RENEWABLE ENERGY AND ECONOMIC GROWTH: AN INVESTIGATION ON TURKEY AND EUROPEAN UNION*

YENİLENEBİLİR ENERJİ VE EKONOMİK BÜYÜME: AVRUPA BİRLİĞİ VE TÜRKİYE ÜZERİNE BİR ARAŞTIRMA

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ABSTARCT

Energy is one of the indispensable elements of life. Throughout history, humanity has always been dependent on energy, even establishing residential areas in regions close to energy sources. However, the energy resources that have been ongoing for centuries and presented for the use of mankind are inadequate to meet demands due to unconscious use and also the rapidly increasing world population. In this context, renewable energy sources gain importance. The trend towards renewable energy sources from traditional energy sources is preferred both in the context of environmental impacts and provides the sustainability of countries' economic growth performances. Countries that are outsourced to fossil sources are subject to high inflationary pressures in the case of possible price increases, which disrupt economic stability. In this paper, contributes to the sustainability of economic growth in the use of renewable energy sources the European Union (EU) and the axis of Turkey were discussed.

Keywords: *Renewable Energy, Economic Growth, EU, Turkey.*
JEL Classification: *O13, P48, Q42.*

ÖZ

Enerji, hayatın vazgeçilmez unsurlarından birisidir. İnsanlık, tarih boyunca her zaman enerjiye bağımlı olmuş, hatta yerleşim alanlarını dahi enerji kaynaklarına yakın bölgelere kurmuşlardır. Ancak, günümüzde yüzyıllardır süregelen ve insanlığın kullanımına sunulan enerji kaynakları, gerek bilinçsiz kullanım ve gerekse de hızla artan dünya nüfusu nedeniyle talebi karşılamakta yetersiz kalmaktadır. Bu bağlamda, yenilenebilir enerji kaynakları önem kazanmaktadır. Geleneksel enerji kaynaklarından yenilenebilir enerji kaynaklarına yönelim, hem çevresel etki bağlamında tercih edilmekte hem de ülkelerin ekonomik büyüme performanslarının sürdürülebilirliğini sağlamaktadır. Fosil kaynaklarda dışa bağımlı olan ülkeler muhtemel fiyat artışları durumunda yüksek enflasyon baskısı altında kalmakta ve bu da, ekonomik istikrarı bozmaktadır. Bu çalışmada, yenilenebilir enerji kaynakları kullanımının ekonomik büyümenin sürdürülebilirliğine katkısı Avrupa Birliği (AB) ve Türkiye ekseninde ele alınmaktadır.

Anahtar Kelimeler: *Yenilenebilir Enerji, Ekonomik Büyüme, AB, Türkiye.*
JEL Sınıflandırması: *O13, P48, Q42.*

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1. INTRODUCTION

The energy that will be the primary priority of every country and every person as long as the world exists is indispensable for life and is at least as important as water and food and life. At this point, the proximity of the countries to the energy resources has become one of the most important criteria of wealth and prosperity. However, traditional (primary) energy resources face the danger of extinction in the very near future due to the increasing world population. At this point, the transition to renewable energy sources is crucial at the point of ensuring energy supply security. This paper, the effect on the economic growth of renewable energy sources are discussed in the context of Turkey and the European Union. The fact that Turkey and compared to the EU, Turkey is the only candidate country that already stems from the European Union. At this point, the occurrence of renewable energy awareness in Turkey is important in the European Union acquis alignment point.

Humanity has been dependent on every energy source every day from creation to day. Over time, dependence on energy resources is becoming more and more important, depending on developing technology and increasing population. With the development of technology, new production possibilities have developed and the production scales of countries have reached incredible dimensions. It is possible with the existence of energy supply that the manufacturing industries, which are described as the backbone of the economy, can survive. The use of proprietary technology also makes no sense without energy. However, energy resources are not evenly distributed across the globe. While some regions are equipped with rich oil deposits, some regions have significant natural gas reserves. Some regions have coal mines, while in some regions there are very few resources. No matter where in the world, these energy sources will disappear someday. As a matter of fact, nowadays we are going through a period where danger signals are given. So much so that the primary energy sources in the world are constant, the world population is increasing day by day. This demand, which is increasingly increasing in supply stability, also emphasizes the importance of ownership of energy resources. Throughout history, many states have fought to have energy resources. Even today, under the founding of the European Union, wars are taking place to have coal and steel mines. One day, dependence on these fossil resources, which will definitely be consumed, jeopardizes the energy supply security of the countries. At this point, the importance of renewable energy sources is better understood. A country that does not have any fossil sources necessarily has one or more of the following wind, solar, water (hydro), geothermal, wave, tidal, or biomass energies. So, by saving economies from dependence on fossil resources, saving countries from external dependency, they will protect both their economic well-being and environmental negative externalities.

2. CLASSIFICATION OF ENERGY RESOURCES

2.1. PRIMARY ENERGY RESOURCES

Non-renewable energy sources, also referred to as stock sources, are found in fixed quantities in nature. Once these resources are consumed, they cannot be used forever because they do not come to their place (Ozsabuncuoglu and Ugur, 2005: 103). Coal, oil and natural gas, which are called fossil fuels, are the leading sources of renewable energy sources.

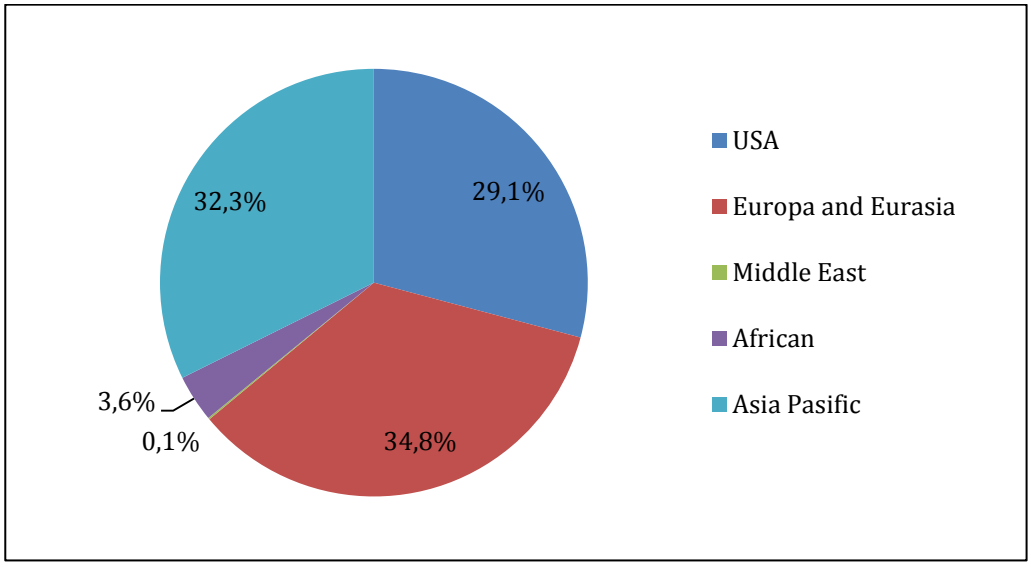
2.1.1. Fossil Fuels

2.1.1.1. Coal

The combustible, sedimentary organic coal is composed of a combination of elements such as carbon and hydrogen, especially oxygen and oxygen. Between the rock strata under the ground under the influence of heat, pressure and microbiological effects for millions of years has come to the vein (enerji.gov.tr, 2017).

