Batman	1.1	0.253	TÜPRAŞ
Star (under construction)	10	1.5	SOCAR
Total	38.1	8.463	

Table 1. Refineries and storage capacity in Turkey 2015 (EIA, 2016)

Petroleum pipelines

Local pipelines

In 2015, 28 distribution companies are active in the local network. The main domestic crude oil pipelines are from Batman-Dortyol, Selmo-Batman and Ceyhan-Kırıkkale. There are also 26 transmission lines for refineries and distributors (IEA, 2016).

IRAQ-TURKEY CRUDE OIL PIPE LINE

The Iraq-Turkey crude oil pipeline was completed on 27 August 1973 to transport crude oil produced in Iraq's Kirkuk and other production areas to the Ceyhan Marine Terminal. In 1985 the annual transport capacity was increased to 70.9 million tons. BOTAŞ is the owner of the part of pipeline that is in the territory of the Republic of Turkey and is also the operator of that part of the pipeline (MENR, 2017).

For Iraq, as it is likely to increase its oil production, this pipeline is an important gateway for entering the world markets. For Turkey, the Kirkuk-Ceyhan pipeline is important in terms of establishing good relations with Iraq, for regional stability, to profit from transit fees, and to feed the Ceyhan Energy industrial zone (Bilgin, 2011).

BAKU – TBILISI – CEYHAN MAIN EXPORT CRUDE OIL PIPELINE (BTC)

The Baku-Tbilisi-Ceyhan (BTC) crude oil pipeline is used to transfer the oil produced in the Caspian region, with Azerbaijani oil being first, through a safe, economic and environmental pipeline system through Azerbaijan and Georgia to Ceyhan, and from here to reach out to the global markets with oil tankers. It is important for the transportation of additional Caspian oil, but also Turkey's environmental concerns about the straits (Bilgin, 2011).

The BTC Crude Oil Pipeline, which began operation on 4 June 2006, reaches Turkey through Baku and Tbilisi, and aside from the Azerbaijani oil, also carries Turkmen and Kazakh oils based on production (MOENR, 2017). With the majority being Azerbaijani oil, this pipeline operating at full capacity conducts a transfer of over 1 million barrels per day (Bilgin, 2011).

In addition, with the BTC crude oil pipeline, Turkmen and Kazakh petroleum are being transported, as well as Azeri oil. With a share of 6.53% of TP, Turkey is not only an import country, but also it seems a commercial partner at the same time. Thus, the BTC is a credible project that Turkey has a share in and is ultimately important for the resource diversity of Turkey (DEMİR, 2010).

2.2. 2. Natural gas

Turkey, in the 1990s, decided to become one of the countries to increase natural gas consumption due to its relatively low-cost and lesser negative impact on the environment compared to oil and coal. However, the high rate of dependence on Russia in terms of both source and supply diversity poses a threat to energy security. Turkey currently imports 82 percent of its needs in the form of piped gas, and 18 percent in the form of LNG imports (BP, 2016).

Figure 8 shows Turkey's natural gas imports by country between 2006-2016. When the data is examined it can be said that, Turkey's dependence on pipe gas is dependent on Russia, Iran and Azerbaijan. For LNG, Turkey is dependent on Algeria and Nigeria. This dependency, particularly in terms of security and diversification of supply, threatens Turkish energy security. Emphasis has been given especially to the development of the LNG trade and investment for new LNG conversion facilities to reduce this dependency (Biresselioglu et al., 2012).

countries	Russia		Iran		Azerbaijan		Algeria(LNG)		Nigeria(LNG)		Others (LNG)		TOTAL
years	*Import*	*%*	*Import*	*%*	*Import*	*%*	*Import*	*%*	*Import*	*%*	*Import*	*%*	
2006	19,316	63.9	5,594	18.5	0	0	4,132	13.6	1,100	3.6	79	0.2	30,221
2007	22,762	63.5	6,054	16.8	1,258	3.5	4,205	11.7	1,396	3.8	167	0.4	35,842
2008	23,159	62.0	4,113	11.0	4,580	12.2	4,148	11.1	1,017	2.7	333	0.8	37,350
2009	19,473	54.3	5,252	14.6	4,960	13.8	4,487	12.5	903	2.5	781	2.1	35,856
2010	17,576	46.2	7,765	20.4	4,521	11.8	3,906	10.2	1,189	3.1	3,079	8.0	38,036
2011	25,406	57.9	8,190	18.6	3,806	8.6	4,156	9.4	1,248	2.8	1,069	2.4	43,874
2012	26,491	57.6	8,215	17.8	3,354	7.3	4,076	8.8	1,322	2.8	2,464	5.3	45,922
2013	26,212	57.9	8,730	19.2	4,245	9.3	3,917	8.6	1,274	2.8	892	1.9	45,269
2014	26,975	54.7	8,932	18.1	6,074	12.3	4,179	8.4	1,414	2.8	1,689	3.4	49,262
2015	26,783	55.3	7,826	16.1	6,169	12.7	3,916	8.0	1,240	2.5	2,493	5.1	48,427
2016	24,540	52.9	7,705	16.6	6,480	13.9	4,284	9.2	1,220	2.6	2,124	4.5	46,352

Table 2. Turkey's natural gas imports by countries between 2006-2016 (bcm) (EMRA, 2016).

2.2. 2.1. Turkey's Natural Gas Infrastructure

Natural Gas Network

Turkey's natural gas transmission network consists of 12 812 kilometres (km) of pipelines and nine entry points. These entry points are made up of four international pipeline import points, two LNG entry points, two production fields and a storage facility entry point (IEA, 2016).

Storage activities

Just as natural gas is widely used in all countries, demand for natural gas in Turkey changes according to the seasons, and demand in the winter months can reach up to twice the demand in the summer months. For that matter, gas storage has been needed for a long time now to store surplus gas in summer and to provide stored gas to meet demands in winter. In addition, in the case of pipeline maintenance, or possible demand restrictions for various reasons, with regards to the energy planning of countries, having natural gas in underground storage facilities to ensure the balance between supply and demand during these periods is of great importance in terms of a national energy strategy.

At the end of 2015, Turkey had a gas storage capacity of 2.84 bcm. The MENR Strategic Plan (2015) includes objectives such as to increase storage capacities to 10% of annual consumption (5 bcm) and then to 20%. Turkey's only underground gas storage facility is in Silivri. The second underground natural gas storage facility for the country is being built under the Salt Lake and the plant is expected to be ready in 2019.

