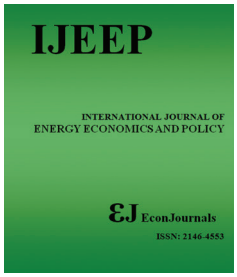

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Security of the Energy Supply in Turkey: Prospects, Challenges and Opportunities

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ABSTRACT

In today's world, energy is one of the most important inputs for a multitude of industries and production branches. Access to uninterrupted, adequate, reliable, cheap, stable and sustainable energy has become essential to the basic functioning of modern societies. Ensuring energy security is of critical importance in terms of economic stability and sustainable growth. Interruptions in the energy supply can cause serious economic and social losses. Lack of energy security discourages investors by threatening production and increasing costs. The aim of this study is to identify the primary risks concerning the security of the energy supply in Turkey and to propose solutions. The study discusses the current state of energy security in Turkey, which is substantially dependent on foreign supply to meet its energy needs. The study also examines the importance of the advantages and opportunities offered to Turkey by both domestic and renewable resources, which are not being fully utilized, despite their high potential, and Turkey's potential to become an energy transit hub in terms of energy security.

Keywords: Turkey, Energy Security, Energy Diversity, Transit Route
JEL Classifications: Q41, Q43, Q48

1. INTRODUCTION

At present, the most important goal of both developed and developing countries is to ensure sustainable economic growth. Energy is closely associated with all economic and social aspects of sustainable growth and it is also a key parameter in shaping domestic and foreign policies. Ensuring healthy and sustainable economic growth at the national level, as well as increasing welfare and quality of life at the individual level, depend on sustaining and increasing production in a stable way. While energy resources are required to establish a stable economy, supplying these requirements in a timely and uninterrupted manner is just as important. In the event that supply is disrupted, a shortage of energy inputs may lead to a reduction in production volume, loss of welfare and failure to maintain consistent growth. When an economy becomes dependent on any form of energy supply, taking actions to prevent potential disruptions, such as a reduction, depletion or interruption in that supply is vital to ensure economic, social and political stability.

Security of the energy supply has risen in importance on the regional, national and international policy agenda during recent decades due to growing dependence of industrialized and emerging countries on imported energy resources and the increased frequency of disruptions in energy supply. Energy supply can be influenced by events including the political instability of energy producing countries, attacks on energy infrastructure, as well as accidents, natural disasters, terrorism. Such events may lead to significant disruptions or create uncertainty about energy supply or demand, which may lead to volatility in energy prices.

Many oil supply disruptions have occurred since oil became a dominant energy source in the 1950s. Much of the world's crude oil is located in regions that have been prone historically to political upheaval, or have had their oil production disrupted due to political events. Several significant oil supply interruptions have occurred at the same time as supply disruptions triggered by political events, most notably the Arab-Israeli War and Arab oil embargo in 1973-74, the Iranian revolution in the late 1970s and the outbreak of Iran-Iraq war in the early 1980s, and Iraqi invasion of Kuwait in 1990. More recently, disruptions to supply from political events have been seen in Nigeria, Venezuela, Iraq, Iran, and Libya, especially the heightened security threat

from the Islamic State of Iraq and the Levant (IEA, 2014a). Considering the past history of energy supply disruptions caused from political events, economic decision-making units are generally evaluating the possibility of future disruptions and their potential effects.

Therefore, along with rising concerns regarding the obtainability of energy, the security of energy supply has become one of the primary topics of discussion both nationally and internationally. Energy security is commonly expressed as a condition in which countries, especially net energy importing countries, have access to sufficient energy resources under timely and economically acceptable conditions to meet the energy demands of those countries (APERC, 2007). In short, energy security can be defined as the uninterrupted availability of a reliable, stable and sustainable supply of energy at all times, in various forms, in sufficient quantities, and at reasonable prices.

The interest in energy security is based on the opinion that an uninterrupted supply of energy at affordable prices is critical for the functioning of an economy. There are four primary steps to achieving a sustainable supply of energy:

- Developing domestic and renewable energy resources
- Increasing domestic and cross-border exploration and production activities
- Improving energy efficiency and conservation
- Diversifying the energy portfolio.

The first of the steps involves uncovering the potential of domestic and renewable energy sources, developing them, and using them in compliance with a plan, formulated by taking supply and demand requirements into consideration. Existing domestic and renewable energy sources can provide an alternative to foreign energy sources, as well as a means to overcoming energy bottlenecks, thereby decreasing dependence on imported energy inputs and ensuring energy security.

The second step involves participating in energy investments (projects) including exploration, production, transit and trade (cross-border pipelines) outside national borders, as well as developing some form of control over extraterritorial energy resources. However, given that searching for and extracting energy resources, such as oil or natural gas, requires significant investment and expensive technologies, achieving such goals is not an easy task for all countries.

The third step relates to energy efficiency. In an economy, using available energy resources in an efficient and effective manner is as important as ensuring the supply of such resources. Improving energy efficiency or using energy more effectively involves generating a higher level of output with the same amount of energy or decreasing the amount of energy used for a given level of output (for instance, in such areas as heating, lighting, and transportation). Optimizing energy efficiency means the utilization of energy with the highest possible efficiency at all stages, ranging from production to consumption. In this context, by decreasing unnecessary consumption of energy resources and meeting energy needs by lowering energy consumption via new technologies (technological advancements) without having to make new energy investments, the need to import energy may decrease, as well.