According to British Petroleum (BP) data for 2015, the distribution of world proven coal reserves (891.5 billion tons) by region is shown in Figure 1. According to this, the most coal reserves in the world are located in Europe and Eurasia region with 34.8%. The country with the most coal reserves in this region is Russia with a share of 17.6% (157 billion tons). In Turkey, with world-class reserves of 8.7 billion tons, has a share of 1%. The Asia Pacific region has 32.3% of the world's coal reserves. This region is the country with the most coal reserves in Australia with 12.8% (114.5 billion tons) in China and 8.6% (76.4 billion tons). The Asia Pacific region is followed by the USA with a 29.1% reserve share and Africa with a 3.6% reserve share.

Figure 1. Distribution of World Coal Reserves by Zones *



* It is the year 2015.
Source: BP Statistical Review of World Energy, June 2016. (bp.com)

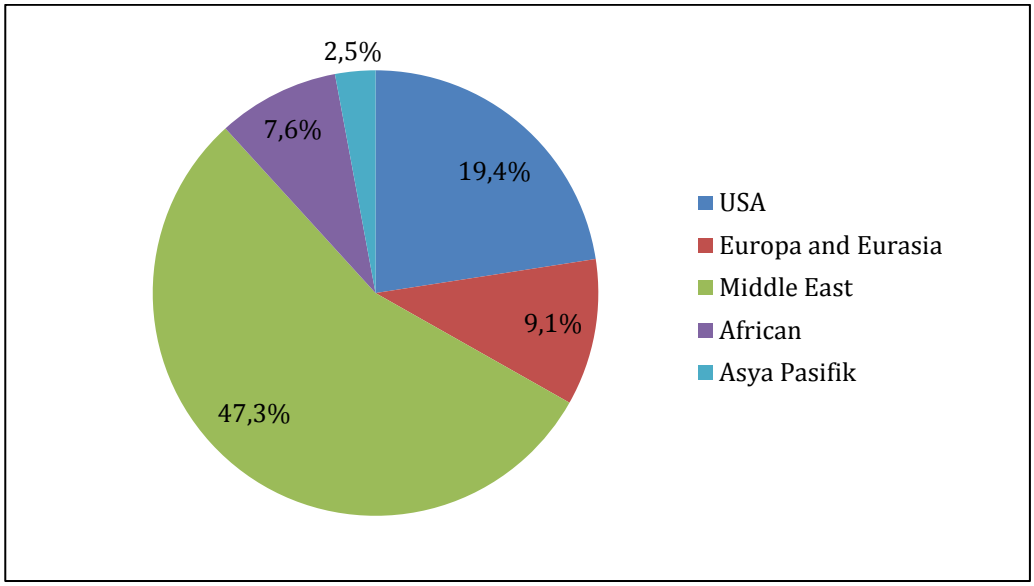
2.1.1.2. Oil

Crude oil is liquid hydrocarbons formed by metamorphism of organic material in the earth and stored in porous rocks. The term "crude" at the beginning of the petroleum means that it is a raw material and it is in an untreated form. Crude oil is separated into its components in refineries (by distillation) and converted into many intermediates and fuel products that we use in our daily lives. Petroleum is a mixture of organic compounds containing only two elements (carbon and hydrogen). Oil naturally leaks to the earth through fault lines and cracks in the rocks, accumulating to form tar, asphalt and pitch

ponds. For this reason, petroleum as a substitute for petroleum in English is derived from Greek (from Greek) as origin and is a combination of the word "petra" meaning stone and "oleo" meaning oil, and means oil. Crude oil can be found in different colors such as green, brown and black in nature and it can be as fluid as water on earth depending on its content and it can be as dense as honey (tpao.gov.tr).

According to BP (2015) data, there are about 1.7 trillion barrels of proven oil reserves in the world. According to Figure 2, 47.3% (803.5 billion barrels) of this reserve is in the Middle East. This rate corresponds to nearly half of the world reserve. The US is the second most reserved region in the world with 19.4% reserve (567.2 billion barrels). The US follows the Asia Pacific region (42.6 billion barrels) with Europe and Asia (155.2 billion barrels) with 9.1% reserve share, Africa (129.1 billion barrels) with 7.6% reserve share and 2.5% reserve share.

Figure 2. Distribution of World Oil Reserves by Zones *



* It is the year 2015.
Source: BP Statistical Review of World Energy, June 2016. (bp.com)