Natural gas pipelines

CURRENT NATURAL GAS PIPE LINES

RUSSIA – TURKEY NATURAL GAS PIPELINE (WESTERN LINE)

On 14 February 1986, a 25-year duration natural gas purchase and sale agreement was signed between BOTAS and Soyuz Gaz Export in Ankara. Under the agreement, natural gas purchasing began in 1987 in gradually increasing amounts with the maximum amount of 6 billion m3/year being reached in 1993 (MENR, 2017).

BLUE STREAM GAS PIPELINE

Under the scope of the 25-year natural gas purchase and sale agreement signed between BOTAS and Gazexport on 15 December 1997, natural gas from the Russian Federation reaches Turkey from a line passing under the Black Sea. According to the agreement, an annual 16 billion m3 natural gas is supplied to Turkey

The financing and construction of the natural gas pipeline in the territory of the Russian Federation, was undertaken by the GAZPROM Company, with the financing and construction of the Turkish part under the Black Sea, undertaken by BOTAŞ (MENR, 2017).

EASTERN ANATOLIA NATURAL GAS MAIN TRANSMISSION LINE (IRAN – TURKEY)

A natural gas purchase and sale agreement was signed between Iran and Turkey on 8 August 1996 in Tehran to supply an annual 10 billion m3 of Iranian natural gas to Turkey through pipeline (MENR, 2017).

BAKU-TBILISI-ERZURUM NATURAL GAS PIPELINE (BTE)

On 12 March 2001, a 15-year natural gas purchase and sale agreement was signed for the construction of the Baku-Tblisi-Erzurum Natural Gas Pipeline that aimed to supply Azerbaijani natural gas produced in the Shah Deniz field, located in Azerbaijan's South Caspian Sea region, to Turkey at an annual supply of 6.6 billion m3 and flow through the pipeline commenced on 4 July 2007 (MENR, 2017).

It is planned to increase the capacity of the BTE's section located on Azerbaijani and Georgian soil (South Caucasus natural gas pipeline) parallel to the second phase production of the Shah Deniz field and to have it connected to the Trans-Anatolian natural gas pipeline (TANAP) at the border of Turkey and Georgia. Project activities had started in 2015, and are planned to be completed and ready to supply gas to TANAP by the end of 2018. According to 2016 data, 13.98% of Turkey's natural gas import was supplied by Azerbaijan (Çıtak, 2016).

1: Tanap Project

The TRANS-Anatolia Natural Gas Pipeline (TANAP) was initiated by Azerbaijan and Turkey. With the TANAP project, it is planned to carry the natural gas produced in Azerbaijan's Shah Deniz 2 field to other areas to Europe via Turkey (MENR, 2017).

The project is planned to be implemented in four stages.

1. At the end of the first stage, Turkey will purchase 6 billion cubic metres of natural gas per year.

2. In the second stage, it is planned that the capacity of the line will reach 16 billion cubic metres in the year 2020. In this stage, 6 billion cubic metres of gas will be sold to Turkey and 10 billion cubic meters will be exported to Europe.

3. In the third stage, it is planned to increase the annual capacity of the line to 23 billion cubic metres in 2023.

4. In the final stage, the pipeline's annual capacity will be increased to 31 billion cubic meters. In the following phases, based on the natural gas supply-demand balance, it is planned for the TANAP project to reach 50 billion cubic metres (Suleymanov, 2017).

While Turkey is only a transit country in the BTC and BTE projects, it will be in almost all the GGK value chain. Turkey has a 19 percent share in Shah Deniz Phase II and South Caucasus Pipeline Expansion Project through TP, and a 30 percent share in the TANAP Project through BOTAŞ. The activities related to the project are carried out by TANAP Doğal

Gaz İletim A.Ş. in which BOTAS has a share of 30, SOCAR has a share of 58 and BP has a share of 12 in TANAP Doğal Gaz iletim A.Ş. (MENR, 2017). This means that Turkey will produce both natural gas and will carry this gas by its own pipelines (ERDOĞAN, 2017).

2: Turkstream Gas Pipeline Project

Aside from supplying natural gas to Turkey from the Russian Federation, the project will be constructed to supply Russian gas to Europe via Turkey and will be a pipeline system consisting of a marine section and a land section.

Within the scope of the project, it is planned that the first phase will provide the natural gas supply to Turkey through the 15.75 billion m3 capacity first line, and later, the construction of the other pipeline based on the gas purchasing commitments of the EU member states. A new company will be established of the two countries with a partnership of equal share, to carry out the construction and operation of the second pipeline This pipeline on the onshore section will supply gas to Europe (MENR, 2017).

2.3. To turn Turkey into an energy hub

Turkey, who aims to turn its geographical position into an opportunity instead of having to bear to the costs resulting from the region's political and economic unrest, has begun to construct the principle axis of its energy policies around its target of becoming an 'energy centre'. In this context, alongside continued energy trade cooperation with Russia, Azerbaijan and Iran, important projects and collaborations have been signed with countries that desire to transfer their energy resources to foreign markets such as Iraq, Turkmenistan and East Mediterranean countries (Karagöl et al., 2016).

Under the scope of the Southern Gas Corridor (SGC) which will enable the transfer of Azerbaijani natural gas to European countries, it is expected that TANAP will provide a significant contribution towards Turkey becoming an energy centre. Additionally, turning towards alternative markets such as the Iraqi Kurdish Regional Directorate (IKRD), Turkmenistan and Qatar will strengthen Turkey's energy supply security. Turkey is in a critical position to ensure the ‘security of energy supply’ for counties that supply and demand energy. Apart from this, in the ensuring of supply of safe and sustainable energy, Turkey is taking strides in becoming a central country in energy instead of just being a transit location between energy supplying and demanding countries (Özdemir et al., 2015).

"Even though Turkey does not have the ability to become a hub for the time being due to the lack of resources and facilities" (Özdemir and Raszewski, 2016: 267), in the future, if it supplies enough gas to the system from different countries and is able to evaluate the possibilities provided by its geostrategic position and fulfil the necessary conditions, it will be able to become a hub. In this context, Turkey will have made many gains in the context of energy security (Özdemir and Raszewski, 2016).

Resource country and route diversity

If we assess the future of the TANAP project, the Azerbaijani gas to be transported will provide an important contribution to Turkey's reduction of natural gas dependence on Russia and Iran since Turkey will meet 25% of the increasing gas demand. Turkey's becoming a regional energy hub will also lead to an increase in its value as an important country in securing energy supply security for Europe (ERDOĞAN, 2017).

Besides, it is possible to transport not only Azerbaijani gas but also other countries’ gas with this pipeline. Turkmen gas will be able to pass under the Caspian Sea and be transported through Turkey to Europe. Kazakhstan, another important coastal country of the Caspian, can supply gas to TANAP. Likewise, the gas coming from Northern Iraq, Qatar, Iran and the Eastern Mediterranean can be transported by TANAP (Sevim, 2013).

