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FOREWORD

Energy has been the most contested meta since the mid-19th century. Since energy was utilized for light and heating at first and later for industrial production it has become one of the indispensable element of social and economic life. In line with the industrial and technological development, increasing energy need and consumption have become one of the indicators of power in economic, political and social areas since having political power depends on a strong economy. Also, energy is a fundamental factor in contemporary economy. Therefore, states struggle to have necessary energy resources, keep energy routes under control and access to energy easy and cheaply.

Since the states do not have an equal position in energy reserves, there occurs a struggle to possess and access to energy resources. On the other hand, it has to be noted that possession of energy resources does not mean that that state has economic and political power. Since energy is an area of contesting global powers, it may lead to political, economic and social instability. It is possible to test the above statement by looking at the present and potential conflict areas in the world.

Energy creates political as well as economic dependency between energy supplying and consuming countries. In order to mitigate the effects of this dependency, regional and global cooperation occurs. On the other hand, energy becoming a political tool with high economic and political cost has led states, both suppliers and consumers, to alternative energy resources. Thus, it is possible to explain why states with high levels of income from energy resources started to invest in other areas that can create income, such as tourism.

Another issue is the legal and environmental problems occurring during the extraction and transportation of energy resources. Environment and environmental problems are top in the agenda of the world since the end of 21st century. Huge environmental contaminations on land and sea occurring during production and transportation of fossil fuel demonstrates the importance of the issue.

In the light of all these issues, 1. International Eurasia Energy Problems Symposium has been held in 28-30 May 2015 at İzmir Katip Çelebi University by the Faculty of Economic and Administrative Sciences in order to host as an academic platform for up-to-date ideas and opinions. During the symposium, experts on the area found opportunity to express their opinions in areas of energy supply and security, alternative energy resources, legal and environmental problems, regional political and economic conflicts and contesting global powers.

Definitely, hosting an international symposium is hard work. However, consecutive success makes hard work a pleasure and proud for organizers and supporters. There is no doubt that organizing conferences, meetings and symposiums necessitates team work. On the other hand, individuals and institutions who chair these teams and give support financially and morally have to be mentioned.

Therefore, we thank to the rector of İzmir Katip Çelebi University, Prof. Dr. Galip AKHAN, who encouraged the symposium. Also, we thank to the dean of the Faculty of Economic and Administrative Sciences, Prof. Dr. İbrahim Attila ACAR, who cultivated fast and practical solutions to problems occurred during the organization and demonstrated patience, harmony and understanding; and to the president of the organization board Assoc. Prof. Dr. Nesrin DEMİR from the Department of International Relations, who has a

significant share in the success of the symposium with her never-ending energy and enthusiasm.

In the symposium held in 28-30 May, the participants, who sent the full texts of their work, bear the legal and academic responsibilities. During the editing process, meaning and content of their work have been kept.

Dr. Osman TEKİR

Organization Board Member

ÖNSÖZ YERİNE

Enerji 19.yy'nin yüzyılın ortalarından günümüze uğrunda en fazla mücadele edilen meta olmuştur. Enerji, ilk başlarda aydınlanma ve ısıtma, yirminci yüzyılın başlarından itibaren de sanayide ve yan ürünlerde yoğun olarak kullanılmasıyla birlikte, sosyal ve ekonomik hayatın vazgeçilmez bir unsuru haline gelmiştir. Öyle ki sanayi ve teknolojinin gelişmesiyle parelel olarak, artan enerji ihtiyacı ve tüketimi, başta ekonomi olmak üzere siyasal ve toplumsal anlamda bir ülkenin güç göstergeleri arasında sayılmaktadır. Çünkü siyasal bir güç ve etkiye sahip olabilmenin yolu güçlü bir ekonomiye sahip olmaktan geçer. Enerji, modern ekonominin de temel bir faktörüdür. Bu yönüyle ülkeler, gerek enerji kaynaklarına sahip olmak gerek güzergahları kontrolleri altında bulundurmak gerekse de en kısa ve ucuz yoldan enerjiye ulaşabilme mücadelesi içindedirler.

Enerji rezervleri açısından dünya üzerindeki ülkelerin eşit konumda bulunmayışı bu kaynaklara sahip olabilme ve ulaşabilme mücadelesini de beraberinde getirmektedir. Şu hususun da dile getirilmesi gerekir ki; enerji kaynaklarına tek başına sahip olmak o ülkenin ekonomik ve siyasal bakımdan güçlü olduğu anlamına gelmemektedir. Zira küresel güçlerin mücadele alanı olmasından dolayı siyasi ve ekonomik ve bunun doğal bir sonucu olarak da sosyal istikrarsızlıklara sebep olabilmektedir. Yerküre üzerindeki mevcut ve potansiyel çatışma alanlarına bakılacak olursa yukarıda dile getirilen ifadelerin doğruluğunu görmek mümkündür.

Enerji, tedarikçisi olan ülkeler ile enerjiye ihtiyaç duyan ülkeler arasında ekonomik açıdan olduğu kadar, siyasal açıdan da bağımlılık yaratabilmektedir. Bu bağımlılıktan kurtulabilmek için bölgesel ve küresel ittifaklar ve işbirlikleri ortaya çıkmaktadır. Bunun yanında gerek enerjinin siyasetin bir aracı haline gelmesi gerekse de siyasi ve ekonomik olarak maliyetinin yüksek oluşu ve diğer nedenler, ülkeleri alternatif enerji kaynaklarına yöneltmektedir. Bu durum tedarikçi ülkeler açısından da böyledir. Bütçe gelirleri arasında en büyük kalemi oluşturan enerji konusu, körfez ülkelerinde son yıllarda diğer gelir getirici alanlara özellikle turizm alanında yaptıkları yatırımları bu görüş ışığında açıklamak mümkündür.

Bir başka husus da gerek enerjinin gün yüzüne çıkarılması gerekse de bu enerjinin sevk edilmesi sırasında ortaya çıkan çevre ve hukuki sorunlardır. Çevre ve çevre sorunları, 21.yy'nin sonlarından başlayarak günümüze kadar dünyanın en önde gelen konuların başındadır. Kara ve denizdeki en büyük çevre kirlenmelerinin katı fosil yakıtlarının üretilmesi ve taşımacılığında, ortaya çıktığı dikkate alındığında konunun önemi daha iyi anlaşılacaktır.

Bütün bu hususlar göz önünde bulundurularak yeni fikirler ve görüşlerin akademik bir platformda dile getirilmesine ev sahipliği yapmak amacıyla İzmir Katip Çelebi Üniversitesi, İktisadi ve İdari Bilimler Fakültesi tarafından 28-30 Mayıs tarihinde '1. Uluslararası Avrasya Enerji Sorunları'başlıklı sempozyumu düzenlenmiştir. Bu sempozyumda enerji arz ve güvenliğinden, alternatif enerji kaynaklarına, çevre sorunlarından hukuki sorunlara, bölgesel siyasi ve ekonomik çatışmalardan küresel mücadeleye kadar konunun uzmanları bildirilerle görüşlerini dile getirme fırsatını bulabilmişlerdir.

Şüphesiz uluslar arası bir organizasyon yapmak, zor ve zahmetli bir uğraştır. Ancak sonrasında gelen başarı, bu zor ve zahmetli iş, düzenleyenler ve destek verenler açısından bir "zevk"e ve gurura dönüşmektedir.

Hiç şüphe yok ki bu tür konferansların, toplantıların, sempozyumların düzenlenmesi ve yürütülmesi bir ekip çalışmasını gerektirmektedir. Ancak bu ekipleri yöneten ve yönlendiren kişilerin, mali ve moral açıdan desteklenmesine katkı sunan kişi ve kurumların da hakkını teslim etmek gerekmektedir.

Bu vesileyle sempozyumun düzenlenmesinde desteğini esirgemeyen İzmir Katip Çelebi Üniversitesi Rektörü Prof. Dr. Galip AKHAN'a teşekkür borçluyuz. Sempozyumun gerçekleştirilmesinde ortaya çıkan sorunlara pratik ve hızlı çözümler üreten, gösterdiği sabır, uyum ve anlayışı takdire şayan İktisadi ve İdari Bilimler Fakültesi Dekanımız Prof.Dr. İbrahim Attila ACAR'a, sempozyumun öncesinde, sırasında, sonrasında bitmeyen enerjisi ve heyecanıyla başarıda büyük pay sahibi olan, düzenleme kurulu başkanı, Uluslar Arası İlişkiler Bölümü öğretim üyesi Doç. Dr. Nesrin DEMİR'e değerli katkılarından dolayı teşekkürlerimizi sunarız. Sempozyuma bildirileriyle katkı sağlayan katılımcılara da teşekkür ediyoruz.

28-30 Mayıs tarihlerinde yapılan sempozyumda tam bildiri metnini gönderen katılımcıların hukuki ve akademik sorumlulukları kendilerinin olup; bildirilerin redaksiyonu yapılırken anlam ve içerik kaymalarının olmamasına azami dikkat gösterilmiştir.

Dr. Osman TEKİR
Düzenleme Kurulu Üyesi

İÇİNDEKİLER
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A SHORT COMPARATIVE ANALYSIS (GERMANY-ROMANIA-TURKEY) REGARDING THE USE OF BIOGAS AS RENEWABLE ENERGY

Gina Raluca KERKMANN*
Yavuz HATUNOĞLU†

ABSTRACT

In the context of the global demographic explosion (according to the United States Census Bureau, in year 2012, there were 7 billion people) accompanied, on the one hand, by the rapid decrease of natural resources as a result of overexploitation, and on the other hand, by the increase of energy needs of the world population, investments in the exploitation technology of renewable resources emerges as a top priority.

Among these resources (as a result of the chain biomass – biogas - electricity and heat) biogas plays an important role; the developed European countries already have clear legislative regulations regarding this type of energy as well as investments in the field with visible benefits for both residents and natural environment. All the investments in technical installations for biogas production – at farm or individual household level - represent the result of a citizens' adequate training in the field (specialized courses but also environmental education) followed by the option for clean energy sources.

This paper presents a comparative analysis regarding this type of renewable energy source – biogas - having as example of a country with old tradition in this field: Germany.

Based on this example in the field of biogas production – legislation, costs of biogas production, environmental projects, there are analyses of both the progresses and minuses registered in two countries, namely Romania and Turkey. Romania is an ex-communist country, member of the European Union that experiences democracy and the rules of a free market economy, but also in a period of acute economic crisis. Turkey is a candidate country for the European Union membership that is characterized by a high economic growth and excellent political and economic stability. For Turkey, there is also a short analysis of Ağrı, which is the authors' place of residence.

Keywords: biogas, environment, legislation, benefits.

ÖZET

Küresel demografik patlama bağlamında aşırı kullanımı sonucunda doğal kaynakların hızla azalması ile, bir yandan, eşlik (2012 yılında Amerika Birleşik Devletleri nüfus sayımı bürosuna göre, orada 7 milyar kişi vardı), ve üzerinde Öte yandan, dünya nüfusunun enerji ihtiyacının artması ile, yenilenebilir kaynakların sömürülmesi teknoloji yatırımları öncelikli olarak ortaya çıkmaktadır.

Biyogaz - Bir zincir biyokütle sonucunda elektrik ve ısı) bu kaynakların arasında biyogaz önemli bir rol oynar; gelişmiş Avrupa ülkeleri zaten sakinleri ve doğal çevreye hem de görebilir yararları ile alanında enerji gibi yatırımlar bu tür ile ilgili net yasama düzenlemeleri, var. Çiftlik veya bireysel hanehalkı düzeyinde - - biyogaz üretimi için teknik tesislerde tüm yatırımlar temiz enerji kaynakları için seçeneği tarafından izlenen bir vatandaş alanda yeterli eğitim (özel kurslar aynı zamanda çevre eğitimi) sonucunu temsil eder.

Biyogaz - - Bu kağıt yenilenebilir enerji kaynağı bu tip ile ilgili karşılaştırmalı bir analizini sunan bu alanda örnek olarak eski geleneği olan bir ülke olan Almanya. Biyogaz üretimi alanında bu örnekte dayanarak - mevzuat, biyogaz üretiminin maliyetleri, çevre projeleri, iki ülke, yani Romanya ve Türkiye'de kayıtlı gelişmeleri ve eksileri de orada analiz edilir. Romanya eski komünist ülke, demokrasiyi ve serbest piyasa ekonomisinin kurallarını değil, aynı zamanda akut ekonomik kriz dönemi yaşamaktadır Avrupa Birliği üyesidir. Türkiye, yüksek ekonomik büyüme ve mükemmel siyasi ve ekonomik istikrar ile karakterizedir Avrupa Birliği üyeliği için bir aday ülkedir. Türkiye için, aynı zamanda ikamet yazarların yeri olarak, Ağrı kent formunun kısa bir analiz bu bakış açısı yapılır.

Anahtar Kelimeler: biyogaz, çevre, mevzuat, yararları.

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1. INTRODUCTION

1.1. The term "renewable energy" refers to those forms of energy produced by the transfer of energy resulted from natural renewable processes. The energy from biomass is part of this category; one form of energy recovery is fermentation, which generates biogas (CH4) or bioethanol (CH3-CH2-OH) in case of fermentation of sugars. The biogas can be directly burnt, while the bioethanol, blended with gasoline, can be used in internal combustion engines (Wikipedia, 2014).

1.2. This paper presents a comparative analysis regarding this type of renewable energy source – biogas- having as example country with old tradition in this field: Germany.

1.3. Based on this example in the field of biogas production – legislation, costs of biogas production, environmental projects, there are analyses of both the progresses and minuses registered in two countries, namely Romania and Turkey. Romania is an ex-communist country, member of the European Union that experiences democracy and the rules of a free market economy, but also in a period of acute economic crisis. Turkey is a candidate country for the European Union membership that is characterized by a high economic growth and excellent political and economic stability. For Turkey, there is also a short analysis of Ağrı, which is the authors' place of residence.

2. MATERIALS AND METHODS

2.1. The method used for the present study is the consulting of different bibliographical sources followed by the extraction of the information items of interest and their interpretation.

3. RESULTS AND DISCUSSION

3.1. The global population has been continuously increasing. According to the United Nation Department of Economic Affairs (Population Division, Population Estimates and Projections Section), in 2010 it reached seven billion inhabitants and the prognosis for 2100 indicates more than 10 billion people (10,853,849,000). For the same period 2010 - 2100, the aforementioned source estimated an increase of the population in Turkey from 72,138,000 to 86,465,000 inhabitants, while for Germany and Romania it indicates a decrease (from 83,017,000 to only 56,902,000 people, respectively from 21,861,000 to only 12,603,000 people) (The United Nations Department of Economic and Social Affairs 2012).

3.2. Consequently, the accelerated rhythm of population increase at global level (particularly in certain countries, such as Turkey), in spite of the decrease of the inhabitants' number in certain countries such as Germany (but here we remark the increase of the standards of living), will surely lead to the increase of the energy consumption per capita.

3.3. From this point of view, a statistics of EIA (U.S. Energy Information Administration) emphasizes a decrease of the energy consumption per capita in Germany from 171 Btu in 2005 to 165.4 Btu in 2011; in Turkey (a country with a comparable number of inhabitants), for the same period, the consumption increased from 51.5 to 61.4 Btu; paradoxically, in Romania (a country of about 22 million inhabitants, in 2011, energy consumption was 75.6 Btu, higher than that registered in Turkey (61.4 Btu) (FIG.1a). However, the decrease in the energy consumption in 2011 compared to 2005 may be a consequence of the general decrease of the standards of living induced by the acute economic crisis the country still confronts with in the present (the continuous increase of the Gcal price due to inflation) (Dediu, 2009:179).

3.4. Given the reduction of the main environmental resources due to overexploitation (fossil fuels, oil), the use of renewable energy sources must become a priority; in developed countries, their capitalization in terms of energy production should not only partially cover the energy demand, but also contribute to the reduction of environmental pollution.

3.5. In the European Union, 4% (69 MtOE) of the consumed primary energy comes from the exploitation of biomass. In the long term, the European countries established a target for 2020: 20% of the energy to be ensured by renewable sources, 230 – 250 MtOE from the capitalization of biomass. According to The Biomass Action Plan, there could be created 250,000 – 300,000 jobs, especially for the inhabitants of rural areas, as the EEA Report (European Environment Agency) (EEA report7/ 2006:10) forecasts.

3.6. From this point of view, Germany is among the top European countries as important share of its energy demands is covered by the capitalization of the "green potential". The main biowaste streams contributing to this potential are solid agricultural residues (e.g. straw), wet manures, wood processing residues, the biodegradable part of municipal solid waste and black liquor from the pulp and paper industry (EEA Report 7/2006:8).

3.7. A report made by the Agency for Renewable Resources demanded by the Federal Ministry of Food, Agriculture and Consumer Protection indicated that in 2012 approximately 11.6% of total primary energy was covered by energy from renewable sources.

3.8. The income achieved in 2012 from the exploitation of renewable resources was also notable: of the 14.4 billion Euros, 6.77 billion Euros are costs for heating and electricity from biomass, while 3.53 billion Euros represents the income generated by fuels obtained from the exploitation of biomass (Fachagentur Nachwachsende Rohrstoffe e.V., 2013:6).

3.9. The target of Germany for 2050 (about 23% of the population's energy demand to be ensured by the capitalization of biomass) involves investments in the construction of specific installations. In 2003 the total number of biogas installations was 1,750 at national level and it increased to 7,515 in nine years. The same source (Agentur für Erneuerbare Energien, 2015) forecasts an increase of this number with another 305 biogas installations in 2014 as well as a 40 MW increase in the total installed capacity, from 3,547 MW in 2013 (FIG.1b).

3.10. Other sources mention 7,700 biogas installations with a total installed capacity of 3,400 MW at the end of 2013 (DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH, 2014:8).

3.11. In Germany, the costs of biogas installations range from 4,500 to 9,000 Euros (FIG. 2). Thus, it can be easily noticed that the German state encourages investments in such installations through prices inversely proportional to the increase of the total installed capacity (Agentur für Erneuerbare Energien, 2015).

Fig. 1a – Average consumption per capita in the analysed countries between 2005 and 2009 (Dediu, M (2009).

Fig. 1b – Dynamics of the number of biogas installations in Germany (1992-2014) (Agentur für Erneuerbare Energien, 2015).

Fig. 2 – Costs of biogas installations in Germany (Agentur für Erneuerbare Energien, 2015) (Agentur für Erneuerbare Energien, 2015).

Fig. 3- Composition of the main substrates used in specific installations for biogas production in 2012 (Fachagentur Nachwachsende Rohrstoffe e.V., 2013:36).

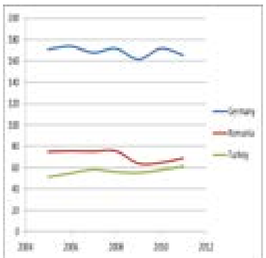

Fig. 1a

Fig.1b

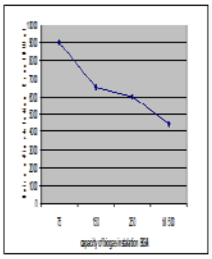

Fig. 2

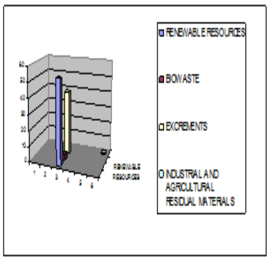

Fig. 3

3.12. The substrates used in biogas production in the installations from Germany are represented by 54% renewable raw materials, faeces (41%) and other categories in smaller shares (FIG. 3) (Fachagentur Nachwachsende Rohrstoffe e.V., 2013:36).

3.13. The success registered by Germany in terms of increasing the share of renewable sources in energy production is undoubtedly supported by a solid legislative basis (EEG 2014). With specific reference to the technical characteristics of the installations, which are the design and use of connections (part 2, paragraph 9, 10), the conditions in which the plant can be improved to increase production capacity (part 2, paragraph 12), the specification of some material damages (part 2, paragraph 13) and more. Chapter 4 includes strict provisions referring to the capitalization of biomass (part 4, paragraph 44) as well as to the regime of biological waste fermentation (part 4, paragraph 45) (Erneuerbare – Energien - Gesetz – EEG, 2014:1-14).

3.14. If Germany represents a standard from the point of view of the capitalization of renewable energy (especially of biogas), the situation is quite different in the other European countries. We mention here the case of an ex-communist country, namely Romania, where, after the 1989 revolution and democracy emergence, the slow transition towards a real market economy draws our attention.

3.15. Unfortunately, any official statistics regarding the number of biogas installations in Romania in 2015 are not available.

3.16. In 2014, the number of biogas installations in Romania was quite reduced, only seven, with a total installed capacity of 500 kW; the first installation was set up in 2013 at Filipestii de Padure 9, Prahova County).

The investment cost 5 million euros and it has an installed capacity of 1MW/h electric power and 1.2 MW/h thermal power resulted from processing 49 t organic substrate/day (Zaharia C., 2015).

Photo 1 – The first Romanian biogas installation from Filipestii de Padure (Prahova County) (July 2013) (Green raport, cenus data).

3.17. From the legislative point of view, Romania respects the Directive of the European Parliament and the Council of Europe regulating the production and distribution of electricity from renewable sources (Jurnalul Oficial al Uniunii Europene, 2009:93).

3.18. At national level, starting with 2008, Romania has law no. 220 for establishing the promotion of renewable energy sources (LEGE nr. 220, 2008) , republished in 2010 under Art. II of Law no. 139/2010. This is based on the former electricity law no. 13/2007 completed by Decree no. 88/2011.

3.19. The law nationally regulates the issuance, use and value of green certificates, attesting the production of a certain amount of energy from renewable sources; they are emitted by NERA - National Energy Regulatory Authority to those producers that use renewable sources (LEGE nr. 220/2008). The GC system is based on a system of mandatory quotas that electricity producers are required to produce from renewable energy sources (RES) in order to get permission to sell electricity to the final consumers (Biogas heat, 2012:27).

3.20. However, in 2012 the country detailed the implementing rules, making possible the authorization of biogas energy producers (Law no. 123/2012). 2 GC are granted for each MWh of produced and delivered biogas electricity (Biogas heat, 2012:27).

3.21. Despite the regulations in the field, there is not any available official statistical data regarding the total production of biogas in Romania and the percent of total national production.

3.22. However, we remark an increasing interest in the elaboration of projects, such as BioGas Heat from 2012, the purpose of which is the implementation of the national policy for the use of heat from biogas plants in Romania. The project was supported by the European Commission through the Intelligent Energy – Europe Programme (Biogas heat, 2012:31).

3.23. In Romania, the subject received a great deal of attention and conferences were organized. The most recent one in 2014 is -The National Conference – Biomass, Biogas & Cogeneration Romania 2014 (Romanian News Press Agency (AGERPRES, 2014).

3.24. Turkey is among the developed countries of the world. In Turkey, electricity consumption registers an 8% increase per year according to the Ministry for Energy and Natural Resources (Energie und Natürliche Ressourcen). A great share of the electricity demand is covered by imports. According to the National Agency of Statistics (TÜV), in 2011 of the total amount of 210 Mrd. dollars paid for imports, 54 Mrd dollars were spent for energy (22%) (ODA, 2012:4).

3.25. Even if Turkey imports energy, it has important energy resources, namely 11.6 billion tons of brown coal and 1.3 billion tons of hard coal. The future targets of Turkey are ambitious, aiming at a 30%

increase of renewable energy sources by 2023. With regard to the potential of biogas production, a report of TMMOB (Verband der Türkei Ingenieurskammern und der Architektur) for 2012 shows an energy potential of biogas of 35 billion kWh (ODA, 2012:6).

3.26. For Ağrı region, the energy potential of biogas is estimated 13,113 (TJ/year) according to a study made by a team of Turkish and German experts; an important share comes from the following areas: energy crops (grass) (58.55%), cereal straws (23.73%) and animal waste (poultry + cattle) (17.03%). The other categories (sugar beet and tomato waste) hold together only 0.65% (FIG.3) (DBFZ - Deutsches Biomasse Forschungs Zentrum gemeinnützige GmbH, 2011:125).

3.27. The former leadership of the city had started an ambitious project in terms of energy from biogas that would provide 500 jobs in the area (www.lternatifenerji.com, 2013). We hope these projects will become a priority for the region.

3.28. One of the most important achievements of Turkey is the establishment of the power exchange EPIAS (Enerji Piyasalari Isletme) in 2014.

3.29. Following the liberalization of the energy market in Turkey, foreign investments in the energy sector increased; German investors brought a contribution of 5 billion euros by 2014 (Bagoglu, C., 2014).

3.30. In terms of legislation, Law No. 5346 was published in the Official Gazette from 18 May 2005, which regulates the production of energy from renewable sources, production capacity and costs of sale on the energy market (Kanun Numarası 5346 / 2005). This law was completed by Law No. 6094 from 29 December 2010 (Kanun No. 6094, 2011).

4. CONCLUSIONS

4.1. While Germany is an example in terms of legislation and share of energy from renewable sources, other countries like Turkey and Romania register important progress in this field with ambitious future projects and also outstanding achievements, such as the Energy Exchange EPIAS (Enerji Piyasalari İşletme). Turkey is already an important milestone in renewable energy production, biogas in particular. The present government and the favourable economic situation promote it among the countries with important decision-making power.

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EFFECTS OF ENERGY POLICY AND EFFICIENCY ON ENVIRONMENT IN TURKEY

TÜRKİYE'DE ÇEVRE ÜZERİNDE ENERJİ POLİTİKASI VE VERİMLİLİĞİNİN ETKİLERİ

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ABSTRACT

At present, Turkey relies on coal, oil, natural gas and hydraulic for its energy. The Turkish Government has plans to meet the energy demand in the country, considering all the alternatives including wind, solar, geothermal, biomass, and other resources. The aim is to create an energy-sufficient country with a continuous, high quality, relaible and economic electricity supply, and also to encourage sufficient investments to meet the growing energy demand in Turkey. The high energy demand in Turkey is closely linked to economic growth, industrialization and population increase.. Thus, the recent projects also includes energy efficiency measures to help reduce waste in energy consumption.

The national energy policy of Turkey is also saving of energy and utilization of domestic energy sources. Due to the increasing trends in the consumption of non-renewable energy resources paralel to the economic, social and population growth in Turkey, there have been substantial problems in meeting the quality requirements of greenhouse gas emissions. As a result, additional efforts still need to be made and policy makers will need to be selective about the policy instruments.

In the longer term, new technologies related to renewable energies will also find cleverer ways of reducing environmental costs, and renewable energy systems will be operated as both relably and economically without waste-disposal problems. It is expected that the related projects will help to enhance energy security, support a clean energy transition, and increase private sector involvement in the development and financing of clean energy and energy efficiency investments.

Keywords: Energy Policy, Efficiency, Sustainable Development, Turkey

ÖZET

Şu anda, Türkiye enerjisi için kömür, petrol, doğal gaz ve hidroliğe güvenmektedir. Türk Hükümeti rüzgar, güneş, jeotermal, biyokütle ve diğer kaynaklar dahil bütün alternatifleri göz önünde buludurarak ülkede enerji talebini karşılamak için planlara sahiptir. Amaç, sürekli, yüksek kalitede, güvenilir ve ekonomik elektrik arzıyla enerjisi yeterli bir ülkeyi oluşturmak ve ayrıca Türkiye'de büyüyen enerji talebini karşılayacak yeterli yatırımları teşvik etmektir. Türkiye'de yüksek enerji talebi ekonomik büyüme, sanayileşme ve nüfus artışıyla yakından bağlantılıdır. Böylece, son projeler ayrıca enerji tüketimindeki israfı azaltmaya yardımcı olmak için enerji verimliliği önlemlerini kapsamaktadır.

Türkiye'nin ulusal enerji politikası ayrıca enerjinin tasarruf edilmesi ve yerli enerji kaynaklarının kullanımıdır. Türkiye'deki ekonomik, sosyal ve nüfus büyümesine paralel olarak yenilenebilir olmayan enerji kaynaklarının tüketimindeki artan eğilimler nedeniyle, sera gazı emisyonlarının kalitesi gerekliliklerini karşılamada önemli problemler vardır. Sonuç olarak, ilave uğraşların halen yapılması gerekmektedir ve politika yapıcıların politika araçları hakkında seçici olması gerekecektir.

Uzun vadede, yenilenebilir enerjiler ile ilgili yeni teknolojiler de çevresel maliyetleri azaltmada daha akıllıca yolları bulacaktır ve yenilenebilir enerji sistemleri hem güvenilir ve hem de ekonomik olarak israfı yok etme problemleri olmaksızın çalışmış olacaktır. Bekleneceği üzere ilgili projeler enerji güvenliğini artırmaya yardım edecek, temiz bir enerjiye geçişi destekleyecek ve temiz enerji ve enerji verimliliği yatırımlarının finansında ve geliştirilmesinde özel sektörün katılımını artıracaktır.

Anahtar Kelimeler: Enerji Politikası, Verimlilik, Sürdürülebilir Gelişme, Türkiye

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1. INTRODUCTION

The high energy demand in Turkey is closely linked to economic growth, industrialization, and population increase. Turkish general energy policies are designed to support economic and social development. Natural conditions of Turkey are favorable for utilization of new and renewable energies, such as hydraulic energy, geothermal energy, wind energy, biomass energy, solar energy, and, probably, nuclear energy. As the use of hydraulic and coal in Turkey will reach its full capacity by 2020, imported natural gas, coal, and other resources will be used to meet the energy demand. By 2020, approximately 75% of final energy demand and 67% of electricity supply will be met by coal, oil, and natural gas. A considerable import dependency exists in oil and natural gas.The primary energy resources (such as coal, oil and natural gas) are scarce and their use with inferior technologies result in an energy generation at non-economical prices and damage the environment.Energy generation of Turkey from its own domestic resources is, at present, about 40% and is expected to be at 20% by 2020. Thus, Turkey will be forced to import energy in increasing proportions. Turkey has in recent years started to pay closer attention to the benefits of energy efficiency for securing energy supplies, reducing pollution and saving money (MENR, 2014).

At present, the preferential choices in energy systems are made according to the inputs of economical, political, and partly environment and human life. Energy requirements for human beings has increased sharply throughout the development of civilization, and there is a firm relationship between the level of development and amount of energy consumed in a country.

To guarantee the energy needs of a country, the environment, cultural heritage, and rich natural sources should be considered. There is no equal relationship between the supply and demand functions in energy utilities. The national energy policy of many countries is now saving energy and utilization of domestic energy sources. In the coming decades, responses to environmental issues are to affect patterns of energy use in Turkey also.

The demand for energy increases tremendously. At present, 77% of world energy production is consumed by 28% of the world's population living in the industrial countries. The world's population is expected to reach 9.6 billion in 2050, which is about 1.3 times that of today's population (UN, 2013). Ninety percent of the population growth will be in the developing countries, which already have more than three-quarters of the world's population. Thus, there will be a great energy demand almost tripling it by 2050, even if the developed countries adopt more effective energy conservation policies so that their energy consumption does not increase at all over that period. However, developing countries and residents of rural areas often must construct their own elecricity generating facilities.

Turkey has the second highest energy consumption growth after China and is highly dependent on external energy resources. Under these circumstances, some legislative or tax advantages must be provided to the producers and consumers. To reduce the share of state finance, private enterprises have been given the right to invest , operate and trade in the electricity sector.

Turkey's energy strategy is aimed at satisfying demand without preventing economic growth. The MENR prepares energy generation and demand plans in accordance with the growth targets given by the Ministry of Development(MD, 2014). Plans are closely related to factors, such as development, industrialization, urbanization, technology, andconservation.Within MENR, the Energy Market Regulatory Authority (EMRA) regulates and supervises the electricity market and also monitors the progress in the renewable energy segment of the market.To meet such an energy demand for new energy plans, Turkey needs to spend approximately US$225-280 billion up to 2020, which its 60 per cent (US$ 135-168 billion) is predicted to use for the machinery(MD, 2014).

As pointed out in the Strategic Plan 2015-2019, the aim of the Turkish Government is to ensure continuous, high quality, reliable and economic electricity suppl , and also to encourage sufficient investments to meet the growing energy demand in Turkey. This plan of the MENR consists of 8 themes, 16 goals and 62 objectives in total. The 8 themes are gathered under the terms of energy supply security; energy efficiency and energy saving;good governance and stakeholder interaction;regional and international effectiveness;technology, research and development and innovation;improvement of investment environment; raw material supply security and finally efficient and effective use of raw material by consideringenvironmental, economic and sustainability principles for the possible goals, objectives and strategies.Thus, an energy policy has been developed to supply high quality , reliable and inexpensive forms of energy to the consumers in a timely manner. It is necessary that investments on transmission and distribution infrastructure should continue and should be completed on time for the purpose of supporting the sectoral growth in electricity and natural gas.Natural gas storage capacity is not adequate currently and is required to be increased(MENR, 2014).

In order to improve the economy , support ecology and save energy , the planning and construction of all industrial plants must consider environment. Energy investments, which are closely related with the environmental protection, require massive financial resources. To cost-effectively improve the environment, the clean power generation is required to meet the growing worldwide energy demand while conserving resources.

Turkey has aimed at increasing domestic production by public, private, and foreign utilities, and increasing efficiency by rehabilitation of existing plants and acceleration of existing construction programsto initiate new investments.Security of supply is handled as three components which are respectively supply, demand and infrastructure.

For the public awareness, the areas to be covered include basic concepts of energy and energy efficiency; general energy status of Turkey; energy resources; energy generation technology; efficient use of energy in daily life; and the role of energy efficiency in climate change and environmental protection.

2. ENERGY, ENVIRONMENTAND SUSTAINABLE DEVELOPMENT

The growth targets given by the State Planning Organization(SPO) are closely related to the factors such as development, industrialization, urbanization, technology and conservation(MD, 2014). To ensure the energy need of a country, the environment, cultural heritage and rich natural sources should be applied .On the other hand, it is also important to use standardized equipment and materials in all areas of energy generation, transmission, distribution and trade.

Although Turkey has recently experienced some of the fastest growth in energy demand of countries in the OECD, its energy use is still relatively low. According to the International Energy Agency (IEA), energy use will continue to grow at an annual growth rate of around 4.5% from 2015 to 2030, approximately doubling over the next decade. The IEA expects electricity demand growth to increase at an even faster pace. Turkey's total energy consumption was 112 Mtoe in 2013, up 12% from 2007(IEA, 2014).