2.1.1.3. Natural Gas

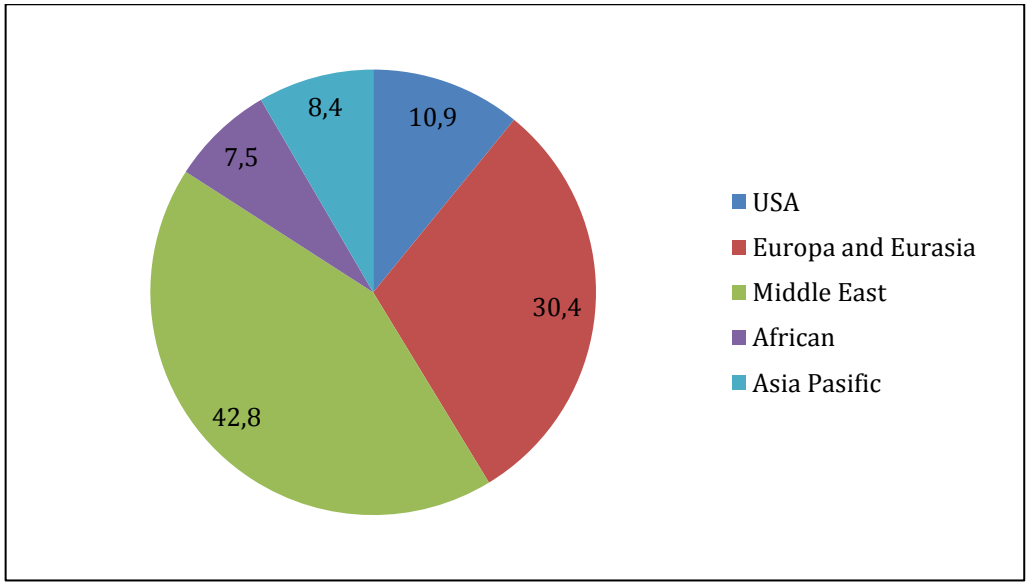
Natural gas, a mixture of light molecular weight hydrocarbons such as methane (CH4), ethane (C2H6), propane (C3H8), can be found alone or in combination with petroleum. Like petroleum, natural gas is found in the microscopic pores of the rocks and flows into the rock to reach production wells. Natural gas is separated on the surface and heavy hydrocarbons (butane, pentane, etc.) are removed. Natural gas is the cleanest fossil fuel we use in our homes. In case of burning natural gas, carbon dioxide, water vapor and oxides of nitrogen are formed (tpao.gov.tr).

According to BP (2015) data, there are 186.9 trillion cubic meters of proven natural gas reserves in the world. The distribution of this reserve on a regional basis is given in Figure 3. Accordingly, the Middle East region is the most reserved region with

42.8% (80 trillion m^3). In this region, Qatar attracts attention with its reserves of 18.2% (34 trillion m^3) and Iran with 13.1% (24.5 trillion m^3) of reserve. Europe and the Eurasia region have a significant natural gas reserve of 30.4% (56.8 trillion m^3). In this region, Turkmenistan attracts attention with its reserves of 17.3% (32.3 trillion m^3) and Russia and 9.4% (17.5 trillion m^3) of reserves.

The America region accounts for 10.9% (20.3 trillion m^3) of world natural gas reserves. 10.4 trillion cubic meters (5.6%) of these reserves are located in the United States, while 5.6 trillion cubic meters (3%) are located in Venezuela. 8.4% (15.6 trillion m^3) of the world's natural gas reserves are in the Asia Pacific region and 7.5% (14.1 trillion m^3) are in Africa.

Figure 3. Regional Distribution of World Natural Gas Reserves *



* It is the year 2015.
Source: BP Statistical Review of World Energy, June 2016. (bp.com)

World natural gas trade is shown in Table 1. According to the BP 2015 data, 704.1 billion m^3 of natural gas is pipelines, and 338.3 billion m^3 of natural gas is liquefied natural gas (LNG). According to this; USA imported 74.4 billion m^3 of gas, 104.8 billion m^3 of Germany, 50.2 billion m^3 of Italy and 33.6 billion m^3 of China natural gas through pipelines. In terms of LNG, Japan imported 118 billion m^3, South Korea 43.7 billion m^3, China 26.2 billion m^3, Spain 13.1 billion m^3.

Looking at the exports, in the year 2015, the USA exported 49.7 billion m^3, Canada 74.3 billion m^3, Germany 29 billion m^3, Netherlands 40.6 billion m^3, Norway 109.5 billion m^3, Russia 193 billion m^3 and Algeria 25 billion m^3 natural gas exports through pipelines. As LNG, Qatar has exported 106.4 billion m^3, Russia 14.5 billion m^3, Algeria 16.2 billion m^3, and Indonesia 21.9 billion m^3.

When we look to Turkey as 39.7 billion m3 of LNG through pipelines in 2015 and 7.5 billion m3 of natural gas were imported. There is also a 0.6 billion m3 export pipelines through Turkey.

Table 1. World Natural Gas Trade (billion m^3)

Country/Region	Import		Export	
	Pipe Line	LNG	Pipe Line	LNG
USA	74,4	2,6	49,7	0,8
Canada	19,8	0,6	74,3	-
Mexican	29,9	7,1	-	-
Other America	18,5	20,0	18,5	5,0
France	35,9	6,6	1,6	0,4
Germany	104,0	-	29,0	-
Italy	50,2	6,0	0,2	-
Netherlands	30,2	2,0	40,6	1,2
Norway	-	-	109,5	6,0
Spain	15,2	13,1	0,5	1,6
Turkey	39,7	7,5	0,6	-
United Kingdom	29,0	12,8	13,4	0,3
Other Europe	97,2	7,1	13,1	1,4
Russia	16,9	-	193,0	14,5
Ukraine	16,2	-	-	-
Other	29,8	-	64,5	-
Train	-	-	19,8	106,4
Other Middle East	27,3	10,5	8,4	19,8
Algeria	-	-	25,0	16,2
Other Africa	8,9	3,8	11,1	32,5
China	33,6	26,2	-	-
Japan	-	118,0	-	-
Indonesia	-	-	10,5	21,9
South Korea	-	43,7	-	0,3
Other Asia Pacific	27,6	50,7	21,0	93,0
World	**704,1**	**338,3**	**704,1**	**338,3**

Source: BP Statistical Review of World Energy, June 2016. (bp.com)

2.1.2. Nuclear Energy

Nuclear energy; politicians, scientists and industrialists came to the agenda in 1879 with the discovery of Uranium. As it is in almost every field of technological progress, the studies that first started in the field of military defense then started to give commercial results. Many of the countries that the United States and Russia have embarked on have done intensive work in order to benefit from nuclear energy. As a result of all these studies, systems have been developed to turn the heat energy, which is turned on by the breakdown of atoms, into electrical energy. These systems are called nuclear power plants (enerji.gov.tr).

Along with the oil crisis that began in the early 1970s, interest in nuclear energy started to increase. Countries that do not have fossil resources, especially oil, have turned

to nuclear energy in order to reduce their dependence on these resources and ensure energy supply security. A deceleration of power plant construction has been seen with the Chernobyl accidents in Three Mile Island (TMI), which lived in the US in 1979, and in Soviet Russia (in today's Ukrainian borders), in 1986, while nuclear power plants are rapidly operating all over the world. After these accidents, there have been administrative and technical developments in order to establish and operate safer nuclear power plants all over the world (enerji.gov.tr). Finally, after a 9.0 magnitude earthquake in Fukushima, Japan, concerns about the reliability of nuclear power plants have intensified again, the need for a more reliable source of energy in case of collapse due to any reason (Erdal, 2012: 171-181).