The TürkAkım Gas Pipeline Project, which was launched to sell Russian gas to Turkey and Europe via Turkey, is very important especially in terms of the supply security for Turkey. Because natural gas disputes between the Russian Federation and Ukraine in recent years have caused the supply of gas from the West Line to Turkey to be cut off from time to time; this situation jeopardises the security of the supply to Turkey, especially in the winter months. Within the scope of TürkAkım, only a total of 14 billion cubic meters of gas purchased from the West Line will be delivered to the country via TürkAkım without changing the terms and conditions of the existing contracts, upon the commissioning of pipelines to be built to supply gas to Turkey. This will ensure that gas transported directly from the Russian Federation to Turkey will not be exposed to possible interruptions from third parties and without the use of the transmission system of another country (MENR, 2017).

Price Safety

Turkey, which has limited resources, is in a position where it must import oil and gas. "Turkey, which imports about three quarters of the energy it consumes from abroad, is among the few countries with the highest rate of external dependency on energy. For this reason, it pays a large amount of foreign currency to the energy producing countries. Turkey is buying gas from Russia at high prices. However, gas from Şahdeniz II to be transported by TANAP will benefit Turkey in terms of price security. Because Azerbaijani gas will be pumped to Turkey from TANAP, it will cost 12% less than Russian gas (ERDOĞAN, 2017). In addition, thanks to the competitive market that will be formed with the increase of the international energy transmission lines between Asia and Europe, Turkey will be able to access oil and natural gas at lower costs, because a market will emerge where gas will compete with gas (Çıtak, E., 2016), (Tagliapietra, 2016).

SECTION 3

In this section, the risks that could affect Turkey's energy security are discussed.

3.1. Risks

In the international literature, there are many studies suggesting specific categorisation for the classification of the risks that may threaten the security of supply of oil and gas (Doukas et al., 2011), (Akalın and Tüfekçi, 2014). In this study, security risks of supply of Turkey's oil and natural gas are classified under two main headings;

1: Conflicts, political instability and export restriction,

2: Physical security of energy lines.

3.1.1. Conflicts, political instability and export restriction

As mentioned in earlier chapters of the study, Turkey is dependent on three major countries for oil supply (Russia, Iran and Iraq) and for gas supply (Russia, Iran and Azerbaijan). The political crises that may arise from the main supplier countries mentioned, the political situation in which the countries are located, or the relationship of these countries with other states, seriously threatens the energy security of Turkey. Below, these countries have been analysed in terms of their impact on Turkey's energy security.

3.1.1.1 Russia

Both Turkey and Russia place emphasis on the 'mutual benefit' principle in energy relations; any project or area of collaboration must serve the interests of both countries. Natural gas is only one aspect of the comprehensive relations. During the Russian and Ukrainian natural gas crisis of 2008 and 2009, and during Iran's cut of gas supply in the winters of 2007 and 2008, Russia graciously and carefully supplied extra gas to the Turkish market to mitigate the potential adverse effects of the gas shortage (Babali, T., 2012). Moreover, natural gas disputes between the Russian Federation and Ukraine in recent years have caused the supply of gas from the Western Line to Turkey to be occasionally cut off; this situation jeopardises the security of Turkish supply especially during the winter months. With the construction and commissioning of a pipeline with the sole purpose of supplying gas to Turkey, within the scope of the TurkStream project, it is planned that the annually received 14 billion cubic meters of gas from the Western Line will be delivered to Turkey through TurkStream without changing any of the existing terms and conditions of the current agreement. This will ensure that gas will be transported directly from the Russian Federation to Turkey and will not be exposed to possible interruptions from third parties and not use the transmission systems of another country. These examples and similar applications demonstrate Russia's commitment to being a 'reliable supplier' (Suleymanov, 2017).

On the other hand, as mentioned in the previous sections of the study, Turkey is a country largely dependent on Russia, especially in terms of natural gas. If Russia stops the gas flow for any reason, it will be very difficult for Turkey to meet its energy needs (Sevim, 2013). For example, on November 24, 2015, the shooting of the Russian SU-24 plane by Turkish F-16's (because the of the Russian plane's continued border violations despite repeated warnings during its bombing of Syrian sites), resulted in a serious crisis between Turkey and Russia, who had recorded a multilateral cooperation together in the 2000's. The TurkStream project, which seemed a big step on the road to changing Turkey from a transit country to an energy centre, received its share of negative publicity after the crisis, and although there was no mention that the project would be completely shelved, the negotiations were stopped. However, after a year following the suspension of political and economic relations, the crisis was resolved and an inter-governmental agreement was signed between the Government of the Republic of Turkey and the Government of the Russian Federation on 10 October 2016 regarding the TurkStream Gas Pipeline. The official approval process for the agreement has been completed in both countries (İLTER, E. and KINIK, H., 2017).

3.1.1.2. Iran

Turkey considers Iran as a less reliable supplier country than Russia, because Ankara's energy trade and other economic and political relations with Tehran have always been inconsistent. As an example, in terms of oil and gas imports, while Turkey wants to reduce the cost of energy it receives from Iran, Iran is reluctant to reduce the prices. The natural gas imported from Iran is more expensive than the natural gas imported from Azerbaijan and Russia. It also falls below the conditions that are often agreed on the quantity and quality of gas that Iran is committed to selling. The Turkish-Iranian natural gas pipeline started gas transmission on the 10 December 2001. According to the natural gas purchase agreement, Iran needs to supply 10 billion cubic meters of natural gas to Turkey annually (Babali, 2012). Figure 8 shows the quantities of natural gas taken from Iran.