Finally, the fourth step pertains to energy portfolio diversification. This diversification applies primarily to countries that are energy import dependent. Due to limited domestic energy sources, these countries are forced to satisfy their energy demand largely through imported energy inputs.

Security of the energy supply is affected by various economic, political and social variables, such as declining production in energy producing countries, changing climate conditions, the manipulation of energy supplies, attacks on supply infrastructure, terrorist attacks or political crises (Löschel et al., 2010). The importance of the concept of diversity in terms of its pivotal role with regards to security is therefore clear. From the viewpoint of energy importing countries, the most important way to achieve energy security is to ensure diversity. Ensuring diversity is based on three factors: Diversifying the energy forms to be used, diversifying energy supply sources and diversifying import routes in terms of country or regional risk (Kocaslan, 2014)[1]. Energy portfolio diversification is a key policy designed to secure energy supply by reducing the risks that may result from excessive dependence on a single import source, energy forms or routes (Yergin, 2006. p. 70).

Turkey, which is on a path of the fast integration with the world economy, is simultaneously attempting to complete necessary infrastructure works, realize its development goals and increase social wealth. This is leading to an acceleration in the demand for energy. Obtaining sufficient energy in a timely manner under economically reasonable conditions in a way that supports economic growth and social development actions is Turkey's primary objective as it is the world's. Security of energy supply is thus one of the core elements of energy policy.

Turkey has become one of the fastest growing energy markets in the world in parallel with its increasing population, growing economy and transformation from an agricultural to an industrial economy over the last 10 years. In spite of this growth, in 2013, Turkey's share of global primary energy consumption was only approximately 1% (BP, 2014), though it is expected to grow. However, contrary to high consumption rates, an important progress is not observed in the country's production of primary energy sources. Due to limited domestic energy production, Turkey's energy demand is mostly met by imports. Under current conditions, Turkey will continue to depend upon imports to meet its energy needs in the foreseeable future. Ensuring security of the energy supply is thus an important part of decreasing the dependence on imported energy inputs and providing uninterrupted availability of energy at an affordable price.

In this study, Turkey's position in terms of energy supply security is assessed, given its limited energy resources and dependence

1 The concept of energy security is generally viewed from the perspective of energy importing countries. The countries, who have energy resources and who export them, unlike net energy importers, seek energy demand diversity and thus choose the path of market diversification.

on imported energy inputs. The aim of this paper is to contribute to Turkey's prospective energy plans, policies and programs, considering domestic energy resources as well as the possibilities arising from its geographical location. Accordingly, the first part of this paper briefly examines existing domestic and renewable energy sources, which are insufficiently exploited despite Turkey's high potential. The paper then examines the concept of energy diversity, which is an important element of energy security, from the perspective of Turkey. This is followed by a discussion of developments in Turkey's energy efficiency. Finally, this study concludes by examining the subject of safe energy transport routes, which is considered an integral part of the energy security system.

2. RISKS AND OPPORTUNITIES IN TURKEY'S ENERGY SECURITY

2.1. Domestic and Renewable Energy Sources

As a necessary input in every phase of production as well as an element required to improve living standards, energy is one of the main components of economic and social development. Reaching a certain economic growth rate is only possible with an uninterrupted, high quality and reliable energy supply. Without energy, initiating and sustaining production, as well as distributing manufactured goods and services, is impossible. Therefore, experiencing a disruption in the energy supply or failing to meet rising energy demand at a reasonable cost may cause economic instability.

Economic and social concerns, such as increasing fossil fuels prices and security of supply issues, have rekindled interest in renewable energy sources, such as wind, solar, hydroelectric and geothermal. In Turkey, as in all net energy importer countries, developing technologies, as well as increasing energy deficits, require focusing on domestic and renewable energy sources and putting more thought into new and alternative energy sources. Given global market conditions, procuring energy in a constant and economic manner is not always possible. Renewable energy sources in particular have become more important than ever due to the increase in oil and natural gas prices in recent years. Therefore, it is necessary to prioritize domestic resources, initiate new investments, and improve and develop current facilities (Bayrak and Esen, 2014). Under these conditions, the potential of domestic energy resources, which may constitute an alternative to fossil fuels, such as oil and natural gas, on which imports Turkey is highly dependent, offers various possibilities in terms of decreasing the dependence on imported energy inputs and providing energy security (Balat, 2010).

Hydroelectric power comes first on the list of domestic energy sources that are not sufficiently exploited despite Turkey's high potential. The technically usable potential is 216 TWh, and the economic hydroelectricity potential is 140 TWh in Turkey. Noting that the installed capacity of current hydroelectric plants in Turkey is 22.289 MW and average annual total production is 59.245 GWh, it can be observed that only 28% of technically usable hydroelectric potential is currently being utilized (MENR, 2014a). That means 72% of hydroelectric energy potential in Turkey is idle and waiting to be harnessed.