Nuclear energy use amounts in selected countries are given in Figure 4. According to BP (2015), the US is the most beneficiary of nuclear energy in the world with 839.1 TWh. The United States is followed by France with 437.4 TWh, Russia with Russia with 195.2 TWh, China with 170.8 TWh, Canada with 104.2 TWh, Germany with 164.8 TWh, Germany with 91.5 TWh.

Figure 4. Nuclear Energy Use Quantities in Selected Countries (TWh) *

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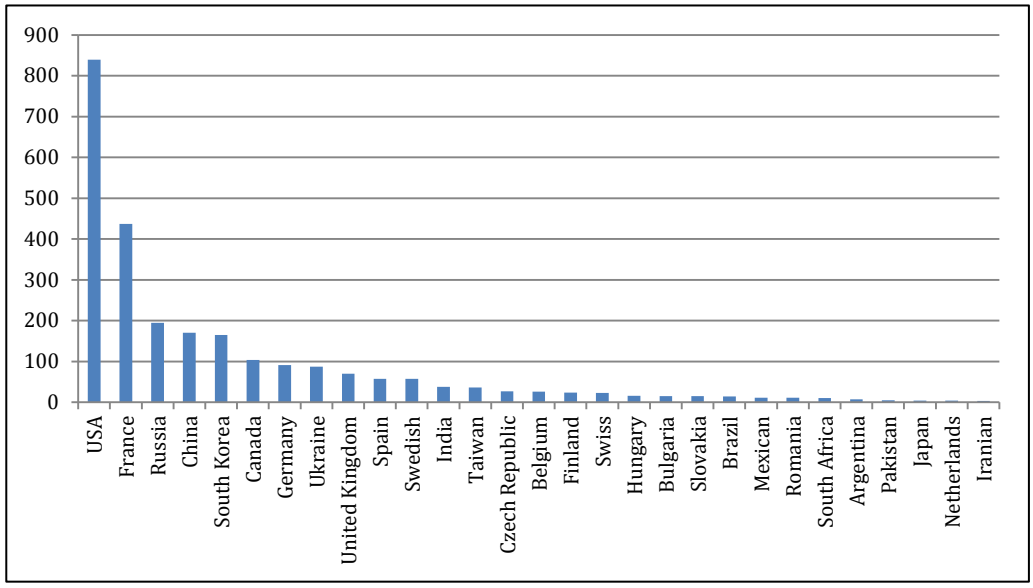


* It is the year 2015.

Source: BP Statistical Review of World Energy, June 2016. (bp.com)

2.2. RENEWABLE ENERGY RESOURCES

Renewable energy sources are self-renewable sources that can be used forever if certain conditions are fulfilled (Ozsabuncuoglu and Ugur, 2005: 187). Such energy sources can be listed as hydraulic, solar, wind, geothermal, biomass, tidal, and wave energy. In recent years, such rapid changes have been made in the renewable energy market, investments and policies that the renewable energy perception may be behind the realities. 2008 Global energy consumption has begun to return to its former level in

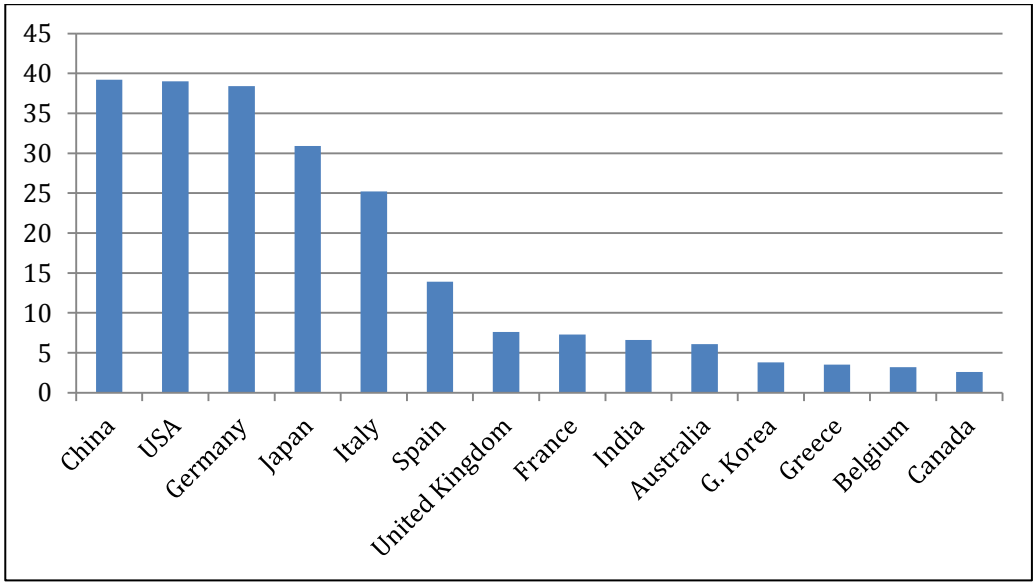
2010 following the decline in global energy demand due to the global recession caused by the global financial crisis. In 2009, renewable energy sources accounted for about 16% of the global final energy consumption. By 2010, nearly 20% of the global electricity supply was met by renewable energy sources. Finally, at the beginning of 2011, renewable resources constituted ¼ of the global power capacity (REN21, 2011: 11).

2.2.1. Hydraulic Energy

The most advanced technology development in renewable energy sources is hydraulic energy. The source of hydraulic energy, which is one of the oldest energy sources currently available, is sudden. Therefore, it must be installed on a water supply. Hydroelectric power plants convert the power of the flowing water to electricity and the energy potential determines the flow or rotation speed of the water (MEB, 2012: 27).

The amounts of hydraulic energy usage in selected countries are shown in Figure 5. When the data of 10 countries with the most usage in the world are examined, China ranks first with consumption of 1,126 tera watt hour (twh). This figure represents 28.5% of world consumption of 3.946 TWh. Followed by Canada (383.1 TWh), Brazil (360.9 TWh), the United States (253.7 TWh) and Russia (169.9 TWh), respectively. In Turkey, the world consumption of about 0.02 twh'lik cake with 66.9%, 'is like a share.