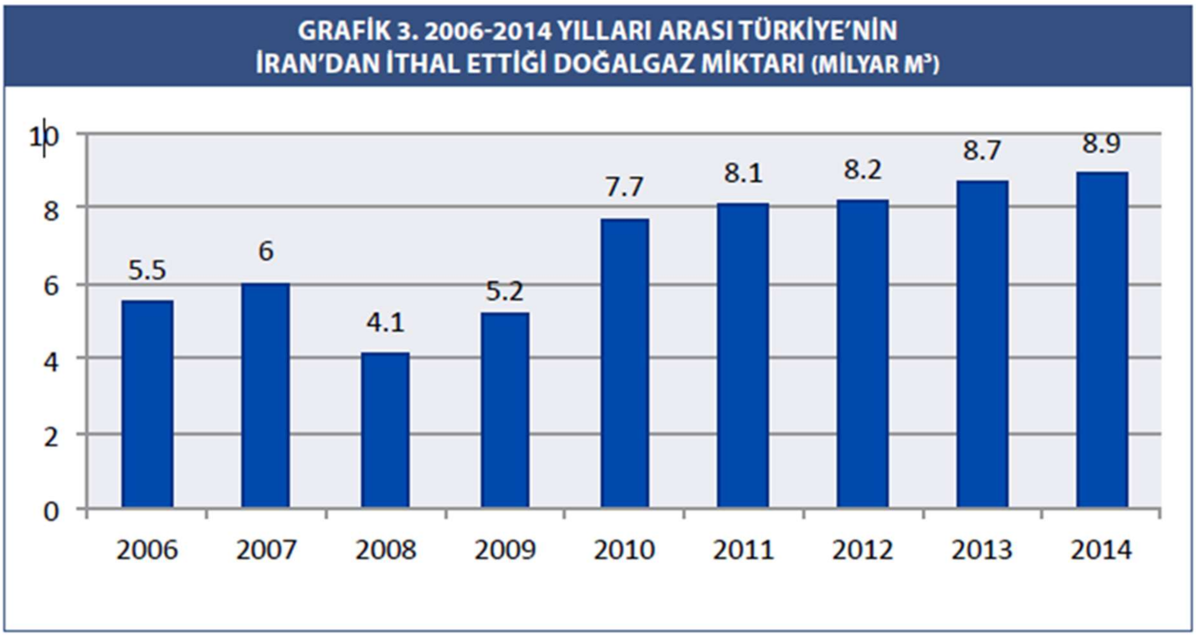


***Figure 8**. the quantities of natural gas taken from Iran (Karagöl et al., 2016)*

Iran has remained below the promised annual supply of natural gas. From the point of view of energy supply security, there are problems between Iran and Turkey from time to time. These troubles are especially evident in Iran's supply of natural gas to Turkey. In 2004, 2007 and 2012, natural gas shortages originating from Iran were the main problems. Iran was cutting natural gas back blaming, ‘malfunctions in natural gas stations’ or ‘increase in domestic demand’, as reasons and so caused heating problems in Turkey from time to time, as well as the deceleration in industrial production. (Austwick and Rzayeva , 2017).

It is thought that the fate of the Iran-Turkey energy trade business union is largely related to events in Syria and Iraq. It seems that Turkey's interest in energy trade with Iran has diminished due to Iran's attitude toward the events in Syria and Iraq, and the political change in the region. Moreover, the Western states' claims that Iran uses uranium enrichment activities for the construction of nuclear weapons, and has not allowed the International Atomic Energy Agency (IAEA) to oversee its nuclear activities for a long period of time has caused Western countries to impose sanctions on Iran. The sanctions implemented since 2012 have negatively affected many areas from Iran's economy to external relations. The decline in Iranian oil production after sanctions also showed itself in exports of oil to Turkey. In July 2015, Iran allowed the IAEA to inspect its nuclear program. Iran remains committed to nuclear energy, but it remains uncertain as to how Iran will deal with the steps it considers to be necessary for nuclear energy (Saka et al., 2016).

Turkey has concerns about possible sanctions against Iran in the future, and the subsequent effects on natural gas and oil exports from Iran. Turkey believes that a new wave of sanctions will not directly affect the gas exports from Iran, as the natural gas purchase and sale agreement between the two countries is strictly based on the ‘buy or pay’ provisions. In other words, stopping the purchase of natural gas will not save Turkey from its obligation to pay (Babali, 2012).

Despite the significant amount of oil and gas trade between Turkey and Iran, relations between the two countries will depend on developments in the future. International developments and Iran's attitude towards these developments will determine the fate of the Iran-Turkey energy cooperation. Focusing on the problematic areas of bilateral relations, three main topics are highlighted: the high cost of energy imports, the problems of energy supply security, and the international sanctions imposed on Iran. If the problems that exist in Iran's relations with Turkey and the Western countries are resolved in some way, then Iran can play a role as one of Turkey's most important energy suppliers in the future (Kalicki, and Goldwyn, 2013), (Austwick and Rzayeva , 2017).

3.1.1.3. Iraq

The country, which spent the 1990s under a repressive regime, passed through a difficult period in the 2000s with the war that was begun with the intervention of the United States. The war that started in 2003 brought about significant changes in the political structure of Iraq. In this process of deepening sectarian and ethnic divisions, the Kurdish Region of Iraq (KRI) was separated from the Iraqi Central Government and became an autonomous structure. Since 2003, this has led to the emergence of a dual political structure in Iraq (Bowlus, 2017).

Despite the bilateral political structure in Iraq, the Iraqi oil company SOMO (The State Oil Marketing Organization) is the sole authority under the central government with control over the oil export. According to the ‘Iraq Petroleum and Natural Gas Law’ adopted in 2007, the Federal Oil and Gas Council of the Central Government must approve an agreement with the KRI for any agreement to be valid. But KRI, which wants to reduce its dependence on the Central Administration by applying independent policies in the operation and transfer of energy resources, has begun signing agreements with major international oil companies with the discovery of new oil deposits in its territory (Costigan, 2016). These developments have caused relations with the Central Administration to be further strained, and the fact that KRI has started to sign independent agreements with energy companies is also reflected in Turkey-Iraq relations. The agreement, which gave KRI a petroleum extraction license called Block 9 in an 800 square kilometres area within its territory, caused great controversy in Iraq. The Turkish Energy Company, a subsidiary of TP, made an agreement, but the Central Government overturned the agreement made for Block 9 and cancelled the license of TP which had permitted the oil to be exported through Turkey (Karagöl, et al., 2016).

On the other hand,

> "from 2011 to 2012, Exxon-Mobil (US), Total (France), Gazprom Neft (Russia), Chevron (US), and TAQA (Abu Dhabi) signed production-sharing contracts for exploratory blocks in the KRI. These contracts signalled that Erbil had wrested de facto control over the northern Iraqi oilfields from Baghdad and, by 2013, Erbil completed construction of a new pipeline that runs from Khurmala at the head of the Kirkuk oilfield to the Turkish border, where it links up with the Turkish section of the original Kirkuk–Ceyhan system. The Khurmala–Ceyhan Pipeline traverses territory that is Kurdish-dominated and so will not be susceptible to sabotage in the way that the original Kirkuk–Ceyhan Pipeline was.
>
> The Khurmala–Ceyhan Pipeline handles 450,000 bpd, but additional pumping stations, set to be operational by the end of the second quarter of 2015, will increase the volume to 700,000 bpd" (Bowlus, 2017, p.740).