Another underutilized energy source is solar power. With its potential and ease of use; solar energy seems to have a larger and infinite source of power amongst all the energy resources. Considering that the total solar power potential of Turkey corresponds to a rough figure of 80 Mtoe, it is obvious that Turkey is not even able to utilize 1% of its current potential. Although Turkey has a potential to obtain an electrical power of 380 billion kWh from solar energy, there is no economically viable development takes place in this regard (MENR, 2014a).

A further domestic energy source that is not be adequately utilized despite Turkey's high potential is geothermal energy. Turkey, where the existence of hot steam sources is known to exist depending on the tectonic lines and volcanic areas in addition to over 600 hot water sources, some of which exceed 100°C, are identified, with the total gross geothermal heat capacity of 31.500 MW, has a significant potential in this regard as well. Yet, the installed power of Turkey in this field is approximately 114.2 MW, which corresponds to a 22.8% of its potential and therefore, it is safe to say that 67.3% of its current potential stands still idly (MENR, 2014a).

Due to its geographical location and the prevailing climate conditions, the wind energy potential that Turkey holds is theoretically able to meet its entire energy needs. According to the studies, conducted by the Turkey's Ministry of Energy and Natural Resources (MENR), there is an annual wind power potential of 5.000 MW in areas, where the wind speed is 8.5 m/s or above while such potential is 48.000 MW in areas, where the wind speed is 7.0 m/s or above (MENR, 2014a). However, despite the fact that Turkey comes second, after Great Britain, in terms of the wind energy potential, the investments in this field remain at a very low rate (Eniş, 2003. p. 181). Currently, only 18% of available capacity is being used, leaving 82% as latent potential.

Although being in low quality, the hard coal and lignite that are being extracted in Turkey are the most promising natural resources of the country. Despite this fact, considering the current coal plants, it is also obvious that only around 19% of the pit coal and lignite potential, which corresponds to 12.550 MW of installed power, is being used (MENR, 2014a). That means 81% of Turkey's coal and lignite based energy potential also lies untapped.

As a result, when the insufficiency of fossil based energy sources of Turkey and its consequent foreign dependency is taken into account, the search and development of the renewable and infinite alternative energy sources in the energy production comes to prominence. However, it is also seen that Turkey has failed to use its potential sufficiently.

2.2. Energy Diversity

Turkey's importance in international energy markets is increasingly growing, both as energy transit hub and as an important energy customer. Concurrent with its economic expansion, Turkey's energy demand has increased rapidly over the past few years. Projections by MENR (2014a) and IEA (2014b) show that this trend will continue in the future. In the last decade, Turkey has been one of the largest economies having the highest rate of increase

in electricity and gas demand in the world. Furthermore, Turkey has also had the highest rate of energy demand increase among OECD countries (MENR, 2014a). Trends in total domestic energy production and total primary energy consumption of Turkey are presented in Figure 1.

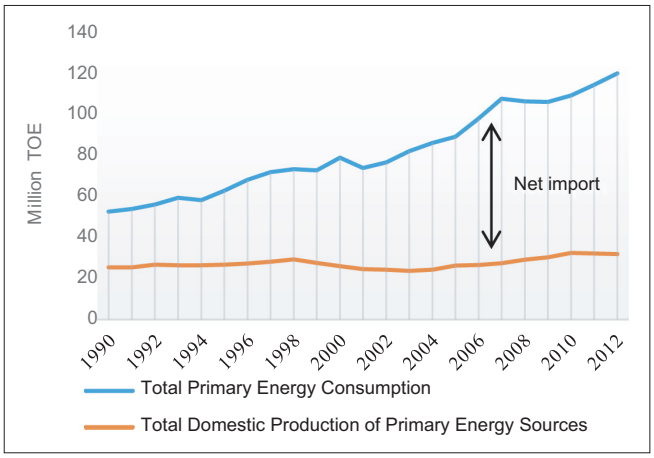
With limited domestic reserves, Turkey depends almost entirely on imports for its energy supply and, as a consequence, has energy deficit and security of energy supply. Based on data published by MENR (2014b), Turkey's total primary energy consumption has risen considerably within the last two decades, from 52.6 million tons of oil equivalent (Mtoe) in 1990 to 120.1 Mtoe in 2012. Turkey's domestic energy production has also increased from 25.5 Mtoe in 1990 to 31.9 Mtoe in 2012. However, Turkey's domestic production shows no sign of significant further growth in the long term. This is the biggest challenge for Turkey's energy security. According to the International Energy Agency (IEA), Turkey's total energy demand will continue to grow at an annual rate of approximately 4.5% from 2015 to 2030, rising to over 237 Mtoe by 2030 (IEA, 2014b). Turkey's energy consumption has been growing considerably faster than its production, increasing the country's reliance on energy imports. This imbalance constitutes a threat to the Turkish economy. Under current conditions, Turkey's energy balance is not in equilibrium and the economy needs highly foreign sources.

Turkey has almost every type of energy resource. However, they are not sufficient to meet the country's energy needs. In Turkey, which has very limited domestic sources of oil and natural gas, the coverage ratio of domestic production to energy demand is 27% in 2012. In other words, total energy imports, which correspond to 90.292 TOE, make up 73% of the total energy supply. This ratio is 92% for petroleum and coal and 98% for natural gas (Table 1). In Figure 2 the resource distribution of energy consumption as of the end of 2012 is given.