Figure 5. Hydraulic Energy Usage Amounts in Selected Countries (TWh) *



* It is the year 2015.
Source: BP Statistical Review of World Energy, June 2016. (bp.com)

2.2.2. Solar Energy

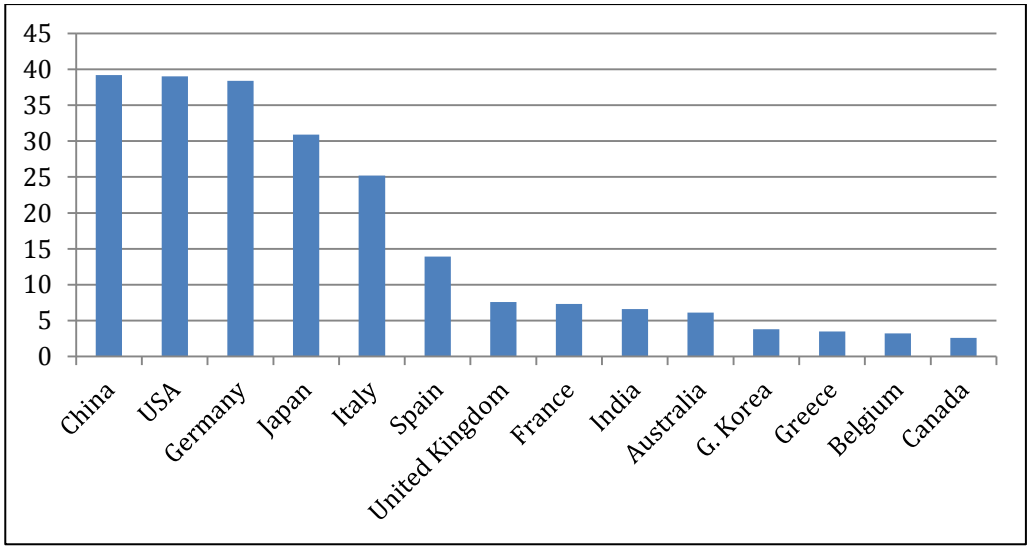
Solar energy is at the forefront of renewable energy sources. So, the main source of fossil and hydraulic energy is solar energy. Solar energy is a continuous source of energy that will continue to travel for as long as the world is there, as the energy of the energy that heats up during the helium conversion of hydrogen. Solar energy can be used

to transform heat and convert it to electricity. Heat conversion process is provided by panels, and electricity conversion process is provided by batteries (MEB, 2012: 14).

The total annual solar energy in the world is 5.3 * 1014 KCal (Kilo Calorie), which is 167 thousand times the world's final energy consumption per year. In other words, the total amount of energy received by the world in one year from the sun is equal to the total amount of energy produced in one year by working 70 million power plants with a capacity of 1000 MW for 24 hours a day (Ozsabuncuoglu and Ugur, 2005: 193).

Solar energy usage amounts in selected countries are given in Figure 6. China (16%) and the United States (15%) and Germany (15%) are leaders in the world with their use of about 39 TWh, according to BP (2015) data. These countries are followed by Japan with 30.9 TWh, Italy with 25.2 TWh and Spain with 13.9 TWh. Meanwhile, Turkey is located at the end with 0.3 twh'lik solar energy consumption. This figure is the number of sunny days and solar energy potential in Turkey is very low to extremely high.

Figure 6. Solar Energy Consumption in Selected Countries (TWh) *



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Source: BP Statistical Review of World Energy, June 2016. (bp.com)

2.2.3. Wind Energy

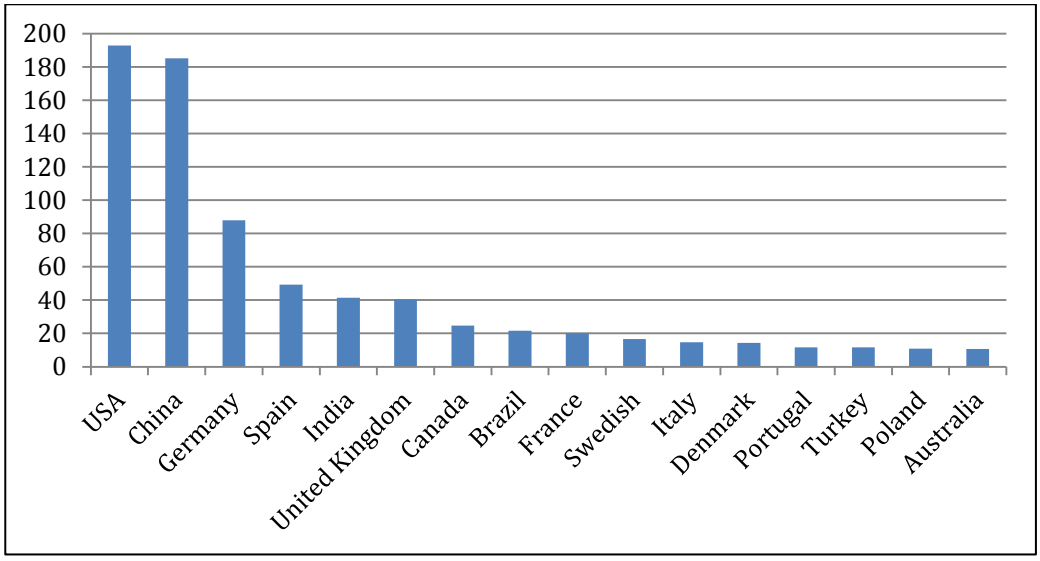
The wind comes to the surface at different elevations on the Earth, from the birth of the sun to the sunrise, by heating and cooling again at variable speeds. The kinetic energy of air in motion is called wind energy. The wind is the natural horizontal movements of the air in the atmosphere close to the Earth's surface. The basic principle of air movements is that the present atmospheric pressure changes between regions. The wind is the air flow displaced between low pressure and high pressure region. It always moves from the high pressure area to the low pressure area. The greater the pressure difference between the two zones, the higher the airflow rate (MEB, 2012: 17).

These energy utilization systems are manufactured for the purpose of bringing a mechanical energy propeller formed during the general horizontal movement of the

wind, teeth that are connected to each other by 90 ° and other points by means of the transmission mill or turning them in other directions (Ozsabuncuoglu and Ugur, 2005: 198).

The amounts of wind energy usage in selected countries are given in Figure 7. According to BP (2015), the US is 23% of the world's wind energy consumption and ranks first with 192.9 TWh. The United States is followed by China with 185.1 TWh (22%), Germany with 88 TWh (11%) and Spain with 49.3 TWh (6%). Meanwhile, Turkey has 11.6twh'lik with the use of 0.01% share in world consumption. As in the field of wind energy with solar energy potential in Turkey is extremely important to get the world-class share remains extremely low.