With the average values for the world's total finalconsumption by sectors in 2035 the IEA estimates that the buildings and agriculture sectoris to be the largest user, accounting for 33.1% of the total. The sectors of industrial, transport and non-energy use will account for 29.6%, 26.6% and 10.7%, respectively (IEA, 2010).On the other hand, the shares of world resource consumption by sectors are as shown in Table 1.

Table 1. Shares of World Resource Consumption by Sector, 2012

	Resources			
Sector	Coal	Oil	Natural Gas	Electricity
Industry	80	8,5	36,5	42,3
Transport	0,4	63,7	6,6	1,6
Non-energy use	4,3	16	13,5	-
Other	15,3	11,8	43,4	56.1

Source: IEA,2014

In Table 1, the other sector includes agriculture, commercial and public services, residential, and non-specified other.

Since 1990, the share of services and the primary sector in Turkey has nearly doubled and that of industry increased slightly, while transport and residential have seen their share moderately decline. In absolute terms, energy use in all sectors has increased substantially over the past two decades, reflecting strong economic growth(IEA, 2010).

The energy systems in both developing and developed countries can have significant environmental impact. Therefore, a sustainable global energy system must optimize efficiency and limit emissions. As concluded by the World Energy Council(WEC), sustainable energy systems are achievable if vigorous action is taken in several areas such as energy diversity and efficiency, cost reflective prices, market-sensitive interventions, supply reliability, regional integration of energy systems, market-based climate change responses, technological innovation and development, and public trust (WEC, 2013).

In relation to the energy supply and demand in Turkey, the general data is shown in Table 2.

Table 2. Electricity Supply and Demand inTurkey

	Year				
Data	2007	2009	2011	2012	2013

Population (10^6)	70.5	72.5	74.7	75.6	76.6
Installed capacity (MW)	40835	44761	52911	57059	64007
Gross Electricity Generation (TWh)	191.5	194.8	229.3	239.4	240.1
Electricity supply (TWh)	181.7	185.8	218.4	230.5	235.1
Electricity demand (TWh)	190.0	194.0	230.3	242.3	246.3
Per capita supply (kWh)	2575	2562	2924	3049	3068
Per capita demand (kWh)	2692	2675	3082	3205	3213
Per capita net consumption (kWh)	2198	2162	2490	2577	2583

Source : MENR ,2014

Use of fossil fuels with high sulfur and ash content, old combustion technologies and out-of-date industrial premises, insufficient use of air pollution control devices and insufficient insulation practices are still some of the main causes of air pollution problems due to energy utilization in Turkey .Besides the emissions of carbon dioxide from burning fossil fuels , the combustion of coal may also release toxic metals and radioactive substances.These wastes can cause environmental and health damage.

As shown in Table 3, the shares of energy generation by sources in Turkey is highly dependent on the coal and natural gas. It is however , a known fact that the share of hydraulic resources to the world elecricity generation is only 16.2%. This amount for Turkey was about 24.2% in 2012 and 16.1% in 2014(TEIAS, 2014; MENR, 2014; IEA, 2014) .

Table 3. Share of Electricity Generation by Sources (%)

Energy Resources	World (2012)	Turkey (2012)	Turkey (2014)
Coal	40.4	27.5	29.2
Natural gas	22,5	43.7	48.7
Hydro	16,2	24.2	16.1
Nuclear	10,9	-	-
Oil	5.0	1.5	1.8
Other	5.0	3.1	4,2
Total(TWh)	22668,0	239	250,0

Source: TEIAS, 2014; MENR, 2014; IEA, 2014

Asimilartrend for the regions ofOECD andworld can be seen in Tables 4 and 5(IEA, 2014).

Table 4. Fuel Shares of Total Primary Energy Supply, 2012

Resources	World	OECD
Oil	31.4	35.8
Coal	29	19,4
Natural gas	21,3	25,8
Biofuels + waste	10	5,3
Nuclear	4,8	9,7
Hydro	2,4	2,3
Other	1,1	1,7

Source: IEA, 2014

In Table 4, the share of oil in total primary energy supply is the first level, and the fosil fuels(oil, coal and natural gas) include around 81% of total.

Table 5. Fuel Shares of Total Final Consumption, 2012

Resources	World	OECD

Oil	40.7	47.6
Electricity	18,1	22,3
Natural gas	15,2	19,8
Biofuels + waste	12,4	5
Coal	10,1	3,4
Other	3,5	1,9

Source: IEA, 2014

For both regions of OECD and world, regarding of the fuel shares of total final consumption in 2012, oil keeps its role in the first level(see, Table 5).

According to the TEIAS data, as shown in Tables 6-8, the most of installed power capacityin Turkey belongs to thethermal energy plants(TEIAS, 2014).

Table 6. Installed Capacity by Source (%)

	Year					
Energy resources	2007	2009	2011	2012	2013	2014
Thermal	66.8	65.6	64.1	61.4	60.4	61.2
Hydro	32.8	32.5	32.4	34.4	34.8	34.0
Geothermal+Wind	0.4	1,9	3,5	4,2	4,8	5,8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: TEIAS, 2014

Table 7. Electricity supply by source (%)

	Year				
Energy resource	2007	2009	2011	2012	2013
Coal	27,9	28,6	28,8	28,4	26,6
Hydro	18,7	18,5	22,8	24,2	24,7
Natural Gas	49,6	49,3	45,4	43,6	43,8
Geothermal+Wind	0,3	1	2,4	2,8	3,7
Other	3,5	2,6	0,6	1	1,2

Source: TEIAS, 2014

Table 8. Electricity Generation by Source (%)

	Year					
Data	2007	2009	2011	2012	2013	2014
Thermal	81.0	80.5	74.8	73.0	71.6	79.7
Hydro	18,7	18,5	22,8	24,2	24.7	16.1
Geothermal+Wind	0.3	1.0	2,4	2,8	3.7	4.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: TEIAS, 2014

It isa known fact that at the present moment, the contrubition of renewable energy to the world primary energy is not high to meet the primary energy and electricity supplies.The trends in relation to renewable energy are the same for Turkey also. However, it will help to obtain national savings and reduce environmental problems related to the usage of fossil fuels. A general data given by TEIAS indicates that the shares of electricity generation and energy consumption in Turkey are highly related to the imported resources as shown in Tables 9 and 10.

Table 9. Electricity Generation by Source (%), 2013

Energy resource	Import	Domestic
Natural gas	43.8	-
Coal	13.0	13.6
Oil	0.7	-
Hydro	-	24.7
Renewables	-	4.2

Table 10. Energy Consumption by Source (%), 2013

Energy resource	Import	Domestic
Natural gas	30.1	0.4
Oil	27.3	2.0
Coal	16.5	12.6
Waste	-	3.5
Hydro	-	4.2
Renewable	-	3.4

Source: TEIAS, 2014

Turkey produces both hard coal and lignite which make an important contribution to Turkey's energy sector and power mix, and is aimed to expand its role in electricity demand. The use of coal (and especially of lignite) increases energy security, but also creates risks in local environmental pollution and greenhouse gas emissions. Environmental and climate change issues should be fully taken into account when assessing the competitive position of coal in the power generation mix. Carbon dioxide emissions per unit power at the point of use are twice as high for coal as compared to gas, but hydro, nuclear power, and most renewables do not directly contribute any. Fossil fuels, particularly coal and gas, will remain importan(IEA, 2013).

Renewable energy can be used to displace fossil fuels such as natural gas, oil, or coal. These sources are both environmentally safe and economically sustainable. Renewables offer the potential for carbon free energy.The TEIAS indicates that the planned installed

capacity by renewable energy sources is as shown in Table 11.

Table 11. Planned Installed Capacity by Renewable Energy Sources (MW)

	Year			
Energy resources	2013	2015	2017	2019
Hydraulic	22289	25000	27700	32000
Wind	2759	5600	9500	10000
Geothermal	311	360	420	700
Solar	-	300	1800	3000
Biomass	237	380	540	700

Source: TEIAS, 2014

On the other hand, the predictions indicate that,by 2020, per capita consumption in Turkey will just reach the level of the present consumption of today's developed countries(TEIAS, 2014).In Table 12, a few energy statistics of Turkey have been compared with the other countries(IEA, 2014).Turkey's electricity consumption per capita is slightly below the world average, 2760 kWh compared with a world average of 2972 kWh, and equal to one - thirds of the OECD average (IEA, 2014).

Table 12. Energy Statistics in 2012

Data	World	OECD	China	Turkey
Population (million)	7037	1254	1358	74.9
GDP(billion 2005USD)	54588	39490	4756	627.75
Energy production (Mtoe)	13461	3869	2525	30.56
Electricity consumption (TWh)	20915	10145	4737	206.71
CO_2 emissions(Mt of CO_2)	31734	12146	8251	302.28
Per capita consumption (kWh)	2972	8089	3488	2760

Source: IEA, 2014

Renewable Energy Law of Turkey, which has been passed by the Turkish Parliament on May 10, 2005, allows the produced electricity to be supplied to the grid but still more legitimate arrangements in producing energy from renewables (biomass, geothermal, wind, and solar) are necessary. The share of these renewables is, at present, about 11% ofTurkey's domestic primary consumptionand it is expected that the energy produced by wind, geothermal, and solar sources will be increased as the share of biomass (wood, animal, and plant waste) energy slightly decreases (MENR, 2014).

Whereas ,hydraulic energy is both environmentaly safe and economically sustainable when compared to other sources of energy. The use of hydropower brings manyprofits for water supply and for irrigation in agriculture, but it has consequences for the aquatic ecosystems. It should be noted that biodiversity in aquatic ecosystems by chemical pollution, eutrophication, and the structural change (loss of wetlands, deforestation, water abstractions, obstruction and accumulation of rivers) is disproportionately affected.

Dams are necessary not only for irrigation and hydropower, but also for the domestic water supply in large cities. However, dams also result in flooding which can be good or bad, depending on local conditions. It is expected that emissions are considerably lower than those of gas and coal power plants. The amount of methane (CH_4) and carbon dioxide(CO_2) produced depends on the vegetation that decomposes after impoundment. The hydraulic projects often improve environmental conditions, providing wetlands and various new developments in the vicinity of the reservoir. Hydropower plants change solids and sediment regime, the reservoir area and downstream. In the river damming biomass is converted into greenhouse gas(MD,2014).

In 2014, the hydro installed power capacity in Turkey is 23691 MW, which corresponds to only48% of the total economically feasible potential of the country. Up to 2020, it is expected that about 1121 new hydro plants will be constructed to make use of the full available potential, and that the total hydro installed capacity will be almost 47524 MW(SHW,2013).

Geothermal power plant is sustainable and emits low emissions when compared to the emission intensity of conventional fossil fuel plants.The pollutants (a mixture of gases and toxic elements) could cause environmental damage if released. By injecting cooled geothermal fluids back into the earth this environmental risk is reduced.

It is also known fact that the environmental impact of wind power when compared to the environmental impacts of fossil fuels, is relatively minor. While a wind farm may cover a large area of land, many land uses such as agriculture are compatible with it..The ecological impacts may or may not be significant, depending on specific circumstances. They affect the siting and operation of wind turbines. Some noise generated by wind turbines may also cause negative health effects on people who live very close to wind turbines.

In Turkey, the energy produced with renewables (except hydro) is mostly used for heating and cooking. Within this framework, theeconomic electricity production potential of wind and geothermal sources is estimated at around 20,000 MW and 4,500 MW, respectively. In addition, the economic geothermal heating potential is 31,500 MW which can meet 30% of all heating needs, but currently only 0.5% of potential is used. The present installed capacity of wind energy is 3630 MW and it is only 405 MW for geothermal energy(TEIAS, 2014). The economic heating and electricity potential of solar energy has an estimated 116,000 MW, and the energy produced with solar energy is, at present, only used for heating, which is already less than 1% of the national energy production. As the power generation by solar energy is not envisioned in the current development plan, the authorities do not view it as cost effective. There is, however, a great deal on solar thermal and PV installed power. Obviously, more research into renewable energy is needed (MENR, 2014; EUAS, 2013).

Turkey is facing significant energy and environment policy challenges, including on energy security and emissions to air, and the government needs to explore all possible means to respond to them. In particular, Turkey should ensure that its energy efficiency, low-carbon and renewable energy policy goals will be successful through adequate funding and strategic design of energy research and development.

Diversification of primary energy resources and utilization of the country's resources rationally are the key components for both of sustainability and low cost energy supply.Fora sustainable development the next investments on industry should be made for the clean technologies in regard with the environment-friendly. Depending upon the latest technological developments the economic and political factors will also affect the quality of the cleaner environment. To provide the resource diversity, utilization of domestic renewable energy resources such as hydro, wind, solar, geothermal, biomass should be increased in electricity(MENR, 2014).

On a fuel basis, as shown in Table 13, coal has remained the dominant source of CO_2emissions in the world. In 2012, it accounted for 43.9% of emissions, a relatively stable share since 1990. Emissions from oil use (35.3% of the total) were higher than those from natural gas use (20.3%).

Table 13. Fuel Shares of World's CO_2 Emissions, 2012

Energy Resources	(%)
Coal	43.9
Oil	35.3
Natural gas	20.3
Other	0.5
Total	100.0

Source: IEA, 2014

According to the data given in Table 12, the regional share of CO_2 emissions indicates that the OECD countrieshave planned to reduce emissions up to 29% by 2035(IEA, 2014).

Table 14. Regional Shares of Electricity CO_2 Emissions (%)

	Year	
Region	2012	2035
OECD	38.3	27.3
China	26.0	24.65
Asia	11.6	19.85
Middle East	5.2	6.95
Africa	3.3	3.65
Other	5.6	17.6
Total	100.0	100.0

Source: IEA, 2014

Turkey has been a Party to the United Nations Framework Convention on Climate Change (UNFCCC) since 2004 and to the Kyoto Protocol since 2009, and maintains its non-Annex B status. Turkey has two options: maintaining its status as an Annex-I Party without an emission target, or adopting a target like other Annex-I Parties. However, its total emissions of the greenhouse gases (GHGs) have increased strongly since 1990.

As indicated in Tables 15 and 16, accordingtodatagivenbyTUIK, the inventory results revealed that the overall greenhouse gas (GHG) emissions as CO_2 equivalent for the year 2011 was 422,4 million tonnes. In overall 2011 emissions, the energy sector had the largestportion with 71%. The energy sector was followed by industrial sectors with 13%, thewaste with 9% and the agricultural activitieswith7%.

Table 15. Greenhouse Gas Emissions as CO2 Equivalent in Turkey (Mt / year)

	1990	1995	2000	2005	2010	2011

CO	141,56	174,09	225,61	259,77	326,55	344,69
CH	34,05	47,39	53,81	52,82	57,59	58,81
N2O	12,22	16,82	17,14	14,67	13,08	12,65
F Gases	0,6	0,52	1,66	3,73	4,89	6,26
Total	188,43	238,82	298,21	330,98	402,1	422,42

Source: IEA,2013; TUIK,2013

Total greenhouse gas emissions as CO_2 equivalent increased 124% in 2011 compared to the 1990's emission.

Table 16. Greenhouse Gas Emissions as CO2 Equivalent in Turkey (Mt / year)

	1990	1995	2000	2005	2010	2011
Energy	123,88	161,5	213,2	242,34	285,07	301,25
Industrial Processes	15,44	24,21	24,37	28,78	53,94	56,21
Agriculture	30,39	29,23	27,85	26,28	27,13	28,83
Waste	9,72	23,88	32,79	33,58	35,97	36,13
Change compared to 1990	-	26,74	58,26	76,65	113,39	124,17

Source: IEA,2013; TUIK,2013

It was also pointed out that the biggest share of CO_2 emissions was inenergysector(with 86%), biggest share of CH_4 emissions was from waste (with 58%),and the biggest share in total of N_2O emissions was seen in agricultural activities(with 77%).

Turkey currently has the lowest energy related carbon dioxide emissions among the IEA contries (IEA, 2013), but its emissions are increasing at a fast rate.Since 1990, emissions from power and heat generation have tripled, while increases in the other sectors have been much smaller, 80% on average. Renewable energy and energy efficiency projects are assisting to reduce CO_2 emissions in Turkey by more than 3 million tons annually (IEA, 2014).

Efforts to limit energy-related GHG emissions focus on promoting renewable energy, energy efficiency, nuclear power, fuel switching and sustainable transport. Turkey has very large untapped potential for hydropower, wind power and solar and geothermal energy. It also has large potential for energy efficiency improvements, especially in buildings and industry. In the power and heat sector, switching to natural gas from oil and coal reduces carbon intensity, and the government is also planning to develop nuclear power capacity(MENR, 2014)

To limit GHG emissions from transport, Turkey plans to intensify efforts to increase the use of railways and maritime transport; prepare sustainable urban transportation strategies and plans; expand the public transportation facilities; improve fuel quality; promote the use of alternative fuels and new technology engines; and provide incentives to renew the vehicle fleet .Thus, it is expected that theses plans will bring environmental and energy security benefits.

Turkey does not have a broad policy on promoting biofuels for transport. Turkey relies on excise taxes on transport fuels for a large part of its budget revenue and biofuels are likely to remain uncompetitive under this fiscal regime.

By 2040, the world's energy supply mix will consist of oil, gas, coal and low-carbon sources. While coal is abundant and its supply secure, its future use is constrained by measures to tackle pollution and reduce CO_2 emissions. Turkey's approach is to implement policies and measures to protect the climate system on the basis of equity and in accordance with common but differentiated responsibilities and respective capacities. The recently adopted National Climate Change Strategy is comprehensive, and initial implementation action includes the energy sector(IEA, 2014).

In recent years, Turkey has improved its policies to control air pollution. For example, old coal-fired power plants are being equipped with flue gas desulphurisation units, and in the transport sector, environmental performance has improved thanks to several new regulations on emissions from motor vehicles and quality standards for motor fuels. To reduce local air pollution, the standards should be strengthened and implemented effectively and efficiently(MENR,2014).

Higher environmental standards and pollution controls have been put in place in Turkey. Privatisation of the generation segment of the electricity market is considered an important tool to improve productivity and environmental performance of existing plants.

In the past few years, Turkey has put major legislation and regulations in place to increase energy efficiency and advance environmental objectives, including limiting growth of carbon emissions. As Turkey promotes its energy efficiency and environmental policy goals, it is important to place these two objectives on an equal footing with energy securityconcerns, to reinforce energy security by energy efficiency and sustainable development.

Climate change is a serious global energy-related environmental problem, and is also a challenge in Turkey. Cost-effective measures to mitigate climate change would also help Turkey improve both its energy security and environmental performance.

3. ENERGY POLICY

Turkey's energy policy broadly follows the strategic objectives such as energy security, economic growth and environmental protection. The MENR is responsible for the preparation and implementation of energy policies, plans and programmes in co-ordination with its affiliated institutions and other public and private entities.

The Strategic Plan 2015-2019 of the MENR has beendesigned as a strategic road mapfor the developments in the field of energy and natural resources and aimed to be implemented under the consideration of environmental, economic and sustainability principles in terms of its all goals, objectives and strategies.

Turkey imports practically all the oil and gas it uses and these imports may more than double over the next decade. A key part of Turkey's policy is energy diplomacy with the supplier countries in the region, which have more than 70% of the proven oil and gas reserves of the world. Thus, the government aims to strengthen Turkey's role as a transit country between its neighbouring supplier regions and the European and other international markets.

Gas has been especially important in the power sector, and gas use is expected to continue to increase fast in all sectors by 2020. The interrelation between the electricity and natural gas sectors requires close monitoring of electricity and natural gas systems. Domestic gas production is small. Turkey imports more than 98% of its gas needs. According to the data given in 2009, 52% of gas imports came from Russia, followed by Azerbaijan (15%), Algeria (14%), Iran (16%) and Nigeria (3%). Turkey has several plans for diversifying its gas supplies further. Diversifying import sources and routes is the cornerstone of Turkey's gas security policy. To bridge the gap between supply and projected demand, Turkey is actively pursuing additional gas supplies from several countries. Turkey has signed eight long-term sales and purchase contracts with six different supply sources (IEA, 2010).

With the strategic targets, the main components of security of supply are considered to be the provision of generation and imports, transmission, storage and distribution infrastructure and management of demand. As regards natural gas security, Turkey plans to increase its natural gas storage capacity(to be at a level of 10% of the consumption in accordance with Natural Gas Market Law no. 4646) over the next years (MENR, 2014).

In addition to diversifying the sources of oil and natural gas, Turkey is also improving security of supply by ambitious projects to increase domestic energy production. The country has large reserves of lignite and significant untapped potential for hydropower. Its also aims to build plants for wind, solar and geothermal energies. Furthermore, Turkey is also moving to introduce nuclear power as a new source in its energy supply mix. The regulatory authority in nuclear energy is the Turkish Atomic Energy Authority. However, private sector companies are also able to establish and operate nuclear power plants.

The nuclear energy is not used yet as power generation resource in Turkey, and is intented to supply a certain part of its primary energy from nuclear (3.8% of total)until 2020. The regulatory authority in nuclear energy is the Turkish Atomic Energy Authority(TAEA). However, private sector companies are also able to establish and operate nuclear power plants. Diverse nuclear power plant projects have been planned and negotiated for that purpose. Thus, two suitable sites have been identified, one at Akkuyu on the Mediterranean coast, the other at Sinop on the Black Sea.

Turkey is a candidate for EU membership and is moving to harmonise its legislations on many topics with EU legislations. There are, generally, no legal restrictions on private-sector operations. As a party to the Kyoto Protocol, Turkey is planning to adopt nationally appropriate mitigation actions and voluntary targets to limit emissions growth and move to a low- carbon energy economy in an economically sustainable manner.

Taking into condideration of the fast growth of the Turkish economy, increasing population and rising living standards, electricity demand is also growing at a high rate. In this context, great policy opportunities with regard to market reforms, the electricity mix, and the improvement of efficiency and environmental standards should be created to provide several amendments regarding regulations on unlicensed electricity production andrenewable energy.

Turkey encourages a policy of strengthening oil supply security by increasing domestic oil exploration and production activities. In recent years, the number of permits granted and the number of companies, both foreign and domestic, operating in this field in Turkey have increased. As Turkey imports oil in a significant growth (by some 90% up to 2020), the security of oil supply will become more crucial and need to expand oil storage capacity.

4. ENERGY EFFICIENCY

The MENR has the overall responsibility for energy efficiency policy in Turkey. An important multi-stakeholder body is the Energy Efficiency Coordination Board (EECB). Its main responsibility areas are national energy efficiency strategies, plans and programmes; implementation and effectiveness and steering energy efficiency studies.

Turkey's energy efficiency policy is guided by the 2007 Energy Efficiency Law and the subsequent by-laws. The law is based on four topics: administrative structure and tasks for delivering energy efficiency services across sectors; training and awareness; penalties for misconduct (typically fines); and incentives to increase energy efficiency and renewable energy use. The aim of this law is to reduce energy intensity by 15% below the reference scenario projections by 2020, and has wide-ranging plans for further improvements in energy efficiency. The law also regulates the integrated use of geothermal energy, the re-injection of geothermal fluid after use, efficiency and environmental protection. The largest energy-using sectors in Turkey are :manufacturing industry, transport, services and buildings.

According to the data given by MENR as shown in Table 17, the average primary energy intensity of Turkey between the years 2007 and 2012 decreases slightly from 0.295 to 0.275 Toe/$1000 GDP. The Energy Strategy Plan sets a 20 percent primary energy intensity reduction target for 2023 compared with the 2007 level (MENR, 2014).

Table 17. Primary Energy Intensity (TOE/$1000 GDP)

	Year				
Data	2007	2009	2010	2011	2012
Without Seasonal Adjustment	0.30	0.33	0.29	0.27	0.28
Seosonally Adjusted	0.29	0.30	0.28	0.26	0.27

Source: MENR, 2014

Energy efficiency performance in power generation in countries has been investigated and the energy efficiency of electricity generation is summarized as follows: a) it is above 40 per cent(world average) in over half of the countries, b) it is above 50 per cent in about 30 per cent of countries. However, it exceeds 60 per cent in countries such as Canada and Brazil, with a large share of hydroelectricity in their power generation mix. According to the data given by Enerdata, the energy efficiency of thermal power plants in the world is as shown in Table 16(ABB, 2013).

Table 18. Efficiency of Coal - Based Generating Technologies, 2011

Technology	Efficiency(%)	Share in total capacity
Subcritical	25 - 37	80.9
Supercritical	37 - 45	16
Ultra-supercritical	45 - 50	3
Integrated gasification combined cycle (GCC)	40 - 45	0.1

Source: ABB, 2013

Energy efficiency improvement in thermal power generation is closely linked to the spread of gas combined-cycle plants since the 2000s.The spread of effficient coal production technologies has also contributed to the improvement in the efficiency of thermal power generation, although to a lesser extent.

In relation to power grid efficiency, as shown in Table 19, the rate oftotal network losses in Turkey was around 15.7 per cent in 2013.A substantial part of the losses are in fact non-technical losses due to electricity theft and unpaid bills. Loss and illegal consumption rate in electricity distribution is planned to reduce to 10% until the end of the plan period(TEIAS, 2014).

Table 19. Network Losses in Turkey (%)

	Year				
Data	2007	2009	2011	2012	2013
Transmission	2.5	2.2	1.9	2.6	2.4
Distribution	12.0	13.3	12.7	12.7	13.3
Total	14.5	15.5	14.6	15.3	15.7

Source: TEIAS, 2014

Although Turkey has a considerable high energy efficiency potential, these possibilities have not been utilized satisfactorily yet. Thus, appropriate studiesregarding financial and technical support and the awarenessshould be conducted for energy efficiency and energy saving.For future work, it is obvious that the strategic plan 2015-2019 should be secured the predictability and transparency of policies without delay, at least on an indicative level

(MENR, 2014).

Energy intensity as an important indicator of energy efficiencies directly related to the sectors comprising the national industrial structure. The energy intensity of Turkish industry is higher than any modern standard. Energy intensity of Turkish industry is two times higher than the OECD average and four times higher than Japan's average. Turkish industry has to increase energy efficiency in production and increase the share of the renewable energy in its energy mix in line with the EU regulations and standards(IEA, 2014).

According to the World Bank data, energy efficiency in industry (including iron and steel, cement, textiles, chemicals) could be significantly improved by replacing equipment and using new process technologies. For example, consumption in steel plants could be cost-effectively reduced by 22% and in cement plants by 28%. The primary energy intensity in Turkey isaimed to reduce 30% by 2020**.** The other studies such as maintenance, repairment, rehabilitation and modernization of public power plants will be also completed until the end of 2019(MENR, 2014).

Turkey's efficiency policies in the transport sector include improving energy efficiency standards; promoting public transport ;reducing specific fuel consumption for domestic vehicles, and installing advanced signalling systems .Fuel-efficient cars present a new market to explore in Turkey. Their costs run higher than consumers are willing to spend, but given the increase in gasoline and diesel prices and the introduction of vehicle tax rates that are based on emissions, fuel-efficient cars pose as an area of marketing potential. In the areas of building, appliances, lighting, air-conditioning, cooling and heating, Turkey has set energy performance standads according to international best practice to save money for both electricity generation and consumption(IEA, 2014).

As also concluded by Shah, the effects of energy efficiency on environment can be summarized as follows(SHAH, 2015):

* It makes energy smarter.

* It makes energy cheaper and cleaner.

* It helps to reduce air and water pollution, noise and vibration.

* It allows to improve the resource efficiency by using robotics technology.

* It cuts energy bills by more than half.

5. TURKISH ENERGY MARKET

Turkish electricity market has been increasing in size with its economic developments which industrialization and urbanization make room for the importance of electricity in Turkish market. Turkey is gradually reforming its electricity sector in order to ensure an efficient and cost-effective supply of electricity through a competitive market and private- sector participation.

With regard to the new electricity market law (forced in 2013),the establishment of a competitive and liberalized electricity market has been enabled, the license types have been changed, the pre-licensing process has been set out and privatizations in the electricity market and establishment of an energy exchange have been regulated (MENR, 2014).

Turkey has different kinds of energy sources which Turkish energy sector is becoming more active, competitive and attracting the attention of investors. Turkey's importance in world energy markets is growing, both as a regional energy transithub and as a growing consumer. Turkey's energy demand has increased rapidly over the pastfew years and likely will continue to grow in the future .Defining policy on carbon pricing will be important to give clear signals to private investors in the sector.

According to the data given by MENR, for the energy market the targets may be summarized as follows:

* To reduce the risks arising from dependency on gas imports, the share of electricity generation based on natural gas should be decreased down to 30% as of 2020,

* The share of renewable resources should be increased up to 30% as of 2023,

* All known domestic lignite and hard coal resources and hydroelectric potential should be utilized by 2023.

6. OVERALL DISTRIBUTION OF ENERGY RESOURCES

Turkey is geographically located in close proximity to more than 70% of the world's oil and gas reserves, but unfortunately, it is dependent on energy imports, primarily of oil and gas.

As shown in Tables 20 and 21, by 2020, although the share of coal is expected to increase up to 37%, the shares of oil and natural gas decrease to 28.8% and 23.7%, respectively for primary energy supply in Turkey.

Table 20. Primary Energy Supply by Source (%)

	Year		
Energy Resources	2007	2008	2020
Coal	29.4	29.9	37.0
Oil	30.7	30.0	28.8
Natural Gas	30.4	30.6	23.7
Nuclear	-	-	3.8
Hydro	3.1	2.9	4.3
Other	6.4	6.6	2.4

Source: MENR, 2014

In relation to the final consumption by source, by 2020, although the share of coal is expected to increase up to 25.6%, the shares of oil and natural gas decrease to 30.7% and 15.2%, respectively for primary energy supply in Turkey. The share of electricity, however, increases up to 22.9% .

Table 21. Final Consumption by Source (%)

	Year		
Energy Resources	2007	2008	2020
Coal	18.2	17.2	25.6
Oil	36.5	36.8	30.7
Natural Gas	18.4	17.8	15.2
Electricity	17.2	18.4	22.9

Other	9.6	9.8	5.6

Source: MENR, 2014

In order to meet the demand growth in a sustainable manner, Turkey aims at fully utilizing its indigenous hard coal and lignite reserves and renewable resources such as hydro, wind, geothermal and solar energy. Turkey has potential producing 30% of its electricity need from the renewable by 2023. In recently, more attention has been also paid to heat (geothermal and solar).Biofuels for transport, in turn, are hardly used, and remain marginal in the policy debate.

Turkey has large potential for increasing power generation from renewable sources. Thus, it is needed to ensure a smooth integration of this new renewable electricity capacity into the grid. Firewood is the largest source of heat from renewable sources. The secondlargest source of heat from renewable sources is geothermal. The third source for heat from renewable sources is solar energy. Two-thirds of this was used in the residential sector and the rest in industry.

Turkey's renewable energy supply has remained largely unchanged. The use of firewood for heating, the largest source of renewable energy, is slowly declining, while electricity generation from renewable sources is rising. In relative terms, renewable sources contribute less to total primary energy supply than they did a few years ago, but, commendably, the government has introduced targets and policies that will help to change this downward trend. The IEA data indicated that the share of renewables in primary consumption in 2013 was around 10.5% (IEA, 2014).

The current promotion mechanism for renewable sources of electricity relies on a feed-in tariff. The draft amendment to apply different tariff levels for different renewable energy sources is on the agenda of the Parliament. The government should consider explicitly and transparently limiting the feed-in tariffs for individual technologies.

Electricity is the clear focus of Turkey's renewable energy policy. However, as the country has large potential for geothermal and solar heat, Turkey should also consider stronger mechanisms to promote the use of renewable energy for non-electricity purposes. Turkey could consider expanding biofuels use for transport, as long as these are produced in a sustainable and cost-effective manner and help reduce greenhouse gas emissions.

Turkey produces both hard coal and lignite. Of the two, lignite is by far more important, with significant reserves and production spread through almost all regions of the country. Turkey produces all the lignite it uses, but imports around 90% of its hard coal needs.

On the other hand, the most effective utilization of domestic coal resources has been specified as one of the basic objectives and it has been further aimed that by the future investments, the electricity generation from domestic coals should reach a level of 125 TWh by the end of the plan period. For accomplishing this objective, these investments are to be accelerated and new resources shall be explored.

In Turkey, biomass is expected to play a crucial role in relation to heat, electricity and transport. The share of geothermal, wind and solar energy are small, but expected to rise fast. Turkey has incredible geothermal growth over the past decade and there is utilization for geothermal both for heating and power generation yet still has a large untapped potential.

Integration of nuclear energy into the Turkish energy mix is also one of the main tools in responding to the growing electricity demand while avoiding increasing dependence on imported fuels.Policies concerning nuclear power will remain an essential feature of national energy strategies, even in countries which are committed to phasing out the technology and that must provide for alternatives.Nuclear plants can contribute to the reliability of the power system where they increase the diversity of power generation technologies in the system.

For countries that import energy, it can reduce their dependence on foreign supplies and limit their exposure to fuel price movements in international markets. Safety is the dominant concern, particularly in relation to operating reactors, managing radioactive waste and preventing the proliferation of nuclear weapons.

7. CONCLUSIONS

There is an increasing trend in the consumption of non-renewable energy resources supporting the economic, social, and population growth in the world. At present, the importance of fossil fuels is still very high and they play a major role in air pollution. The contribution of fossil fuels to the world electricity is about 71%. This percentage for Turkey is approximately 70%.

Turkey imports about 90% of the hard coal, and the quantity of imported coal seems to be risen and hold its importance for electricity. Turkey’s lignite reserves make a significant contribution to Turkey’s energy sector and power mix. The government has begun a policy to encourage exploitation of Turkey’s domestic lignite reserves instead of natural gas for electricity generation.

Coal is the most important resource in electricity generation on world basis. Total coal reserves of Turkey form only 0.7% of the world total. By 2020, about 36% of final energy demand and 25% of electricity supply will be met by the utilization of various coals. World coal usage is set to increase by 27% over 20 years, with most of this increase being in China and India. Since 1992, emissions of CO_2 have increased by 3% in OECD countries with coal accounting for approximately 40% of the total. In Turkey, the coal production for thermal power plants is closely related to the general energy demand. Unfortunately, the Turkish lignites have low calorific value, high-mineral matter, high-moisture and sulphur contents. Two major problems of using coals as an energy resource are: (i) the cost of conveying, and (ii) the emissions from coal-fired power plant.