As shown in Figure 2, diversification of primary energy sources is not sufficient. Countries have to attain a certain balance among energy resources. Turkey's energy consumption is divided as follows: Natural gas 32%, hard coal and lignite 31%, petroleum 27% and renewable resources 10%. Turkey's current source diversification (Figure 2) is not likely to support the security of energy supply plans.

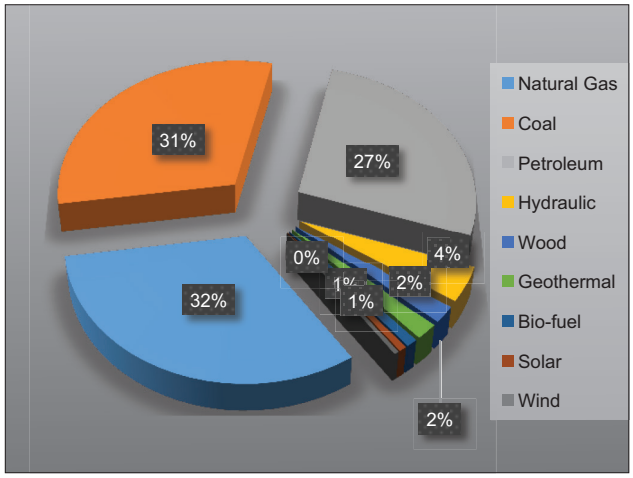
Clearly, being dependent on a single energy source, supplier or supply route comes with both economic and political risks. In a crisis, dependence on a single source or producer may lead to economic and social turmoil, which is hard to repair. In terms of energy security, a supply chain should be established with different sources from various suppliers. The problems Turkey faces (this is applicable to all European nations, who are also net energy importers) in terms of the supply of natural gas and oil as a result of the tensions in the Middle East (e.g., Syria, Iraq) or between Ukraine and Russia brought renewed attention to the subject of energy security. These problems emphasize Turkey's dependence on just a few energy sources, dependence that is likely to gradually increase. Therefore, it is clear that a possible interruption in the supply of such resources shall greatly impact the economy.

Figure 1: The trends in total energy production and consumption of Turkey



Source: MENR (2014b)

Figure 2: The distribution of energy consumption by resources in Turkey (2012)



Source: MENR (2014b)

Table 1: Production, consumption and net imports of fossil fuels in Turkey, 2012

Fuel	Production (%)	Consumption (%)	Import (%)	Import dependency (%)
Oil*	2.32	29.87	27.55	92.2
Natural gas**	0.63	45.26	44.62	98.6
Hard coal*	2.29	31.46	29.17	92.7

Source: Derived from the MENR (2014b). *Million tons, **Billion m^3

The issues resulting from improperly executed energy policies are apparent in the example of electrical power. Most of the energy demand of production activities such as industry, transportation and communications, as well as the majority of the energy demand to meet the daily needs of society relates to electrical power. Electrical power is a secondary type of energy, generated from fossil resources such as petroleum, natural gas and coal, as well as from hydraulic and nuclear energy. The percentile distribution of electrical power generated in Turkey by type of primary energy sources as of the end of 2012 is given in Table 2.

The distribution pattern in Table 2 shows that fossil resources, comprised of coal and natural gas, provide 72% of total electrical power generation in Turkey, while renewable energy sources make up only a small fraction of that total. 43.6% of Turkey's electricity generation comes from natural gas, whereas globally, the share of natural gas averages 22.5%. Turkey's remaining electricity generation comes from coal (28.4%), hydraulic energy (24.2%), and oil (0.7%). The share of renewables in electricity generation is 5.0% globally and 3.1% in Turkey. Natural gas meets most of Turkey's increasing demand for electricity. It represents almost half of Turkey's current energy import expenditures and has become the main energy source in electricity generation.

The world supplies 10.9% percentage of the electricity need with the nuclear power and yet Turkey does not currently generate any electricity from nuclear power. But the government plans to build nuclear power plants to diversify Turkey's electricity supply portfolio. Nuclear power will play a key role in Turkey's future energy strategy as the country moves toward achieving supply security.

Turkey is a heavy user of natural gas that is imported almost all of it for electrical power generation. Using natural gas for electrical power generation means producing such energy with an imported input, which is not controlled by Turkey both in terms of costs and supply[2]. This implies that Turkey generates electricity using one of the most expensive available methods. Increasing demand for electricity is closely related to increasing demand for natural gas. This increase leads to significant economic and policy issues for Turkey. Compounded with the unfortunate fact that natural gas is Turkey's preferred source of electrical power, this resource is obtained mainly from a single country, which constitutes a failure in terms of Turkey's energy and national security.

Turkey meets its demand for natural gas from countries with little political stability, such as Russia, Iran, Algeria, Nigeria and Azerbaijan. As of 2013, Russia is Turkey's largest natural gas supplier, with a share of approximately 58% of Turkey's total imports of natural gas, followed by Iran (19%), Azerbaijan (9%), Algeria (9%) and Nigeria (3%). While most of the gas that Turkey imports is transferred from Iran, Russia and Azerbaijan by pipeline, a small portion is shipped from Algeria and Nigeria by tankers in the form of liquefied naturel gas (LNG). The percentage distribution of Turkey's natural gas imports by country as of the end of 2013 is given in Table 3.