Figure 7. Wind Energy Usage Amounts in Selected Countries (TWh) *



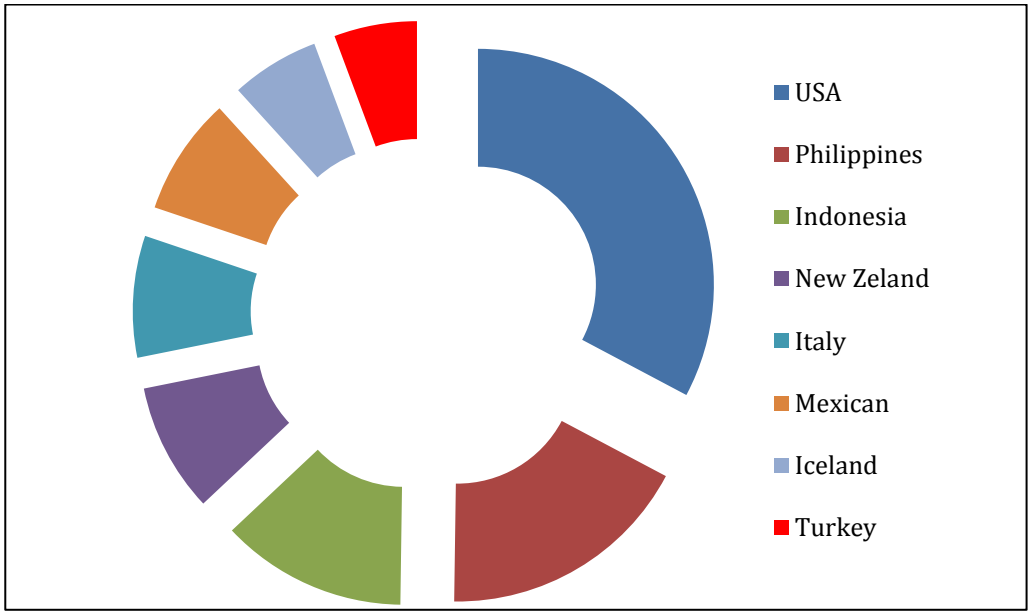
* It is the year 2015.
Source: BP Statistical Review of World Energy, June 2016. (bp.com)

2.2.4. Geothermal Energy

Geothermal energy is the heat energy that is obtained by artificial means from hot water, steam and dry steam formed by the accumulation of heat accumulated in the rocks in the depths of the earth and stored in the reservoirs by means of fluids. Geothermal resources are usually formed around active volcanic and magmatic units with active fracture systems (enerji.gov.tr).

Geothermal energy production capacity in selected countries is given in Figure 8. Accordingly, the US has a potential of 3.596 MWh and 27.7% of the world's geothermal energy potential. Philippines is second in the world after USA with 1917 MWh and 14.8% share. Indonesia ranked third among 1,401 MWh and share with 10.8'lik%, New Zealand 7.5%, Italy 7%, Mexico 6.8%, 5.1%, while Iceland and Turkey has a 4.8% share with 624 MWh potential.

Figure 8. Geothermal Energy Production Capacity in Selected Countries (%) *



* It is the year 2015.
Source: BP Statistical Review of World Energy, June 2016. (bp.com)

2.2.5. Biomass Energy

Conceptually, the English biomas word was translated into biomass in Turkish and translated as biomass. The source of this energy, which is stored chemically, especially in the form of cellulose, during the photosynthesis process of plants, and which can be used in various forms, is solar. The conversion of solar energy to stored energy in the form of biomass is the basis for human life (Ozsabuncuoglu and Ugur, 2005: 203).

Wood, charcoal, animal fur; agricultural products and forestry organic waste, alcohol and methane fermentation; energy obtained by living sources such as various water plants is called biomass energy (MEB, 2012: 24).

2.2.6. Wave and Tidal Energy

The wave energy is obtained by cylinders that are formed by the connection of a 1/7 prototype wave energy transducer with filament glass reinforced with fibrous plastic cylinders. When each wave arrives, it works and these waves are transmitted to generator by hydraulic motors and energy production is provided. Wave energy is yet to be studied only at academic level. It is not used effectively and effectively worldwide (Ozsabuncuoglu and Ugur, 2005: 201).

The tidal energy is the period during which the kinetic energy generated by rising and falling of the water is transformed into electrical energy as a result of the tidal motion resulting from the moon's gravitational force (Ozsabuncuoglu and Ugur, 2005: 201).

Wave and tide; pollutant effect, the wind is esteemed, and the continuity as the gravitational force between earth, sun and moon continues. No fuel costs and long life. The tidal gauge acts as a breakwater and protects the basin against floods, which are very high waves. This energy has positive aspects such as dependency on fossil fuels, global warming, acid rain, indirectly reducing any kind of pollution, electricity to the coastal areas where there is no electricity network and turning the salt water into fresh water and pumping it to the required region (MEB, 2012: 30).

3. ENERGY SUPPLY SECURITY

Energy supply security has been one of the three main pillars of protection of competitiveness and the environment since the "Green Paper" entitled "For the European Union (EU) Energy Policy" published by the European Commission in 1995 (De Paoli et al., 2010: 6). Any threat of supply interruption or supply security that may arise as energy is abandoned, will cause life to suffer.

De Paoli et al. (2010) categorizes the risks that may arise against energy supply security as follows:

Geological Risks: There is an atyfthe cost of depletion or removal of an energy source.

Technical Risks: Includes system failures due to weather conditions or the downtime and maintenance of the energy system.

Economic Risks: The lack of investment and inadequate supply contracts point to imbalances between supply and demand.

Geopolitical Risks: It concerns government decisions on war, civil war, terrorism, or suspension of deliveries as a result of an unsuccessful regime.

Environmental Risks: It depends on the pollution that can cause resource limitation, such as potential damage caused by accident (oil spills, nuclear accidents) or greenhouse gas emissions.

At this point, the importance of renewable energy sources emerges once more. The risks mentioned above are not serious enough for renewable energy sources.

4. THE BASICS OF THE EUROPEAN UNION ENERGY POLICY

Following the Second World War, the understanding of the transfer of iron and steel resources of France and Germany to the management of a supra-state authority and the prevention of a new war in Europe by combining interests in iron and steel resources, which are key points in terms of both international security and economic growth dominated. The European Coal and Steel Community (ECSC) was established with the Paris Treaty of 1951, and the process of European economic and political integration that has continued to this day has begun. In 1958, the Rome Treaty and the European Atomic Energy Community (EAC) and the European Economic Community (EEC) were established. Since then, the energy policy of the (present) EU has progressively developed in parallel with economic integration (IKV, 2005: 6).