The main reason for the success of the Kerkük-Ceyhan pipeline in the past, the present success of the Khurmala-Ceyhan oil pipeline, and the planned future pipeline between KRI-Turkey is that Turkey is an excellent transit state due to its geographical location. KRI's oil and gas pipelines reduce Turkey's overall energy bill because transportation costs are relatively lower than other sources on the world market and Turkey is paying for transit energy transfers. For this reason, strategically, in the event of an oil supply crisis, the adjacency of KRI oil provides more energy security for Turkey (Özdemir and Raszewski, 2016). As far as KRG is concerned, KRG is largely dependent on Turkey in opening its resources to the world market. Because KRI's export options to Syria, Iran or even Iraq are both more expensive and have more political risk when considering previous historical events. For KRI, Turkey is the most accessible and closest alternative in the short to medium term (Paasche and Mansurbeg, 2014).

3.1.1.4. Azerbaijan

It can be said that Turkey has made a great deal of the anticipation in the initiatives to preserve and strengthen its historical and cultural ties with the new independent states in the Caspian Sea basin. Turkey's relations with Azerbaijan have grown tremendously thanks to close socio-economic and high-level political cooperation since 2010 (Ediger ve Durmaz, 2016). The ‘Two States One Nation’ rhetoric, a demonstration of the Azerbaijani relations between Turkey and Azerbaijan, is being continued today by both countries. The Trans Anatolian Natural Gas Pipeline (TANAP), which has recently left its mark on global energy markets, is an important step supporting this discourse (Çıtak, 2016).

The greatest risk in terms of the sustainability of oil and natural gas received by Turkey from Azerbaijan is that there is no natural boundary between the two countries. Existing pipelines are delivered to Turkey via Georgia (ERDOĞAN, 2017).

Diplomatic problems with Azerbaijan's neighbours after independence have continued to affect the energy relations in the Nagorno-Karabakh conflict, especially with Armenia. The BTC and BTE pipelines are extremely vulnerable, being only 40 km from the existing front line. In 2016, the supply of natural gas and oil was completely cut off during the 4-day war between Azerbaijan and Armenia. The problem that Azerbaijan has with Armenia is a serious threat to Turkey's energy security (Ediger and Durmaz, 2016).

3.1.2. Physical security of energy lines

3.1.2.1. Terrorist Attacks

The developing Turkey is among the countries that imports more energy than it produces. Although Turkey purchases a major part of its energy needs from external sources, it holds a significant portion of the global energy transmission lines. This situation makes Turkey an important player in the centre of energy wars. At present, the chaotic environment experienced in neighbouring countries and Turkey's fight against terrorism makes Turkey a target for terrorist organisations. This situation poses a great risk for the security of energy transmission lines passing through Turkey (Karagöl, et al., 2016). Especially since terrorist organisations who fail in rural and urban areas, target oil and natural gas transmission lines which are easier targets for them. The primary aim of attacks undertaken by terrorist organisations on energy transmission lines is to make an impression; a secondary aim is to provide advantages to countries that are in competition with Turkey regarding energy transmission lines. As such, it is known that in recent years, hundreds of sabotages and attacks have been carried out on existing energy transmission lines and those under construction (AKBAŞ and ÜRÜN, 2016).

At the end of the Iraq war, and because of the United States partial withdrawal from the territories of Iraq, the strengthening of terrorist organizations such as Al-Qaeda and DAEŞ in the region have been a disaster for the Middle East and the world. From Turkey's perspective, it has been the re-initiation of terrorist activities against Turkey by the PKK terrorist organisation, which has made use of the authority gap in Northern Iraq to construct a logistic and training base there as well as obtaining the heavy weapons left by the Iraqi army through various ways (AKBAŞ and ÜRÜN, 2016).

For example, the Kirkuk-Ceyhan pipeline, which is a crucial crude oil supply channel that connects Iraq to the coasts of the Mediterranean, is the energy line that has been subject to the most terrorist attacks. The pipeline has a remarkable capacity of about 1.6 million barrels per day, but the line is often interrupted by frequent sabotage of terrorist groups, especially the

PKK. (PKK: Partiya Karkeren Kurdistane or Kurdistan Workers' Party is a Kurdish nationalist party demanding political rights for the Kurds in Turkey. Due to their armed struggle against the Turkish government, the PKK has been declared as a terrorist organisation by both American and Turkish governments.) (Costigan, 2016).

Terrorist attacks on pipelines are among the major threats in Turkey. These sabotage incidents consist of terrorist attacks, non-terrorist political and apolitical sabotage. As part of the political sabotages, an important part of the PKK's attacks on the Kerkük-Yumurtalık oil pipeline has been the target of the Turkey-Iran-Natural Gas Pipeline since 2005. Between 1987 and 2010, 59 sabotage events were carried out by the PKK against pipeline. In addition, since 2003, more than 300 attacks have been made on power transmission lines in Iraq, and the Turkey-Iraq Oil Pipeline has almost come to a standstill (Arcuri, 2013).

As another example, companies began exploratory hydraulic fracturing experiments in the promising Dadas shale formation in the southern Diyarbakir region in the south-eastern part of the country. Although Turkey is particularly keen to extract rock gas reserves in this region, operations are often interrupted because of the terrorist attacks in the region. In addition, aside from terrorist attacks, sometimes attacks on the pipelines are carried out for theft (EIA, 2016).

3.1.2.2. Accidents

Pipelines and Distribution Stations

The route of the pipelines is not always underground or outside the city, or in places with low population. For this reason, human-induced accidents on the line passing through settlements, or erroneous explosions and punctures can occur during maintenance work. These events cause erosion and closure of the line, a stoppage of the flow of energy, as well as having a negative impact on public health and the local economy due to the spread of fire, explosions and poisoning.

There have been 159 attacks, sabotages, accidents, and violations since the first accident on the NATO Western Oil Pipeline in 1976 through until June 2013. The line where most problems occurred has been the Kerkük-Yumurtalık Crude Oil Pipeline with 38 incidents. Eight cases occurred on the Turkey-Iran Natural Gas Pipeline, two in Baku-Tbilisi-Erzurum Natural Gas Pipeline, one in Baku-Tbilisi-Ceyhan Crude Oil Pipeline (Özdemir and Raszewski, 2016). Figure 9 shows the number of accident in oil and gas infrastructure in Turkey between 1976-2013.