For preparing its future policies on climate change, Turkey should update its energy scenarios without delay and focus on cost-effectiveness as a criterion to help prioritise the various policies and measures.

Turkey will need to expand government resources for market reform, environment and energy efficiency programmes to realise the objectives it has adopted. The government should ensure sufficient resources to implement the complex energy policy agenda.

Many energy efficiency technologies are applied in buildings, industrial facilities, transport systems and nationwide power infrastructure to help power growth while using less and cleaner energy. These technologies could slash costs by up to 80 per cent, help to achive energy savings by up to 30 per cent and deliver half the cuts in emissions needed to slow global warming over the next 25 years. Thus, the countries could stay cost-effective and make sustainable progress.

More should be done, however, to ensure a sustainable transport future. In the fastgrowing urban areas, the government should consider intensifying policies across several areas, including land-use planning, parking supply and pricing, road pricing, public transport and non-motorised transport.

Turkey should in any case consider developing domestic policy frameworks such as the establishment of a carbon market, which could direct finance towards low-carbon energy developments, but also facilitate linking to other such mechanisms in other countries or regions. This would be especially useful for power generation, the fastest growing source of CO_2 emissions in Turkey, to avoid a high risk of carbon "lock-in".

Due to the fact that natural gas is an import resource causing high foreign trade deficit as well as procurement risk, it is aimed that the share of the natural gas in electricity generation should be reduced to 38% by the end of the plan period.

New and renewable energies will become one of the main energy sources in the near future because the fossil fuels will inevitably run out. Renewables are important not only in generating jobs and developing future industries but also in meeting Turkey's energy and environmental targets. Turkey's policy has been to stimulate the use of new and renewable sources of energy where they have had prospects of being economically competitive and environmentally acceptable.Electricity generation from solar energy should be, without delay, supported.

It is estimated that renewables (biomass, hydro, and other renewables) will be meeting approximately 14% of the world's total primary energy demand by 2030. This assumes that the share of biomass will fall from 11% in 2006 to 10% in 2030 and hydropower will remain stable at around 2% of total energy consumption (IEA, 2014). It is also expected that the renewables, such as wind, geothermal, and solar, have the potential to make major contributions to Turkey's energy needs in the longer term if their investments in these technologies continue. Turkey aims at further increasing its use of hydro, wind, geothermal and solar energy resources and Turkey has potential producing %30 of its electricity need from the renewable by 2023. Some technologies, including biofuels and fuel cells, can also contribute to heat, transport, and electricity markets in the longer term, and also relevant for Turkey.

Biomass energy is one of the most significant renewable energy resources regarding its potential, and is expected to play a crucial role in Turkey. It is flourishing and has amazing opportunities for the development and commercial implementation of energy crops. Turkey has huge capacity for biofuels industry which is expected to see rapid expansion over the next years due to agricultural potential and policies on environmental friendly alternative fuels in Turkey.

It is aimed that the integration of nuclear energy into the Turkish energy mix is also one of the main tools in responding to the growing electricity demand while avoiding increasing dependence on imported fuels.

Turkey is located in a region that holds 72% of the world's proven gas reserves and 78% of proven oil reserves. Thus, this position makes Turkey an indispensable energy corridor between the energy producing and consuming countries to provide opportunities to investments in pipeline projects.Turkey's importance in world energy markets is growing, both as a regional energy transithub and as a growing consumer. Turkey's energy demand has increased rapidly over the pastfew years and likely will continue to grow in the future.Turkey has different kinds of energy sources which Turkish energy sector is becoming more active, competitive and attracting the attention of investors.

Turkey currently has the lowest energy-related carbon dioxide emissions per capita among the IEA countries but its emissions are increasing at a fast rate. Turkey's approach towards future mitigation activities in all the emitting sectors is outlined in the National Climate Change Strategy Document which has been approved under the coordination of the Ministry of Environment and Urbanization in 2010. It covers the short-, medium- and long-term actions (up to ten years) and also includes some targets, such as reducing CO_2 emissions in the energy sector. The strategy supports improving the efficiency of the supply chain as well as increasing the use of renewable energy resources(MEU, 2010).

To obtain a sustainable and steady development, the technology and the global economy must develop in harmony with the environment. It is also clear that global environmental problems are direct consequences of the increasing consumption of energy, especially from fossil fuels having high sulphur and carbon contents.

To meet high growth in demand of Turkey in a reliable way, all the projects (including new and renewable projects) should be completed within the anticipated time. Turkey has developed and implemented several energy efficient projects, aimed at industry, transport, and residential sectors. It is also expected that the market reform, including price reform, will lead to more efficient consumption. As a result, to ensure steady development in an environmentally-friendly way, additional efforts are required and policy makers will need to be selective about sustainable development targets. In the longer term, new technologies will also find more clever ways of reducing environmental costs and integrated power plants, and renewable energy systems will be the examples to operate both reliably and economically without waste-disposal problems.

Carbon dioxide emissions per unit power at the point of use are twice as high for coal as compared to gas, but hydro, nuclear power, and most renewables do not directly contribute any. Fossil fuels, particularly coal and gas, will remain important .Policy choices and market developments that bring the share of fossil fuels in primary energy demand down to just under three-quarters in 2040 are not enough to stem the rise in energy-related carbon dioxide (CO_2) emissions, which grow by one-fifth.

Turkey is powered for the most part by plants running on fossil fuels and these plants continue to be built. Hydropower plants comprise about 20% of Turkey's installed capacity but, in some regions, have been regarded as wasteful and damaging to surrounding ecosystems by environmental groups and locals. Meanwhile, Turkey is hoping to build five nuclear plants by 2030, for which their proximity to active fault lines have been a topic of concern and subsequent opposition.

Privatization of the major part of state-owned electricity generation facilitiesand the entire distribution network will be completed. The public sector will continue to generate electricity at the power plants that are excluded from privatization, and it will also continue transmission and wholesale activities.

A balanced resource diversification on the basis of primary energy resources and differentiation of origin countries will be ensured, share of domestic and renewable energy resources in the production systemwill be raised to the maximum extent.

As also aimed in the strategy plans, the following targets should be obtained in time:

* To create and complete adequate emergency supply stocksfor oil and natural gas

* To support,,develope and encourage new environment friendly practices in production and services

According to theMD program components for energy efficiency, the following items should be taken into consideration:

***** Developingadministrative and institutionalcapacity for energy efficiency

* Developing sustainablefinancial mechanisms for financing ofenergy efficiency studies and projects

* Increasing energyefficiency in industry

* Improving energyefficiency in buildings

* Improving energyefficiency in transportation

* Disseminating on-siteproduction, cogeneration and microcogeneration systems inelectricity.

Various sources of energy in terms of air pollution, effects on climate, normal operational radioactivity, eyesores, meeting peak demand, and risk vulnerability indicates that hydroelectric power plants are the least risky and the least harmful ones in comparison with the other types of power plants.

Finally, policies run thin and old habits are putting the country at risk for droughts and desertification, which has already begun to affect Turkey.

LIST OF ABBREVIATIONS

ABB	:Asea Brown Boveri group limited company
CH_4	:Methane
CO_2	:Carbon dioxide
EECB	:Energy Efficiency Coordination Board
EMRA	:Energy Market Regulatory Authority
EU	:European Union
F-gases	
HFCs	:(hydrofluorocarbons);
PFCs	:(perfluorocarbons);
SF_6 :	(sulphurhexaflooride)
GDP	:Gross Domestic Product
GHG	:Greenhouse Gases
IEA	:International Energy Agency
MD	:Ministry of Development
MENR	:Ministry of Energy and Natural Resources
Mt	:Million tonnes
MW	:Megawatt
N_2O	:Nitrous oxide
OECD	:Organization for Economic Co-operation and Development
SPO	:State Planning Organization(DPT)
TAEA	:Turkish Atomic Energy Authority
TETC	:Turkish Electricity Transmission Company(TEIAS)
TOE	:Tonne of Oil Equivalent
TSI	:Turkish Statistical Institute(TUIK)
TWh	:Terawatt-hour
UN	:United Nations
UNFCCC	:United Nations Framework Convention on Climate Change
WEC	:World Energy Council

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ENERGY SECURITY ISSUES OF THE BALTIC STATES

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ABSTRACT

The purpose of the paper is to assess the successes and challenges that the three Baltic States face as they try to meet the EU energy policy objectives, and, also, to provide an overview of the contemporary Baltic energy situation and policies. The first part will focus on the political implications of the energy security issues of the Baltic States, then will seek to provide an overview of energy dependence on domestic politics, bilateral relations with Russia, also in frame of the EU-Russia relations. The European Commission's recent strategy on energy union will be addressed. The three Baltic countries are – energy-wise – in a precarious position. The energy pathways of Estonia, Latvia and Lithuania lead to Russia rather than to any other EU State. Therefore, a brief summary of the Baltic States' gas and electricity sectors will be provided following by the analysis of the effectiveness of the EU's energy policy of liberalisation and diversification for the Baltic energy markets and the region. The essential factor that determines the energy policy of each of the Baltic States is the distinct structure of their energy sectors. Each of the Baltic States has different energy policy determinants. Moreover, they have different renewable energy policies. Lastly, the renewable energy policies of the Baltic States viewed through the prism of interests of each country and a wider regional perspective will be assessed.

Key words: energy security, energy policy, Baltic States, renewable energy policy.

1. Introduction

A consensus seems to exist on the issue of energy security achieving a particular importance since the energy shocks of the 1970s, when present asymmetries between the geographical distribution of resources and energy consumers had been consolidated by oil shortages in the petroleum-dependent countries (Choucri, N. 1977). Since then, the energy security has been deeply integrated into the debates of the vast amount of theories – environmental, geopolitical, economic, legal, international relations etc. For economist E.F. Schumacher, energy is "not just another commodity, but the precondition of all commodities, a basic factor equal with air, water, and earth."

An overview of the existing theories demonstrates various approaches. However, eventually all of them come to agreement that due to importance of energy for both modern economies and postmodern lifestyles, energy security is paramount to human security. Natural gas, coal, oil, and uranium are currently needed to energize our vehicles, light schools and workplaces, produce food, manufacture goods, and cool and warm our residences.

Although its importance is frequently mentioned, the meaning of 'energy security' is far from clear. According to von Hippel, the literature on energy security 'demonstrates that the concept is ill-defined' and 'few works have made a serious attempt to clarify the concept of energy security' (1998:15). Chester's analysis of definitions of energy security concluded the concept is 'inherently slippery because it is polysemic in nature, capable of holding multiple dimensions and taking on different specificities depending on the country (or continent), time frame or energy source to which it is applied' (2009:887).

In an attempt to place energy security on a sound theoretical foundation, Nakamura (2002) identifies two contemporary approaches to energy security: 'market analysis' and 'geopolitical'. In both, energy is represented largely by oil. The market analysis approach is characterised by its close focus on economics, faith in market mechanisms to meet oil demand, and suspicion of government intervention (Nakamura 2002:12-16). It regards oil as a commodity easily purchased at any time and takes an optimistic view of the potential for technology to deliver higher oil production and counteract its environmental impacts. In this approach, energy security and national security are seen as distinct. Although Yergin (2008) and Chapman (2009) argue that in practice market forces have never been given free rein and domestic pressure for low energy prices has motivated states to push the burden of adjustment onto other parties. The history of the oil business (Painter 1991, Randall 2005) and the relationship between Saudi Arabia and the United States (Bronson 2006, Ottaway 2008) is replete with examples of state intervention in the oil market on the grounds of national interest. Nakamura argues that 'in debates on energy security the geopolitical approach, where the pursuit of national interest is a priority, is becoming more important' (2002:12).

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There are debates over what constitutes energy security and these arguments have been sometimes hindered by a lack of clear understanding concerning the different components of the energy security problem and their policy implications. Haighighi (2006) states that ‘the multi-faceted nature of energy security, makes it very difficult to provide a definition of energy security that is accepted by all.’ A commonly accepted practical definition of the concept of energy security is ‘adequacy of energy supply at a reasonable price’ (2006:4). This definition suggests that energy should be physically available and its price should be reasonable. Furthermore, Haighighi emphasises that there is also a subtle difference between the definition of oil and gas security. Gas security could be defined as the ‘guarantee that all the gas volumes demanded by customers will be available at a reasonable price’. Oil security means ‘reliable and adequate supply of energy for a reasonable price’ (2006:6). The difference between these two definitions is that gas security necessitates the satisfaction of demand without necessarily emphasizing the adequacy of gas supplies in all sectors. Haighighi (2006) states:

> ‘If one particular sector normally uses gas, but gas cannot be obtained, then it can be substituted by other fuels, such as coal or oil. The same does not apply to oil there are sectors in which oil is the dominant source of energy and no other energy can currently substitute it, such as the domain of transport in the European Union. Consequently, if there is no oil reaching that sector, the sector cannot function. In this case, as the oil market is a global market, a major shock anywhere in the world will be felt throughout the world oil market. The global nature of the oil market has prompted some to suggest that even if an energy-producing country could magically and inexpensively raise its domestic output to eliminate total imports, a shock in the world oil market will affect its domestic price and threaten the stability of its economy. Therefore, efforts to combat oil insecurity should also be made at the global level.’

There are also growing number of studies attempting to measure and quantify energy security of industrialised countries belonging to the Organization of Economic Cooperation and Development, and centres on aspects of energy security such as electricity supply, nuclear power, and gasoline powered automobiles (Sovacool, Brown 2010). Thus, they are not applicable to developing or underdeveloped countries that have patchy and incomplete electricity networks, limited nuclear power units, and non-motorized forms of transport. Furthermore, Sovacool argues that ‘such studies often rely on only a handful of dimensions or metrics (such as per capita commercial energy consumption, share of commercial energy in total final energy use, share of population with access to electricity, and energy intensity)’ that are sectorial in focus, i.e. investigating only electricity, or energy efficiency, or household energy consumption. Numerous studies on energy policy have noted that having comparative indicators is a prerequisite for setting energy targets. Frequently, metrics are divided into simple and complex. The IEA, for example, visually arranges energy indicators according to a pyramid where aggregated indicators that form the basis of IEA statistics fall at the top, disaggregated indicators the middle, process indicators at the bottom.

For Kleber (2009) defining and valuing energy security could use ‘five Ss’ model, for Aperc (2007) the ‘four As’, or for Hughes the ‘four Rs’ (2009). Multitude of definitions of energy security certainly serves some practical value as well as results in that the concept has become diffuse and often incoherent. Sovacool (2009) identifies five key dimensions to energy security –availability, affordability, technology development, sustainability, and regulation. Availability includes having ‘sufficient energy resources, stockpiles, and fuels, as well as the appropriate infrastructure to transform these reserves into energy services’. Affordability includes equitably enabling access to energy services at the lowest cost with stable prices. Technology development includes ‘adapting to and recovering from interruptions in supply, investing in new research as well as proper maintenance, and ensuring reliability’. Sustainability includes minimizing energy-related degradation to forests, land, water, and the global climatic system. Regulation includes having ‘legitimate and participatory modes of energy policymaking, competitive markets’ and well informed energy consumers (2009:4).

2. Formulating Baltic Countries’ Energy Security Problem

Since their accession to the EU, the energy sector remains the most vulnerable national area for Estonia, Latvia and Lithuania – an “Achilles heel” of the three Baltic States. The vulnerability stems from the fact that the energy sectors of the three states remain inextricably linked to and fully depended on Russia while they are virtually isolated from the rest of the EU, making them “energy islands” (Grigas 2013). This predicament is not concern of only statesmen and strategists as energy effects almost every aspect of the Baltic States – the economy, industry and the well-being of citizens. Industry which accounts for a significant portion of total gas consumed (50% of total gas consumed in Lithuania, 21% in Estonia, 14% in Latvia) was hit with high gas prices. Gas prices are particularly sensitive for households who depend on gas for heating in the winter months, making up 10% of total gas used in Estonia in 2011, 9% in Latvia, and 5% in Lithuania (Grigas 2012:22), which represents 10 to 15% of their post-tax income. The priorities of the Baltic countries have generally coincided with the objectives of the EU energy policy. Diversification and security of energy sources, increasing the competitiveness of domestic energy markets and a focus on renewables are within the interests of the three countries. Lithuania and, to some extent, Estonia have been more willing to take the lead in liberalisation and security of energy supply policies, while Latvia has preferred a slower and more cautious approach. In terms of sustainability and renewables, Latvia has set the most ambitious targets.

2.1. Baltic Gas Sector

The Baltic States and a few other EU states such as Bulgaria, Romania, Slovakia, and Finland rely solely on Russia for gas imports. The Baltics are more vulnerable in terms of gas than most other EU states not only because of their import dependence on a single source, but also due to their gas infrastructure. Baltic gas infrastructure was built in the Soviet era and depends on Gazprom-owned pipelines that deliver Russian gas. Only Finland and Bulgaria have comparable conditions. The Baltic States are still not connected to the gas pipelines of other EU states. Furthermore, interests of Russian monopoly Gazprom dominate the Baltic gas sector since Gazprom became an investor in the national gas companies of all three states: EestiGaas (37%), LatvijasGāze (34%), and LietuvosDujos (37%) (IEA 2013).

However, Latvia and Lithuania benefit from unique circumstances that have mitigated their gas sectors' weakness. Latvia's comparative advantage and guarantee of gas supply is Inčukalns, the only significant gas storage facility in the region with it present capacity (4.4 billion cubic meters of which 2.3 billion cubic meters is active) that exceeds Latvia's annual consumption of gas, which in 2012 was 1.5 billion cubic meters (Grigas 2012:7). In Lithuania, the gas transit from Russia to its Kaliningrad territory via Lithuania serves as a sort of guarantee of gas supply for Vilnius since any interruption to Lithuania directly affects Kaliningrad.

Projects promoting energy security have been characterized by inaction and slow progress. Developing energy infrastructure projects is resource- and time-intensive. Agreements for international cooperation, planning, and construction - even in best case scenarios - can take decades. For example, in the case of BEMIP, the Baltic States have found it hard to agree on the construction of an EU co-sponsored LNG terminal. Latvia, Lithuania, and Estonia were unable to reach an agreement for a location of the LNG terminal in 2011. So, in 2012 the European Commission stepped in and ordered an independent research to identify the most suitable location, which decided that Finland was the most suitable location providing that a natural gas pipeline to Estonia is constructed. In early 2014, after much deliberation, Finland and Estonia announced the construction of two LNG terminals. This proposal was shut down by the European Commission who declared it would not finance two terminals. Lithuania, in contrast, decided to fly solo without EU support or the cooperation of other countries and it has been far more successful in constructing its floating LNG terminal. Despite mechanisms offered by the EU, Lithuania, working on its own, has managed to make unprecedented steps towards energy security for the Baltic States.

2.2. Electricity Sector

Baltic States' electricity market relies on different domestic resources or lack thereof for electricity production. Estonia relies on its resources of shale oil, which is used to generate 90% of the country's electricity (Eurostat 2013). In spite of the EU environmental regulations, Estonia opened the world's biggest shale oil plant Enefit280 in mid-2013 and doubled EestiEnergia's oil output to 10,000 barrels a day. For electricity, Latvia depends on three hydroelectric power plants on the Daugava river: Keguma HES, Plavinu HES and Rigas HES, which in 2012 supplied 49% domestically produced electricity (Eurostat 2013). Lithuania closed its last nuclear reactor, which accounted for 77% of domestic electricity production, due to the EU regulation in 2009.

Unlike the natural gas sector, Baltic countries have already become an "energy peninsula" in terms of electricity connections. For example, Estlink connects Finland and Estonia. In 2014, construction of the LitPol Link, an electricity link between the Baltics and Continental Europe, began. Regional electricity connections contribute to an already functioning energy market and provide additional tools to enhance energy security.

3. Integration of the EU Internal Market

Since the Lisbon treaty came into force in 2009, the EU has a policy and funding for promoting energy security for its Member States. As the case of the three Baltic States demonstrates, challenges remain for the international cooperation which is required to enhance energy security. In other words, integrating energy infrastructure by connecting pipelines and establishing electricity links among the EU member states is necessary for the functioning of the single EU energy market. The EU's integration policies are driven by The EC's 2011 conclusions that "No EU member state should remain isolated from the European gas and electricity networks after 2015 or see its energy security jeopardised by lack of the appropriate connections" (European Council, 2011). The main mechanism to achieve this in the Baltic States has been the EC's Baltic Energy Market Interconnection Plan (BEMIP), which plans for several interconnection projects in the gas and electricity sector (EC, 2012).

There are two strategic gas interconnection projects for Baltic countries: q, a gas pipeline with 2.3 Bcm per annum connecting Poland to Lithuania and Balticconnector, an offshore pipeline between Finland and Estonia. GIPL is included in the European Network of Transmission System Operators (ENTSO-G) ten-year development plan for 2011–2020, as well as the BEMIP Regional Transmission System Operators Gas Regional Investment Plan for 2012–2021. The estimated costs of the pipeline are around EUR 500 million with the EU likely to be the primary funder and Lithuania's Lietuvos Dujos and Polish GAZ-SYSTEM (Hockertz, Wittmann 2012). Still the success of the project depends on the EU's support and financing if it is to be completed by the 2017 deadline. The Baltic connector seeks to connect Baltic and Finnish gas grids to enable two-way gas flows between Finland and Estonia and provide more gas supply capacity and flexibility for the whole region (Gasum, 2013). The pipeline's capacity will reach 2.4 bcm/year, cost €96 million and is scheduled to be implemented in 2015.

BEMIP-supported electricity links include Nordbalt (Sweden-Lithuania- Latvia), Estlink2 (Estonia-Finland), LitPol Link (Lithuania-Poland) and an Estonian-Latvian 3rd interconnection. Implementation of these projects has gained new momentum with the promise of the EU funds. The electricity connection projects as well as the gas connection projects have been submitted to be considered EU Projects of Common Interest (PCI) in energy infrastructure (EC, 2013). The PCI list was confirmed at the end of 2013 and was qualified for funding from the "New Package", which designated €5.1 billion from the EU's 2014- 2020 budget to upgrade Europe's energy infrastructure.

After years of delay due to Latvia's and Lithuania's disagreement over whose territory will receive the cable from Sweden, Nordbalt interconnection is scheduled for launching into operation in December 2015. Meanwhile, EstLink2, the second undersea cable between Estonia and Finland, was finished in 2014. LitPol Link planned for 2015 will allow Lithuania and other Baltic states to join the Western European Electricity System for the first time via Poland. The project had experienced years of delay primarily because of lack of Polish interest and difficulty in finding agreement with the various Polish land owners of the territory where LitPol Link would pass through. However, in 2012 when the EU designated €214 million and EBRD with Lithuanian government agencies offered an additional €2 million and €4 million respectively, progress started to accelerate (Litgrid, 2014). Following the interconnection of Lithuanian and Polish transmission grids, a new back-to-back converter station and strengthening of Polish and Lithuanian internal high voltage transmission grids is planned.

In terms of renewable energy, the Baltic states are also under obligation to meet Europe 2020 strategy and raise their share of renewable energy sources (RES) consumption to at least 20% by 2020 and according to the "Green Paper" to 30% by 2030 (European Commission, 2013). In fact, each of the states has raised more ambitious targets with Estonia seeking 25% in renewables, Latvia 40%, and Lithuania 23% by 2020 ("Statistics Estonia", 2013). In the latest 2013 annual reports, the share of RES in gross final energy consumption in Estonia was 25,9%, Latvia 35,1% and Lithuania 20,3% (Eurostat 2014). The Baltic performance has been exemplary with Latvia having the second highest RES percentage after Sweden in the EU **77** and Estonia being the first member state to exceed its Europe 2020 target in 2011 ("The Baltic Course", 2014).

Estonia's high levels of RES is linked to electricity production from biomass which is used in co-burning with shale oil, but is criticised for high levels of carbon dioxide emissions. Estonia's greatest potential in renewables lies with biomass, wind power, which rose 23% due to three new wind parks, and small-scale hydro-power ("Elering", 2013). Latvia has historically benefited from hydro-power as its most significant RES, but also has potential in biomass while solar energy is still only generated by pilot projects (Ministry of Economics of the Republic of Latvia, 2013). Lithuania's greatest RES potential to-date appears to be biofuel, biodegrading industrial and communal waste, solar energy and possibly wind energy ("Lithuanian Confederation of Renewable Resources", 2013). However, the higher prices of RES have received a backlash from Latvia and Lithuanian governments, which plan to re-assess government subsidies and seek more EU funds for financing renewables.

4. Conclusion

Since the Lisbon treaty came into force in 2009, the EU had a policy and funding for promoting energy security for its Member States. As the case of the three Baltic States demonstrates, challenges remain for the international cooperation which is required to enhance energy security. Some progress has been achieved, but a consensus among the EU Member States, especially on the location of where projects worth hundreds of millions of euro should be based, remains hard to achieve. Despite this, the EU has the necessary legislation and plans for enhancing energy security for its Member States. Energy security has become one of the top priorities for the Union. New EU leaders, who are well aware of vulnerabilities the European energy market, have set an ambitious goal: to create a European Energy Union. The EU must follow through with its current European Energy Security Strategy. The value of the 'Energy Union' will be in bringing together the different aspects of the EU's energy policy under one umbrella. Indeed, the five dimensions of the Energy Union; (1) ensuring security of supply, (2) completing the internal energy market, (3) reducing European energy demand, (4) decarbonising the energy mix, and (5) promoting research and innovation; seem to suggest that the framework will aim to tie these existing objectives together. Measures taken under the Energy Union should bring coherence to all EU policies that have implications for energy security while contributing to creating sustainable energy systems and economy. For example, when exploring alternative sources and building new infrastructure, these measures should align with the EU's climate and energy targets, including the objective to reduce the EU's emissions by at least 80% by 2050.

ENERGY SECURITY OF THE EU AND THE ROLE OF TURKEY

George KOUKOUDAKIS[*]

ABSTRACT

This paper by examining recent normative and empirical discourses aims to analyze the role and contribution that Turkey can make towards the energy security of the European Union (EU). The main argument of this study is that the EU should consider Turkey as a basic actor for the implementation of its energy security strategy –diversification of routes and suppliers of energy- but at the same time should pay attention to the sensitive international relations of the wider region. It is common knowledge that energy security is not only influenced by geographical factors but also from a series of other variables. International politics of the regions concerned are also of prime importance. Within this context the proposed analysis is focusing not only on the strategic location of Turkey between the energy producing regions and energy consuming Europe but mainly to the international relations within this security complex. As a result, EU-Turkey relations are evaluated with particular focus on the EU membership prospect for Turkey. Greek –Turkish relations with emphasis on energy co-operation and the process of rapprochement between the two countries constitute also a point of reference. At the same time relations between Turkey and the Republic of Cyprus are also considered by this paper as an integral aspect of EU-Turkish relations. Russian-Turkish relations, especially after the crisis in Ukraine are also of high importance for EU's energy security strategy.

INTRODUCTION

There is no doubt that energy over the last decades has evolved to an integral aspect of international security agenda. The importance of energy supply however, dates back to the eve of the World War I, when, as Daniel Yergin points out, the then First Lord of the Admiralty Winston Churchill decided, in his effort to make the British fleet faster than its German counterpart, to shift the power source of the navy from coal to oil. This implied that the "Royal Navy would not rely on coal from Wales but on insecure oil supplies from what was then Persia. Energy security thus became a question of national strategy"(Yergin, 2006, p.69).

Modern societies "are entirely addicted to energy services" (Baumann, 2008, p. 4). There are not many things left of human activity that do not require energy sources. It goes without saying that any sudden and long interruption in the energy system (production, transition, supply) is able to cause social, political and economic turmoil. As a result, "a satisfactory supply with energy is a precondition for economic growth and also for the legitimacy within a political entity (Baumann, ibid).

Energy security is defined "as a condition in which a nation and all, or most, of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risk of major disruption of service." (Burton et al. 2004, p. 5). Furthermore, according to the International Energy Agency, energy security has a long-term and short-term aspects. "Long-term energy security is mainly linked to timely investments to supply energy in line with economic developments and environmental needs. On the other hand, short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance"(2001, Retrieved, 01/01/2015). From the above definitions one can easily argue that energy security means different things in different places. In countries that cannot cover their energy needs by domestic sources energy security concerns focuses on supply whereas in countries with export oriented energy economies security concerns are focusing on demand. Consequently, this implies that energy security is also influenced by a series of variables.

According to a brief literature review there are eight main variables that can influence energy security. The first is the fluctuations of energy prices within the competitive international markets (Williams, 2007). The second is international and domestic terrorism that targets energy infrastructure throughout the energy system (Alsancak, 2010, Koknar, 2009). The third is internal political instability both in producing and transit countries (Gawdat, 2006). The fourth is geopolitical competition for the control of energy producing regions between the great powers of the international system (Williams, 2007). The fifth is the bilateral relations of the states involved in the energy system (Koukoudakis, 2015). The sixth variable is the constantly increasing demand for energy resources by the developing countries and the competition that this demand implies with the developed countries (IEA, 2007). The seventh variable is considered to be huge natural disasters such as hurricanes and earthquaques (Yergin, 2006). Finally the eight variable is the investment on the infrastructure of the producing countries and the technological developments on the energy sector (Bauman, 2008).

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ENERGY SECURITY OF THE EUROPEAN UNION

The European Commission defines energy security as “the ability to ensure that future essential energy needs can be met, both by means of adequate domestic resources worked under economically acceptable conditions or maintained as strategic reserves, and by calling upon accessible and stable external sources supplemented where appropriate by strategic stocks”(EC, Retrieved, 2009).

European Union is in a high degree an energy dependent area. Its own sources, two thirds of which are located in five of its 28 member states, can hardly satisfy 48% of its energy consumption (EC, 2011). It is also worth to be noted that the external dependence of the EU on oil and gas is estimated to 83.5% and 64.2 % accordingly (ibid). Furthermore, given the constantly increasing demand for energy among the EU member states, it is estimated that by 2030 the external energy dependence of the EU will reached 75% (Gawdat, 2006). At present the EU imports most of its energy resources from three main areas. These areas are : the North Sea, Russia and the Middle East. This situation becomes further worrying if one bear in mind that the lion’s share of the energy supplies of the EU is hold by two main regions: Russia and its near abroad region and the Middle East.

Russsian oil exports to the EU and oil exports to the EU that are dependent on the Russian export system amount to at least 4.44 mb/d that are equal to 34,71% of the EU’s oil consumption. At the same time Russian gas exports to the EU account for 22% of EU gas demand. Furthermore, almost 50% of EU’s gas consumption is transited via the soviet-made Ukrainian gas transmission system (Tsakiris, 2014, p.p. 9, 13). In particular, Russian gas is delivered through Ukraine, to 18 EU member states. Simultaneously, the EU imports 35 % of its crude oil supplies from the Middle East (EC, 2011).

The situation described above renders the energy security of the EU vulnerable to political developments and military crisis in those areas. The Rusian-Ukranian crisis of 2006 and of 2014-2015 is such an example. The turbulent area of the wider Middle East is also a reference point. This is not only due to the traditional Arab-Israeli conflict and the events in the Persian Gulf in the 1990s and 2000s but also to the social uprising within the context of the “Arab Spring” movement and the actions of ISIS.

As a result the EU over the last 15 years is trying to form a coherent energy policy in order to protect its energy security from any disruption. Thus in 2000 it presented its first “Green Paper entitled: “Towards a European Strategy for the Security of Energy Supply” (EC, 2000). The European Security Strategy of 2003 also presented energy security as a basic concern. (EC, 2003). On 8 March 2006 the European Commission issued a new Green Paper on Energy entitled: A European Strategy for Sustainable, Competitive and Secure Energy,” (EC, 2006). One of the basic targets set as a strategic priority for the EU on this Green Paper was the diversification of routes and sources of supply. Within this context the EU with the Prague Declaration of 2009 highlighted the importance for the creation of a corridor of supply of energy to its territory that is going to bypass Russia and transit energy sources from the Caspian region to Europe (EU, 2009). As it becomes obvious the “Southern Corridor” energy project renders the area of South East Asia of central importance for the energy security of Europe. Consequently the geopolitical significance of Turkey is further enhanced.

TURKEY’S CONTRIBUTION TOWARDS THE ENERGY SECURITY OF THE EU

The geographical location of Turkey is of geopolitcal importance for the EU’s energy strategic planning. Turkey lies between regions that hold 70% of the world’s proven oil and gas reserves (North, South and East) and the biggest energy consuming regions in the west (Roberts, 2004, p. 4). In other words, “Turkey is a natural bridge between Azerbaijan, Iran, Irak, Turkmenistan and Europe” (Babali, 2012, p. 6). At the same time Turkey’s energy infrastructure is also an important factor for the EU’s energy security. There is a series of pipelines that transit oil and gas from Russia and Azerbaijan already in operation in Turkey. The “Blue Stream for Russian gas” is operating since 2003. It is an undersea pipeline that connects Russia with the Turkish port of Samsun. The potential of this pipeline and as a result its strategic importance is that Russian gas can be transported to Europe without going through Ukraine. In 2006 the Baku-Tbilisi-Ceyhan (BTC) was opened. It is a pipeline that transfers oil from Azerbaijan via Georgia to the Turkish port of Ceyhan. The significance of this oil pipeline is that it transfers Caspian oil without going through Russia. In 2007 the interconnector to Greece was opened. It is an interconnector pipeline that carries Caspian gas via Turkey to Greece. Its importance lies on the fact that for the first time gas from the Caspian reaches Europe without crossing Russian territory (Barysch, 2007, p.3). Finally of great strategic importance for the energy security of Europe is that every year some 10.000 tankers pass the Bosphorous strait, which connects the Black Sea with the Mediterranean (ibid).

At the same time moreover, the importance of Turkey for the energy security of the EU lies in the fact that a series of agreements for the construction of various pipelines that will carry oil and gas to Europe have been signed between the government of Ankara and the countries concerned. For example in 2012 the Turkish government signed with its Azeri counterpart an agreement for the construction of the Trans Anatolian Pipeline (TANP). This pipeline is going to carry gas to Europe via Turkey and is expected to be operational in 2018. Within this direction the Shaz Deniz Consortium signed an agreement to construct the Trans Adriatic Pipeline (TAP) that is going to connect TANAP with Europe via Greece, Albania and Italy.