In the 1970s, EEC's energy policy was exposed to external shocks through oil crises. The "New Energy Policy Strategy" adopted by the Council of Europe in September

1974, after the first oil crisis in 1973, adopted a policy of reducing consumption to an acceptable level, increasing supply security and protecting the environment in energy production and consumption. At this point, the first oil crisis caused EET to set a strategy for energy policy for the first time. With the second oil crisis of 1979, the Council set the targets to be reached in 1990 in June 1980, requiring further action. These targets were the member countries' consumption of oil and imports, the need to go for energy conservation and the EEC to comply with the energy policy objectives. In this period members countries have gone to importation and attempted to increase domestic production (Yorkan, 2009: 26).

The European Union (EU) energy policy has three main objectives:

- Establishing a competitive energy market,
- Supply of energy supply security,
- Protection of the environment on the basis of sustainable development.

The EU is aiming to establish a balance on the axis of these three main objectives while creating policy in the field of energy. In addition, the EU aims to achieve 20% savings in primary energy consumption at the "Energy and Climate Change Package" by 2020 (Ministry of EU, 2014: 3). But in recent times there have been major problems in the EU's triple talks. The first of these problems is that the provision of energy supply security has become an increasingly difficult and important issue. From oil crises to day-to-day EU energy consumption and external dependence on energy have increased steadily (Oner, 2009: 11-28).

According to EU Energy Process in 2014 prepared by the T.R. EU Ministry, The EU anticipated that existing strategies would be insufficient to reach the 2020 targets and on 10 November 2010 the Energy 2020 Strategy was published. For the next 10 years in the strategy, the EU's energy priorities are as follows:

- To create a Europe that uses energy efficiently,
- To create a fully integrated energy market,
- To strengthen the consumers and give them the right to choose their suppliers,
- Being a leader in energy technology and innovation,
- Strengthen the external dimension of the EU energy market (Ministry of EU, 2014: 4).

According to Yorkan (2009), the EU's energy sector has created positive targets set for Turkey's energy policy and its negative effects.

In addition, Turkey's reform process began in alignment with the EU internal energy market;

- The energy sector has become more transparent,
- Efforts have been made to determine prices in a more competitive environment,
- Restructuring of energy institutions has started,
- Energy Market Regulation and Supervision Agency (EMRA) was established,
- Efforts to increase energy efficiency and savings have increased,
- Investments in the direction of rehabilitation and modernization of energy related infrastructure have begun,
- Improved inventory holding mechanism for emergencies,

• Developed in the field of renewable energy sources and

• Contribution to the reduction of loss-to-loss ratios has begun (Yorkan, 2009: .24-39).

5. RENEWABLE ENERGY CONSUMPTION AND ECONOMIC GROWTH

The relationship between renewable energy consumption and economic growth in the EU is given in Figure 9. As can be seen in the diagram covering 1990-2014 period, while the EU's economic growth rate was 2.97% in 1990, the share of renewable energy consumption in total energy consumption is only 6.13%. Until the sunny days, the EU experienced a significant expansion process, showing a negative growth of -0.15%, -4.36% and -0.43% in 1994, 2009 and 2012, respectively. Apart from these exceptional years, the EU has always displayed positive growth. However, it cannot be said that it has a stable and sustainable growth performance as a result of both the global conditions and the political and economic conditions in which the EU lives.

So, when we look at the share of renewable energy consumption in total energy consumption, there is a significant upward trend in acceleration and upward trend. By 2014, the share of EU renewable energy use is at the level of 16.05%.

Clearly, it is not rational to speak of a serious interaction between economic growth and renewable energy consumption for the time being in the EU.

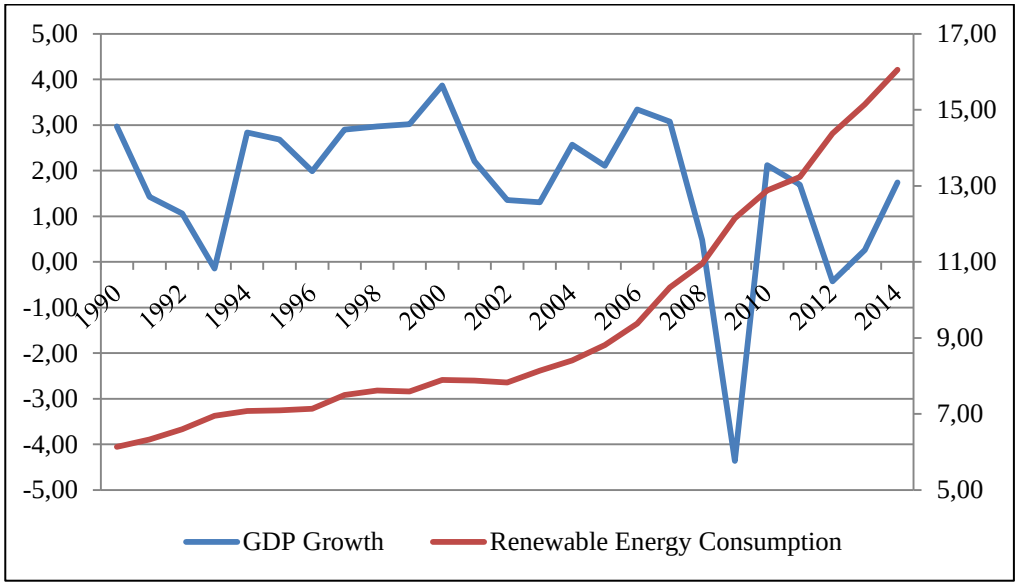
There are some reasons for this:

• The EU has experienced significant expansion in the period 1990-2014 and the new participating countries have not invested in renewable energy as much as the founding countries.

• Renewable energy investments should not yet be productive enough to save countries from their dependence on primary (fossil) energy sources. In other words, renewable energy production is not yet at the size to meet total energy demand.

All of these factors result in the fact that renewable energy consumption is not sufficient for the sustainable growth of the EU's economic growth for the time being. However, the rate of increase in renewable energy consumption and the fact that the economy is moving up almost even without recession will significantly reduce the EU's dependence on fossil resources in the foreseeable future, and will probably have a more positive impact on economic growth.