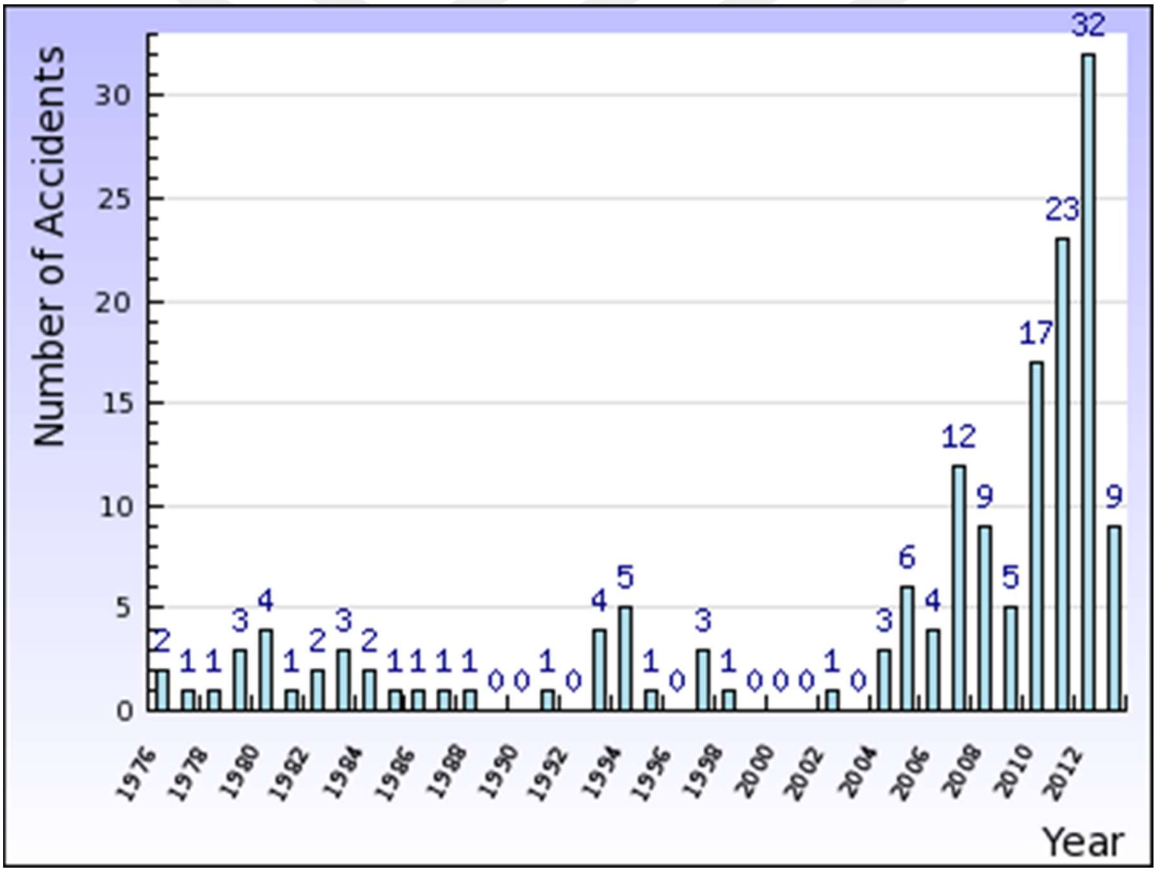


Figure 9 *the number of accident in oil and gas infrastructure in Turkey between 1976-2013 (Technological Accidents Information System, 2017).*

The Straits

The Bosphorus and Dardanelles Straits play an important role in Turkey's goal of becoming an energy corridor. Indeed, many oil tankers and LNG carriers pass through İstanbul and the Dardanelles Strait to carry raw materials to the global market. The passage of tankers in Turkish waters, to meet the increasing global energy demand, has shown a strong and stable increase in recent years. As approximately 3% of the world's daily oil consumption is carried through the Turkish Straits, the Turkish Straits are of importance in terms of global energy security (Gürdeniz, 2009).

This trend has created a positive impact on Turkey's economy, however at the same time, is a serious source of risk for potential tanker accidents and environmental disasters due to the heavy traffic in the Straits. If such an event was to occur, the normal oil flow through Turkey's Straits would be significantly slowed or interrupted. When the intense tanker traffic and the physical features of the Turkish Straits are considered, oil tankers passing through the straits present a great risk for marine accidents. Such an accident, in addition to humanitarian and environmental hazards, would result in an interruption in the flow of oil to world markets. The solution lies in alternative oil-exporting options that by-pass the straits (MFA, 2017).

Due to such problems, some of the world's leading energy companies, along with the Ankara Government, have begun construction of new pipelines to secure the Turkish Straits. To this end, it was decided to construct a Samsun-Ceyhan oil pipeline that will connect the Samsun, Turkey's port at the Black Sea, and the Ceyhan terminal in the Mediterranean. After the completion of work, it will provide advantages such as the formation of alternate routes for the oil coming from Russia and Kazakhstan due to Samsun's proximity to the supply regions, reduction of sea transportation, and utilisation of the destination of arrival (Arcuri, 2013).

In an accident in the Bosphorus in 1994, an oil tanker and cargo ship (M/T Nassia and M/V Ship Broker accident) collided, resulting in the death of twenty-nine sailors and the ship burning for four days. In another accident that occurred in 1999, 235 000 gallons of oil leaked into the sea (Technological Accidents Information System, 2017).

3.1.2.3. Theft

Theft from pipelines is done by placing clamps on pipes, the installation of valves, or drilling; this damages pipelines physically, shortening the lives of pipes and leading to oil leaks and then to long term environmental problems (Onuoha, 2009).

Looking at the data from 2003 to 2008, there occurred more than 400 thefts of oil from pipelines in Turkey. The damage and loss of oil was worth over 5 million dollars. The generated cost does not include expenses inflicted from operational and repair costs. From 2009 to 2010, there were only 75 theft attempts (KEÇECİ, 2013).

CONCLUSION

In this study, the issue of Turkey's energy security has been examined within the framework of Turkey's oil and gas policies. Turkey's energy profile points to a range of strong and weak points. The major weakness involves an over-dependency on oil and gas, which accounts for more than 60% of the total energy demand. In addition, the country has very limited access to these hydrocarbons within its territory, and as a result it has had to import large quantities from the former Soviet bloc and the Middle East. This situation threatens Turkey's energy security (Arcuri, 2013).

As a strong point, Turkey is in a geographical position (within short distances) to reach 70% of the world's proven oil and natural gas reserves. (Bilgin, 2011). Turkey, being a neighbour to the Middle East, Asia and the Caucasus regions where rich oil and natural gas reserves of the world are located, has been a country that has been unable to turn its geographical position to advantage for many years. Despite being a neighbour to countries with energy resources, Turkey has remained in a position of bearing the cost of the region in which it is in, instead of benefiting from its geopolitical position. Turkey, being bereft of energy resources, transfers its resource requirements from foreign markets and is forced to consume more energy with its growing economy. This situation has put Turkey in the position of having an external dependency on energy. To meet the energy needs that have emerged in recent periods when Turkey has achieved high growth rates, energy policies have also undergone a serious transformation process (Karagöl et al., 2016).