Globally, petroleum is still the most important source of energy today, despite emerging technologies. Therefore, any situation that may negatively affect the oil supply can have a strong impact on the economies of import-dependent countries. As of 2012, only 8% of the crude oil procured by Turkey is supplied by domestic production (Table 1). Almost all of the remainder is imported from countries such as Iran, Iraq, Russia and Saudi Arabia. Ensuring security of energy supply requires diversity of energy source and suppliers. Turkey procured 32% of its oil from Iraq, 28% from Iran, 15% from Saudi Arabia, 8% from Kazakhstan and 11% from Russia in 2013. Dependence on a single energy source or supplier contains economic, political and social risks. The percentage distribution of the countries from which Turkey imported petroleum as of the end of 2013 is given in Table 4.

Turkey satisfies almost all of its energy demand with imported energy sources such as oil, natural gas and coal. The total share of those fossil fuels within total energy consumption is 87%. The situation is similar in terms of the generation of electricity, which is indispensable to daily life and business as well as a vital input in all manufacturing areas. Turkey, while dependent on natural gas for 44% of its electrical power in 2012, is also dependent on Russia for 58% of its supply of natural gas. Because key energy sources, such as oil and natural gas, are monopolized by certain countries, constant political crises drive increases in the cost of oil and put the supply security of such resources at risk. This

Table 2: Breakdown of electricity generation by resources in the world and Turkey (2012)

Resources	Turkey (%)	World (%)
Natural gas	43.6	22.5
Coal*	28.4	40.4
Hydraulic	24.2	16.2
Oil	0.7	5.0
Nuclear	N.a.	10.9
Others**	3.1	5.0
Total	239 TWh	22.668 TWh

Source: Derived from the IEA (2014c), TEIAS (2012). *In these graphs, hard coal, asphaltite and lignite are aggregated with coal. **Includes geothermal, solar, wind, heat, etc., N.a: Not available

Table 3: Turkey's imports of natural gas by country of origin in 2013

Country	Import (million m^3)	The share of country (%)
Russia Federation	26.21	57.9
Iran	8.73	19.3
Azerbaijan	4.25	9.4
Algeria	3.92	8.7
Nigeria	1.28	2.8
Spot	0.89	2.0
Total	45.27	100.0

Source: Derived from the EMRA (2014a)

Table 4: Turkey's imports of oil by country of origin, 2013

Country	Import (million tons)	The share of country (%)
Iraq	6.00	32.3
Iran	5.26	28.4
Saudi Arabia	2.75	14.8
Kazakhstan	1.54	8.3
Russia Federation	1.47	7.9
Libya	0.67	3.6
Nigeria	0.48	2.6
Italy	0.26	1.4
Azerbaijan	0.12	0.6
Total	18.55	100.0

Source: Derived from the EMRA (2014b)

2 Due to the fact that their initial investment costs are relatively low and they can be rapidly built, the natural gas plants are preferred. Another important reason for preference is the take-or-pay contract, engaged by the governments based on the inaccurate energy demand forecasts. With this kind of contract, energy importing countries either takes the product from the supplier or pays the supplier the cost for products. Therefore, the countries can prefer to convert at least some of their power plant to natural gas.

condition leads net energy importer countries to seek alternatives. However, upon analyzing the current state of affairs, it is clear that Turkey is failing to take the appropriate steps and measures to remedy the situation.

2.3. Energy Efficiency

Energy efficiency policies are directly related to economic growth and the sustainability of social development targets and play a key role in decreasing import dependence and thus increasing energy security. They should therefore be carefully considered. An overall idea can be obtained regarding whether energy is being used efficiently by an economy or how much energy is being utilized to produce one unit of output by analyzing energy density levels. The energy density ratio, which denotes the energy utilization density of economic production processes, represents the amount of energy used by an economy to generate one unit of added value (Fisher-Vanden et al., 2004). A low ratio indicates that the energy used in production is being used efficiently. If an economy uses energy in a sufficiently efficient manner, the energy thus saved may lead to a decrease in the energy consumption required to produce the same amount of goods and services without compromising quality and performance. While energy saving is provided, however, energy demand continues to increase. Meeting the increasing energy needs fuelled by economic growth, urbanization, and population growth with less energy consumption benefits the economy in various ways, such as decreasing foreign resource dependence and increasing resistance to foreign originated impacts. Figure 3 shows the energy density and efficiency figures for selected European countries and Turkey.