Figure 9. Renewable Energy Consumption and Economic Growth in European Union (%)

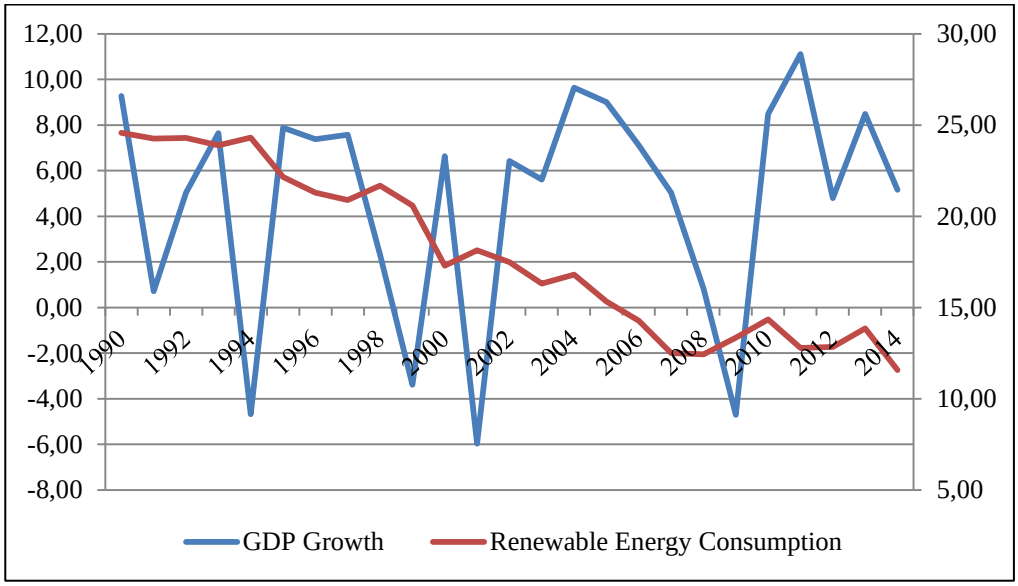


Source: databank.worldbank.org, Access Date, 27.12.2017.

Renewable energy consumption and economic growth in Turkey relationship is given in Figure 10. Accordingly, Turkey is a very volatile period 1990-2014 (floating) has an economic growth and development. Almost every expansion period is followed by a contraction period. This means that the level of output obtained in one period is lost in the next period. Turkey's economy with the impact of the global economic crisis in 2008 compared to the previous period, entered the post-2002 period, though still more positive growth trend has entered into a narrowing trend. However, compared with the EU, Turkey's crisis is higher than the output speed is more stable economic performance in the post-crisis period.

When looking at the share of renewable energy in total energy consumption, followed by Turkey to the EU trend in the opposite way down. This situation; Depending on the fact that Turkey's enough to make investments in renewable energy and increasing energy demand stems from the inadequacy of existing renewable sources. As the demand for energy increases, the share of renewable energy in total energy production is gradually decreasing and demand is met with imported resources, especially oil and natural gas. This means that the expansion of both the current account deficit is caused by the increased dependence on foreign energy field in Turkey.

Figure 10. Renewable Energy Consumption and Economic Growth in Turkey (%)



Source: databank.worldbank.org, Access Date, 27.12.2017.

6. CONCLUSION AND POLICY IMPLICATIONS

Both the EU and is based both in history as far back as fossil sources of renewable energy in Turkey. The use of renewable energy sources has fallen into the agenda of countries that have foreclosed due to security problems in the supply of fossil resources and also due to environmental factors. Within the developed countries it will be appropriate to separate the ones with and without energy sources (primary sources) from each other. Such are the facts that the developed countries that have energy resources, especially the USA, endeavored to continue to depend on the fossil resources, and almost never fell from the agenda of the world, where the countries with fossil resources entered into conflicts of interest. The emergence of newly exploited resources in the US, such as rock oil in recent years, has also caused progress in the area of renewable energy to slow down.

The situation in developing countries is no different. The current use of renewable energy, dependency on fossil resources and conversion costs, as well as high initial cost of installation such as wind and sun, seems to have not gained enough seriousness in the country that is dependent on imports in the installation.

When the EU and Turkey to the point, the EU than in Turkey, where a higher awareness in the renewable energy field, and in particular the core EU countries taken up many years ago that this issue is clear from the directive that created the EU's renewable energy field. In the second part of the work, this topic has been widely used.

Considering the period 1990-2014 in the EU, it is seen that the EU's economic growth rate was 2.97% in 1990, while the share of renewable energy consumption in total energy consumption was only 6.13%. Until now, although the EU has experienced a significant expansion process and generally has a positive growth performance, Showed

negative growth of -0.15%, -4.36% and -0.43% in 1994, 2009 and 2012 respectively. Regarding the share of renewable energy consumption in total energy consumption, it is noteworthy that the economic growth performance is negative in the period of 1990-2014, but it is constantly upward and stable.

The EU's share of renewable energy use in total energy consumption in 2014 is 16.05%. This, of course, is not enough for a Union that has the highest level of awareness of this area, like the EU.

Here are the primary reasons for this table:

1) The EU has experienced significant expansion in the period 1990-2014 and the new participating countries have not invested in renewable energy as much as the founding countries, or the awareness of this area is low.

2) Renewable energy investments must not yet be productive enough to save countries from their dependence on primary (fossil) energy sources.

The renewable energy production and investments of the EU are not yet sufficient to meet the total energy demand. There is no definite reference as to what is the potential in this issue.

At the sustainable pace of the EU's economic growth, renewable energy is not yet delivering the desired contribution, but despite the increasing rate of renewable energy consumption in the EU and the recession of the economy, the energy demand is constantly increasing almost without deceleration. This will significantly reduce the EU's dependence on fossil resources in the near future and will likely provide positive contributions to the sustainability of economic growth. Indeed, a significant part of the EU's oil and gas imports and as each year's budget is devoted to this area of Turkey.

When we look to Turkey, during the period 1990-2014 it has attracted much attention fluctuating trend economic growth. Almost every expansion period is followed by a contraction period. This means that the level of output obtained in one period is lost in the next period. However, Turkey's economy in the period after 2002 has entered a more positive growth trend compared to the previous period, although the effects of the 2008 global economic crisis was felt, though not so low compared to the US and the EU. So much so that Turkey, as a country that draws attention to the rapid recovery and return to pre-crisis levels after the crisis.

When we look at Turkey's share in the total energy consumption of renewable energy consumption, it is seen that the EU follow a trend opposite way down. The basic reasons for this situation are as follows:

1) Adequate level of investment in renewable energy will reduce dependence on fossil resources are not available in Turkey. In other words, current renewable energy investments are not in a size to meet the total demand.

2) As the demand for energy increases, the share of renewable energy in total energy production is gradually decreasing and the demand is met with imported resources, especially oil and natural gas.

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