Because of its diverse and international dimensions, it emerges that energy security cannot be attained by countries acting alone and that it can only be achieved by acting collectively. To increase the security of Turkey's energy supply in context of oil and gas, it is necessary to:

- increase the share of domestic production,
- improve energy transportation and storage possibilities,
- provide technological developments,
- reduce the environmental effects of energy,
- increase physical security at every stage,
- provide diversity of source and source countries and,
- ensure long-term cooperation between states.

Forecasts for the future increase of oil and natural gas demand in Turkey, and as the use of energy resources in the world also increases, the importance of transit countries which allow these resources to reach consumer countries has grown. A healthy cooperation between Turkey-Iran, Turkey-Azerbaijan, Turkey-Iraq, Turkey-Central Asian Turkic Republics and Turkey-Russia is important for the safe transport of natural gas and petroleum to the European Union and other world countries (AKBAŞ and ÜRÜN, 2016).

It is of the utmost importance that Turkey's relations with selected energy-supplying countries in the region are problem-free, so that the goal of Turkey becoming a central country in energy can be analysed from all dimensions and perspectives. This will also be a determining factor in the formation of Turkey's energy policies in the forthcoming period (Karagöl et al., 2016).

This study highlights the importance to Turkey of securing a range of suppliers for its energy needs. It is also apparent that maintaining energy security in a complex political environment is of paramount importance. There are many angles from which this issue could be studied in future.

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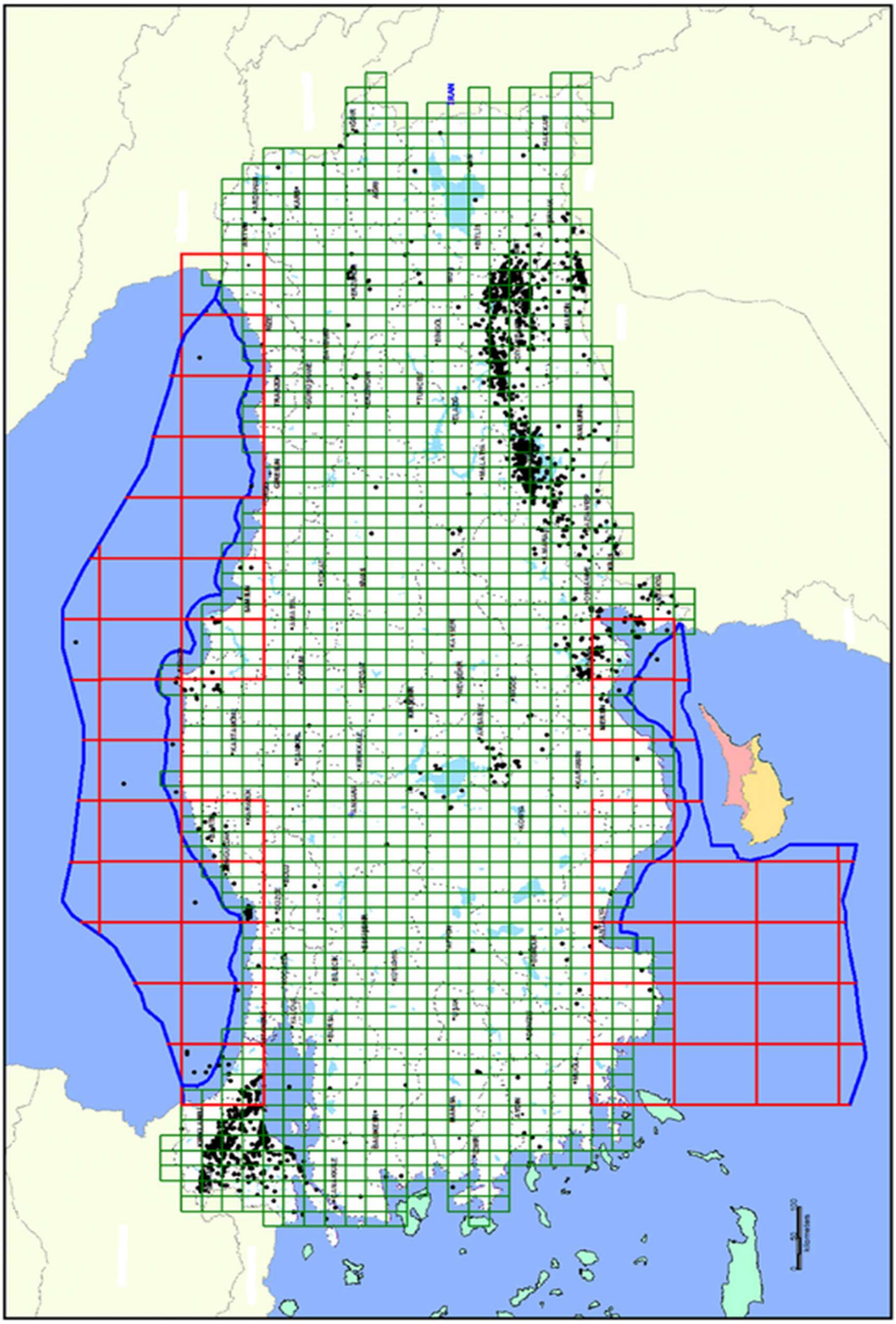
Appendix 1

The energy security scores of 25 large energy using countries in 2014

Country	Risk Score	Large Energy User Group Rank
Norway	733	1
Mexico	766	2
New Zealand	799	3
United States	824	4
Denmark	827	5
United Kingdom	828	6
Canada	832	7
OECD	869	
Australia	903	8
Germany	930	9
France	932	10
Poland	959	11
Spain	1,017	12
Italy	1,038	13
Turkey	1,064	14
Japan	1,068	15
Netherlands	1,091	16
Indonesia	1,123	17
South Africa	1,185	18
India	1,186	19
Russia	1,192	20
China	1,212	21
South Korea	1,29	22
Brazil	1,297	23
Thailand	1,627	24
Ukraine	1,944	25

Appendix 2

Petroleum license application map for Turkey.