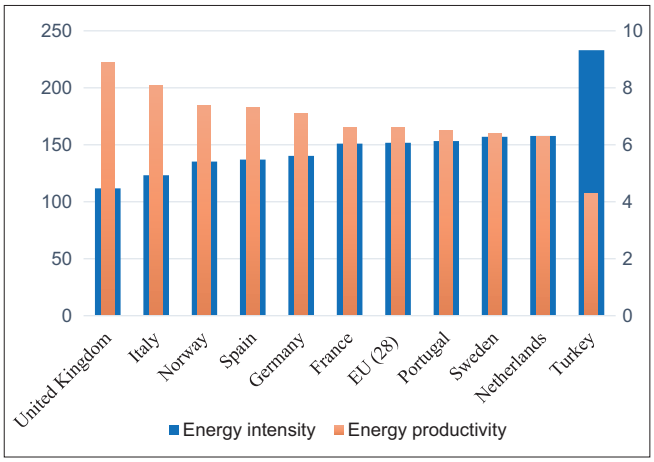
Turkey, when compared to the largest European countries, can be regarded as one of the more energy dense economies (Figure 3). According to 2010 data, Turkey's energy density is 233 Koe/€1000, which is relatively high compared to the average figures for the EU (152 Koe/€1000). However, when rising energy needs and goals are considered, Turkey's performance in terms of energy efficiency is expected to improve.

Energy efficiency is directly related to energy saving and the two concepts are generally used interchangeably. The concept of energy saving usually relates to the measures taken to decrease energy consumption in its final phase of use, while energy efficiency indicates the use of energy and energy related products in an effective and efficient manner across all phases, from production to consumption. Energy efficiency is thus a broader concept that also covers energy saving. Increasing energy efficiency also means expanding energy saving to all phases.

According to the results of an analysis conducted by the MENR based on sector related energy consumption data, it was determined that Turkey has an energy saving potential of around 15-30% (approximately USD 3 billion), including 30% in the housing and services sectors, 20% in the industrial sector and 15% in the transportation sector (MENR, 2010)[3]. Those ratios correspond to a

3 These figures coincide with the results of detailed analysis conducted by the World Bank and IEA. For details see, ECSSD (2011).

Figure 3: Energy intensity and energy productivity for European countries (2010)



Source: Eurostat (2015)

savings amount of 4.7 Mtoe in the construction and services sector, 3.7 Mtoe in the industrial sector and 2.2 Mtoe in the transportation sector, which adds up to 10.6 Mtoe. This figure equals 33% of total production (31.964 thousand toe) and 33% of total consumption (120.094 thousand toe). Through various measures, it is possible to decrease the energy bottleneck that Turkey currently suffers, to decrease foreign resource dependence and foreign currency reserve loss and to resolve many other macroeconomic issues at no extra cost.

Low energy efficiency means higher costs for all production units on a sector basis. Therefore, Turkey must improve its energy efficiency to sustain its competitiveness in the global economy. Non-productive use of energy, for Turkey, also means increasing public sector energy expenditures and allocating more funds in the government budget to energy expenditures. Similarly, non-productive use of energy may mean further increasing the already large current deficit in energy import, which will lead to greater vulnerability to foreign impacts due to suitability restrictions of import inputs and price volatility. Therefore, energy efficiency or the use of energy in a more effective way is vital to Turkey's competitiveness and long-term sustainable growth.

2.4. Routes to Enhance Energy Security

The notion of controlling energy resources and the location from which such resources are transferred constitutes a significant factor in most countries' foreign policies. Having a safe route to transport energy is an integral part of any energy security system. This means that countries that are conveniently located geographically may provide a safe route for pipelines and thus become energy corridors. Such a situation provides many financial and political benefits to the relevant countries, such as foreign investment, new work areas and significant transit fees, in addition to convenient access to the energy sources for domestic use (Bahgat, 2006).

Turkey's geographical location, situated between oil and natural gas producers and net energy importer countries, offers Turkey the opportunity to become an energy corridor. Turkey, due to its

geographical and political circumstance, is perceived as a reliable partner that may provide a safe corridor for the transportation of oil and natural gas. The EU's energy policies, which call for the diversification of source countries and import routes, also strengthens the position of Turkey in this regard. The crisis experienced in the gas supply from Russia to the EU clearly demonstrates the vital need for the EU to develop alternative pipeline projects passing through Turkey.

In addition, Turkey is an important and reliable transition country that hosts transit pipelines for international markets in the West, as well as one of the most important customers for the oil and natural gas producers in the Caspian region, Central Asia and the Middle East. Turkey, taking advantage of the opportunities offered by its geographical location, has been developing various policies that will enable it to benefit from this potential in the coming years. During this period, the topic of energy has become more prominent in Turkish foreign policy and is gradually becoming one of its main dynamic and determinant factors.

Turkey is located in a region - the Middle East and Caspian Basin - in which 71% of the world's proven gas reserves and 55% of the world's proven oil reserves are deposited (Tables 5 and 6). Therefore, Turkey acts as a bridge between net energy exporters and consumers and becomes a pivotal country for the establishment of energy security through the diversification of energy source, suppliers and supply routes. This situation is of great significance for the EU and other western countries, which make great efforts to ensure their energy security, and for the countries in the Middle East and the Caspian Basin, which seek markets for their petroleum and natural gas resources. Thus, while Turkey is developing projects to satisfy its own energy demand, it also aims to serve as the most convenient transit route, opening it to European and other international markets. Playing a key role as energy corridor between energy producing countries and energy importing countries is becoming an essential part of Turkish energy policies. Turkey's location as natural bridge provides it with opportunities in terms of energy security, while bringing responsibilities as well.