At the same time, Turkey's potential contribution to EU's energy security should not be overestimated. Turkey's dependence on Russian gas is estimated at 63% (Kayisi, 2011, p. 72) and its needs in gas are expected to doubled due to its great economic growth over the last decade (Fackrell, 2013). "Turkey's domestic gas production was around 0.7bcm in 2009 covering 2% of total demand. This makes Turkey a country close to becoming completely import dependent in terms of gas" (Kaysi, 2011, p. 72). Turkey in 2012 imported also 91 % of its oil. Furthermore, the country is experiencing an annual energy consumption increase between 4-5%. At the same time among the EU members this increase is only 1.6% (Babali, 2012, p. 2). This implies that a big portion of the gas that is going to be transited via Turkey to Europe will be consumed in Turkey. Furthermore it should also bear in mind that Caspian Gas would cover a small fraction of overall European imports, as the BTE line will convey only 10-15bcm per year of Azeri gas to Europe, a small volume compared to the EU's projected future annual consumption of 700bcm (Tekin and Williams, 2009, p. 7). Simultaneously many commentators on an EU level are afraid of Turkey using the EU's energy dependence as leverage for its accession (Euractive, 2009).

All in all from the above it can easily be argued that Turkey can play a vital role in the formulation of the "South Stream" energy arterial that is going to supply energy sources to the EU bypassing Russia. A series of other variables beyond geography are of fundamental importance for this important role. The following sections are going to focus on EU-Turkey relations, Greek-Turkish energy co-operation, the relations between Ankara and Nicosia and finally Turco-Russian relations.

RELATIONS WITH BRUSSELS

The importance of Turkey for the energy security of the EU has been recognized in many ways by statements of EU officials and even by EU official documents. The 2004 Turkish Progress Reports presents an overall view on the role that Turkey can play in the strategic planning of the energy security of the EU. As the reports states: "Turkey will play a pivotal role in diversifying resources and routes for oil and gas transit from neighboring countries to the EU" (European Commission, 2004, p.116). Also in 2009, the then President of the European Commission Emannuel Baroso stated that Turkey can contribute greatly through co-operation on energy to the benefit of EU citizens (New York Times, 09/01/2009).

Despite of all these facts however, Euro-Turkish relations over the last 10 years have not been encouraging and promising. Accession negotiations have been stalled and Turkish Foreign Policy (TFP) has set in many instances other priorities. From one hand the EU, after the biggest enlargement of its history in 2004, is experiencing an enlargement fatigue. This is also due to the financial crisis, which took place within the eurozone and is still developing in Greece and in other EU members in the South. The current economic crisis has leaded the "deepening and widening" perception of European integration to stagnation. Simultaneously the Cyprus issue is evolving as another main obstacle to Tukey's quest for EU membership. Turkey does not recognize the Republic of Cyprus, which since 2004, has become an EU member. As a result Turkey is not undertaking its obligations stemming from the 2005 Additional Protocol to the Ankara Association Agreement of 1963. As a result, Turkish airports and ports remain closed to Cypriot aircraft and ships. In reply to this attitude on behalf of Turkey, the European Council of December 2006 vetoed the opening of eight negotiation chapters.

TURKEY'S EU MEMBERSHIP QUEST AN EVALUATION

All in all ten years after the initiation of accession negotiations between the EU and Turkey only 16 chapters have opened so far out of 33. At the same time, big EU member states like France and Germany are still raising objections towards Ankara's prospect for full accession. On top of that "with Britain's disengagement from the EU in the past years, the camp in favor of Turkish membership has been significantly undermined"(European Union Center of North Carolina, 2014, p. 4).

Turkey on the other hand, has lost the reformist zeal that followed is characterization as a candidate for EU accession country in 1999. On the contrary there are instances, like the repression of the Gezi Park protests in Summer 2013, that have raised questions among European political circles regarding the quality of democratic life in Turkey (Balfour, 2014, p. 2).At the same time Turkish Foreign Policy (TFP) has differentiated in many respects compared to EU foreign policy choices. Without any doubt, Turkey's foreign policy under its guiding dogma of Ahmet Davutoglu "The Strategic Depth of Turkey", has often come at odds with the EU. On Rusia-

Ukraine crisis, Syria, Iraq, the Islamic State, Israel, Palestine and Egypt, "Turkey implemented policies that led to substantial divergences with the EU" (Pierini and Ulgen, 2014, p. 16).

From the above, however, becomes clear that Turkey can be a basic actor in the EU's energy strategic planning. As a result the EU will commit a strategic mistake if it will lose interests on its relations with her. What is urgently needed is a new modus vivedi for Euro-Turkish relations that will be based not necessarily on the accession process that is common knowledge to both sizes that it has stagnated and that is going to take years to be completed but on areas of common interests like counterterrorism, immigration and energy (Pierini and Ulgen, 2014).

THE EUROPEANIZATION OF THE CYPRUS ISSUE

The conclusions of the European Council's Summit in Helsinki in 1999 constitute a turning point not only in Turkey-EU relations but also in Cyprus-Turkey relations (European Council, 1999). According to the European Council's conclusions Turkey apart from the Copenhagen criteria undertook the obligation, as a candidate state, to resolve in a peaceful way all of its disputes with its neighbor countries and to make all the necessary efforts required under the aegis of the UN for the resolution of the Cyprus problem. Furthermore, it underpinned that a political settlement was not a precondition to Cyprus accession to the EU. The European Council underlines that "a political settlement will facilitate the accession of Cyprus to the European Union. If no settlement has been reached by the completion of accession negotiations, the Council's decision on accession will be made without the above being a precondition"(ibid).

By accepting the European Council's conclusions of 1999, Turkey made a very important shift in its foreign policy at least as far as the Cyprus issue is concerned. As Kivanc Ulusoy points out,

"since her official application to the EC in 1987 and the following Greek-Cypriot application in 1990, Turkey's strategy was based on rejecting any linkage between the Cyprus issue and her relations with the EC/EU……The Summit constituted also a break for the Cyprus conflict since it provided a clear linkage between the progress of the quality/nature of Turkey-EU relations and the resolution of the conflict together with the rest of Turkey's problem with her neighbors" (Ulusoy, 2008, p. 314).

When Cyprus officially joined the EU a great amount of skepticism and criticism was raised against it by the majority of the members of the international community. This on one hand was due to the fact that the Greek Cypriots with a great majority had turned down the UN's General Secretary Kofi Anan's plan for the unification of the island whereas the Turkish-Cypriots had accepted it. Academic and political circles in Greece also expressed their worries that probably this was the last opportunity for the resolution of the Cyprus issue. On the other hand, these pessimistic attitudes were due to the expectation that the best timing for resolving the Cyprus issue was before the accession of the Republic of Cyprus into the EU. This is also reflected in the various studies that were published a few years before the accession of the Republic of Cyprus to the EU (for example, Diez, 2002, Theophanous, 2003).

Within the EU as well as in Turkey there were worries that Cyprus membership without the previous resolution of its political problem would have a negative effect on Euro-Turkish relations because Cyprus could take advantage of its veto power and block Turkey's European prospects. In Greece, there was a great fear that this development might bring Greek-Turkish rapprochement effort to an end bringing back the tentative and economically costly antagonism in the Aegean.

Under those circumstances and amid severe skepticism, the Republic of Cyprus joined the EU in 2004 with its political problem unresolved. The AKP government of Tayip Erdogan in return called for an end to the isolation of the Turkish-Cypriot Community. It is worth noticing however, that none of the aforementioned concerns expressed by various parties, have been confirmed. The Greek-Turkish rapprochement effort has continued, admittedly at a lower pace, and Euro-Turkish relations were not negatively affected. Indeed Cyprus at the European Council of December 2004 gave its consent for the initiation of entrance negotiations between the EU and Ankara.

Simultaneously, the European Council adopted a negotiation framework setting out the principles governing the negotiations. As far as the Cyprus issue is concerned the framework is making a clear link between Turkey's accession progress and its contribution to the resolution of the political problem of the island. As a result, Ankara's progress in its accession talks would be measured by its continued support for efforts to achieve a comprehensive settlement of the Cyprus problem within the EU framework and in line with the principles on which the Union is founded, including steps to contribute to a favorable climate for a comprehensive settlement, and progress in the normalization of bilateral relations between Turkey and all EU member states, including the Republic of Cyprus"(European Council, 2004). The opening date was set for the 3 October 2005. Moreover, since the departure of Tasos Papadopoulos from the Presidency of the Republic of Cyprus in 2008 bicommunal talks were resumed between community leaders. In their first meeting in May 2008

Mr Christofias and Mr Talat committed themselves to working towards a bicommunal, bizonal federation with political equality as defined by relevant Security Council resolutions"(UN ,News Service, 2011).

Turkey, however, in July 2005, declared that despite its official acceptance, with the signing of the additional protocol to the Ankara Agreement, to extend its Customs Union with the EU to all ten new member states Cyprus included, this did not imply recognition of the Republic of Cyprus. Turkish Prime Minister Tayip Erdogan stated that Turkey would recognize the Republic of Cyprus when there is a "comprehensive peace settlement on the divided island" (quoted in Ulusoy, 2008, p.318). As a result, the EU responded that "recognition of all Member States is a necessary component of the accession process." The EU's attitude was also reflected in EC progress reports on Turkey in 2009 and 2010. More specifically the EC states that "Turkey does not meet its obligations of full, non-discriminatory implementation of the Additional Protocol to the Association Agreement and has not removed all obstacles to the free movement of goods, including restrictions on direct transport links with Cyprus" (European Commission, 2010, p.36).

The government of Ankara continued its reactions towards the Republic of Cyprus. It vetoed Cyprus application to the International Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Technologies and maintained its position on the exclusion of Cyprus from the EU-NATO strategic co-operation in crisis management within the framework of European Security and Defense Policy (ESDP) and also refused to open its ports and airports to Cypriot flagged ships and aircrafts (Ulusoy, 2008:318). Furthermore, Turkey vetoed Cyprus' membership of the OECD and in some cases its military forces violated the territorial waters and airspace of the Republic of Cyprus (ibid. p. 37).

As a result of this behavior on behalf of Turkey and also because of pressure from the Republic of Cyprus, the European Council meeting in 2006, as was stated before, decided to suspend eight chapters from the negotiation process of Turkey's accession to the EU. As the official site of the European Union states: Due to the Turkish failure to apply to Cyprus the Additional Protocol to the Ankara Agreement, the Council decides that eight relevant chapters will not be opened and no chapter will be provisionally closed until Turkey has fulfilled its commitment. The eight chapters are: Free Movement of Goods, Right of Establishment and Freedom to Provide Services, Financial Services, Agriculture and Rural Development, Fisheries, Transport Policy, Customs Union and External Relations http://ec.europa.eu). The tension between the Republic of Cyprus and Turkey continued even until the beginning of 2011. On a statement by his Turkish Counterpart Ahmet Davutoglou, "that no one should ever try Ankara's patience or present it with the dilemma of having to choose between the breakthrough of North Cyprus and the EU", the Cypriot Foreign Minister Marcos Kyprianou commented that we not only do not accept Turkey joining the EU, but will also block any further progress in its accession negotiation (www.xinthuanet.com, 2013).

Furthermore on 17th December 2010 an agreement was signed between the Republic of Cyprus and Israel on the delimitation of their Exclusive Economic Zone (EEZ). Israel pursue this agreement as a result of the discoveries of two offshore natural gas fields in northern Israel in 2009. This agreement was signed despite the intense reactions of Turkey. It is worth to be mentioned that relations between Turkey and Israel have deteriorated as a result of the "flotilla crisis)" that took place in 2010 and resulted in the assassination of ten Turkish activists that were trying to deliver humanitarian aid by sea to Gaza. Those agreements were accepted by the EU. In 2011 the Republic of Cyprus also discovered natural gas in the Aphrodite field in its EEZ a few miles west of Israel's Leviathan field (Denise, 2012, p. 1). As a result Israel and Cyprus signed agreements of co-expoloitation of their offshore natural gas reserves. These reserves could also serve the energy security goals of the EU. The formation of a South-East Mediterranean corridor if is going to be implemented could do that. Tentative relations, however, between Turkey and the Republic of Cyprus, constitute a threat to EU's energy security planning.

Thus, a successful settlement of the Cyprus issue will be in the interests not only of the two communities that live on the island but for the international community as a whole. At the same time, resolution of the Cyprus problem will strengthen Turkish potential for EU membership and will also increase its significance for the energy security of the EU.

Overall it can be argued that despite the potential for regional energy co-operation that will entail mutual benefits for all the parties involved, diplomatic and geopolitical issues between Turkey, the Republic of Cyprus and Israel do not contribute to the strengthening of the importance of Turkey for the energy security of the EU. This might imply that the EU in its effort to serve its strategic principle of "diversification of roots and supplies, will have to exclude Turkey from the construction of a new energy corridor in the East Mediterranean basin. In that case the only choice for the EU, despite its greater financial cost, will be the construction of an "East Mediterranean" energy corridor that is going to transfer gas from Israel and Cyprus to the rest of the Union, via Italy and Greece.

GREEK-TURKISH ENERGY CO-OPERATION

Greek –Turkish relations has been an area of concern among European political leaders. A couple of years before Greece's accession to the then EEC (1981), many objections were raised in Europe that the problematic character of the two neighboring countries was going to create problems in the functioning of EEC's institutions. Since 1999, however, Turkish-Greek relations are going through a rapprochement process that has benefited both countries in many respects (Koukoudakis, 2013, 2015). From 2000 to 2013 more than 100 bilateral agreements have been signed which contributed greatly to an impressive increase in the bilateral trade between the two countries, (Liargovas, 2004) to the increase of the direct foreign investments of Greek and Turkish Companies in Turkey and Greece respectively, (Papadopoulos, 2008) to the increase of tourist activities between the citizens of both countries,(Greek Ministry of Foreign Affairs, 2011) to the improvement of the railroads and sea lines that connect both countries,(Osman, 2007) to the increase of the cultural and scientific co-operation between the people of both countries,(Koukoudakis, 2011) to the signing of a series of Confidence Building Measures (CBM),(Onis and Yilmaz, 2008)) to the joint ventures for the construction of Natural Gas Pipeline that is going to connect Turkey with Greece and Greece with Italy (Ifantis and Tsakiris, 2010) and to the Establishment of the Council of Strategic Co-Operation where the Prime Ministers of both countries meet annually.

As far as energy co-operation is concerned Greece and Turkey have already contributed greatly to the strategic planning of the EU. The construction of the Interconnector Turkey-Greece (ITGI) pipeline and the TANAP and TAP projects do not only constitute a win-win situation but have increased their importance to the energy security of Europe. Furthermore, in 2008 the electricity grids of both countries were linked as a result of a memorandum of understanding that was signed in 2002 between DEH, Greece's Public Power Corporation, and TEIA, Turkish Transmission System Operator. As a consequence, one of the basic principles of the EU's Energy Security Policy the diversification of supplier countries and energy roots has been served well.

"Generally speaking, cooperation in this important field suggest a readiness by the two governments to pursue, or at least accept, the development of overlapping interests with whatever constraints on their freedom of action this may entail, in exchange for a greater degree of joint, in the event energy security vis-a vis the rest of the world and a more important joint role in European energy geopolitics." (Papadopoulos, 2008).

This implies that the rapprochement efforts should continue. Nobody can deny today that it serves the interests of both countries.

RELATIONS WITH RUSSIA

Turkey over the last decade has improved greatly its bilateral relations with Russia. Energy is the main area of co-operation. Actually, the origins of this co-operation date back to 1984 when a bilateral agreement on energy was signed. In addition the foreign policy of AKP has facilitated the establishment of the High Level Cooperation Council in 2010. Since then 40 bilateral agreements were signed. Energy, trade and tourism top the list. The Visa Free Travel Agreement is one of them. Furthermore, due to the deterioration of the relations between Russia, the USA and the EE as a result of the Crisis in Ukraine, Ankara, has taken advantage of this development and further strengthened its economic ties with Moscow. Turkey has refused to takepart in the US and EU sanctions against Russia. As was stated in the first section of this study, Turkey thanks to a series of bilateral energy agreements that has signed with Russia can at least contribute to the diversification of the routs that natural gas takes in order to reach the EU. At the same time, however, choices that have been made my TFP on several issues like Syria and Iraq have been at odds with the foreign policy of Russia. This means that Turko-Russian relations may also have its limits. "Turkish – Russian relations have historically been characterized by rivalry and great wars, a rapid process of transformation in recent years has seen these countries move toward closer cooperation." (Ozdal, 2015). What seems today crucial in bringing both countries together is their interdependent relations. Russia needs Turkey in order to to have an alternative root that bypass Ukraine in order to transit oil and gas to Europe. Turkey needs Russia not only in order to strengthen its significance in the international relations of energy but also in order to satisfy its constantly increasing domestic energy needs. What is therefore is expected in the longer run is the further normalization and strengthening of their bilateral relations with emphasis on energy. A prospect that should not be neglected by EU strategic planning on energy.

CONCLUSIONS

In conclusion it can be argued that Turkey can make a very important contribution towards the energy security of the EU. Its unique geographical location combined with its transit infrastructure and the forthcoming implementation of natural gas and oil transit projects can serve the energy security interests of the EU.

At the same time, however, relations between Turkey, the EU, Greece, Cyprus, Russia and Israel will determine the extent to which Turkey will be able to influence the strategic energy security planning of the EU. As far as EU-Turkey relations is concerned, given the stagnation of the accession process, what is urgently needed is the establishment of a modus vivendi that is going to be characterized by constructive co-operation over a series of issues of common concern. Energy is undoubtedly one of them. Meanwhile, a solution of the Cyprus issue will be beneficial not only for the energy security of the EU and for Turkey's but mostly for the Cypriot citizens and will undoubtedly contribute to peace and stability in the wider area. Such a development may also lead to the normalization of the relations between Ankara and Tel-Aviv. In the longer run, as European energy needs become more pressing the EU may have to give more serious consideration to Turkey's accession.

Simultaneously, Greek-Turkish rapprochement process should enhance. Greece is the natural geographical passage of Turkey to Europe. Energy co-operation between them has very positive results that will serve the energy security of the EU.

Relations with Russia are also an area of great interest given the interdependence relations between them. What is expected in the near future is the tightening of energy co-operation despite basic differences on foreign policy choices.

In sum Turkey's importance for the energy security of the EU is great but international relations of the area are also bound to exercise strong influence on the strategic planning of the EU in that very sensitive field.

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EUROPEAN UNION'S ENERGY SECURITY CHALLENGES IN 21ST CENTURY

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ABSTRACT

The oil crises made states more aware that their power was dependent on access to natural resources and raw materials to feed the economy's industrial base. Growing demand for energy resources and scarcity of them gave rise to using of energy as a foreign policy tool. Thus energy security became one of the broader range of nontraditional security issues that emerged in the past years, it has been integrated into the debates of the international relations theories. On the other hand, after the Russian-Ukrainian gas crisis concerns on energy issues increased in the European Union and the Union's energy security was required a review. The last developments show that in 21st century an energy security is not only a topic of the European Union's economic agenda anymore. A serious political effort is needed in order to deal with the growing energy demand of the Union. The theoretical approach to the subject has remained a neglected part of the relevant studies. Therefore, this paper intends to explain the Union's energy security issue within the framework of exising international relationstheories.

Keywords: European Union, energy security, international relations theories

INTRODUCTION

Only after the oil shocks of the 1970s energy issues began to be discussed seriously within the security topics. Energy security issues have traditionally focused on crude oil supply disruptions in the Middle East. After nearly two decades of comfortable supply margins from the oil embargoes, the global energy system was stretched to the breaking point in 2000s. The expansion of the European Union (EU), the break-up of the Soviet Union and the economic explosion in the Asia Pacific region have meant major shifts in demand and supply and in geopolitics. The recent Russian-Ukrainian natural gas disputes and oil disruptions highlighted the importance of the issue on the geopolitical agenda (World Economic Forum 2006). Today "an exceeding tight oil market, high oil prices, geopolitical rivalries and countries' fundamental need for energy to power their economic growth" (Barbieri2011) place the energy issues to the security agenda of the states. This means that research on energy, or energy security, cannotbe separated from politics, especially geopolitics (Hu & Ge 2014).

With the gas crises in 2006 and 2009 between Russia and Ukraine that dominated international headlines, energy supply security has one again become a major political concern of the European Union.Moreover,Ukraine's rejection of signing an Association Agreement with the EU under the pressure of the Putin administration at the Vilnius Summit was followed by the pro-European demonstrations. This was a good opportinuty for Russia to provoke the confronting sides in order to keep Ukraine away from the EU. At the present time dimentions of the subject expanded, resulting in mutual sanctions between Russia and member states and two frozen conflicts in Ukraine - the center of the Europe. The EU's energy dependency was a deterministic factor during the negotiations with Russia. The high dependency of the EU to the energy imports and vulnerability to external energy shortages are the main challenges of the Union's energy security in 21st century.

Thus, the purpose of this study is to deal the EU's energy security challenges in the light of recent developments, drawing a theoretical framework for it. First part of the paper includes the several definitions of energy security concept. In the second part it is aimed to explain the energy security issues from the theoretical point of the view. The purpose of the next part is to survey the EU's energy security in terms of IR theories. Finally, the paper concludes by arguing that the EU's energy security will remain one of the vulnerable issues. Therefore, the Union should settle with Russian interests in Ukraine. By this way the EU will protect its own stakes actually in a short and medium terms. But for a long term the member states should make serious effots to

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gather a common way toward the multifarious suppliers in order to achieve the Union’s main goal of sustainable, environmentalist and secure energy supply.

1. THE CONCEPT OF ENERGY SECURITY

The current energy security system was created in response to the 1973 Arab oil embargo to ensure coordination among the industrialized countries in the event of a disruption in supply, encourage collaboration on energy policies, avoid bruising scrambles for supplies, and deter any future use of an “oil weapon” by exporters (Yergin 2006).

Security can be defined as defensive (in relations to a threat) or offensive (optimizing of profits in relations with other actors) (Grafstein 2002). The energy security is offensive, as it is the only vulnerable point of the Western states, they prefer to use the offensive strategy (Belyi 2012). Security of supply is an important goal of energy policy in many countries around the world. Despite the high importance of energy security in policy, several authors have pointed out that the term is not clearly defined(Winzer 2011). Although in the developed world the usual definition of energy security is simply the availability of sufficient supplies at affordable prices, different countries interpret what the concept means for them differently. Energy-exporting countries focus on maintaining the “security of demand” for their exports, which after all generate the overwhelming share of their government revenues (Yergin 2006).Basicly, energy security is an umbrella term that covers many concerns linking energy, economic growth and political power (World Economic Forum 2006).

The International Energy Agency (IEA) defines energy security as “the uninterrupted availability of energy sources at an affordable price” (IEA 2014). Energy security has many dimensions: long-term energy security mainly deals with timely investments to supply energy in line with economic developments and sustainable environmental needs. Short-term energy security focuses on the ability of the energy system to react promptly to sudden changes within the supply-demand balance. Lack of energy security is thus linked to the negative economic and social impacts of either physical unavailability of energy, or prices that are not competitive or are overly volatile (IEA 2014).

After the establishment of the IEA, the concept of national energy security was formally proposed, the core of this concept being the stabilization of crude oil supply and price security. The signing of the Kyoto Protocol in 1997 marked the start of countries considering the endowment of energy security with environmental protection and sustainable development connotations. Thus, energy security is defined as a country or religion able to obtain a stable, adequate, economic and clear energy supply to meet demand, ensure stable economic and social operation, and guarantee the ability and status of sustainable and coordinated development (Hu &Ge 2014).

The Asia Pacific Energy Research Centre (APERC) defines energy security as “the ability

of an economy to guarantee the availability of the supply of energy resources in a sustainable and timely manner with the energy price being at a level that will not adversely affect the economic performance of the economy”, emphasizing the “four A approach” of Availability, Accessibility, Affordability and Acceptability, when dealing with this question. According to that view, security of energy supply is affected by factors such as the (physical) availability and the (geopolitical) accessibility of energy sources, the (price and cost of infrastructures) affordability of energy as well as the (environmental) acceptability (APERC 2007).

European Commission’s a 2000 Green Paper referred to energy supply security as “the uninterrupted physical availability of energy products on the market, at a price that is affordable for all (private and industrial) consumers, while respecting environmental concerns and looking towards sustainable development” (European Commission 2000). This involves an obvious extension of the IEA definition, with the inclusion of environmental and sustainability issues that may introduce additional and sometimes disparate constraints. In this context, the Commission’s Green Paper identifies several sources of risk in the energy arena. *Physical risks* distinguish between permanent disruption (due to stoppages in energy production or to exhaustion of energy resources) and temporary disruptions (due to geopolitical crisis or natural disasters). *Economic risks* cause by volatility in energy prices after imbalances between demand and supply. *Political risks* bring about by energy exporting countries that intend to employ energy deliveries as a political weapon. *Regulatory risks* arise due to poor regulations in the domestic markets and regulatory variability in exporting countries (both in terms of security of energy investments and of security of supply contracts). Social risks occur due to social conflicts that are linked to continuous increases in energy prices. *Environmental risks* are related to the energy sector (oil spills, nuclear accidents, etc.) and may cause significant environmental damages (Labandeira & Manzano 2012).

Experience has shown that to maintain energy security countries must abide by several principles. The first and most familiar is what Churchill urged more than 90 years ago: diversification of supply. Since Churchill’s day, the key to energy security has been diversification. This remains true, but a wider approach is now required that takes into account the rapid evolution of the global energy trade, supply-chain vulnerabilities, terrorism, and the integration of major new economies into the world market (Yergin 2011).

According to the World Coal Association, there are many drivers governing the secure supply of energy. The first is the ***diversification of generation capacity***, which is a well-balanced energy system, comprising various power generation technologies, and with suitable capacity, enables the advantages of each to be maximised, allows prices to remain reasonably stable, and ensures a continuing supply to the consumer.*Price* is the provision of affordable energy to the consumer is dependent on the cost of generation, transmission and distribution. The interruption of supply networks can negatively impact prices and create economic difficulties for countries exposed by over-reliance on one energy source. Sustained price rises and short-term spikes in oil, gas or electricity can trigger inflation and recession.Also *significant investment* is needed to meet the forecast growth in energy demand. The availability of that investment – particularly problematic in many developing countries – will be a significant factor over coming years. .Energy must be readily available, and thus the *ease and safety with which fuels and electricity can be transported* is a key driver for energy security .***Concentration of suppliers***is the reliance on imported fuels from a limited number of suppliers may increase the risk of adverse market influence. Where suppliers are from politically unstable countries, there may also be an increased risk of supply disruption .To achieve a diverse energy mix, countries must have access to different energy sources, requiring both *infrastructure and expertise*, whether in generation technologies, fuel handling, access to delivery systems such as pipelines, ports or electricity interconnections and transmission lines.*The interconnection of energy systems*, particularly electricity, must also be considered in terms of security. A limited market or connection increases the risk of supply disruption by reducing the options available to meet demand .*Diversification in the uses of fuels* may also be important for energy security. Fuel transformation – such as coal to gas, gas to liquids and coal liquefaction – can meet demand even when conventional supplies may be affected. The energy supply system can be vulnerable to disruptions caused by *political interests and even terrorist attacks*(World Coal Association, 2014).

According to Haighighi, it is imperative to distinguish between the two sources, oil and gas, since they have different characteristics from the perspective of energy security (Haighighi 2006).Unlike oil, gas is relatively difficult to store and gas transportation infrastructure is rigid in nature (for the time being). This means that a physical link between producer and consumer is required and the number of alternative routes to the consumer is limited. In comparison to gas, oil transportation is not costly, and therefore oil that is destined for a specific place can easily be redirected to another destination. Moreover, unlike the global oil market, the gas market is regional. A global oil market implies that a disruption of oil supply in one part of the world may affect the whole world whereas gas disruption does not necessarily have worldwide repercussions. This is again due to the fact that firstly, the costs of gas transportation are higher than oil, and delivery systems are inflexible, and secondly, gas development in one country or region is isolated (due to a lack of easy switching between routes) from the development of other regions, which suggests that disruption in one region does not necessarily influence another. Another difference between oil and gas is that seven cases of oil disruption have been reported since 1950, occurring for purely political rather than physical reasons, whereas no gas disruptions have occurred and if they did, were only minor and short-term. This last difference shows that oil has historically been used as a political weapon while gas does not have such political characteristics. In addition, gas security is mostly concerned with physical shortage rather than price shocks, the latter being an oil security concern. Haighighi points that the multi-faceted nature of energy security, which will be elaborated below, makes it very difficult to provide a definition of energy security that is accepted by all. A commonly accepted practical definition of this concept is *adequacy of energy supply at a reasonable price*. This definition suggests that energy should be physically available and its price should be reasonable.

Generally, perception of energy dependency as a serious security issue increased the strategic importance of the energy-producing and transit countries so that geopolitics, which emphasizes protecting national borders traditionally, gained new meanings such as oil geopolitics and pipeline diplomacy.

2. ENERGY SECURITY IN THEORIES OF INTERNATIONAL RELATIONS

Scarcity of energy resources and increased demand for energy are the main reasons of nationalization and using of them as a foreign policy tool, resulting in a dynamic security structure that is very difficult to manage (Balaam & Dillman 2014). The management of the energy-related relationships among the states that involves access to energy sources, their production, export, import, transportation and supply is one of the contemporary study fields.

The oil shocks in 1973 and early 1980s changed the views of officials, experts, and the public about the national security. The oil crises made states more aware that their power was dependent on access to natural resources and raw materials to feed the economy’s industrial base. Because energy security became one of the broader range of nontraditional security issues that emerged in the past years, it has been integrated into the debates of the international relations (IR) theories. An overview of the existing IR theories demonstrates various approaches(Belyi 2012).

Realists put emphasis on energy security within the framework of state's power and define it as one of the state's national interests. As realists argue, the main point of foreign policy is to project and defend the interests of the state in world politics. Focusing on national security and state survival, realists consider the state as an essential for the good life of its citizens. But states are not equal: on the contrary, there is an international hierarchy of power among nations. The most important states in the world politics are the great powers. International relations are understood by realists as primarily a struggle between the great powers for domination and security (Jackson and Sorensen 2007) in the international arena, which is an anarchical system, where the states look for opportunities to take advantage of each other (Lebow 2010). The absence of world government - anarchy and egoism greatly impede cooperation. But actors who focus on relative gains find it much more difficult to cooperate (Donnelly 2009).

Realists point out that through history, certain commodities, and in particular energy commodities, minerals, water and food have had a strategic value beyond their market price and as such they have been repeatedly used as tools of foreign policy by exporters and have been among the prime catalyst of armed conflict (Luft and Korin 2009). Moreover,energy resources are important elements of state power, because states dominate over the actors within it, as well as implement legislation defining exploitation, taxation, privatization and extractions,.The more resources it has the more powerful the state is. Of course a state power perspective based on energy resources depends on the state‟s ability to extract and transport the resources as well as the global demand for them (Cesnakas, 2010).

States positions on issues of energy resources in the international system depend on the conflicts, bargaining and consolidation of interests of most powerful states, and interaction between energy resources exporting, transit and importing states. Exporting and transit states will try to acquire as much power as they can from energy resources and importing states‟ attempt to acquire energy resources translates into power elements. Energy resource exporting states can increase or decrease the extraction of energy resources in order to expand their influence abroad and to affect international markets (Cesnakas, 2010).

It is interesting to note that energy security is central in ensuring national security, and at the same time, a threat to national security. In some cases, application of military forces as a response to threats has been taken into account. In the worst scenarios, energy security could trigger some drastic measures by powerful states, including resorting to military actions. Such

measures are being used in order to foster policies leading to the supply of energy resources by the suppliers or put under the control energy high prices. It seems that a global strategy has been formed in order to confront any measure, which may hinder or prevent energy supply (Koolaee 2011).

However, a major concern for all economic liberals is the state's role in the market and other parts of the economy. The liberal values and ideas are focused on the so-called laissez-faire principle that the state should leave the economy alone. Although liberals agree with that people are fundamentally self-interested, they do not see this as a disadvantage because competing interests in society can engage one another constructively. Believing in the cooperative, constructive side of the human nature, in his famous book *The Wealth of Nations*, Adam Smith established on the principle that the nation is best served when state power is used to create wealth, which produces more power and national security. Following Smith, David Ricardo argued that free international market stimulates industry, encourages innovation, and creates a "general benefit" by raising production. These positive-sum payoffs of trade bind together the nations of the world by a common thread of interest and intercourse, weakening or entirely eliminating reasons for war (Balaam & Dillman 2014). Thus, energy interdependence and the growing scale of energy trade require continuing collaboration among both producers and consumers to ensure the security of the entire supply chain. Long-distance, cross-border pipelines are becoming an ever-larger fixture in the global energy trade (Yergin 2006).

Institutionalism, which is one of the most novatrice conceptions of international political and economic relations argue that institutions, stemming from norms and regular practices, build a basis for stability and security of economic relations. The process of legalization of international relations stems from the juridical ideology: respect of law leads to a better security (Belyi 2012). Each institution is shaped by particular principles, norms and rules which influence different approaches to resolving problematic resource management. On this basis, some institutions promote knowledge and information on energy and energy-related issues such as environment; some of them establish general legal binding institutions, which have emerged through general multilateral conventions and agreements; some constitute issue-specific agreements which directly involve the international energy markets; some form practices of regional economic organizations. Also there are cross-border institutions set by private commercial actors. Thus, the density of institutions explains the various angles of energy policy strategies.

Many states officials attempt to use trade as an instrument to achieve political, social, and economic objectives. Application of sanctions by international community to punish the states who use the trade as a tool of foreign policy is not effective enough. A political economist Susan Strange has pointed that energy sector can not be analysed in purely quantitative terms. The oil shocks were partially provoked by Israeli-Arab conflict of 1973, which can not be incorporated into economic modeling (Strange 1980). On these grounds, she stigmatises the existing theoretical barriers existing between three major social sciences, i.e. economics, political science and international relations and stresses the need to analyse energy security from both economic and political angles. Her conception represents a particular view of a structural approach to the international political economy: the structures which shape global political and economic behaviour for states, firms, and other social and economic actors (Strange 1980). She argues that four primary structures, namely security, finance, production and knowledge, constitute a source for structural power of international actors (Strange 1980). Energy, in turn, plays a vital role for production (especially industry, residential and transport sectors), finance (in terms of benefits provided especially by oil trade), knowledge (related to technological development, including energy and environental sectors), as well as security (setting up international institutions dealing with energy supply or direct intervention in oil-producing regions) (Strange 1980).Thus, some theoretical approaches support the non-liberal structure of energy security. As Kuttner suggested, in the absence of the world government, cross border trade is always subject to rules that must be politically negotiated among nations that are sovereign in their own realm but not outside their borders. For Kuttner, trade is always political, economist and columnist(Kuttner 1991).