Appendix 3

Crude oil imports quantity by country in 2005-2016 (million ton)

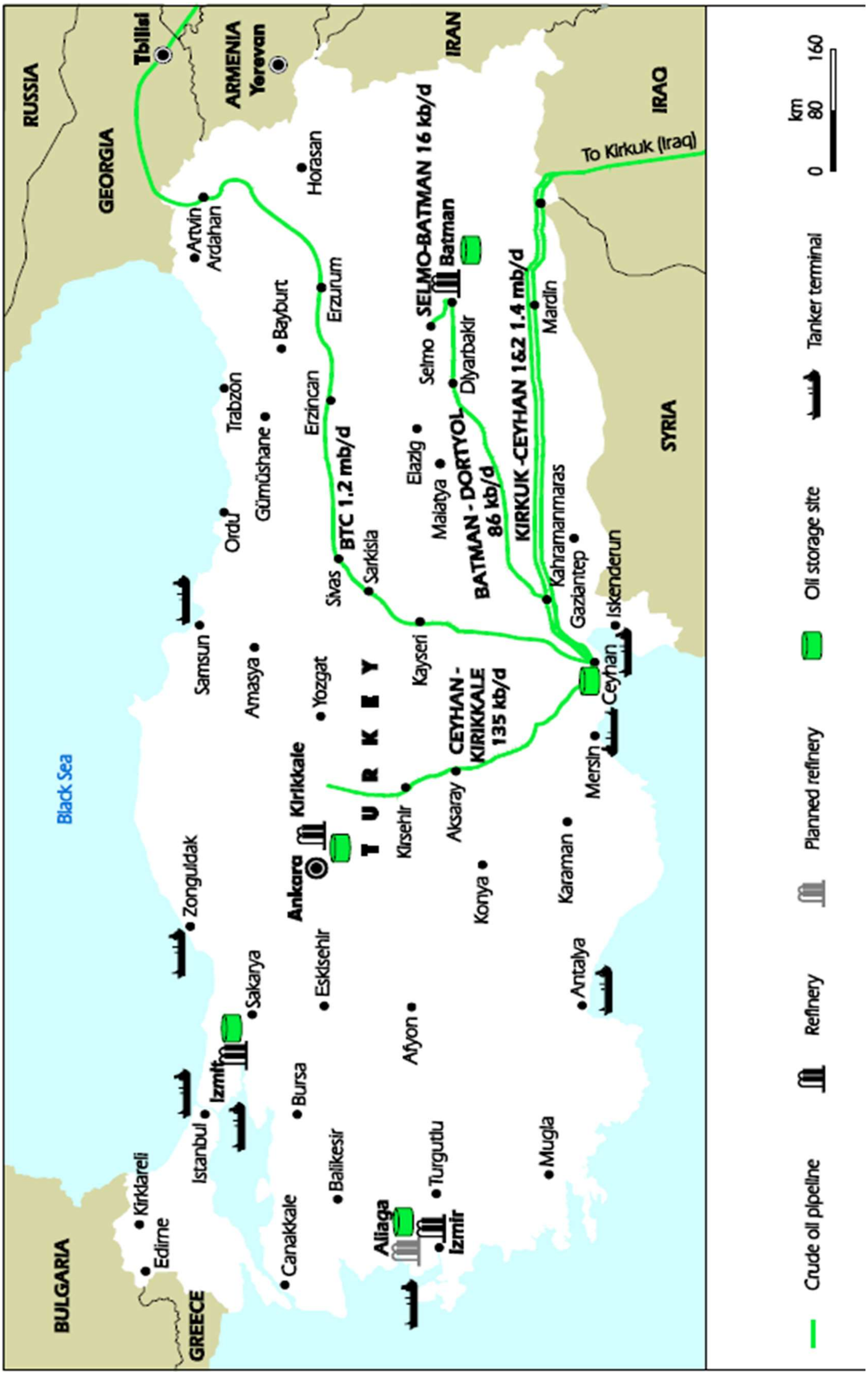
countries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Iran	6.90	9.10	8.40	7.80	3.20	7.20	9.30	7.50	5.30	5.20	5.60	6.90
Russia	7.20	6.90	9.40	7.10	5.80	3.30	2.10	2.10	1.50	0.60	3.10	3.20
Libya	4.50	4.20	0.60	0.00	0.10	0.00	0.00	1.00	0.70	0.08	0.00	2.20
Saudi Arabia	3.50	3.40	3.60	3.10	2.10	2.00	2.00	2.80	2.80	2.00	2.40	0.00
Italy	0.00	0.00	0.40	0.40	0.20	0.10	0.10	0.30	0.30	0.20	0.30	0.03
Syria	0.30	0.00	0.20	0.50	0.20	0.40	0.30	0.00	0.00	0.00	0.00	0.00
Iraq	1.00	0.50	0.90	1.90	1.70	2.00	3.10	3.70	6.00	5.90	11.40	9.30
Kazakhstan	0.00	0.00	0.00	0.60	0.50	1.80	1.20	1.40	1.50	1.50	0.70	0.60
England	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Azerbaijan	0.00	0.00	0.00	0.08	0.08	0.00	0.08	0.20	0.10	0.00	0.00	0.00
Georgia	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nigeria	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.40	0.50	1.80	0.50	0.00
Colombia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.90	0.00
Egypt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.09	0.10
Yemen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Koweit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	2.50
Greece	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
TOTAL	**23.40**	**24.10**	**23.50**	**21.68**	**14.12**	**16.80**	**18.18**	**19.40**	**18.70**	**17.90**	**25.09**	**24.91**

Percentage of Crude oil imports by country in 2005-2016

countries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Iran	29.49	37.76	35.74	35.98	22.66	42.86	51.16	38.66	28.34	29.05	22.32	27.70
Russia	30.77	28.63	40.00	32.75	41.08	19.64	11.55	10.82	8.02	3.35	12.36	12.85
Libya	19.23	17.43	2.55	0.00	0.71	0.00	0.00	5.15	3.74	0.45	0.00	8.83
Saudi Arabia	14.96	14.11	15.32	14.30	14.87	11.90	11.00	14.43	14.97	11.17	9.57	0.00
Italy	0.00	0.00	1.70	1.85	1.42	0.60	0.55	1.55	1.60	1.12	1.20	0.12
Syria	1.28	0.00	0.85	2.31	1.42	2.38	1.65	0.00	0.00	0.00	0.00	0.00
Iraq	4.27	2.07	3.83	8.76	12.04	11.90	17.05	19.07	32.09	32.96	45.44	37.33
Kazakhstan	0.00	0.00	0.00	2.77	3.54	10.71	6.60	7.22	8.02	8.38	2.79	2.41
England	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Azerbaijan	0.00	0.00	0.00	0.37	0.57	0.00	0.44	1.03	0.53	0.00	0.00	0.00
Georgia	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nigeria	0.00	0.00	0.00	0.00	1.42	0.00	0.00	2.06	2.67	10.06	1.99	0.00
Colombia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.79	3.59	0.00
Egypt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.36	0.40
Yemen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00
Koweit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	10.04
Greece	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32
TOTAL	100.0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Appendix 4

Turkey's Oil Infrastructure



Appendix 5

Turkey's major oil and natural gas transit pipelines