Turkey allows pipeline projects and other supplementing infrastructure programs on its soil to support its aim of being an energy transit hub. Because Turkey will earn incomes from transit fees and gain regional influence through the control of such energy routes, those types of efforts are complementary to Turkey's energy policies. Turkey is mentioned in many pipeline projects, completed or under progress, that will satisfy the energy needs of Europe. Turkey strongly supports such projects and continues to seek support as well. Such projects mean large-scale gains in terms of Turkey's energy security and economic interests.

In recent years, different pipeline projects have been carried out in Turkey. The most prominent ones are The Baku-Tbilisi-Ceyhan (BTC) Crude Oil Pipeline, Iraq - Turkey Crude Oil Pipeline (Kirkuk - Ceyhan Oil Pipeline), Turkey - Greece - Italy (TGI) Natural Gas Pipeline, Turkey - Bulgaria - Romania - Hungary - Austria (NABUCCO) Natural Gas Pipeline, the Trans - Adriatic Natural Gas Pipeline (TAP) and the Trans Anatolia Natural Gas Pipeline (TANAP) projects (Figure 4).

The BTC Crude Oil Pipeline Project, which constitutes the most important component of the East - West energy corridor, is developed with the aim of delivering the abundant oil sources of Azerbaijan to the European markets over Turkey. From this pipeline, which has an annual transfer capacity of 50 million tons, 248 million barrels of crude oil was dispatched to Europe in 2013 (BOTAS, 2014).

Iraq Turkey Crude Oil Pipeline is a project that reaches to the Mediterranean through Turkey with the point of origin of Kirkuk and its neighboring area in Iraq. The line has an annual capacity of

Table 5: Proved oil reserves in the Middle East and Caspian Basin, 2013

Country	Thousand million tones	Thousand million barrels	Share of total (%)
Azerbaijan	0.96	7.00	0.4
Kazakhstan	3.93	30.00	1.8
Russian Federation	12.74	93.03	5.5
Turkmenistan	0.08	0.60	*
Uzbekistan	0.08	0.59	*
Iran	21.57	157.00	9.3
Iraq	20.24	150.00	8.9
Kuwait	13.98	101.50	6.0
Oman	0.75	5.50	0.3
Qatar	2.60	25.06	1.5
Saudi Arabia	36.52	265.85	15.8
Syria	0.34	2.50	0.1
United Arab Emirates	12.98	97.80	5.8
Yemen	0.39	3.00	0.2
Total	127.17	939.43	55.6
Total World	238.20	1687.89	100.0

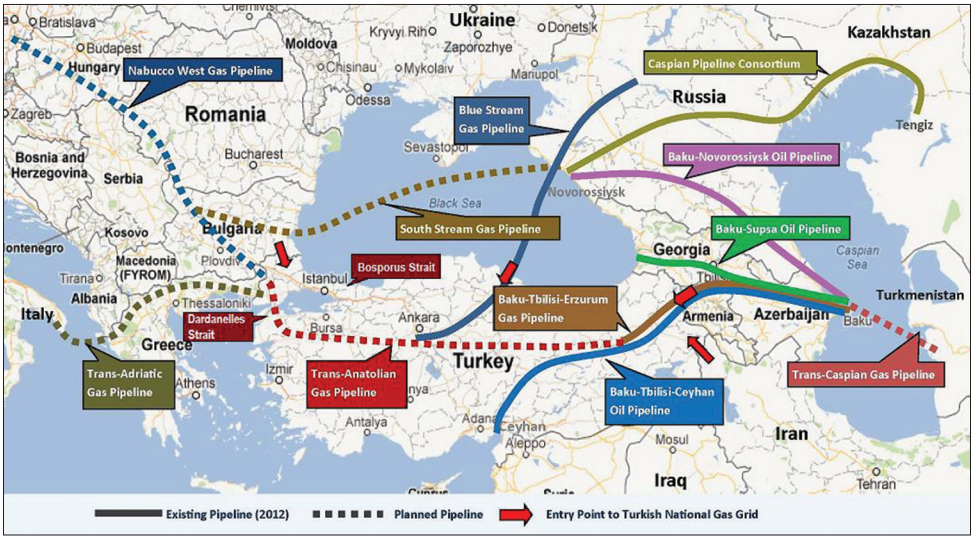
Source: Derived from the BP (2014). *<0.05%

Table 6: Proved natural gas reserves in the Middle East and Caspian Basin, 2013

Country	Trillion cubic feet	Trillion m^3	Share of total (%)
Azerbaijan	31.00	0.88	0.4
Kazakhstan	53.87	1.53	0.8
Russian Federation	1103.61	31.25	16.8
Turkmenistan	617.27	17.48	9.4
Uzbekistan	38.35	1.09	0.6
Bahrain	6.73	0.19	0.1
Iran	1192.93	33.78	18.2
Iraq	126.70	3.59	1.9
Kuwait	63.00	1.78	0.9
Oman	33.55	0.95	0.5
Qatar	871.50	24.68	13.3
Saudi Arabia	290.77	8.23	4.4
Syria	10.06	0.28	0.2
United Arab Emirates	215.10	6.09	3.3
Yemen	16.90	0.48	0.3
Total	4671.34	132.28	71.3
Total World	6557.8	185.7	100.0

Source: Derived from the BP (2014)

Figure 4: Existing and planned oil and natural gas pipelines to Europe



70.9 million tons of crude oil, and in 2013, it carried 12.7 million tons of crude oil (BOTAS, 2014).