Thus, energy issues somehow exist in political, military, economic and environmental parts of the theories, although they do notinvolve an energy sector directly. Because of the multifaceted character of energy and the fact that energy exists in many different areas, it may be considered as a “threat”, “political power”, “cooperation”, “economic welfare”, “national security”, “casus belli”, “environmental security” according to the existing conditions. What is the common for all of these theories is the increasing concerns on energy after the Russian-Ukrainian gas crisis in 21st century (Korkmaz 2010).

3.ENERGY SECURITY ON THE EUROPEAN UNION’S AGENDAIN 21ST CENTURY

In order to analyse the EU’s energy security issue from the theoretical aspects, it is crucial to display how the concept of “energy security” isperceived by the Union. Although self-sufficiency and dependency rates differ from onemember state to another, energy security is perceived from a “supply security” point ofview, thanks to increasing dependency on energy imports. Commission’s policy papers did not give a definition of the concept, but they refer to secure, competitiveand sustainable supply of energy resources, thus demonstrates geopolitical, economicand environmental aspects of the issue (Korkmaz 2010).In thissense, in addition to environmental approach, the concept of energy security is perceivedin the EU from both economic and geopolitical point of views (Korkmaz 2010).

Thus, having a secure supply of energy is very important for the well-being of European citizens and the economy. The European Union's prosperity and security hinges on a stable and abundant supply of energy (European Commission 2014).

The external dimension of EU energy security policy was limited to a political coordination of energy security measures among EU member states before the oil shocks. These coordinated security measures emerged immediately during the first oil crisis in 1973 and it was a response to an external event (the energy crisis) rather than a common foreign energy security policy of the member states (Belyi 2012).

But later, when Europe as a major energy consumer addressed future energy needs and faced a number of challenges, such as a rapidly rising global demand and competition for energy resources from emerging economies like China and India, persistent instability in energy producing regions like the Middle East, a fragmented internal European energy market, and a growing need to shift fuels in order to treat climate change policy, an energy supply security had become a key concern for European nations and the EU (Phillips & Cook 2012). Because the EU is highly dependent on energy from abroad, importing 53% of all the energy it consumes at a cost of more than one billion Euros per day. This includes 88% of its crude oil, 66% of its natural gas, 42% of its solid fuels such as coal, 95% of its uranium (European Commission 2014).

The origin of EU-28 energy imports has changed somewhat in recent years, as Russia has maintained its position as the main supplier of crude oil and natural gas and emerged as the leading supplier of solid fuels. In 2012, some 33.7 % of the EU-28’s imports of crude oil were from Russia, slightly below the shares recorded for 2010 (34.7 %) and 2011 (34.8 %). Russia became the principal supplier of solid fuels in 2006, overtaking South Africa, having overtaken Australia in 2004 and Colombia in 2002. Russia’s share of EU-28 solid fuels imports rose from 13.1 % in 2002 to 30.0 % by 2009, before falling somewhat to 25.9 % by 2012. Despite this contraction, Russia remained the primary source of solid fuels imports into the EU in 2012, although its share was only slightly ahead of those recorded for Colombia (23.7 %) and the United States (23.0 %). By contrast, Russia's share of EU-28 imports of natural gas declined from 45.2 % to 29.5 % between 2002 and 2010, but this trend was reversed with increases in 2011 and 2012. Qatar's share of EU-28 imports of natural gas rose from less than 1 % in 2002 to 11.0 % in 2011, before dropping back to 8.4 % in 2012. The security of the EU's primary energy supplies may be threatened if a high proportion of imports are concentrated among relatively few partners. More than three quarters (76.8 %) of the EU-28's imports of natural gas in 2012 came from Russia, Norway or Algeria — as such there was a greater concentration of imports than in the previous two years as the same three countries accounted for 71.0 % of natural gas imports in 2010 and 72.0 % in 2011. A similar analysis shows that 53.6 % of EU-28 crude oil imports came from Russia, Norway and Saudi Arabia in 2012, while 72.6 % of hard coal imports were from Russia, Colombia and the United States. Although their import volumes remain relatively small, there was some evidence of new partner countries emerging between 2002 and 2012. This was notably the case for crude oil imports from Nigeria, Azerbaijan and Kazakhstan, or natural gas imports from Qatar (European Commission 2014).

Figures such as these mean that the EU can be vulnerable to external energy shocks. Many member states are heavily reliant on a single supplier including six who are entirely dependent on Russia for their natural gas. The situation is particularly acute in Bulgaria, Estonia, Finland, Slovakia, Latvia and Lithuania which the European commission judges 100% dependent on Russian gas (Neslen 2014). Three member states – Estonia, Latvia, and Lithuania – also rely on a single external operator for the operation and balancing of their electricity network, and for a large share of their electricity supply. The majority of Russian gas exports to Europe passes through Ukraine from where a number of pipelines travel west, delivering gas to central and northern Europe (Stem 2003). The serious nature of these dependencies was brought to the forefront during the winter gas shortages in 2006 and 2009, and more recently by the ongoing crisis in Ukraine.

Although the dispute between Russia and Ukraine over the gas payments and debts is a subject of another researchs, like the last developments in Crimea, these events are directly related with the EU's energy security. Moreover, mentioned disputes between Russia and Ukraine concern many aspects of the EU-RF relations. Conflict of interests is its main features. With the election of Putin to the presidential post in 2000 nationalism in domestic and foreign affairs was promoted in Russia, which has manifested itself in a brutal counter-insurgency in Chechnya, invasion of Georgia, occasional cutoffs of gas flows to Ukraine, thereby to the some EU countries (Balaam & Dillman 2014).Annexation of Crimea and ongoing disputes are the peaks of this nationalism. Besides, Russia emerged as a key player in the oil regime, increasing its output of oil.

Current situation creates additional risks for the European security. Briefly, this is caused bythe process of geopolitical restructuring of the European space following the collapse of the "socialist camp" and the formation of two "centres of influence" on the European continent. The EU and Russia have been implementing their fundamentally different competing integration projects in the post-Socialist (now, the post-Soviet) states. The EU pursues the policy of enlargement and/or creating a group of partner countries that would act on the basis of the Western norms and standards. In the meantime, Russia has been pursuing an integration project of its own (the Eurasian Union) that would be governed by the rules and norms inherent to the state-centric political system of an "Eastern" pattern. Ukraine is directly influenced by the above-mentioned competing integration projects, in which it has an important role to play. Becausefor Russia, "losing" Ukraine means the final devaluation and complication of implementation of its integration project. While implementing the Wider Europe, the European Neighbourhood Policy and promoting the Eastern Partnership Initiative, the EU is penetrating even farther into the post-Soviet region of the Eastern Europe and the Caucasus that Russia considers to be the sphere of its privileged interests. This is the key problem of relations in the EU-Ukraine-Russia format (Rzaumkov Centre 2012). It is a struggle between RF and the EU for their own values and domination, where Russia uses its energy sources for opportunities to take advantage of. Soros summarized the situation more clearly pointing that the Russian attack on Ukraine is indirectly an attack on the European Union and its principles of governance (Soros & Schmitz 2014). Energy dominance provides Russia with a regional instrument that has been used repeatedly in recent years to keep CIS neighbours in line, but evidently operates further afield in the form of "gas spats" with CEE and Baltic states whose political or market attitudes fail to confirm to Kremlin expectations. Russia is able to operate thusly because its largest energy company, Gazprom, is managed by the Russian state, and whose ambitions in recent years have lain close to the political orientations of the Kremlin. Centralized political power twinned with concentrated non-liberal market power is not only doubly anathema to the democratic, liberalized EU market structure, it keeps Russia an unpredictable negotiating partner (Hadfield & Amkhan-Bayno 2012). That is why the energy supply took a place among the security issues of the EU recent times.Merkel's statement that there will be a new look at energy policy as a whole (Welle 2014) gives a hint about the EU's countermove againstRussia in the near future.

On the other hand, Russia's ambassador to the European Union, Vladimir Chizhov, has excluded the possibility of a "gas war" between Russia and the West, emphasizing that Russia is and will remain a reliable partner and energy supplier (Welle 2014).It's clearly in Russia's interest to preserve the energy status quo: Russia exported 71 % of its gas to Europe with the largest volumes to Germany and Italy (European Commission 2014). For Russia, the natural gas sector contributes approximately a fifth of the national budget (Reuters 2014). Similarly, the EU's keepingGazprom out of the sanctions list, imposed on Russian companies after annexing Crimea, was a result of the mutual interdependence between two sides. Mentioned interdependence defined the limits of the EU's policies against Russia during Ukrainian crises (Has 2014) as well as an amount of the mutual losses.May be the gains are different but consequently an energy cooperation between the Union and Russia feeds both sides' economies.The mutual economic interdependence enforces the sides to act rationally. Living in a totally connected, networked planet, linked together at both business and every other level, including security and international policy, as never before in history, the Union cannot actually cut Russia off, whether in energy terms or in any other way. Maybe Gazprom's total monopoly thrall can be reduced somewhat to some countries, with better connectors and back-up systems. But overall Russian gas will remain a large, important, and probably growing component ofthe European energy market (Howell 2014). That is why European energy 'diversification' strategy, and Ministerial statements and policies in support of it, should be rooted in realism, honesty and a firm view of longer term interests (Howell 2014).

Besides the end of the Cold War offered an unprecedented opportunity to overcome the previous economic divisions on the Eurasian continent. There was therefore a recognised need to ensure that a commonly accepted foundation was established for developing energy cooperation. On the basis of these considerations, the Energy Charter Treaty (ECT) process was born (Konoplyanik and Wälde 2006). The purpose of the ECT (Article 2) is that it "establishes a legal framework in orderto promote long-term cooperation in the energy field, based on complementaritiesand mutual benefits, in accordance with the objectives and principles of the Charter"(Energy Charter Treaty 2004). But in October 2009, the Russian Federation terminated its provisional application of the ECT, because of opposition from Gazprom and to a lesser extent Rosneft and Transneft, who persistently claimed that ratification would be damaging to "Russian" interests. Russia's decision prevented the international legal regime for the energy governance. Thus, in the international system there are no global supranational institutions capable of dominating the energy system effectively, so states in the international system remain self-helping actors. Existing transnational institutions, dealing with energy resources issues, become active only when their members confront clear and present threats to their interests, like the International Energy Agency or Organization of the Petroleum Exporting Countries. Regional supranational organizations act efficiently only when the interests of almost all member states match (Cesnakas 2010).

In sum, multifaceted characteristics of the energy makes able to develop various approaches about the EU's energy security issues. Because the energy issue is a new security topic, developed after the oil shock of the 1970's and has a multifaceted feature, it is impossible to place this subject to the basis of particular IR theory.

CONCLUSION

In a world of increasing interdependence, energy security will depend much on how countries manage their relations with one another, whether bilaterally or within multilateral frameworks. That is why energy security will be one of the main challenges for the EU members' foreign policy in the recent years. In the meantime, diversification of gas supply sources for Europe has become a priority for energy strategy and foreign policy of the EU. Having a deep dependency to the Russian natural gas, the Union mentions about the contributions of other countries such as Turkmenistan, Iraq and Iran to its energy demandin the longer term perspective if conditions are met to lift the sanctions regime.But today unstable political environment in the Middle East and Central Asia restricts the EU's maneuver area in terms of diversification of suppliers. In this situation Russia remains being a major supplier of the member countries. But ongoing disputes in Ukraine created serious suspicions about the Union's energy security. The roots of Ukrainian crisis resided in basic difference of opinions between the West and Russia. The EU followed the same path for Ukraina as it did in 2004 enlargement process. The Union continued to develop its relations with Russia, trying to join with Ukraine. The pursued policy by the Union was undesirable for Russia however. Increasing influence of the European-Atlantic bloc in post-socialist areas step by step after the Cold War was unacceptable for Russia in terms of its national interests. Thus Ukraine was "a last castle" for Russia. It is hard for Russia to image the Eurasian Economic Union without Ukraine. Ukraine's participation is essential in order to realize Russian global geopolitical ambitions. At the same time, Ukraine was a country which highlighted in the EU's strategic documents. The aim of the Union was to make Kiev as closer as possible to the European family (Ozbay 2015). That is why the Ukraine's preference had a strategic importance for both sides, whose interests conflicted here.

Regardless of all these, the mutual interdependence on trade and especially energy enforces the EU and Russia to act rationally, as the realists argue. There is a bilateral negative effects of the EU's sanctions on Russia. Russia is the EU's third largest commercial partner, while the EU is Moscow's most important trade partner. The Union is an implementer of the sanctions, therefore all attentions about the impacts of them focused on Russia. However, there is serious cost of the sanctions to the EU, following by the reactions of member states. As the effects of sanctions are cumulative with derogations for certain contracts still in force, these protests will surely increase over the next few months when the sanctions start to take full effect (Giumelli 2014).Minsk Agreement dated on 12th February 2015 legitimized the existence of two new “frozen conflicts” in Ukraine posed by Putin administartion, which will hang over the Europe like the Sword of Damocles. That is why mentioned rationality involves the cooperation between the sides in each sector of ecomony, as the liberal views support. Strengthening their economies, deep trade relations will restore the political ties between the EU and Russia, promoting Strange’sstructuralist approaches about security, finance, production, knowledge, transportation, trade, energy and welfare also. Establishment of EU energy institution will be helpful in order to deal with the energy issues of member countries, managing their demands and suppies centrally.

Besides, an isolation of Russia is not possible because this country shares with China the title to be one of the great powers of Asia. The ongoing sanctions warcorrodes the gathering way between the sides after the Cold War. Opposite steps that taking mutually complicate the existing deadlock. Russia deepensits energy ties withChina, signing a second blockbuster deal and with other Asian countries. The EU proposes to form a new energy union in 2015-2016. In the light of all happening, cooperation and respect to the Russian interests is the only best way for the EU today.

Ukranian dispute showed that diversification should remain the fundamental starting principle of the EU’s energy security for both oil and gas. The member states should make serious effots to gather a common way toward the multifarious suppliers in a long term in order to achieve the Union’s main goal of sustainable, environmentalistand secure energy supply.

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GREEN MARKETING FOR GREEN ENERGY OF TURKEY
TÜRKİYE'NİN YEŞİL ENERJİSİ İÇİN YEŞİL PAZARLAMA

Tolga ŞENTÜRK

ABSTRACT

Turkey is the world's 18th largest economy, a member of The Group of Twenty (G20) major economies and an associate member of the European Union. Turkish government has been privatizing Turkey's energy market and has an assertive green energy plan aiming to produce 30% of electricity demand from RES in 2023. This plan will contribute to the targets of sustainable environment and economy, but also will create a green energy market. Marketing green energy requires specific programs and implementations. In this respect green marketing principles may help to the business. Green marketing is an effective way to differentiate and promote environmentally friendly products. In this study, we analyse the green energy potential and green energy goals of Turkey and how can its green energy be marketed. We argue the effectiveness of green marketing as a tool and what can do for avoiding misuse.

Key Words: Electricity market, green marketing, green energy, Turkey.

ÖZET

Dünyanın 18. büyük ekonomisi olan Türkiye bir G20 üyesidir, aynı zamanda Avrupa Birliği aday ülkesi konumundadır. Türk hükümeti enerji piyasasını özelleştirmekte, ayrıca 2023 hedefi olarak elektrik talebinin %30'unu yenilenebilir enerji kaynaklarından karşılamayı planlamaktadır. Bu plan ülke ekonomisinin ve doğasının sürdürülebilirliğine katkı yapmakla birlikte, bir yeşil enerji piyasası yaratmaktadır. Yeşil enerjiyi pazarlamak spesifik pazarlama programlarına ve uygulamalarına ihtiyaç duymaktadır. Bu çerçevede yeşil pazarlama prensipleri iş dünyasına yardımcı olabilir. Yeşil pazarlama çevreci ürünlerin diğer ürünlerden farklılaştırılmasında ve tanıtımında etkili bir yöntemdir. Bu çalışmada Türkiye'nin yeşil enerji potansiyeli, hedefleri ve bu kaynakların nasıl pazarlanabileceği analiz edilecektir. Bu çerçevede yeşil pazarlamanın etkililiği ve yanlış kullanımının önlenmesi üzerinde durulacaktır.

Anahtar Kelimeler: Elektrik piyasası, yeşil pazarlama, yeşil enerji, Türkiye.

INTRODUCTION

The products that do not harm to the environment named as "green products", such as recycled diaper and paper, organic foods and renewable energy. Like other products, green products should also attract consumer attention to overcome traditional marketing challenges and gain profit. This target might be achieved by green marketing programs whose core is to underline public environmental benefits. The purchase of green (renewable) energy supports the environmental protection and sustainable economic growth. Such benefits of green power attract consumers' and governments' attention. Therefore, green power suppliers use green marketing to promote their products and influence consumer choice.

There are growing number of green marketing programs for renewable energy in the developed countries such as USA, UK, Germany, Denmark and Finland (Hast et al., 2015; Wiser, 1998; Wüstenhagen and Bilharz, 2006; Yang et al., 2015). As a developing country, Turkey has a large green energy potential and it can establish its green energy market. To promote it, Turkey can use green marketing tolls like the developed countries. In this respect, some important research questions emerge: (1) Can a green energy market really be developed in Turkey? (2) Which customer segments must be targeted? (3) How might marketers design their programs to direct Turkish customer's demand to green energy?

The aim of this study is to answer these questions by implementing the extensive behavioural, marketing and business literature on consumer demand for green power, and thus, to understand deeply of how, why and when a green energy market may emerge. In particular, the study argues the implementations of these literatures for renewable electricity marketers and provides insights into the possible adaptations of commercial marketing and social marketing practices. The first section describes green energy, green energy markets and Turkey's green energy potential. The relevant academic literature on green marketing is then reviewed. In the final section, applications of this literature for renewable energy marketing strategies are underlined. Two staged approach that may be used by marketers to generate public and governmental interest and customer demand for green energy are emphasized.

1. GREEN ENERGY AND GREEN ENERGY MARKETS

Green energy or green power is the generation of electricity from sources such as biomass, wind, sea, solar, geothermal and hydraulic energies that do not place harmful effects to the environment. Green energy sources have sustainable and secure characteristics beneficial to nature and economy. The interest in renewable energy sources (RES) increases steadily all over the world, since they are an alternative to fossil fuels (Ozgur, 2008).

It is estimated that the world's energy consumption will be 53 billion kWh by 2020 (Omer, 2008). Such demand might create significant harm on the environmental health of the globe by hazardous gas emissions and global warming. To struggle with environmental problems and achieve sustainable development, RES appear to be the one of the most efficient and effective solutions.

Growing numbers of states, regions and cities seek to supply their energy 100% from renewables. For example, there are approximately 20 million German citizens live in regions supply their energy from 100% RES. Today, green energy sector is a big employment area and the number of people working in green energy industries has continued to rise. About 6.5 million employee work directly or indirectly in green energy sector all around the world (REN21, 2014).

1.1. Green Energy Potential of Turkey

Turkey is the world's 18^{th} largest economy, a member of The Group of Twenty (G20) major economies and an associate member of the European Union. In the last decade, Turkey showed vast economic growth with %5 annually average. Economic growth creates increasing energy consumption inevitably. If the planned growth in the government's 2023 agenda will occur, energy consumption of Turkey will increase five times between 2000 and 2025 (Melikoglu, 2013). To meet this increasing demand, public and private sector investments continue. Private sector's electricity production in Turkey increased from %51.7 in 2006 to %59,7 in 2011 (MOD, 2014). Another development is the plan to establish an energy stock market in 2015.

Although Turkey has almost all kinds of energy resources, it is a big energy importer. More than half of the energy requirement of Turkey has been supplied by imports (Akpınar et al., 2008). If the government does not change Turkey's energy policy in a reasonable time, majority of this big energy consumption would be supplied from oil and natural gas in the following years. The cost of petroleum products had been increased in the last decade and became fluctuate in the fourth quarter of 2014. Oil and natural gas are the biggest proportion of imports in Turkey. These importing energy products turn the scale of the foreign trade and cause harm to the Turkish economy. In order to have a sustainable economic growth and eliminate the environmental problems, Turkish government plans to supply 30% of its electricity demand from renewable energy sources. This green energy production target also matches with the EU (Melikoglu, 2013) and today it seems like has been achieved. The share of RES in electricity production was %29 or 69 TWh/year by the end of 2013 in Turkey (MENR, 2014).

Turkey has rich renewable energy sources. The potentials of the main RES of Turkey are 6105 TWh/year solar, 290 TWh/year wind, 216 TWh/year hydro (Benli, 2013), 197 TWh/year biomass and 35 TWh/year geothermal energy (Melikoğlu, 2013). If we consider Turkey's 424 TWh estimated electricity demand in 2023 (MENR, 2014), 127 TWh/year of that production should be supplied by green energy to adopt the EU goals and 2023 plan. Therefore, in 2023, only the wind energy can supply Turkey's extra 58 TWh/year RES based electricity demand.

The utilization of renewable energy sources needs proper government policies. The incentives offered for the RES in Turkey were revised by Law No. 6094 in 2010. With this law, different renewable sources were incentived by different feed-in-tariffs. Equipment production was also promoted by the law. Yet, these developments are still unsatisfied when compared to the EU countries with developed RES markets. For example, feed-in tariff amounts are higher in Germany (Baris and Kucukali, 2012).

1.2. Green Energy Market Developments in Turkey

Electricity market has liberalized recently in Turkey, thus green energy production is developing accordingly. As we pointed out under the title Green Energy Potential of Turkey, Turkey has been privatizing its energy market and has an assertive green energy plan aiming to produce 30% of its demand from RES in 2023. Renewable energy sources amount in electricity production was %29 in 2013, so the goal has almost met.

After liberalization of electricity production sector in 2005, the share of public production declined to 37,8 in 2012 (TEIAS, 2013). There are 500 producers now. Some of them produce electricity in form of %100 RES like Boydak Energy. Some big energy investors like Sabanci Holding and Zorlu Holding has its production from RES over %50. Foreign investors also have warm interest to the sector. Some of them produce technologies and components. For example, German Enercon and American TPI Composites produce wind tribune wings.

Turkey has thirty five million residential consumers and they will have their freedom of supplier choice in 2016. Accenture’s last “Energy Consumer Report of Turkey”, applied in 72 cities and on 1000 consumers, reveals that %48 of the residential consumers are not satisfied with the service (Accenture, 2014). According to research, %52 of them express that they may change their supplier depending on the price. This result shows that the price will be an important competition tool in Turkish energy market. If we consider high prices of green electricity, research results gain much importance. Because, it shows that price sensitive consumers have the majority. %40 of the participants also expressed that good service and information centre application is important. %85 of them will seek for product and service mix. These results reveal that consumers have high expectations about the services. In this respect, green electricity can be supplied with other products and services if the right consumer segment identified and targeted.

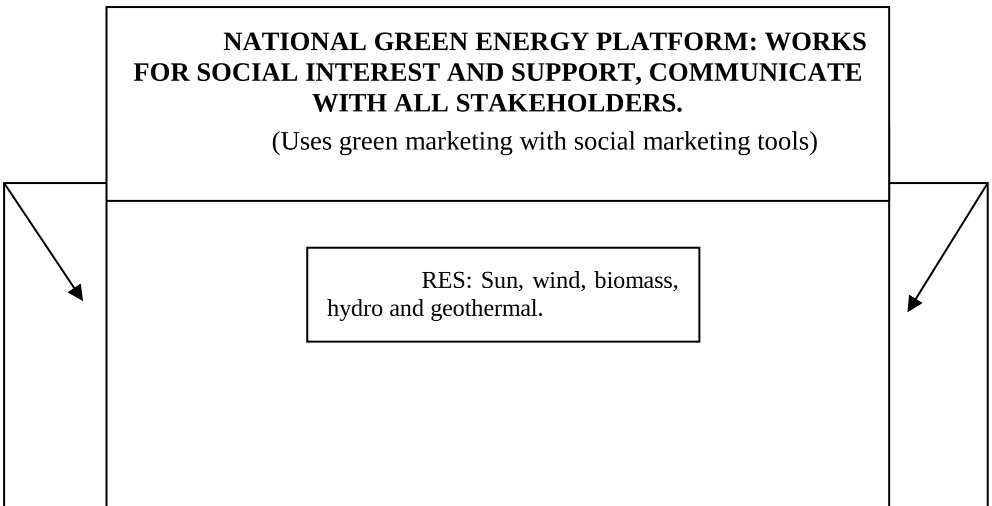
2. GREEN MARKETING AND GREEN ENERGY MARKETING

Green marketing is a marketing concept differentiates and promotes environmentally friendly products effectively. The concept has been growing stronger over the last decade due to the ongoing ecological problems. Environmental challenges force managers to formulate strategies that control pollutions and protect the environment. Also the numbers of consumers willing to purchase environmentally-friendly products and services are significantly increasing (Zuhairah and Azman, 2015) so that, green economy is greatly gaining importance in numerous countries. Green economy is a profitable sector that comprises green product, organic agriculture, clean technology, natural resources and renewable energy (Saxena and Khandelwal, 2012). The marketing needs of these products are met by green marketing. By this approach, the consequences for the firms are: closeness to consumers, superior feedback, enhanced competitiveness, improved company image and of course increased sales (Pujari et al., 2003).

As the electricity market is liberated, competition on lower prices and product differentiation are expected to dominate the market. Competition on retail sector will allow consumers to select their supplier. Therefore, several findings suggest that some consumers will make purchasing decision based on the environmental characteristics of the energy source (Wiser, 1998). Green power marketing targets such customers to generate a new market and increase the sales. With this marketing approach customers’ willingness to purchase might be enhanced and they may even be persuaded to pay a premium for the renewable energy sources.

2.1. Green Marketing Framework for Green Power

The lack of intention and knowledge about green power by most policy-makers, potential consumers, and energy firm managers has played against renewable energy market developments in Turkey. Thus, green marketing framework for the green energy of Turkey has two aspects in this study. The first aspect is marketing the green energy idea. The objectives are governmental, organizational, business and public interest and support. Social marketing tools are recommended to use in a green marketing concept so as to achieve this objectives. The second aspect is describing the green marketing strategies for business to customer (B2C) and business to business (B2B). So a green marketing mix includes social and commercial marketing principals are recommended (see Fig. 1).



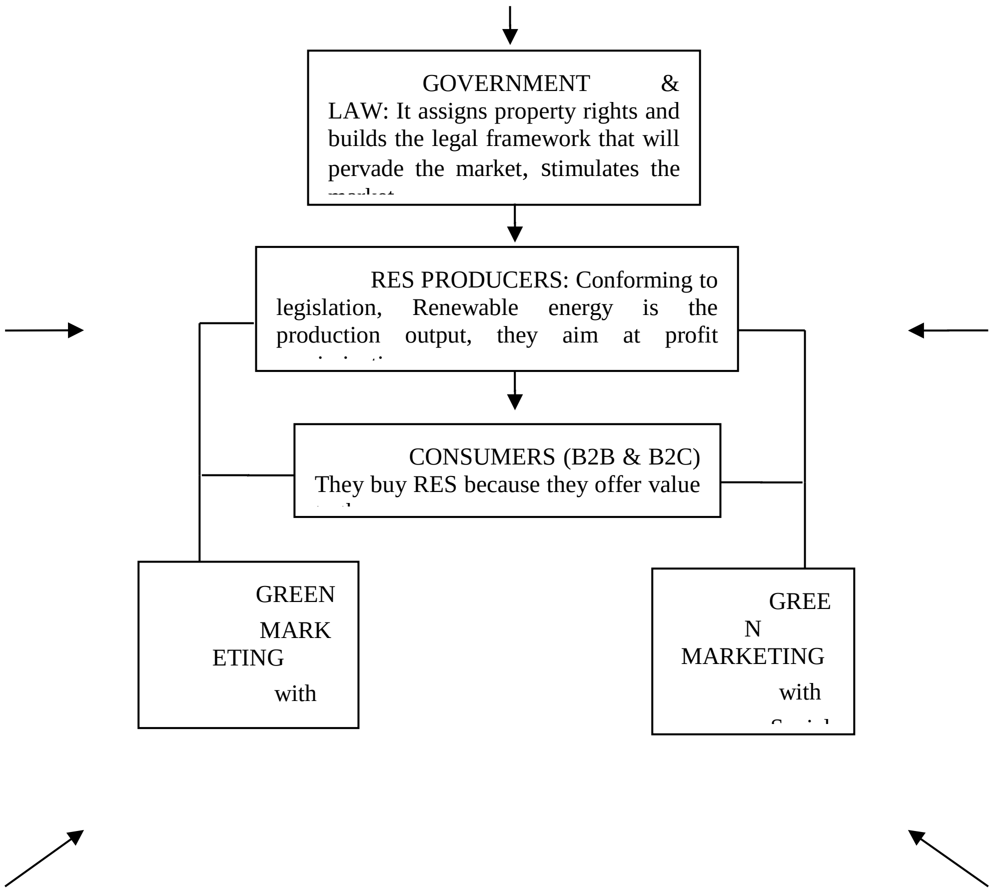
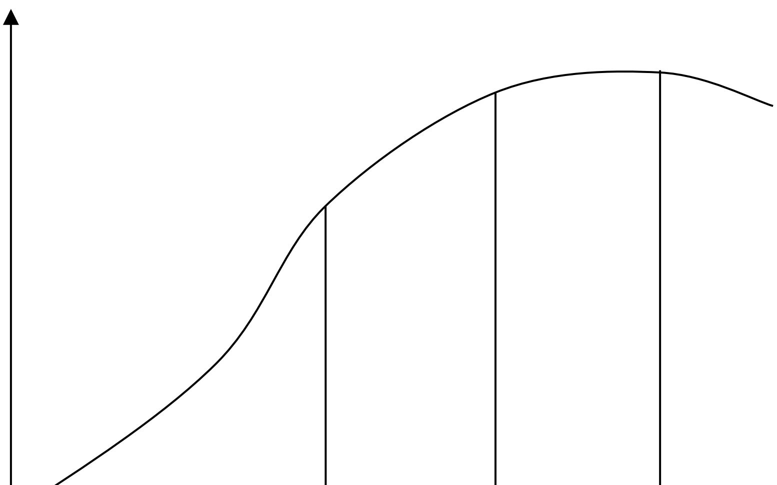


Fig. 1. Green Energy Marketing Strategy Framework for Turkey, adopted from Menegaki (2012).

In *Fig. 1*we describe green energy platform promoting the green environment concept to increase the level of awareness to protect the environment. This platform might be composed of environmental groups, scientists, experts and universities. With this organization, the need for green energy and sustainable environment can be emphasized. Furthermore, the green energy idea can be disseminate to all stakeholders (governments, regions, municipalities, distribution utilities, oil and car industries, economical development agencies, farmer associations and industrial associations etc.).

Fig.1 also indicates the supply process of RES to the customers. The customers are categorized as from business to customer (B2C) and from business to business (B2B). Special marketing practices must be used for these segments. Both governmental agencies and private green energy suppliers should try to influence these markets. While government or governmental agencies are using social marketing tools in a green marketing concept for the consumers, the green energy suppliers use commercial marketing tools for them.

When we examine green energy products from life-cycle perspective, we may realize strategic importance of social and commercial marketing (*Fig. 2*). Social marketing is needed for the introduction and growth phases of the life-cycle. In maturity and decline phases commercial marketing implementations are necessary (Menegaki, 2012).



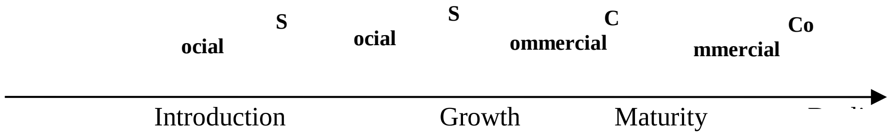


Fig. 2. The life-cycle of green energy products in a green marketing program (adopted from Menegaki, 2012)

Green customers buy green products, including green energy, because they are concerned about the environment and want to protect it. Thus, firms can use green marketing to sell its green products by finding and targeting green customers. To increase the number of green customers, public interest and consciousness on environmental benefits of green energy should be enhanced. Enhancing public interest and consciousness is a social issue and it can be achieved by social marketing principles. Therefore, green marketers should use social marketing in their green energy marketing programs.

Social marketing is described as the modification of trade marketing principles and implementations for social transformation programs, campaigns and causes (Dann, 2006). Since social marketing aims to influence social behaviour and benefit entire community, it is a useful tool for governments, local authorities and organizations along with marketers. The business alone can not produce socially desirable levels of green energy generation. Researchers suggest that the government should have a role to play in stimulating the green behaviour (Leonidou et al., 2010; Lipp, 2001). It would also be a mistake to rely exclusively on green consumption. To increase stakeholder involvement in renewable energy action plans, marketers and governments should consider a) coordination with environmental groups; b) stakeholder advisory boards; c) disclosure fossil sources mix and emissions; d) well promoted social-based projects on environmental problems (Wiser, 1998). Awareness, information and education are very important for a green energy market (Paladino and Pandit, 2012). Thus, a disciplined, organized and permanent green energy platform might be established. For example, “Citizen Energy Forum” founded by the European Commission, deals regulations and consumers’ problems in order to implement competitive and reliable energy markets. Energy companies, network companies, national and local authorities, independent dispute resolution bodies, consumer interest groups are the participants of this Forum (Menegaki, 2012). With such a structure, the targets of green energy market might be achieved.

Marketing implementations might be more effective when they generate social influence and compatible with social norms and values (Paladino and Pandit, 2012; Wiser, 1998). Messages that underline the harm of the environmental problems and the cooperation requirement should be used by governmental agencies and green power marketers wherever feasible (Paladino and Pandit, 2012). Local and visible projects should be considered in terms of their attraction and positive impact on consumers (Burkhalter et al., 2007; Kaenzig et al., 2013; Mattes, 2012). Because they are visible proofs of the consumer’s individual actions. For example, Michigan’s Traverse City Light and Power utility effectively applied green marketing to construct a wind energy turbine. Due to plant is visible from the settlement, project has generated community enthusiasm. Thus, the success of Traverse City’s green marketing program supported the claim that local and social programs may contribute (Wiser, 1998). This example shows that governmental agencies and marketers may co-operate with local stakeholders for its green marketing programs. So that the social marketing might be the first step for consumer awareness, consumer demand and also commercial marketing.

2.1.1. Consumer Profile and Willingness to Pay

In green energy marketing the first step should be identifying the potential customers. There are many studies attempting to identify and profile the environmentally motivated consumers (e.g., Aguilar and Cai, 2010; Bergmann et al., 2006; Ladenburg and Dubgaard, 2007; Ladenburg, 2010; Longoet al., 2008; Zografakis et al., 2010). The main findings of this literature demonstrate that income, age, gender, education, group size, level of energy information, awareness on climatic change, communication strategies, social pressures and status have significance. The “green customers” tend to be better educated, female and have higher income than average earnings (Paulos, 1998). Green energy marketers may especially target this group. Because these customers can reach the information channels easily and they may buy green electricity with its higher prices.

Green energy market researchers also indicate the results of consumer willingness to pay. Surveys reveal strong consumer support for RES, with consumers willing to pay higher to protect the environment

(Menegaki, 2012; Paulos, 1998). While interpreting the survey results, researchers must be careful because of a paradox. Consumers express that green power products have higher prices, while simultaneously they express high willingness to pay for such products (Gossling et al., 2005; Tsagarakis et al., 2010). Paulos (1998) underlined that Colorado Public Service's green energy research had showed about %80 of its customers were willing to pay more for RES. But unfortunately, after the program was offered, it was seen that only about %8 of the customers has taken into action. In this respect, the survey results must be used to focus green marketing efforts on the proper consumer groups.

2.1.2. Green Marketing Mix

The product in social marketing is an intangible item that is propositions, messages or promises instead of tangible products. So, in green energy case, the product must be dealt with social marketing perspective by green marketers. Because the core product of green energy is a social benefit (clean and sustainable environment). In this scope, consumers might realize they have an environmental problem and the green energy product offered to them (the new buying behaviour suggested to them through social marketing) is an effective solution (Lipp, 2001; Menegaki, 2012; Salmela and Varho, 2006; Ozaki, 2011). Consumers might be persuaded that the green energy is the unique product to satisfy their needs.

Green marketers should also personalize the environmental benefits of their products (Wiser, 1998; Rowlands et al., 2003); for instance, point out personal health and recognition rather than decreases in effluent gas levels. Possibility of recognition in community by consuming green power is another stimulating factor for purchasing. Gaining the approval of others is a psychological benefit costumers may obtain. Therefore, green energy consumption must be made visible for customers (Paladino and Pandit, 2012). Making the green energy observable by others may cause customer satisfaction. Business customers also gain recognition by the promotional materials green marketers offer. Such marketing offer may improve the corporate image and in this way increase sales and improve employee morale (Wiser, 1998). Stickers, decals, newspaper and magazine ads and billboards featuring with business participants should be considered in green marketing program.

Studies indicate that the type of green electricity product influences customers' willingness to pay. In the Austrian (Haller, 2005), US (Borchers et al., 2007), Canadian (Rowlands et al., 2012), and German market (Kaenzig et al, 2013) it is monitored that relative "greenness" of energy sources is important for consumers. For example, solar power is preferred to wind power and biomass rated third in US market (Borchers et al., 2007). Similar results were found in Canada (Rowlands et al., 2012). Thus, in Turkish market, green marketers should find which types of green electricity sources have the most influence on consumers' willingness to pay. A satisfactory electricity generation mix might be offered as a product by this way. Recently, policy makers are also interested in electricity generation issue. Menegaki (2012) reported that the EU is now setting standards, which will allow consumers to make information-based decisions by knowing the mix of their energy sources, changing the image that electricity is a homogeneous product.

Price, as a second "P" of "4P", has also an important relation with energy source. Large upfront costs necessary for RES make green electricity expensive. For example, Melikoglu (2013) estimated that, to produce 160 TWh/year green electricity in Turkey, the upfront costs of RES for that production amounted 31 billion dollars, but for fossil sources it took 8 billion dollars.

Price maintains its impending role on clean energy consumption (Paladino and Pandit, 2012). Many consumers stated that green electricity is very expensive. In markets where price sensitive consumers are of majority like Turkey, pricing of green energy will be a big challenge. If some solutions are not generated, only the lowest priced green energies will survive in a competitive world.

One solution alternative is that a well established communication strategy may transmit environmental effects of energy sources to consumers. If consumers were given an option list from cleanest to dirtiest and the pricing of the energy source was based according to its position on the scale, consumers would agree to pay higher price at that time (Laroche et al., 2001). Another solution is that flexible pricing implementations (Wiser, 1998). Consumers may buy 25%, 50%, 75% or 100% of their electricity form renewables based on their income level. Through this implementations long-term customer contracts are possible.

Place is the third marketing mix component green marketers should consider in order to generate and enhance green electricity demand. For the green electricity "place" may be perceived as accessibility. Therefore, RES integration to the electricity network is very important. Development of the Turkish production and grid infrastructure is crucial to bringing green energy from suppliers to customers. For example, a rural isolated residence might be out of range of the green energy supplier. In that situation, even if household consumer affords to buy green electricity, there is no possibility. Another important point is that, suppliers should be visible and known. Then, their offer might be considered and evaluated. To achieve this aim, they should generate a well designed place and promotion strategy.

Promotion is a marketing function, including personal selling, sales development, public relations and advertising to inform and educate consumers about the products and services, or persuade consumers to try new, improved or different ways of satisfying their wishes and needs (Akgun et al., 2014). An integration of green marketing messages and product offers will be needed to create and enhance B2C and B2B demands of green electricity, and selective market surveys contribute to refine promotion strategy (Wiser, 1998). A number of studies indicate that consumers are susceptible to the environmental effects of their energy supplier (Hartmann and Ibanez, 2007). Avoiding non-renewable energy sources, having a part in climate change, also contribute to the growth of green energy through their purchasing behaviour is an aim for green power consumers (Wüstenhgen and Bilharz, 2006). Thus, promotion strategies which recognize that a person may individually help the environment may be successful. Green marketing messages that underline the marginal impact of a consumers' investment in a RES and using appeals that give people a sense of leadership may work (Wiser, 1998). Firms might be perceived to be supportive of environmental sustainability issues by involving environmental groups in the development of products (Mostafa, 2007). Having a green accreditation is also important for companies in order to ensure the customers (Lipp, 2001). Firms can gain it from governments or NGOs. Such certification helps to increase consumer confidence to buy and to minimize their information search (Paladino and Pandit, 2012). Disclosure labelling (Paulos, 1998),factual claims (Minton and Rose, 1997), clear messages and relevant information (Tanner and Jungbluth, 2003) should be provided. For example, in Kurckartz's (2006) research, %34 of German consumers express that more information about green electricity would lead them to buy a green electricity tariff. Studies on green marketing show that green consumers seek to make a positive impact on environment and that relevant information on product increases willingness to pay (Herbes and Ramme, 2014).

Promotion opens up ways for the marketers to sell the products or services. By supplying metarial forms of customer value, like stickers, decals, price stability and discounts, membership cards including discounts on green products, matched donations to local environmental projects ,tree seedlings and bird feeders, green marketers may increase green electricity demand (Wiser, 1998).Some public relations activities such as renewable energy prizes, industry awards, conference sand other open events might have a strong promotional effect on green electricity (Menegaki, 2012). It is also vital to borrow successful promotion experiences from other countries.

The power of social media should not be ignored by green marketers in terms of relationship marketing. The web provides new opportunities for promotion. Green electricity marketers may communicate directly with consumers through news releases, blogs, online videos etc. By setting up a blog, people may find interesting stories about green power, their queries might be answered and their complaints may be handled by government or firms. Thus, marketers may get a powerful tool to communicate with the consumers and promote their product or services. As we look at the Accenture's last "Energy Consumer Report of Turkey", consumers stated that information centre implementations are important for them. In this respect, we can understand that customer relations management is inevitable for Turkish green electricity providers.

In order to have long-term customers, green marketers can provide staged private awards. For example, contracts above one year may provide discounts or bonus products to the customers. Green marketers should also constantly inform their customers of how their individual behaviour is helping to protect the environment (Wiser, 1998). Such marketing implementations might be managed by well established customer relation management and data bank system.

CONCLUSION

Building public interest and consciousness on environmental benefits of green energy is vital for a green electricity market. Only if the impacts of energy generation are better understood and appreciated by consumers, the environmental benefits of renewable energy will create more than a niche market. For obtaining a mass market, green energy marketing must be developed first in social marketing context and then in traditional marketing context. By implementing in the first two phases of the RES life-cycle, social marketing may pave the way for commercial marketing. In a green marketing program for green power, social marketing is a prerequisite for the introduction and growth phase and commercial marketing can take part in the growth and maturity stages. Social marketing may penetrate all market segments. For example, green marketers can generate interest from all consumer segments by social marketing and then implement flexible price strategy for proper segments by commercial marketing. A well established customer relations management system also might be used in a commercial marketing context in order to gain long term customers.

Business managers should understand that by investing in green energy, they might be more competitive and environment friendly. By this way, they may prepare for future competition and sustain market leadership. By using and promoting green power they can enhance their brand value and be different from their competitors.

Finally, green marketing alone can not create a strong and reliable green electricity market in Turkey. But if done right, it may help. To activate green energy potential of Turkey, governments, municipalities, environmental groups and all other stakeholders should take in action and work for creating consumer awareness. To overcome this problem, a *"National Green Energy Platform"* is needed. In cooperation with that platform, marketers should use green marketing mix to create green electricity demand. And to increase this demand marketers should;

Persuade consumers that green energy product offered to them is an unique and effective solution to environmental problems,

Use flexible pricing to attract as many consumers as they can,

Develop production and grid infrastructure in cooperate with Turkish government,

Make advertisement campaigns, public relations activities and use social media to promote green energy.

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PANDORA'S BOX: ENERGY SECURITY IN THE MEDITERRANEAN

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ABSTRACT

Recent discoveries of gas around Cyprus have started a new argument. Will the new discoveries facilitate or hinder regional security efforts? This paper hopes to answer this question. The first part of the paper will deal with which actors constitute the Mediterranean security system. The second part will deal with energy security in the Mediterranean region. The third part will note the new gas resources and how this will contribute to new energy power politics in the region. Finally, the last part will provide a conclusion on how the new fields can change the approaches to energy in the future.

1. ENERGY SECURITY

International Energy Agency defines energy security as "the uninterrupted availability of energy sources at an affordable price (IEA, 2015).A simpler definition may be the association between national security and the availability of natural resources for energy consumption. Access to cheap energy has become one of the essentials of national economies. Energy security can be analyzed from two different aspects, long and short-term measures. Long-term security measures denote to reducing the dependence on any one source of imported energy (IEA, 2015). It supports diversification of energy sources; mainly different energy sources from different countries need to be imported. If there is a problem with natural gas being pumped from Russia, natural gas or oil from another country has to be put to use.Increasing the number of suppliers and reducing the overall demand through energy conservation methods can be the examples of long-term energy measure. Short-term energy security measures can be defined as the ability to respond collectively in case of energy supply disruption (IEA, 2015).

A key part of ensuring secure and affordable supplies of energy to Europeans involves diversifying supply routes. This includes identifying and building new routes that decrease the dependence of EU countries on a single supplier of natural gas and other energy resources (Energy-European Commission 2015).

2. THE APHRODITE GAS FIELD

The Aphrodite Gas Field that was discovered in 2011 is reported to be a natural gas field. It is located just offshore from the island of Cyprus. It is just west of Israel's Leviathan gas field, countries like Turkey, Greece, TRNC, Cyprus Republic, Israel, Egypt, Lebanon and Palestine all have interest in the newly found resource. Exploring and finding a field is important but what is more important is delivering the resource for consumption. How can natural gas be transferred to other geographies?

Natural gas consists of methane. It is produced by two methods; biogenic and thermo genic (Natural Gas Org 2013). Methanogenic organisms located in marshes and landfills produce the biogenic method. Anaerobic decay of organic matter deep under the Earth's Surface makes up the thermo genic method.

The movement of natural gas from producing regions to consumption regions requires a complicated transportation system. Sometimes, natural gas produced from a particular well will have to travel a great distance to reach its point of use. The transportation system for natural gas consists of a complex network of pipelines, designed to transport natural gas from its origin, to areas of demand. Transportation of natural gas is closely linked to its storage: if the natural gas being transported is not being consumed, it can be put into storage facilities for when it is needed.

If extractions are finalized in the Mediterranean Sea, the problem of how it will be transported will be posed. There are three methods on how it can be transferred. First it can be transferred once it is liquefied. This can be done from a stationary terminal. The second method is having a floating terminal. The third method is transporting natural gas via pipelines. The first two methods are not cost efficient. The third method is cost efficient but conflicts of interest arise (Karaçin, 2015:11). The question of how gas will be extracted and how it will be transferred which countries will take part needs to be addressed.

Eastern Mediterranean region is replete with conflicts. The Arab-Israeli Peace Process, The Cyprus Conflict, The Turkish-Israeli impasse, the political instabilities in Egypt, Lebanon war in Iraq, civil war in Syria etc. Since the region is volatile, Turkey remains an attractive option. (IENE, 2013). If Israeli and Cypriot gas is

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proven, it may equal to that of Azerbaijan (IENE, 2013). Even further to that of Caspian Sea (Andoura and Koranyı, 2014:13) An uninterrupted energy transfer is nearly impossible to have. Looking from a more optimistic view, if cooperation is reached in the field of energy than political solutions can be reached as well. On the contrary poor relations between the parties hinder negotiations. High-level negotiations resolving political issues were neglected, low-level negotiations continued (Hürriyet Daily News, 2014).

The natural gas that was discovered by Noble energy has not been extracted yet due to the political uncertainties. Greek Cypriot part of Cyprus wants to transfer the gas from the island to Crete to Greece. It refuses to have talks with Turkey. If the natural gas transferred to Turkey and then to Europe, it won't accept it. A sub-sea pipeline is viewed as being more secure (Hürriyet Daily News, 2014). On the subject of sharing the energy profit with the Turkish Cypriots, it's seeking political agreement first and then an energy agreement. They situate Turkish Cypriots as being passengers on the ship that the Greeks Cypriots are steering (Mavroyiannis, 2014:57). It's interesting to see that they see the Turkish Cypriots as passengers rather than partners. It also sees that it will contribute to security of Europe's energy supply through creating a third corridor

Turkey favors a pipeline that crosses the Mediterranean into its borders. It doesn't recognize the (Exclusive Economic Zone) that was formed by the Greek Cypriots. The Greek Cypriots also had a previous arrangement after becoming a EU member. It had signed an exclusive economic zone agreement with Egypt, Lebanon and Israel. The earliest time frame that the Aphrodite fields gas extraction would be 2016(karaçin, 2015:11). In a recent summit that was held between Greek Cypriots, Egypt, and Greece in May 2015. The topic of the summit was to determine of EEZ of Eastern Mediterranean (Kohen, 2015). Another important aspect of the meeting was once the Eastern Mediterranean gas is extracted it would be transferred to other lands via Egypt. Both of the topics will take time to settle but the process can be evaluated as forming a strategic partnership. Israel and Greek Cypriots and Russia and Greek Cypriots are already working on new cooperation texts. Turkey views all these agreements as being defunct and unilateral. It states that natural gas cannot be unilaterally operated.

Since Turkey is in unfriendly terms with both Israel and the Greek Cypriots it may be politically viable to see Turkey out but commercially that is not the case (Brookings, 2015:10).

Both Israel and Cyprus have no gas infrastructure they have 3 options. They can transfer by pipeline, via LNG and combination of both (Andoura and Koranyı, 2014:30). They can both sell a lot of gas to immediate neighbors and other markets. A subsea pipeline from Leviathan to Turkey then to Europe is cost effective. If Aphrodite field is to work the eastern Mediterranean can emerge as a natural gas transit hub. Energy facility in Cyprus and a pipeline to Turkey are not competing actions for Israeli gas. It strengthens one another (Andoura and Koranyı, 2014:30).

3. TROUBLED RELATIONS

3.1.Israel

Turkey and Israel had been in good relations up until the AKP (Justice and Development Party) government's rise to power in 2002. Turkey's export market, which was mainly Europe, shifted to the Middle East. The shift also took place in foreign policy. Islamic cultural heritage, Ottoman legacy and its unique geopolitical importance provided Turkey with a new action plan. It got involved in the Palestinian conflict and became an important party in Arab public opinion. In 2006 Prime Minister Erdogan invited Hamas leader Meshal to Ankara, when Israel was regarding him as a terrorist leader (Çağatay 2006). The bi-lateral relations took another turn in when Israel started an attack in Gaza just when Turkey was conducting negotiations between Israel and Syria between 2008-2009. The trouble continued in 2009 at Davos World Economic Forum with Prime Minister Erdoğan's "one minute intervention" Israeli embargo to Gaza. Finally after the Israeli raid to civilian flotilla of Mavi Marmara and deaths of Turkish citizens the bi-lateral relations nearly came to a stop (Arab News 2010). The Arab Spring also created the "Turkish Model" that was popular among Arab nations. AKP and Turkey became more popular in the Middle East that resulted in Israeli dismay (Usta 2012). It was obvious that Israel and Turkey were becoming not only in their bi-lateral relations but also in their regional foreign and security policies. Both Israel and Turkey resorted to balance of power politics in the Mediterranean (Oğuzlu 2011). What used to be a strategic partner for Israel is becoming a foe, therefore the new discoveries in Mediterranean urge Israel to find new partners. This ushered in the agreements of Israel-Cyprus-Greece and Egypt-Cyprus-Greece and finally Egypt-Cyprus-Greece-Israel.

3.2.Cyprus (The Greek Cypriot Part)

Cyprus was divided in 1974 into two parts after the Greek Cypriot atrocities that were committed against the Turkish Cypriots that were also inhabitants of the island. Turkey intervened by using its rights that were granted by the Guarantee Agreement that was signed by United Kingdom, Greece and Turkey of 1960s. In 1981 Turkish Republic of Northern Cyprus was founded, the only recognition came from Turkey. In 2004 the Greek Cypriot part of the island Cyprus Republic entered the EU despite the protests of Turkey and the Turkish Cypriots. The recent discoveries came as a “blessing” to the island the otherwise sterile island.

3.3.Greece

The Aegean Sea had been a point of dispute for both Turkey and Greece for many years and they came to brink of war in 1987 and 1996.Turkey has stated that any unilateral attempt of Greece to expand its maritime zones will constitute a *casus* belli (cause of war)(Tziarras and Mitchell, 2015). Since relations with Turkey have never been warm on political disagreements, Greece to started looking for new partners in bolstering the new energy deal. Greece is also experiencing economic problems therefore in order to pull away from debts it needs financial help. If the Cypriot gas is extracted and transferred to Greece via Crete it will make a Greece an important energy hub.

According to İşeri and Andrikopoulos (2013:41) the region is blessed with gas but cursed with inability to exploit. Due to many political irregularities taking place in the Mediterranean, explorations nearly came to a stop. Israel’s estrangement from the Middle East due to strong anti-Israeli policies of Turkey has left it with the option of making new alliances to balance Turkey in the region. The new discoveries have provided Israel this chance. It first made energy cooperation with Greek Cypriots and then with Greece. In both of the cases Israel is the pivot. These energy deals transferred it to military agreements as the perceived security threat of Turkey grew (İşeri and Andrikopoulos, 2013:42). Later, Egypt was also included in the energy partnership talks. Egypt also is one of the states that Turkey is having problems with. Prime Minister Erdoğan’s insistence on detesting General Sisi and yet supporting ex-president Morsi due to his roots in the Muslim Brotherhood, have created problems for the bi-lateral relations.

Any solution without the inclusion of Turkey will be lacking. There are five options presented to Greek Cypriots (İşeri and Andrikopoulos, 2013:42). First option is a pipeline to Greece. The second option is, a land based liquefied natural gas plant (LNG). Third is, offshore energy plant. Fourth is, floating, production, storage and offloading (FPSO). Fifth is a pipeline to Turkey. The fifth option is the low cost one. Another appealing point is that if an energy dialogue and interdependency between Turkey and Greek Cypriots begin there may be hope for political development as well. This option will also meet Turkish energy import needs. It will also decrease the Europe’s dependence on Russian gas. If Turkey becomes the transfer hub it can also transfer Egyptian and Israeli gas to Europe.

CONCLUSION

Despite the attempts to have a long and peaceful solution to the conflicts of the Eastern Mediterranean, it appears as though the rush for natural gas may result in freeing all the evils in the world. This reserve may be the one of the last natural gas reserves in the world and once exploited it may be as rich as the Caspian Sea.It is obvious that not only the Mediterranean inhabitants but also others will be involved in how the natural gas will be attained and transferred to other geographies.

Greece and Israel are attempting to find new allies in the Mediterranean and yet Turkey still is the pivot. A solution without Turkey will be shortcoming. The upcoming elections in Turkey may or may not change foreign policy goals but if Turkey wants to take part in this new rearrangement of alliances and energy security system in the Eastern Mediterranean, it has to modify its ulterior motives and discrepancies.

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RENEWABLE ENERGY FOR MORE ETHICAL DEVELOPMENT

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ABSTRACT

The purpose of this paper is to put forward the economical and environmental consequences of renewable energy investments as an increasingly important tool of ethical development for countries. Nowadays, energy is one of the most important economic component that highly foreign-dependent economies on energy, feels more the importance and pressure of it. Therefore, countries are attempting to provide their own energy need to close their energy deficit and they are tending to various energy investments. Besides, the arise of the environmental awareness in nations, increasing sensitivity of worldwide individuals to environmental issues, launching several organizations that aim protecting the nature and rising voices with future anxiety of ecosystem are forced countries to protect and make use of their natural resources with renewable energy investments by creating an ethical development programme towards environment. In this context, a literature review is made on several country tendencies to utilize their infinite natural resources for "green" and "sustainable" development and various reports are collected for analyzing economic, social and environmental contributions of their renewable energy investments.

Keywords: renewable energy, sustainable development, development ethics

1. INTRODUCTION AND TERMINOLOGY

Motion in physics, chemical reactions in chemistry, processes that sustain life, energy is needed in all these value creating activities. Energy is a sign of living, manufacturing, changing and developing. Thus, energy is a crucial input for all goods and services that shape worldwide economies. In addition the industry of energy is an important sector that creates jobs and value by extracting, transforming and distributing energy goods and services throughout the economy (World Economic Forum & IHS CERA, 2012, p. 7). In the study by Toman and Jemelkova (2002) shows that the literature on energy and development puts forward that energy development is an important component of broader development by influence of energy in industries.

Goulet (1996) argues that the true indicator of development is not increased production or material well-being but qualitative human enrichment. For Goulet (1975), there are three universally accepted ethical values - *life-sustenance, esteem, and freedom* -are ought to incorporate within a value based frame of the "good life" that is exactly what the development is perceived(Marangos & Astroulakis , 2009, p.382) as the case of "being more" in challenge to "having more" (Astroulakis, 2014, p.103). Goulet states that the internal goods of development would humanize development work, empower people to procure their sustenance, raise their self-esteem, extend their freedom and maintain hope of a better situation(Cortina, 2007, p. 9). Goulet (1971) alsoargues that "development ethics is useless unless it can be translated into public actionBy public action is meant action taken by public authority, as well as actions taken by private agents by having important consequences for the life of the public community. The central question is: How can moral guidelines influence decisions of those who hold power?"(IDEA, n.d.).The reason for attention to development ethics is that processes of social, political, economic and environmental development bring both enormous opportunities and threats for humankind, individually and collectively, and that the associated benefits and costs highly unequally and unfairly distributed (Gasper, 2012, p.117).Development ethics is concerned with ethical issues of local and global relationships, with particular attention to issues of global justice, human needs, human rights, and human security (Becker & Brown, 2013, p.37). Crocker (2008) defines development ethics as a moral reflection on the ends and means of local, national and global efforts to overcome poverty, inequality, violence, tyranny and environmental degradation. In addition to these development ethicists, St.Clair (2014, p. 284) emphasizes that in the second decade of the twenty-first century, the history and context of development ethics need to include environmental damage and to situate the debate a direct part of the debate on climate change and transformative processes toward sustainability.

Einstein's quote -"The significant problems we face can not be solved at the same level of thinking we were at when we created them."- can be correlate with sustainability.The Brundtland Report of World Commission on Environment and Development (1987) indicates of meeting the needs of today's societies

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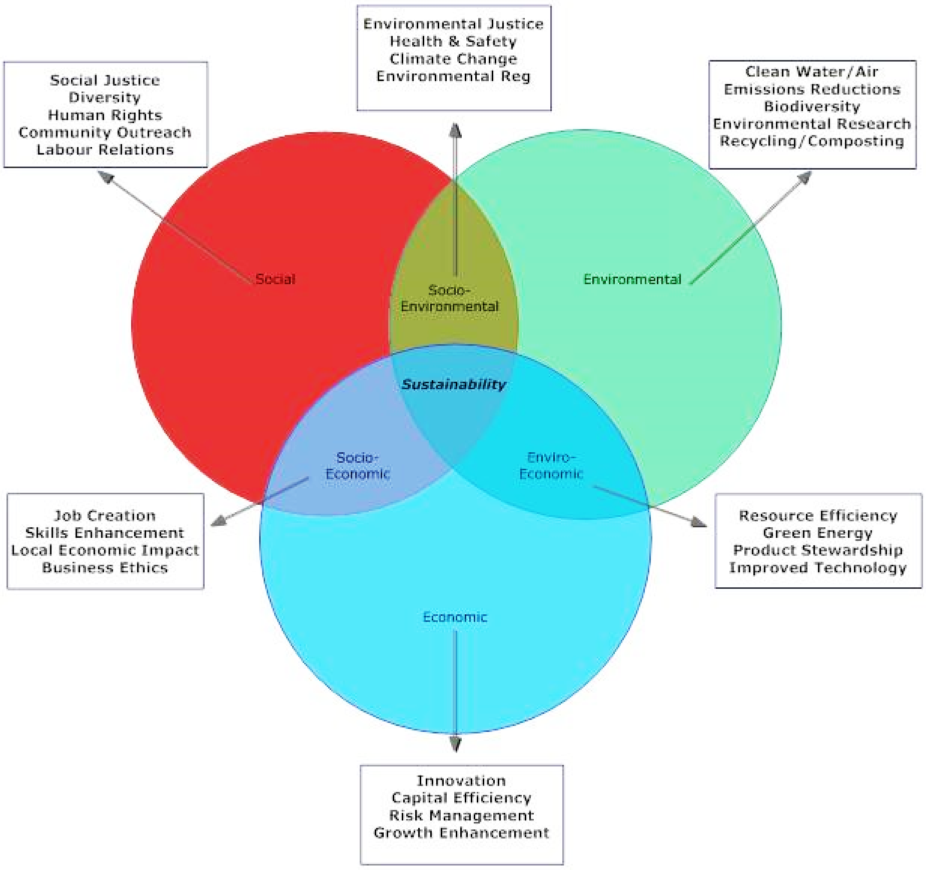
without compromising the needs of tomorrow's societies with a sustainability mind and defines sustainable development as “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations”.

Figure 1. Dimensions of Sustainable Development



Source: Nijenhuis, 2012, p.14

Sustainability is not just environmentalism, in most definitions of sustainability concerns for social equity and economic development can be found (University of Alberta, n.d.). Sustainability means a reasonable and conservative use of available resources including economic, social and environmental goals (Zink, 2008, pp. v) as seen in the Figure 1. For Lawn (2000), above all thesesustainability is a desirable human goal.

The enviro-economic dimension of sustainable development indicatesrenewable energy sources as a green energy source but also renewable energy may contribute all these three dimensions. Renewable energy is definedas “energy that is derived from natural processes that are replenished at a higher rate than they are consumed” (IEA); “energy gained from sources in the process of which few or hardly any harmful effects on the environment occur”(SEIA); “any form of energy from solar, geophysical or biological sources that is replenished by natural processes at a rate that equals or exceeds its rate of use” (IPCC, 2012, p.38); “energy obtained from resources that are essentially inexhaustible, including the wind, sun, living organisms or their by-products (biomass), the earth’s own internal heat (geothermal), and the movement of water (hydro, wave, and tidal)”(NJDEP, 2007, p.1). Renewable energy technologies take this energy and convert it into usable forms of energy, mostly electricity, but also heat, chemicals, or mechanical power and these technologies are often described as “clean”or “green” because they produce little or no pollutants (U.S. Department of Energy, 2000, p.1). In spite of being an old implementation by the age of human being, after 1970’s, the terms of renewable energy has been realized, cared and developed by the countries and firms increasing dependency on energy, and also by the ecological, social and economical returns of fossil fuels, nuclear energy and other non-renewable energy sources. As can it be seen in the Global Status Report (2014) published by Ren21 (Renewable Energy Policy Network for the 21st Century);the value, importance and contribution of renewables continue to appreciate by the rising energy consumption of the world in long-term.

Since the 1980’s, with the awareness of sustainability in economical, social and environmental issues, policies changed globally towards more efficient and sustainable practices, innovations and technologies.

Nowadays, the term sustainability indicates more widely practices but in this paper only renewable energy investments is studied.

2. MATERIALS AND METHODS

	Total primary energy production (Mtoe)			Share of renewables in electricity production (incl hydro) (%)				
	2000	2012	2013	2000	2012	2013	2012 - 2013 (%/year)	2000 - 2013 (%/year)
World	**10034**	**13490**	**13634**	**19,1**	**21,4**	**22,1**	**3,6**	**1,1**
OECD	**3833**	**3882**	**3972**	**16,6**	**20,9**	**22,1**	**6,1**	**2,3**
G7	**2711**	**2671**	**2742**	**14,0**	**18,8**	**20,0**	**6,5**	**2,8**
BRICS	**2765**	**4830**	**4902**	**23,5**	**22,9**	**23,1**	**0,7**	**-0,1**
Europe	**1237**	**1074**	**1055**	**20,5**	**28,6**	**31,1**	**8,7**	**3,2**
EU	**951**	**801**	**796**	**15,2**	**24,4**	**27,5**	**12,8**	**4,7**
Finland	15	17	17	33,5	40,9	36,0	-11,8	0,6
France	131	135	135	14,0	15,9	17,5	10,5	1,8
Germany	136	125	122	7,9	24,3	25,3	4,1	9,4
United Kingdom	272	116	109	3,5	12,6	16,1	27,3	12,5
Norway	227	202	192	99,7	98,1	97,9	-0,2	-0,1
Turkey	26	32	29	25,0	27,3	28,8	5,6	1,1
CIS	**1257**	**1764**	**1789**	**18,3**	**15,8**	**17,6**	**11,1**	**-0,3**
Russia	978	1322	1338	19,1	16,1	17,8	10,9	-0,5
America	**2882**	**3283**	**3364**	**23,9**	**27,7**	**28,1**	**1,5**	**1,3**
North America	**2038**	**2233**	**2314**	**15,9**	**19,3**	**20,2**	**4,8**	**1,9**
Canada	375	419	441	60,6	62,2	62,7	0,8	0,3
United States	1663	1814	1873	9,2	12,8	13,7	6,5	3,1
Latin America	**844**	**1051**	**1050**	**62,0**	**55,7**	**53,9**	**-3,2**	**-1,1**
Brazil	148	252	253	89,5	82,6	77,1	-6,6	-1,1
Venezuela	221	208	205	73,7	65,1	68,8	5,8	-0,5
Asia	**2198**	**4032**	**4116**	**13,6**	**17,1**	**17,6**	**2,8**	**2,0**
China	1130	2535	2593	16,6	20,5	20,7	1,2	1,7
India	363	553	552	13,8	15,6	16,8	7,8	1,5
Japan	106	28	27	10,9	13,0	13,4	3,3	1,6
Pacific	**254**	**329**	**351**	**18,8**	**19,0**	**20,8**	**9,6**	**0,8**
Australia	234	310	332	8,5	9,5	11,4	20,2	2,3
New Zealand	14	17	17	71,5	71,6	74,0	3,2	0,3
Africa	**876**	**1119**	**1070**	**17,7**	**17,2**	**18,1**	**5,2**	**0,2**
Egypt	53	88	85	17,7	8,9	8,0	-9,9	-5,9
South Africa	146	168	167	2,0	2,0	1,9	-5,1	-0,3
Middle-East	**1330**	**1888**	**1889**	**1,7**	**2,4**	**2,6**	**9,8**	**3,2**
Iran	254	372	352	3,0	5,0	5,6	12,7	4,9
Kuwait	114	173	181	n.a.	n.a.	n.a.	n.a.	n.a.
Saudi Arabia	479	637	631	n.a.	n.a.	n.a.	n.a.	n.a.
U.A.E	156	198	210	n.a.	n.a.	n.a.	n.a.	n.a.

The main purpose of thisstudyis to reveal consequences and importance of renewable energy investments for an ethical and sustainable development. For this part of the study, first several renewable energy reports, papers and other sources were collected to reachrenewable energy data, and the contributions of renewables were examined on sustainability dimensions as economical, social and environmental. Finally, all three dimensions were correlated with values of development ethicsto show the relationship between renewable energy investments with ethical development and try to give the answer of the question:*"What does support renewable energy for more ethical development?"*.

3. RESULTS

3.1. Economical Contributions of Renewable Energy Investments

Energy is one of the most important economic component and has a great share of income and outcome in economies. Countries need energy to produce and will do forever. Mostly highly foreign-dependent economies on energy, feels more the importance and pressure of lack of energy in their economies. Several reports, papers and works reveal that energy is a main input in economy, and with the population,also the demand and supply on energy will continue to increase on worldwide, including all developed, developing and underdeveloped countries to its flow. Therefore, countries are attempting to provide their own energy need to close their energy deficit and they are tending to various energy investments that are directed to non-renewable energy generation technologies, or renewable energy generation technologies.