The Turkey-Greece-Italy Natural Gas Pipeline is projected to carry natural gas from the Caspian region to Greece and Italy through Turkey. Another important project is NABUCCO. The NABUCCO pipeline, which envisaged linking the natural gas reserves of the Caspian region to the European markets, carries special importance for Western Europe. The NABUCCO project represented a direct threat to Russian natural gas pricing and its monopoly supply to European countries (Cain et al., 2012). Both Russian opposition and the effects of the global financial crisis on European economies hindered the project, which was supported by the US and the EU. Nevertheless, failure to realize NABUCCO paved the way for the TANAP and the TAP projects, in which Turkey and Azerbaijan play key roles (Sevim, 2013).

TANAP is a project with a natural gas potential of 1, 2 trillion m^3 that is aimed to bring the Caspian natural gas to Turkey over Georgia (Suleymanov et al., 2013). In the forthcoming phases, it is further planned to extend this pipeline to Greece and Bulgaria then transferring it to European markets. This project will support Turkey realize its long-term international strategy to become an energy corridor for European markets.

TAP, which will transport natural gas from the Caspian Sea to Europe through Turkey, has become one of the most important projects on the European agenda since NABUCCO was held up. The project satisfies the EU in terms of both energy security and economic interest. It is also 450km shorter than NABUCCO and less costly (Sandıklı and İsmayilov, 2014).

It would be more accurate to view TAP as a continuation of TANAP. Turkey profits from both projects. Azerbaijan maintains its policy of balance with Russia with this project and ensures ongoing stability. Turkey becomes an energy transit hub between the abundant resources of Central Asia and the Middle East and European markets. These projects will very likely strengthen regional political relations for Turkey.

Another source of geographical advantage for Turkey are the Turkish Straits. Increased oil exports from Russia and the Caspian Sea region make the Turkish Straits one of the busiest and most important transportation routes in the world for supplying European and other international markets. According to the IEA, the Turkish Straits, which consist of the Bosporus and Dardanelles Straits, are the world's most important oil chokepoint due to their daily oil flow of 3.0 million barrels (approximately 2.5 million bbl/d of crude oil and 0.5 million bbl/d of petroleum products) in 2013 (IEA, 2014b). The Bosporus (Istanbul Strait) connects the Black Sea with the Sea of Marmara, and the Dardanelles (Canakkale Strait) link the Sea of Marmara with the Aegean and Mediterranean Seas. The Turkish Straits' widely used global sea routes are a critical part of regional and global energy security due to the high volume of oil and LNG traded through them.

In light of all of the above, if Turkey is able to implement appropriate energy policies and if it can secure meaningful roles in energy purchase agreements, then in the long run, it will be able to become a key player in the energy corridor that links Central Asia to Europe. Today, transport routes have become the main factor providing economic advantage. Thus, the geopolitical location of Turkey offers great opportunities in terms of energy security. Having control over energy transport routes, although they are not conveying Turkey's own energy resources, is as important as controlling the energy sources themselves (Tekin and Walterova, 2007). Therefore, despite the insufficiencies in its current resources, Turkey may be as politically and economically important in this regard as the energy-rich countries.

3. CONCLUSIONS

Turkey, as a result of its rapid economic growth and increasing level of wealth, is experiencing rising energy demand in every aspect of its economic and social life. However, Turkey's failure to increase its energy production in concert with demand raises the key issue of energy security. Geographic distribution of conventional energy resources, particularly oil and natural gas, is highly uneven around the world. Both resources are controlled

by a limited number of countries, which can cause potentially adverse effects resulting from interruptions in supply or excessive price increases by suppliers, thus posing additional problems for Turkey. Indeed, disruptions in energy procurement can lead to various problems including unstable growth and loss of wealth. Thus the continuous availability of energy in varied forms and in quantities sufficient to ensure sustainable development, a smoothly functioning economy, and welfare improvement, must be ensured and secured.

Turkey has failed to diversify satisfactorily both in terms of energy sources and supplier countries. As mentioned above, being dependent on a single resource or producer constitutes an element of political and economic risk.

Turkey is one of the countries which have the highest hydropower, solar, wind and geothermal energy potential among European countries. In light of the data presented, this study further concludes that Turkey's domestic energy potential holds many opportunities for satisfying Turkey's energy requirements and that unique energy sources are untapped and waiting to be developed. Turkey's renewable energy sources are potential candidates to meet its energy requirements and increase supply security in a sustainable way. Each of the unclaimed energy sources means additional imports of energy. Such an attitude poses a serious threat to the security of energy supply. Therefore, increasing the share of domestic energy in Turkey's energy policies and planning to establish new energy production facilities have become necessities for Turkey's energy security.

Finally, this study also indicates that energy security is a highly critical subject for all countries, including Turkey, which hope to be more active in global policy. Furthermore, the study asserts that Turkey, which is located between the European nations that are in need of energy sources and the energy suppliers, plays a strategic role in ensuring its own energy security, as well as that of the European nations. The existing and planned oil and gas pipeline projects will contribute to the development of Turkey's energy security and to the reduction of the risks associated with potentially less reliable energy partners.

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