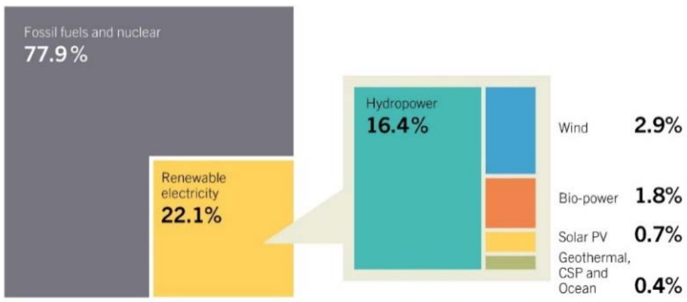
Table 1. Total Primary Energy Production And Share Of Renewables In Production

Source: Enerdata, 2014

Renewable technologies and investments keeps growing by economical and environmental policies of governments and future anxiety of individualswith the term of sustainability development. Table 1 shows total energy production, and the renewable energy contribution and share in total energy production of several countries and unions. In 1990, the total energy production was about 8829 Mtoe, total energy consumption was 8796 Mtoe and by the millenium the production of energy raised to 10034 Mtoe and consumption raised to 10066 Mtoe. In years between 2000 and 2013, the production of energy raised as 2,4% per each year and hit 13634 Mtoe, also energy consumption raised 2,3% per each year and reached 13583 Mtoe at the end of 2013 (Enerdata, 2014).

In total energy consumption, the consumption of renewables increased 2,1% per each year. As can be seen, between the years 2000 and 2013, also renewable energy production achieved growth 1,1% per each year in total energy production, but a considerable increase occurred in 2013. In same period, mostly hydropower (16,4%), wind (2,9%) and bio-power (1,8%) contributed to global energy production in renewables as can be seen in Figure 2.

Figure 2. Renewable Energy Share of Global Electricity Consumption and Production By Sources



Source: Ren21, 2014, p. 21 and p.25

New investments in renewable energy decreased to 231,8 billion USD in 2013 to the pervious year as can ben seen in Table 2. The decline of renewable energy investments does not reflect a real decline, due tothe falling prices and investment costs of solar photovoltaic systems (60% in U.S.) (Walsh, 2014). But in 2014, global investment in renewable power and fuels (excluding large hydro-electric projects) was $270.2 billion, nearly 17% higher than the previous year and this was the first increase for three years, and reflected several influences, including a boom in solar installations in China and Japan, totalling $74.9 billion between those two countries, and a record $18.6 billion of final investment decisions on offshore wind projects in Europe. (Frankfurt School-UNEP Centre/BNEF, 2015, p. 11).

Table 2. Renewable Energy Indicators and Top Five Countries in Renewable Energy Capacity 2013

		2004	2012	2013	TOP 5 COUNTRIES TOTAL CAPACITY 2013				
INVESTMENT					**1**	**2**	**3**	**4**	**5**
New investment (annual) in renewable power and fuels	billion USD	39,5	250	**231,8**	**China**	United States	Japan	United Kingdom	Germany
POWER									
Renewable power capacity (total, not including hydro)	GW	85	480	**560**	**China**	United States	Germany	Spain / Italy	India

Renewable power capacity (total, including hydro)	GW	800	1440	**1560**	**China**	United States	Brazil	Canada	Germany
Hydropower capacity (total)	GW	715	960	**1000**	**China**	Brazil	United States	Canada	Russia
Bio-power capacity	GW	<36	85	**88**	n.a.	n.a.	n.a.	n.a.	n.a.
Bio-power generation	TWh	227	350	**405**	**United States**	Germany	China	Brazil	India
Geothermal power capacity	GW	8,9	11,5	**12**	**United States**	Philippines	Indonesia	Mexico	Italy
Solar PV capacity (total)	GW	2,6	100	**139**	**Germany**	China	Italy	Japan	United States
Concentrating solar thermal power (total)	GW	0,4	2,5	**3,4**	**Spain**	United States	United Arab Emirates	India	Algeria
Wind power capacity (total)	GW	48	283	**318**	**China**	United States	Germany	Spain	India
HEAT									
Solar hot water capacity (total)	GWth	98	282	**326**	**China**	United States	Germany	Turkey	Brazil
TRANSPORT									
Ethanol production (annual)	billion litres	28,5	82,6	**87,2**	n.a.	n.a.	n.a.	n.a.	n.a.
Biodiesel production (annual)	billion litres	2,4	23,6	**26,3**	n.a.	n.a.	n.a.	n.a.	n.a.
POLICIES									
Countries with policy targets	#	48	138	**144**	n.a.	n.a.	n.a.	n.a.	n.a.

Source: Ren21, 2014, p. 15

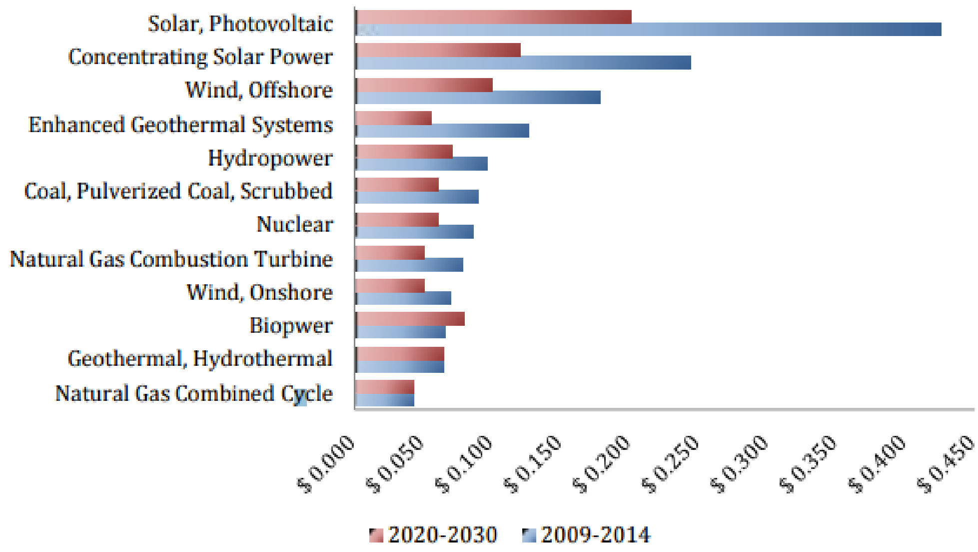
Renewable energy indicators 2013 in Ren21 Report (2014) shows that with the investments the production of renewables are increased and total solar PV capacity boomed in production, from 2,6 Gw in year 2004, up to 139 Gw in 2013 by the investments of countries China, Japan, United States, Germany and United Kingdom mostly to solar energy.

The numbers of countries with renewable energy policies are reached 144 at the end of 2013 and growing numbers of cities, states, and regions (e.g. Scotland and Germany) seek to transition to 100% renewable energy in either individual sectors or economy-wide (Ren21, 2014). Creating a policy framework that simultaneously delivers *secure, affordable* and *environmentally sustainable energy*, a sustainable energy system, is one of the most important challenges facing governments today and this triple challenge is known as the 'energy trilemma' (World Energy Council, 2014, p. 6).

In recent years, policies are also developed to reduce costs of renewables by the effect of technology developments on renewable energy. As the LCOE[*], solar PV has fallen by between 42% and 64% and wind power fallen by between 7% to 12%and between the years 2008 and 2014 (IRENA, 2015). In Figure 3 the LCOE, the cost reductions of energy sources is given by the years between 2009-2014 with the projections of cost reductions between years 2020-2030.

Figure 3. Levelized Cost Of Energy For Alternative Energy Production Systems

[*]Levelized cost of energy (LCOE) is a methodology used for comparing the costs of electricity produced by different generators. It simply accounts for all of a system's expected lifetime costs (construction, financing, fuel, maintenance, taxes, insurance and incentives) and reports the costs per kWh by dividing the total costs by the system's lifetime expected power output.



Source: TEPAV, 2015, p. 48

The strength of economies developed by working power. IRENA (2013, p. 3), estimates that globally 5,7 million people are working directly and indirectly in the renewable energy sector in 2012. The new statistics indicate that the working force in renewable energy sector has reached 6,5 million people worldwide in 2013 (IRENA, 2014a, p. 3). As can be seen in Table 3, employment is mostly actualized in biofuels and solar PV energy technologies.

Table 3. Employment In Renewable Energy Globally And For Selected Countries/Regions (2012)

	World	Brazil	China	India	United States	European Union (EU)		
						Germany	Spain	Other
	Thousand jobs							
Biomass	753		266	58	152	57	39	178
Biofuels	1 379	804	24	35	217	23	4	82
Biogas	266		90	85		50	1	20
Geothermal	180				35	14	0.3	37
Small Hydropower	109			12	8	7	2	18
Solar Photovoltaic	1 360		300	112	90	88	12	212
Concentrated Solar Power	37				17	2	18	
Solar Heating/ Cooling	892		800	41	12	11	1	20
Wind Power	753	29	267	48	81	118	28	124
TOTAL	**5 729**	**833**	**1 747**	**391**	**612**	**370**	**105**	**691**

Source: IRENA, 2013, p.10

IRENA (2014b) presented 2030 renewable energy projections, as by the year 2030 global renewable energy share to 21% of total final energy consumption (total renewable energy supply will exceed individual coal, oil and gas demand), production of renewable energy is expected the share of modern renewables more than triples from 9% in 2010 to 30%, costs of renewable energy will fall by the increasing technology and the employment of renewables will reach to 16.7 million jobs (IRENA, 2014a, p. 4).

According to the Wisconsin Energy Bureau, “Investment in locally available renewable energy generates more jobs, greater earnings, and higher output ... than a continued reliance on imported fossil fuels.” and the Bureau estimates that renewable energy creates three times as many jobs as the same level of spending on fossil fuels (Bachman & Fields, 2015). Briefly, the main reasons of why renewable energy technologies offer an economic advantage are; they are labor intensive, so they generally create more jobs per dollar invested than conventional electricity generation technologies, and they use primarily indigenous resources, so most of the energy dollars can be kept at home (EREC, 1997).

3.2. Social Contributions of Renewable Energy Investments

Social benefits of renewables are improved health, consumer choice, greater self-reliance, work opportunities and technological advances in general (Akella, Saini, & Sharma, 2009). Some of the key benefits are (Clore Social Leadership Programme, The National Trust, Shared Assets, 2014):

- **Autonomy:** Long term income and control over finances are developed in areas where there are few options for generating sustainable wealth.
- **Resilience**: Increase the energy efficiency of local houses and community buildings, protecting against the impact of fluctuating fuel prices.
- **Community empowerment**: Development of new renewable energy generation involves local people in a range of activities, improving skills and confidence and by making collective decisions about the use and distribution of income local communities also develop greater self-determination through the direct control of local resources.
- **Education**: Providing direct experience of the application of science and technology; study sites for a range of disciplines, and opportunities for technical skills development, connecting people to where their energy comes from.
- **Sense of place:** Installation ensures appropriate scale technology is installed which is sensitive to the landscape and the needs of the local community. In addition, the collective endeavor of developing and managing such sites can improve social cohesion, creating new networks and connections between individuals.
- **Local economy:** The much of the hardware and technology is sourced from outside, the planning, survey and engineering works all provide local employment opportunities, and the income from schemes strengthens the local economy.

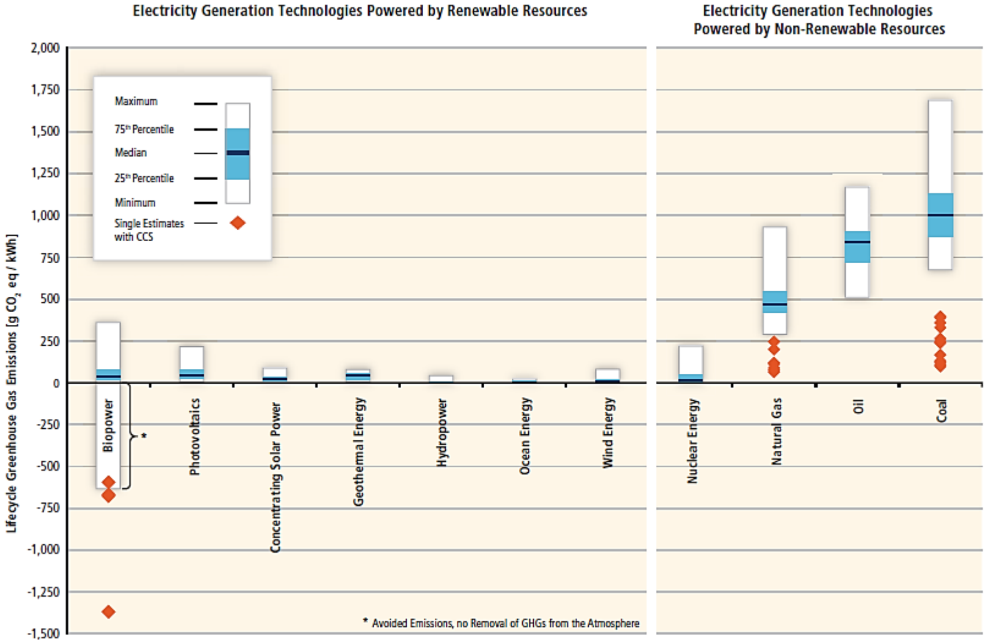
Additionally, the most important social effect of renewables is on human health. Rather than fossil fuels, generating renewable electricity has public health benefits by improving air quality and curing society from of breathing problems, neurological damage, heart attacks, cancer or premature born and renewable energy reduces lost workdays, overall healthcare costs (Union of Concerned Scientists). For example, the economic value of health impacts from fossil fuel electricity in the United States is $361.7-886.5 billion annually, representing 2.5-6.0% of the national GDP (Rizk &Machol , 2013). Also nuclear energy has stochastic (cell killing on a massive scale) and non-stochastic effects (cancer and genetic mutations) to human body, including leukemia, other forms of cancers and diabetes, but also premature births, low birth-weight, infant mortality and congenital defects that is seen after past nuclear disasters (Storm van Leeuwen, 2010, p. 29). For example,a total of 4000 deaths will eventually be attributable to the Chernobyl accident, about 4000 children and adolescents contracted thyroid cancer (15 of died) from ingestion of contaminated milk and other foods (ElBaradei, 2008, p.4), and over 5 million people in Belarus, Russia and Ukraine effected by the radiation (IAEA, 2006, p. 7). The most recently published figures indicate that in Belarus, Russia and Ukraine alone the accident resulted in an estimated 200,000 additional deaths between 1990 and 2004(Greenpeace, 2006, p. 9).

Including social benefits of renewable energy, by 2025, national standard would boost the U.S. economy by $263.4 billion in new capital investment for renewable energy technologies, $13.5 billion in new income for farmers, ranchers, and rural landowners who produce biomass energy and/or lease their land to wind developers and billion in new property tax revenue for local communities and also the cumulative electricity and natural gas savings for consumers in all sectors of the economy would reach $64.3 billion by 2025 and would grow to $95.5 billion by 2030and also cost reductions would extend to consumers in every state as bill savings (UCS, 2009).

3.3. Environmental Contributions of Renewable Energy Investments

Coutries overcome some of energy costs with their capital but our living world have paid much more then capital by the start of industrialization. Today, not just capital costs, but also ecological cost of energy are tried to reduce by governments with policies. Not only by governments with the future anxiety of health and life, also societies, several organizations that aim protecting the nature, some of social groups and individuals are get into the act to change energy policies of countries towards renewable energy generation investments. In Figure 4 and also in Table 4, the lifecycle emissions of energy supply technologies is presented.

Figure 4. Lifecycle Greenhouse Gas Emissions For Alternative Energy Production Systems



Source: Edenhofer, Madruga, & Sokona, 2012, p.19

Table 4. Lifecycle EmissionsOf Energy Supply Technologies (incl. albedo effect)

Technology	Min	Median	Max
Currently commercially available technologies			
Coal – PC	740	820	910
Biomass – cofiring with coal	620	740	890
Gas – combined cycle	410	490	650
Biomass – dedicated	130	230	420
Solar PV – utility scale	18	48	180
Solar PV – rooftop	26	41	60
Geothermal	6	38	79
Concentrated solar power	8,8	27	63
Hydropower	1	24	2200
Wind offshore	8	12	35
Nuclear	3,7	12	110
Wind onshore	7	11	56
Pre-commercial technologies			
CCS – Coal – PC	190	220	250
CCS – Coal – IGCC	170	200	230
CCS – Gas – combined cycle	94	170	340
CCS – Coal – oxyfuel	100	160	200
Ocean (tidal and wave)	5,6	17	28

Source: IPCC, 2014, p. 1335

According to the lifecycle emissions data, coal and oil are top energy supply technologies that increases CO_2 which is an important cause of global warming, climate change and other problems that threats human life. The lowest lifecycle CO_2 emissions are calculated from all renewable energy supply technologies and nuclear energy technology. So that in renewables literature, renewable energy is termed as “clean”, “green” and “sustainable” energy.

Table 5. Damages Categories of CO_2 Emissions And Climate Change

GENERAL IMPACT	CATEGORY
Health	Respiratory illness from increased ozone pollution, pollen, and wildfire smoke
	Lyme disease
	Death, injuries, and illnesses from omitted natural disasters and mass migration
	Water, food, sanitation, and shelter
Agriculture	Weeds, pests and pathogens
	Food price spikes
	Heat and precipitation extremes
Oceans	Acidification, temperature, and extreme weather impacts on fisheries, species extinction and migration, and coral reefs
	Storm surge interaction with sea level rise
Forests	Ecosystem changes such as pest infestations and pathogens, species invasion and migration, flooding and soil erosion
	Wildfire, including acreage burned, public health impacts from smoke pollution, property losses, and fi re management costs (including injuries and deaths)
Ecosystems	Biodiversity, habitat, and species extinction
	Outdoor recreation and tourism
	Ecosystem services
	Rising value of ecosystems due to increased scarcity
	Accelerated decline due to mass migration
Productivity and economic growth	Impacts on labor productivity and supply from extreme heat and weather, and multiple public health impacts across different damage categories
	Impacts on infrastructure and capital productivity and supply from damages from extreme weather events and infrastructure and diversion of financial resources toward climate adaptation
	Impact on research and development from diversion of financial resources toward climate adaptation
Water	Availability and competing needs for energy production, sanitation, and other uses
	Flooding
Transportation	Changes in land and ocean transportation
Energy	Energy supply disruptions
Catastrophic impacts and tipping points	Rapid sea level rise
	Methane releases from permafrost
	Damages at very high temperatures
	Unknown catastrophic events
Inter- and intraregional conflict	National security
	Increased violent conflicts from refugee migration from extreme weather, and food, water and land scarcity

Source: Environmental Defense Fund, Institute For Policy Integrity, Natural Resources Defense Council, 2014, p. 2-3

Environment costs of energy, especially, coal, fossil fuels and nuclear energy are threaten all life. Global carbon dioxide (CO_2) emissions from fossil fuel combustion and from industrial processes increased in 2013 to the new record of 35.3 billion tonnes (Gt) CO_2, which is higher 0.7 Gt than last year's record (PBL & JRC, 2014, p.4).

The coal and fossil fuels cause greenhouse gas emissions and climate change that threat life on world. In Table 5, the damages of CO_2 emissions and climate change on life and ecosystem are categorized for the general impacts of climate change into health, agriculture, oceans, forests, ecosystems, productivity and economic growth, water, transportation, energy, catastrophic impacts and tipping points, inter- and intraregional conflict. In IPCC report (IPCC, 2015, p. 8) argues that "continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions". Three climate-change phenomena will have a particular impact on the energy sector: global warming, changing regional weather patterns (including hydrological patterns) and an increase in extreme weather events are effecting demand, production and consumption of energy (WEC, CISL). Briefly, carbon emissions and climate change effect all economies, countries, environment and every living being on the planet earth.

Instead of low carbon emissions, in the report of World Wide Fund For Nature (WWF, 2011, p. 18) argues that "nuclear is an unethical and expensive option" due to capital, operational and health costs of nuclear energy and its high-level radioactive waste or pollution will be dangerous for 10.000 years for world and its guests. Also disasters like Fukushima, Three Mile, Chernobyl nuclear accidents affected billions of species and they were also economical and environmental disasters for these countries. Environmental fallout from the Chernobyl accident affected cropland, forests, rivers, fish and wildlife, and urban centers, in the three countries most affected, nearly 800000 ha of agricultural land was removed from service, and timber production was halted on nearly 700000 ha of forest (ElBaradei, 2008, p.4).

4. DISCUSSION

The collected data from study indicates thatrenewable energy supports all values of development ethics in economical dimension of sustainability. Renewable energy provides the *life-sustenance*value of ethical development by creating more new jobs and reduces workforce loss in economy by curing health of society. Also renewable energy keeps economies alive in terms of the productivity and energy efficiency that renewables support with new technologies. Renewable energy increases innovations and technologies by supporting research and development in countries, provides income to economies by exporting energy or technology globally, so with renewable energy investments countries gain the value *esteem* of development ethics. The developing technologies reduces costs of renewable investments so renewables achieves savings for an economical growth. Self-production of energy increases GDP per capita, promotes manufacturing andgives economical independency on energy to countries which means value *freedom* of ethical development.

Also in social dimension of sustainability, renewable energysupports all values of development ethics. Renewable energy provides the *life-sustenance*value of ethical development by curing health of societies from the diseases of emissions or radiation pollution. Also renewables assists people to survive on economically and environmentally and enhances the quality of life. Additionally, economical contributions of renewable energy to society are; protecting from the impacts of fluctuating fuel prices by increasing energy efficiency in society, reflecting cost reductions to bill savings and meetingsociety further technology by sourcing it from outside. The collective endeavor of developing and managing such renewable energy technologies can improve social cohesion, creating new networks and connections between individuals. Renewable energy technologiesprovides direct experience of the application of science and technology, improves technical skills and *esteem* of societies, globally. The value *freedom* of ethical development is provided with a range of activities, improving skills and confidence, and by making collective decisions about the use and distribution of income local communities also develop greater self-determinationthrough the direct control of local resources.

In the environmental dimension of a sustainable development, renewable energy also supports all values of development ethics. Renewable energy provides *life-sustenance* by protecting nature and the life on it that also includes humankind. Unlike to coal and fossil energy generation technologies, renewables reduce greenhouse gas emissions of societies, so that renewables preclude the impacts of climate change to all economies, countries, environment and every living being on the planet earth. Also unlike to nuclear energy generating system, renewables protect all life from the diseases of radiation pollution. Renewable energy technology ensures a country to be widely-esteemed social responsible green country by other countries and societies globally, so with renewable energy investments countries gain the value *esteem* of development ethics by taking the care of life. Renewable energy believes and promotes rights to liveof all living being on world healthy and freely by sustaining their lives. That's the value *freedom* of ethical development.

5. CONCLUSION

Since the 1980's, with the awareness of sustainability in economical, social and environmental issues, policies changed globally towards more efficient and sustainable practices. Nowadays, sustainable development is defended by societies and governments with the arise of the environmental awareness in nations, increasing sensitivity of worldwide individuals to environmental issues, launching several organizations that aim protecting the nature and rising voices with future anxiety of ecosystem. These movements are also forced countries to protect and make use of their natural resources with renewable energy investments by creating an ethical development programme towards environment. The Brundtland Report published in 1987 by WCED (World Commission on Environment and Development), frame of sustainability is extended and included technology developments and innovations to avoid from exploitation of resources.

Ethical development aims *life-sustenance*, *esteem*, and *freedom* to maintain and sustain "good life". The goals of sustainable and ethical development are on a similar direction as can be seen by the definitions given. The theory of ethical development realizes a "good life" for societies by economic, social and environmentally policies that are implemented with moral principles. Sustainable development makes contribution to this theory with innovative practices to maintain, protect and sustain all economic, social and environmental components for not only today's generation needs, but also next generation needs to supply the "good life" for whole life of the humankind.

The study reveals that renewable energy serves all the values of an ethical development in all dimensions of sustainability. Renewable energy creates life-sustenance, esteem and freedom values more than other energy generating methods (coal, fossil fuels, nuclear and etc.) to maintain a "good life" for societies in economically, socially and environmentally as a whole and to sustain the "good life" for next generations.

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SECURITIZING MOVES IN THE EUROPEAN ENERGY POLICIES: THE 2006/2009 RUSSIAN-UKRAINIAN GAS CRISES

Sezer OZCAN[*]

ABSTRACT

Securitization can only occur when a referent object experiences a threat against what can be seen as its basic needs. The Copenhagen School scholars have defined security as a speech act and, therefore, the actors' speeches towards existential threats can be considered as the most important steps in the securitization process. In that framework, the European Union (EU) is unable to meet its own energy needs, and is becoming increasingly dependent on oil and natural gas resources. Following the 2006/2009 Russian Ukrainian energy crises, European member states have argued that energy is no longer a question of economics, but rather a matter of politics. Debates on the development of the European energy policies have become dominated by a discourse of insecurity relating to the questions of energy dependence and the relations with energy suppliers. In such a context, the primary objective of this study is to give a comprehensive analysis of the securitization process of European energy policies based on the particular security speech acts of the European actors after the energy crises of the 2006 and 2009. Through doing so, I will analyze these speech acts by using the theory of securitization in order to see how securitization played a role during that period and thus analyze the policy initiatives which accelerated both the Common Energy Policy (CEP) efforts and the Europeanization of energy policies within the EU.

Keywords: The Copenhagen School, Energy Securitization, the EU, Russia, Energy Crises.

1.INTRODUCTION

"He who has oil has empire."

French Prime Minister Georges Clemenceau's Advisor, December 1919 (Schlossberg, 2011, p. 1)

Energy has played a dominant role in the evolution of states throughout history, becoming one of the most important elements influencing global politics and economics within our current international system. Furthermore, it is used in almost every sector and provides the fundamental element of many essential services, such as production, transportation, electricity, finance, communication, business and industrial processes, etc. Today, it is very difficult to consider the modern world without energy, which is typically the activating source of growth and an essential requirement for a state's sustainable development. Therefore, energy's sustainability and accessibility are extremely important factors for human beings' continued survival; energy is fundamental for economic and social activity in the industrialized world, as well. For these reasons, a state with sufficient oil and gas resources becomes economically and politically stronger in the international arena. Its absence (particularly of oil and gas) causes an existential threat for states, with the issue of energy adopting a crucial role within the political agenda of these main international actors. Today, nations' foreign policies are increasingly based on the energy sector; Roberts (2004) highlights, "energy is the currency of political and economic power and what determines the hierarchy of nations" (p.5) meaning that both political and economic powers are highly influenced by a country's possession of energy. Brzezinski (1998) also points out that access to energy resources "stir[s] national ambitions, motivate[s] corporate interests, rekindle[s] historical claims, revive[s] imperial aspirations, and fuel[s] international rivalries all over the world" (p.125). In that sense, energy is evidently a vital part of modern life and survival, as well as a major source of security in all of its varied facets. Given that every nation state is dependent on energy, energy-importing countries are more vulnerable to disruptions in their supplies. With the limited energy sources and an expected decline in its supply, the issue of energy has become a central concern in Security Studies. According to 2010 British Petroleum (BP) statistics, world energy consumption grew by 5.6%, the strongest growth rate since 1984 (BP, 2010). Furthermore, fossil fuels will continue to play a dominant role in the energy sector, with 80% of world energy consumption based on them, such as coal, oil, and natural gas. Indeed, oil and natural gas are the dominant energy sources. Therefore, today, energy has reached the same high priority level as more traditional security policy. As Radoman (2007) argues, "the problems of energy security have long ceased to be only dealt with at economic forums; rather, they are now deliberated at high-level political meetings between heads of state" (p.36).

Following the end of the Cold War, the developments in the world energy market highlighted the difficulties in achieving a reliable supply of energy at a reasonable price. Furthermore, the 2000s witnessed how

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the regions in which the most significant oil and gas reserves are located became essentially unstable.[*] For instance, the Russian-Ukrainian natural gas dispute that provoked temporary cuts in supplies to some EU countries in January 2006 caused commotion in many European capitals, which until then had seen Russia as a reliable supplier. Unforeseeable events, such as natural catastrophes, accidents, and terrorist attacks affecting energy infrastructure, also demonstrated the vulnerability of the tight global energy markets. For example, Hurricanes Katrina and Rita in August and September 2005, which affected areas with a high concentration of oil infrastructure in the United States, were depicted as "the world's first integrated energy shock[s], simultaneously disrupting flows of oil, natural gas, and electric power" (Yergin, 2006, p.70). Accordingly, energy is not only important in the economic field, but also in the security field. When note that energy security has risen from low to high politics, having the potential to become the focus for conflict.

Moreover, producing countries have approached a monopoly status and have attempted to sell their products with higher prices, using their energy industry as a weapon for their own political interest. Consumer countries have also used political and military power to keep their energy needs less expensive and more consistent. Therefore, energy issues have gained particular importance due to the various difficulties experienced within the energy market, including limited sources of supply, high energy demand among global actors (China, India, and the US), states' energy dependency (the EU), increasing energy prices, instability of energy-producing regions (the Middle East), and the use of energy as a political tool against consumer countries (Russia). In this sense, International Energy Agency's (IEA) World Energy Outlook (2007) highlights that "the current trends in the world energy system, with increasing global demand especially in developing countries, underinvestment in the energy industry, and instability in oil and gas producing regions, are unsustainable if one is to avoid an energy gap." Accordingly, the issue of energy started to be a subject of political discourse, as can be seen in the Commissioner Piebalgs' statement: "the world has entered into a 'new energy era' that will last for the next few decades. This provoked a call for an urgent change in dealing with energy: we are facing a period in which we have to get serious about the energy transition we are facing. We can either prepare it sensibly today, or risk being faced with a major crisis to our energy system for want of sufficient preparation" (Piebalgs, 2009). On the other hand, the "novelty" of the situation led him to elaborate on the lack of predictability in the energy sector, which is regarded as a source of political concern in itself. For example, he argues that "global oil markets are not characterized by transparency and, put quite simply, we do not know how long oil will last, but we do know that the clock is ticking" (Piebalgs, 2009). The EU representatives also highlight that all these trends, which had been announced over the previous decades, (fast growth in global demand of energy, increasing dependence on imports from unstable regions, but also rising energy prices and global climate warming) suddenly appeared as "serious risks" (Natorski & Surrallés, 2008, p.71). According to Barroso (2006a) "there are few greater geopolitical challenges confronting us today than energy." He further highlights that "If I am asked today what is the most important issue for global security and development, the issue with the highest potential for solutions but also for serious problems if we do not act in the right way, it is energy and climate change. Energy today is not only considered as a major challenge from an economic point of view but precisely for its implications for environment and climate. Because of increased competition for scarce resources, it poses serious concerns for global security… It is the great challenge of our generation" (Barroso, 2007). He specifically stresses the importance of the energy issue: "My intention is to make energy a central issue at every EU Summit with third countries throughout 2007" (Barroso, 2006b). He additionally states that "Another central challenge is to develop a low-carbon economy and to guarantee the security of energy supply. A large majority of Europeans identify climate change and energy security as major threats" (Barroso, 2008). In the meantime, Palacio, the Commissioner responsible for Energy and Transportation, points out that "Energy is the lifeblood of our economy. Without affordable and reliable energy our current standard of living would be inconceivable. The tragic events of 11 September and their aftermath have increased the urgency of keeping our energy security under control. Suddenly the risk of disruption has escalated. First, the risk of wilful damage to plant and infrastructure, whether that means a terrorist attack on an energy installation at home or a pipeline rupture abroad. Second, the risk of volatility in oil markets, which would have a damaging effect not only on Europe's economy, but also on global economic stability. Above all, it reveals our vulnerability to supply interruption – external and internal" (Palacio, 2001). Palacio underscores energy's relation with economic development and global stability. She states that the risks that she has talked about have become global. More importantly, she names energy as a central strategic issue for the EU. Therefore, we see that, even in the year 2002, certain actors were already trying to put the energy issue at the centre of the security domain. Here, Palacio draws attention to the EU's vulnerability to supply disruption. The above-presented speeches and statements show that there is a discourse going on making the issue of energy to be regarded as an existential threat. In fact, it is defined as the major threat of the time. There is a sense of urgency to dealing with the risks in the energy sector; increasing attention is being paid to the issue of energy security within the agendas of national governments and

[*] 65% of the world oil reserves are located in the Middle Eastern countries from which many terrorist threats emanate. Iran's nuclear program caused another point of friction in the region.

international organizations, with policy-makers and scholars having predominantly ascribed that energy has been taken out of the agenda of normal politics. This situation can be briefly described as follows: "Firstly, requirement for energy resources is rising exponentially as population increase, economies grow, and industrial and personal consumption is steadily increasing. Secondly, in geopolitical terms, energy [has] scarce resources. It means that, the major location of energy resources, particularly oil and gas, are limited. The last reason is competition that has pushed many countries into dependency relationship or reinforced their dependence on specific energy suppliers, thus exposing them to potential political pressure and destabilising economic vulnerabilities" (Bugajski, 2006, p.141). Overall, population growth and economic choices, such as patterns of consumption and production, have paved the way for ascending energy needs and resource depletion. Instability in some exporting nations, geopolitical rivalries, and countries' fundamental need for energy to power their energy growth have all fuelled questions around energy. In fact, there are renewed concerns over whether there will be sufficient resources to meet the world's energy requirements (Brinkworth, 1999, p.12). Therefore, the world currently faces the threats of inadequate and insecure energy supplies at affordable prices. Beginning with the 1973 Oil Crisis and, persisting with various other problems occurring in the Middle East and the Russian-Ukrainian Gas Dispute in 2009, the issue of energy security has become a significant foreign policy objective for the global actors. Indeed, Yergin (2006a) states that "In a world of increasing interdependence, energy security will depend much on how countries manage their relations with one another. That is why energy security will be one of the main challenges of foreign policy in the years ahead. Oil and gas have always been political commodities. But right now, it is more political than it has been for years" (Der Spiegel). In that context, during the 2006/2009 Russian-Ukrainian gas crises it became evident that energy could be used as a political weapon against energy-dependent countries. These crises prompted main European actors to rethink taking extraordinary measures and securitizing the issue at the EU level.

This study mainly aims at establishing a framework for understanding the "energy securitization" concept from the EU perspective. The evolution of the European energy securitization process, based on particular security discourses, will be examined, including an overview of the EU's energy crises: the 2006/2009 Russian-Ukrainian Gas Crises. In that sense, I will assess different discourses made during these crises and analyze the policy initiatives, which lead to Europeanization of the energy policies at the EU level. I will examine the reasons and results of the aforementioned serious energy crises, with the EU having become increasingly aware of the necessity to develop a CEP as the results of these crises. I will focus on the role played by the EU in the policy debates concerning energy security during the crises, analyzing the responses and actions with reference to the theory of securitization. The analysis of the crises considers the extent to which concerns over energy security in both cases resulted in a European response that can be considered as "securitizing" in nature. This will shed light on the importance of energy (particularly oil and natural gas) for the EU member states, highlighting the level of energy dependency on oil and gas resources, as well as the level of energy securitization

2.THE ISSUE OF ENERGY SECURITIZATION

In order to understand political risks and the political dimension of energy security, one has to take into account number of issues such as domestic instabilities, inter-state conflicts, diplomatic tensions, embargos, and perceptions of external threat which are seen as politicization. In fact, energy security typically refers to the securitization of risks and threats related to supply, demand, and competition regarding energy sources, the (in)stability of transport, markets, and infrastructures, and the impact of energy use on the natural environment. Bahgat (2006) provides a clear definition for energy security: "A condition in which a nation and all, or most, of its citizens and business have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risk of major disruption of services" (p.935). In its most fundamental sense, energy security concerns "how one can be secure regarding energy issues." It is not merely a question of protecting existing energy supplies anymore; rather, it is mainly defined as the guarantee of the ability to access the needed energy resources for a state's power growth. Indeed, most of the energy security definitions are commonly based on this definition.

While the language of security has returned to both the policy and academic debates on energy, and while the issue of energy has returned to the security analysis, there have not been many attempts to analyze energy security from a securitization perspective. Compared to the issue of energy security, securitization of energy is a recent subject in the IR literature. With the end of the Cold War, new issues emerged in the field of Security Studies, with many scholars dealing with potential threats that were not military-based. These threats pose radically different risks to other traditionally military threats. In the changed reality of the post-Cold War world, national security and the formation of security threats moved from highly state-centered structures to the process of securitization, which is highly different. Thus, energy issues became part of Security Studies through the process of securitization, which we know from the Copenhagen School's theory. In similar, the concept of securitization offers a useful way to understanding past and current energy security debates. The concept refers to a process whereby an issue becomes a matter of security concern at a particular point in time and addressing a very particular issue. For example, in Europe, the coal industry was much more securitized in the 1920s than today and so was, in the 1970s and 1980s, the importance of oil security. However, since the 2000s, we have observed a securitization and extreme politicization of natural gas. It is important to understand that political relations sometimes create the ground for further energy cooperation and, on the contrary, collapse of political relations creates difficulties for energy infrastructures. For instance, the Arab gas pipeline going from Egypt to Syria demonstrates infrastructure failure due to political contradictions. Therefore, securitization is the ground for the exaggeration or politicization of threats.

The issue of energy securitization is a completely different concept, which can be defined in the broadest sense as a security type occurring in different sectors in order to maintain a secured and sustainable supply of energy at affordable prices. In contrast to energy security, where the economic side of the issue raises more concerns than the political side, in the securitization of energy more attention is given to the political issues. The most important point in terms of energy securitization is the actor's increasing demand and dependence on limited energy resources. In order to figure out the process of energy securitization, it is essential to have a look at the process of energy supply, which is divided into three main elements: production, transportation and consumption. Thus, the uneven supply of energy and demand for energy products create a situation of dependency for producers, consumers, and transit countries. The securitization process is connected with states' political behaviours towards the unbalanced energy markets, which can be considered as existential threats to referent objects, especially regarding the energy policies of the producers, consumers, and/or transit countries. Here, security of supply and security of demand become highly significant for both sides. From the producer's point of view security of demand is the main concern. Yergin (2006b) highlights the importance of "sufficient access to the markets and consumers, for the resources they are exporting, which in most cases constitute the bulk of their government revenues" (p.71). Instead, from the consumer's point of view the access to sufficient energy resources with affordable prices and from stable sources is essential. As stated before, the EU claimed, in the 2006 Green Paper on "European Strategy for Sustainable, Competitive and Secure Energy," that energy security can be described as having stable, regular, and sustainable energy supplies at reasonable prices, while also respecting environmental concerns (EU Commission, 2006). However, with increasing demand consumers fear not being able to access sufficient energy. They also fear the increasing price trends that will continue and may reach an unaffordable level. Finally, for transit countries security of supply routes and retaining and securing their transit status becomes more important, as it contributes greatly to their economy. For instance, the EU's transit dependence is exemplified by the dependence on transit countries located on the gas pipelines route for import from Russia. The 2006 Gas Dispute between Russia and Ukraine showed the importance of these transit countries. In that context, the IEA (2007) points out the following risks for energy supply in its 2007 World Energy Outlook: "increasing dependence for oil supplies on a decreasing number of producer countries; ever greater risk of disruptions to supply due to the growing international trade with oil and gas; danger of political instability in producer and transit countries". As a result, energy-importing countries wish for security of supply from energy-exporting countries. In turn, energy-exporting countries wish for security of energy demand from energy-importing countries. This implies dependency for both sides and, therefore, the anxiety of energy dependency and energy demand gradually sets off the process of securitization. Energy issues have generally appeared indirectly in the securitization literature, primarily in terms of the way in which energy production and consumption affect the environment and contribute to the circumstances in which environmental issues have been securitized.

Where energy security is invoked as a reason for conflict and regime change the actors' actions, threats, or emergencies can be regarded as "securitizing." In other words, the securitization of energy is precisely enabled by the failure of energy. Global actors started to securitize energy following the first energy crisis, in 1973, making it a part of high politics and taking it out of the "agenda of normal politics." Since then the "breaking of the established rules of the game" have been justified to prevent any danger posed if no prevention had been taken (Buzan, Weaver & de Wilde, 2007, p.23). Energy has started to be perceived in terms of existential threats, with the political dimensions of energy having become more significant than the economic one and gaining more consideration within the securitization of energy. Therefore, energy relations consist of transactions such as the "export," "import," and "transit" of energy. Security of demand holds importance for energy producers (export), and as fossil fuels will deliberately continue to play a dominant role in the energy sector, producers have approached a dominant status and have used their energy industry as a weapon for their own political interest. Energy consumers (import), on the other hand, have used political and military power to maintain their energy needs as less expensive and more reliable as possible. Owing to factors such as increasing energy demand, decreasing proven resources of fossil fuels, and increasing and inconsistent costs, energy-importing countries must find continuous, dependable, clean, and cheap energy and also have to diversify such resources. Moreover, they must increase their domestic production.

Eventually, a dependency occurs between producer and consumer, placing both actors in a situation of distrusting each other's reliability. For instance, following the 2006 and 2009 Russian-Ukrainian Gas Disputes, debates concerning "energy security" reached the top of the EU's political agenda. The high level of EU members' dependence on Russian energy supplies, which is the main pre-condition for securitization, has prompted the EU to take extraordinary measures against this threat. Finally, we must consider transit countries, according to which the security of supply routes and retaining and securing their transit status becomes increasingly important and contributes greatly to their economies. As a result of these market-related issues, I should underline that energy has started to be understood as an existential threat to the actors' survival and is no longer only apprehended in economic terms, with a political dimension also present. Global actors have started to securitize the issue of energy to further their own foreign policy interests. The fundamental reason behind the use of the securitization in referring to energy is the actors' increasing demand and dependence on finite energy resources. The issue of energy is, therefore, mainly securitized in line with this growing dependency.

3.SECURITIZATION PROCESS OF THE EUROPEAN ENERGY POLICIES

The EU's energy policy is an essential policy area around which the European integration process has developed. From the foundation of the European Community until present day, energy has played a crucial role in the integration of member states; for example, the establishment of the European Coal and Steel Community (ECSC) in 1952 rendered the security of energy supply a major factor on the European political agenda. Furthermore, the European Atomic Energy Community Treaty (EURATOM), signed in 1957, was also related to the energy sector. Following the 1973 Oil Crisis, member states sought alternative suppliers to reduce their dependence on the Arab countries and, from the 1980s to the 1990s, the EU attempted to revitalize its energy policies in terms of establishing a Common Energy Policy (CEP) at the European level. In response to this, the EU formed the Energy Charter initiative in 1991, which later turned into the Energy Charter Treaty. In 1995, the European Commission published a White Paper on energy policy, prioritizing the security of supply and, developing the competitiveness of European economy, and setting environmental restrictions. Following the Cold War, former Soviet satellite states chose to join the EU, thus expanding the European borders and dangerously increasing the Union's energy supply needs. Europe has also faced new energy challenges such as climate change, the continuous rise of energy prices on the world market, and increasing energy dependency (mainly on Russia). As a result, the issues of energy efficiency, instability in energy producing regions, growing global energy demand, renewable energy, climate change, and alternative energy have been on the EU agenda.

Historically, the European energy policy has been subject to three priorities: cheap energy supply, security of supply, and environmental requirements. The EU energy policy must strive to strike a balance among these objectives, namely, a more sustainable energy-mix with improved security of supply and in which prices are determined by market conditions. However, it seems that the Union and its member states must increasingly address more difficult challenges in all three areas. Furthermore, the course of the energy market in the last few years indicates that the era of cheap energy is over, at least for hydrocarbons. Yet, secure energy supply must be guaranteed by EU countries that increasingly rely on outside resources while – in the long term – wrestle with competitiveness and sustainability challenges.[*] Jürgen Grossmann, the Chief Executive Officer of RWE AG, points out that "Europe's energy challenge is well defined: securing our energy supply while protecting the environment and keeping the competitiveness of our economy. Finding the right balance between these three objectives has preoccupied industry and politicians for years" (European Files, 2011). However, all such efforts towards solving the energy issue do not change the realities of high energy demand and increased dependency on energy-producing countries. In this context, energy represents one of the most important issues in the European Union. As Barroso (2006) stated, "one of the most rapidly evolving global issues is one that affects us all: energy." This highlights the issue of energy security, prompting its emergence as one of the most important matters for the Union, with Piebalgs (2006) emphasizing that "It is clear that, over the last couple of years, the world has entered a new energy landscape. Rising demand for imports from a larger number of countries, geopolitical complexities about energy supply, the challenge of climate change and volatile prices, supported by a mix of unexpectedly strong demand, the risk of terrorism and an ageing infrastructure; all these factors have brought home the unsustainable nature of our energy situation." The Energy and Environment Report, published by the European Environmental Agency (EEA), accurately illustrates some of the main European energy security concerns: "Europe's renewed focus on energy security was triggered both by internal and external factors. Internally, rising energy prices, declining European energy production and a fragmented internal energy market triggered concerns over Europe's ability to secure future energy supplies. Externally, the strain on global demand […] persistent instability in energy producing regions […] and, at times, strained relationships with the Russian Federation — all pointed to the necessity to manage energy security risks and to act accordingly" (EEA, 2008, p.37). All these discourses clearly show that energy supply security has a vital importance for the existence of

[*] The EU energy policy is developing in the triangle of Lisbon, Moscow, and Kyoto, which symbolize the viewpoints of competitiveness, security of supply, and sustainability. See Bas R. Percival, *"The Risk of Energy Securitization on the Eurasian Continent"*, Clingendael briefing papers, July 2008.

the EU as a political unit. Indeed, the Union is one of the global actors to have faced the most obstacles regarding the issue of energy within the international arena and has thus paid increasingly careful consideration to the issue of energy security. Therefore, despite its political and economic strengths, the Union has a vulnerable energy situation, which essentially arises from three main challenges: limited energy reserves and insufficient indigenous production; the rise in energy consumption; and the high import dependency, especially for fossil fuels. All such challenges represent the basic threats of the security of energy supply.

The EU is the second largest energy consumer in the world, heavily dependent on fossil fuel imports: at present, 80% of crude oil and more than 60% of natural gas used is imported. The Second Strategic Energy Review mentions that a combination of energy resource depletion and increasing demand could lead to a situation whereby the "demand-supply balance will become increasingly tight, possibly critically so." Furthermore, the 2011 Communication on External Energy Policy mentions, on several occasions, the threat of heightened global demand, rising prices, and increased volatility driven by rising populations and improving living standards in developing countries (EU Commission, 2011,p.14). Rising demand in producing states, such the North African countries, and major consuming countries, such as China and India, is often mentioned as a threat to energy security (EU Commission, 2011, p.14). The Second Strategic Energy Review (2008, p.3-4) also repeatedly notes that a number of member states are overwhelmingly dependent on a single supplier, Russia, for energy. In "An Energy Policy for Europe," the Commission talks of price increases and volatility being the consequences of "progressive concentration of hydrocarbon reserves in a few hands" (EU Commission, 2007, p.4). Hinting at the political risks associated with this dependency on a few external suppliers, former Energy Commissioner Piebalgs (2008) notes that "80% of the world's oil reserves and a similar proportion for gas are in the hands of state-controlled companies" (p.2). As a result, the EU is unable to independently satisfy its energy demands, mostly due to its limited energy-producing capacity. Despite oil and gas being the main energy resources for most of the EU economies, Europe does not have rich hydrocarbon resources; in fact, European member states only have around 0.6% of the world's proven oil reserves and 2% of the proven natural gas reserves (Bahgat, 2006, p.963). Norway, the United Kingdom, Germany, the Netherlands, and Denmark account for a significant amount of the oil reserves, with Norway, the UK, and the Netherlands also holding the largest amounts of natural gas reserves (OECD/IEA, World Energy Outlook 2008).

Although most of the Union's members require energy imports, countries' energy needs are not even across the EU, making their energy imports unequal. As can be expected, each member state consumes and produces different amounts of natural gas and oil. Member states also differ in terms of energy intensity, import dependency, and energy diversity. This reflects the main reason why the EU cannot form a CEP at the European level. This seems difficult due to member states' national policies with energy-producing countries; thus, these various national interests make a single voice on energy unlikely to happen anytime soon. A classification of EU member states according to their national foreign policy towards Russia and their positions in EU negotiations when dealing with Russia helps to understand this point (Leonard&Popescu, 2007). In that respect, member states can be divided into three groups on the natural gas and oil index. For instance, Austria, Hungary, and Romania are at high risk due to not producing their own gas, importing from Norway and non-EU countries, and having a high gas share of total energy consumption. On the other hand, low risk countries import mainly from EU suppliers, produce their own gas, and/or diversify their energy portfolio. Furthermore, France, which has different energy priorities, is protective of its nuclear program, while Germany and Poland are protective of their coal industries (Karthryn, p.21-23). Additionally, France, Germany, and Italy have improved ties with Russia in order to secure their long-term energy interests. While France and Germany wish to develop long-term relations with Russia, (Cohen, 2006) the new EU member states (such as Poland and the Czech Republic, which are among the Central and Easter European Countries) wish to distance themselves as much as possible from it, trying to eliminate their dependence on Russian energy. Poland and other Baltic countries also try to provide energy security by reducing dependence on Russia through the diversification and formation of a common solid position. For example, when Germany and Russia signed an agreement on the construction of a direct gas pipeline connection running under the Baltic Sea (Nord Stream) in 2005, Germany emphasized several times that this project corresponds to its direct interests. Instead, Poland and Lithuania, which were bypassed by the new gas pipeline, saw in it as a threat to their energy security. Thus, they declared that Germany, by having signed the agreement, had neglected the interests of other states and had not coordinated the strategy at the EU level. This made them less vulnerable and allowed them to negotiate the prices. However, in general, joining to the EU actually weakened their position as decision makers (Westphal, 2006, p.57). From Poland's point of view, the realization of the Nord Stream will divide the energy security of Poland and Western countries, undermining the principle of solidarity and the opportunity to create a CEP (Wyciszkiewicz, 2007, p.25). What also obstructs the formation of the EU's CEP is the various structures of national energy sectors (Egenhofer, 2001, p.40-41). For these reasons, energy policy was not a part of the common market project up until the 1990s; all these disagreements within the EU make it difficult to unite in regards to the energy policy. Also, although Britain, Denmark, and the Netherlands[*] are giant energy producers in Europe, the three large countries Germany, France, and Italy are the main energy consumers. Yet, despite its large portion of energy imports, the EU is able to produce some of its own energy. For instance, Britain is the main oil producer in the Union, while the Netherlands is Europe's major gas supplier, and Norway, Russia, and Algeria are the major non-EU-member states energy exporters. In addition to that, the North Sea contains links to oil and natural gas reserves, with Norway, Britain, Denmark, the Netherlands, and Germany trying to produce oil and gas from them.[†] However, total production during the 1972-2008 period amounted to 62% of the expected ultimate recovery from the known fields and discoveries (Danish Energy Agency, 2009).

Overall, the dominant energy-producing country within the EU is the United Kingdom, producing mainly oil. France comes after the UK in energy production with its nuclear sources, followed by Germany, producing energy from solid fuels such as coal. However, final energy consumption in the Union was accounted for by Germany, followed by France, the UK, and Italy. When considering the import figures, Germany occupies the first place, followed by Italy, France, and Spain. The size of these countries' economies and population are surely very important in these figures, given that large countries always consume more energy, while also trying to produce more energy. However, although Germany produces a part of its energy, it both consumes and imports much. If current consumption rates continue, the North Sea's oil is projected to end by 2050 (Altunısık, p.152). In other words, the European member states, which import half of their collective natural gas and oil requirements, will probably rely on imports to meet over 80% to 90% of their respective collective natural gas and oil needs within the next two decades (Commission, 2008, p.3). Today, the EU imports around 50% of its energy needs, with member states accounting for approximately 17% of the world's total energy consumption (European Union 2006). The International Energy Agency (IEA) (2004) expects that the EU's primary energy demand will grow by almost 0.7% annually across the 2002-2030 period. Therefore, this demand is expected to increase by more than 20% in the next 30 years. In this period, while the share of coal and nuclear power in primary energy consumption is expected to decrease, the share of natural gas and renewable energy is expected to increase (IEA, 2004). Noël claims that "Over the past 40 years, natural gas consumption has grown steadily in Europe, and much faster than primary energy consumption. Since the mid-1970s, imports have covered all this growth. In 2007, Europe imported 300 billion cubic metres (bcm) of gas, accounting for 60% of consumption" (The EU Energy Blog, 2008). Increasing consumption rates and the issue of import dependence have also been accentuated in several EU official papers and strategy documents. According to one of the Commission's Green Papers (2006), more than half (54%) of the gas consumption comes from outside of the EU. This situation becomes even more serious when considering oil consumption. As stated in the Green Paper Annex (2006), "[the] EU's import dependency is high for the oil [resources] and net oil imports account for 81% of oil consumption." Therefore, the picture of the energy consumption and the gap between consumption and production rates in the EU (which leads to import dependence) can be identified. Barroso and Piebalgs highlight that "Europe is entering a new energy landscape. Gas and oil prices have nearly doubled in the last two years. Europe's import dependency is forecast to rise to 70% by 2030, as our hydrocarbon reserves dwindle and demand rises, with implications for our energy security. Our infrastructure must improve; €1 trillion is needed over the next 20 years to meet expected energy demand and replace ageing infrastructure."[‡] Put differently, the EU is becoming increasingly dependent on oil and natural gas resources, while also relying on imports of natural gas, with the Commission highlighting that "Today, the EU's energy consumption is based on, particularly oil (36.9%) and gas (24%), including coal (17.8%), nuclear energy (14%) and renewable energy (7.1%)" (EU Commission, 2009).[§] According to the recent statistics, the total EU energy consumption amounts to 37% oil, 24% natural gas, 16% coal, 14% nuclear, and 9% renewables (Eurostat, 2011).

On the other hand, future scenarios proposed by the IEA (2010) predict that global demand for primary energy sources will increase by 36% between 2008 and 2035, "with fossil fuels accounting for over one-half of the increase in total primary energy demand." From this perspective, European dependence on oil imports is predicted to reach 60% by 2010, 70% by 2020, and 80% by 2030 (European Union). On the other hand, European dependence on natural gas imports is estimated to reach 50% by 2010, 60% by 2020, and 70% by 2030 (EU Commission, Green Paper, 2000). The importance of this problem for the EU essentially increases in the same period, as a rise is foreseen in the share of oil imports for the EU's consumption of up to 90 % (against today's 76%) by 2020 (Green Paper, 2000). However, dependency rates vary among the European member states in terms of both source and level of imports. For instance, Slovakia, Poland, Hungary, and Lithuania are

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[*] The Netherlands produces gas from the Groningen gas field, in the northeastern part of the country. It was discovered in 1959 and is still the largest natural gas field in Europe.

[†] For instance, as of January 1st, 2009, 331 million m³ of oil had been produced, with oil reserves amounting to 200 million m³.

[‡] Jose Manuel Barroso, find the speech at:

http://europe.eu.int/comm/commission_barroso/president/pdf/article_20060308_en.pdf

[§] European Commission, EU Energy and Transport in Figures, Statistical Pocketbook, 2009. http://ec.europa.eu/energy/publications/doc/2009_energy_transport_figures.pdf almost entirely dependent on Russian imports (Green Paper, 2000). Similarly, the high level of dependence on oil imports from OPEC members is particularly problematic for the EU. In terms of natural gas, the EU's security challenges are different, with the gas market presenting specific features. For example, gas is mainly transported through fixed pipelines, which creates direct and long-term interdependence between the producer and the buyer. Consequently, there is no global gas market, but rather regional markets, even though the development of liquefied natural gas (LNG) might change the situation in the future (Checchi, Behrens&Egenhofer, p.14). Additionally, the EU's indigenous gas production peaked in 1996 and has started to decline, whereas its consumption has grown and continues to increase (Checchi, Behrens&Egenhofer, p.15). The two main EU gas providers are Russia and Algeria, although potential substantial supplies from Africa, the Middle East, and the Caspian region, imported either as LNG (from Nigeria and the Middle East) or by pipelines, are seen as important diversification options.

As has been demonstrated so far, due to the lack of sufficient oil and gas reserves, in combination with being a huge consumer, the EU has to import large amounts of oil and gas from external suppliers, which are generally unstable and unreliable. Europe's dependence on oil and natural gas imports has continuously increased to the extent that it has become one of the Union's main challenges. In accordance with this increasing demand, the European Union's top energy supplier is Russia, which supplies 31% of the EU's gas imports, 27% of crude oil imports, 24% of coal imports, 30% of uranium imports, and is the EU's third-largest supplier of electricity (European Dialogue). Indeed, it is predicted that European member states will import 40% of their gas needs from Russia by 2030, as well as 45% of their oil from the Middle East. On average, 40% of natural gas used in the EU member states is imported from Russia, Norway, North Africa, and Algeria. According to 2005 figures, the total European energy demand comprises 38% oil, 29% gas, 19% solid fuels, 6% nuclear energy, and 8% renewable resources. Understandably, Europe's dependence on Russian gas has become a central issue in the European Union's internal debates concerning its relationship with Russia and its energy policy. Furthermore, most of the EU members, especially the Central and Eastern European countries, are desperately dependent on Russia for their gas supply, while almost all are dependent on the OPEC countries for their oil supply.

When discussing the member states' high level of dependence on Russia, it is important to remember that not all member states are equally dependent. Three groups can be identified. First, those states with low dependence on Russia, having imported less than 5% of their gas from it, which includes Spain, Sweden, the UK, the Netherlands, Portugal, Belgium, and Ireland. Second, those with medium dependence, including France, Italy, and Germany, also depicted as Russia's "strategic partners." For example, Germany's Ruhrgas company conducted a strategic partnership with Russia's Gazprom (Pamir, 2004, p.14). Finally, the third group with high dependence on Russian energy, includes Austria, the Czech Republic, Greece, Hungary, Poland, Romania, Slovenia, Finland, Latvia, Lithuania, and Slovakia (the last four of these obtaining 100% of their imported energy from Russia) (Youngs, 2009, p.79). As we can imagine, the popularity of seeing Russia as a threat is chiefly found strongly among the Central and Eastern European countries, such as the Baltic States, the Czech Republic, and Poland, who have also experienced the direct Russian use of energy disruptions for political ends (Aalto, 2008, p.38). These Eastern states are also the main supporters of a stronger common EU policy on energy security. However, even with reluctant support from the UK, Finland, and Sweden, these countries' efforts have little influence in the EU. According to Light, "many European leaders prefer to deal with Russia on a bilateral basis rather than via the EU, pursuing their own energy interests, even when those interests conflict with the interests of the EU as a whole or with the interests of other member states" (Light, 2008, p.9). In this regard, the largest importers of Russian natural gas are Germany, Italy, and France, who import 54% of the EU-27's total share of natural gas (EU Commission, 2011). Thus, this tendency prevents the establishment of a European CEP among the member states. For example, the German E.ON Ruhrgas and the French EDF (Électricité de France, S.A.) generally oppose a common internal market due to their desire to retain monopoly positions, adding to the main reasons why the EC was unable to complete an internal market during the 1990s (Helm, 2007, p.38-39). These companies, along with Italy's ENI (Ente Nazionale Idrocarburi), are strongly aiming to decline the EU's attempts to build an external CEP, by signing bilateral deals with Gazprom for future energy supplies (McGowan). This economic nationalism and bilateralism by these three member states is obviously opposing to the EU's multilateral and market-based approach to Russia in the energy field. As Smith notes, "the EU has been unable to agree upon a common energy strategy- partly due to the very resistance to it by these countries themselves – in particular, France, Germany, and Italy – are now seeking separate deals, favouring their own national energy companies, with Russia" (Smith, 2008, p.15).

However, as has been previously demonstrated, the European Union is heavily dependent on Russia for energy. With the predicted rise in energy imports and dependence from Russia and the Middle East (Gallis, p. 35), the instability of these regions has placed the issue of energy securitization on the European member states' agendas. Even so, the European Commission tries to limit the amount of imports from non-EU countries to a maximum of 30% of the total energy supply, in order to increase energy security within the Union. Therefore, member states are seeking alternative ways of securing energy, such as the diversification of suppliers. Several alternatives to Russian gas are available to EU members, with the Caspian Region, North African, and Latin

American gas resources representing some of them. Indeed, some of the EU members have purchased natural gas from other regions; for example, due to proximity and efficiency, Italy, Spain, Portugal, and Slovenia import North African natural gas from their Mediterranean neighbours. Italy is the main importer of the North African gas, importing 22 million toe from Algeria and 7 million toe from Libya. Algeria also exports more than 10 million toe of natural gas in aggregates, primarily to Spain, Portugal, and Slovenia, with Spain accounting for its primary share of almost 80%. Also, other regions and countries have the potential of becoming natural gas suppliers to Europe in order to reduce the EU's natural gas dependency on particular suppliers, most prominently the Former Soviet Republics of Central Asia, Iran, Gulf and Caspian Countries, and Egypt.

In light of these developments, the issue of energy supply has emerged as a significant question for the EU, triggering energy securitization as a primary challenge for the EU's energy policy. The European member states have become significantly more aware of the issue of energy securitization following the gradual growth of EU dependence on oil and natural gas. While Europe and most of its member states are highly import-dependent, there are major differences in the level of source dependence. Although dependence on Russian gas has declined in recent years, some member states stay totally dependent on external sources of supply. However, the current and projected dependencies on energy and crude oil remain below the levels reached during the 1970s. For example, energy dependence was at its highest in 1972 when it reached 71%, before falling to a low of 41% by 1985. Since then, energy dependence has slowly been on the increase, reaching a high of 55% in 2008. Oil dependence has followed much the same pattern, and at least until the 2000s, has been the central driving force behind increasing energy dependence. Between 1974 and 1985, oil dependence fell from a high of 100% to a low of 58%, but following the enlargement of the EEC to include Spain and Portugal in 1986, oil dependence began to increase again, reaching 77% by the end of the Cold War. During the 1990s crude oil dependence fluctuated between 73% and 79% before increasing, from 75% in 2000 to 85% in 2010. As a result of these reasonably gradual increases, energy and oil dependence in 2010 returned to the same level as that of 1980, after the second oil crisis. In the meantime, the EU-27's current gas dependence is now at similar levels to its crude oil dependence in the early 1980s, when it reached its lowest levels over the last forty years. However, in 2004, the EU-27's gas dependence moved above its total energy dependence for the first time and this trend is set to continue. Herman Van Rompuy, president of the European Council, highlights that "Energy issues will define the politics of the 21st century. Knowing that energy could become a really scarce good in a growing world economy, the battle for energy may even become a matter of survival, of war and peace. However, history is not a fate, but man made. The art of politics is to deal with such challenges. That is why it is so important to reflect upon the subject, as in this issue of Les Dossiers Europeans. Europe is in a vulnerable position, due to our huge energy import dependency. If nothing changes, our import dependency in 2030 will be 70 percent. However, we are not only ones on the world stage in that position. And moreover, we are working hard on different fronts to change it!" (European Files, 2007, p.4). Accordingly, the EU's dependency on the Middle Eastern oil and the Russian gas supplies, in combination with growing natural gas and oil consumption, as well as recent gas crises linked to the transit country Ukraine, have contributed towards enhancing energy securitization efforts at the EU level. As the EU will continue to engage relatively effectively with energy security as a matter of high politics, it is likely to develop the capacity to securitize the issue.

1.1. The EU–Russia Energy Dialogue

Today, Russia is Europe's single most important external supplier. This is due to the fact that, currently, oil and natural gas consumption accounts for more than 60% of the EU's total energy needs (Grgic, 2006, p.150). According to the European Environment Agency's (EEA) report, "the EU's dependence on imports of fossil fuel from non-EU countries rose over the period from 2000 to 2005 […] The largest single exporter to the EU is Russia, supplying 18.1 % of the EU's primary energy in 2005 (up from 13.3 % in 2000). It is the largest single exporter of gas and crude oil and second largest (after South Africa) for coal" (European Environment Agency Report, 2008, p.37). According to the European Commission, almost half of the EU's natural gas will come from Russia by 2020, growing to approximately 60% by 2030. At present, 30% of the EU's oil and 40% of its gas comes from Russia (European Parliament, 2007, p. 40). D. Finon and C. Locatelli (2008) underline that "the share of Russian gas imports could reach 50 per cent by 2020" (p.124). All such data and statistics demonstrate the necessity of Russia's role in the EU's energy market. Matthias Warnig, Managing Director of Nord Stream AG, states that "The role of natural gas is important. Given that Europe looks to developing further renewable energy supplies, gas pipelines can act as a foundation on which to build tomorrow's energy capacity. I firmly believe that the EU's energy security goals will only be achieved by mechanisms that enable facilitated long-term access to natural resources. Russia will remain Europe's main partner due to its vast natural gas reserves and Europe's growing gas consumption, combined with the potential for gas to contribute to CO2 emission reduction targets" (The European Files, 2007, p.17). Indeed, since the Soviet era, relations between Russia and the European Union have been very complex. The Soviet Union began delivering energy supplies to Western Europe in the late -1960s. later on, with the dissolution of the Soviet Union, Russia faced serious economic crises in the 1990s. In 1998, following an economic crisis that erupted in Asia, oil and natural gas prices significantly declined and the Russian economy was severely shaken. During this period, Russia received financial assistance from the EU and the US. In Vladimir Putin's era oil price have increased and Russia's economy began to revive. Thus, the mutual relations between the EU and Russia began to develop in the 1990s. This happened, first, by means of a Partnership and Cooperation Agreement (PCA) signed in 1994 between Russia and the EU, which then became a legal basis for an Energy Dialogue between the two actors.[*] The agreement came into force on December 1st, 1997 and was initially valid for 10 years. After its expiration, two routes were possible: the prolongation of the agreement or the signing of a new, more profound, agreement. The first route was chosen at the EU-Russia summit that took place in November 2006 (European Commission). This cooperation is contemplated in a wide area, including political, economic, and cultural aspects. Three points should be accentuated in the economic sphere which is, by far, the most important part of the PCA: "(a) the Partnership and Cooperation Agreement is the first bilateral document in which western countries consider Russia as a partner with an economy in transition; (b) it contains the first bilateral top-level conception of long-term economic relations with a view to Russia's future inclusion in a wider area of cooperation in Europe; (c) it is an unprecedentedly ambitious program of economic cooperation. It should be stressed that economic convergence achieved through this agreement will lead to more intensive political relations" (Baranovsky, 2001, p.430). The PCA was hailed by President Yeltsin as the first step taken by the European Community since the fall of the Iron Curtain towards the recognition of Russia as a fully-fledged partner in the political and economic spheres. The main objective of the agreement is to "create an economic and technical assistance framework, to ultimately establish a free trade area with Russia, and to further facilitate Russia's accession to the WTO" (Haghighi, 2007, p.343). Hence, as the Energy Charter Treaty did not work as expected in regards to the EU's relation to Russia, the EU considered establishing energy cooperation with Russia in order to decrease the energy dependency and secure its energy supply. Alto highlights that "The year 2000 was a turning point in EU–Russia relations. First, Russia's leadership change from Boris Yeltsin to Vladimir Putin paved the way for a fresh start. Second, in the 2000 Feira European Council meeting, political conditionality and economic co-operation with Russia were decoupled, allowing the intensification of economic links" (Aalto, 2008, p.64). Therefore, a bilateral dialogue between Europe and Russia has become very important and sees mutual interests of both parties. For example, the German Minister of Economics and Technology, Rainer Brüderle, states that "Today the EU depends on imports for 55 percent of its energy supply. Because of increasing demand on world markets, rising energy prices, and repeated occurrences of political instability in major energy-producing regions, the question of how we can meet Europe's energy needs both reliably and affordably is more urgent than ever. Diversifying our suppliers and establishing energy partnerships with oil – and gas – producing countries is one key side of the equation" (European Files, 2007, p.13). The 2000 Green Paper, "Towards a European Strategy for the Security of Energy Supply," also stresses that "specific measures should be carefully studied...These measures should be finalised within the framework of a cooperation and partnership agreement between European Union and Russia" (Commission, Green Paper 2000, p.74). Accordingly, the EU and Russia initiated an "Energy Dialogue" by the Joint Declaration of the October 2000 EU-Russia Summit in order to discuss their mutual dependencies. This dialogue is mainly based on the central assumption that "interdependence between the two regions will grow – from the EU for reasons of security of supply; on the part of Russia, to secure foreign investments and facilitate its own access to EU and world markets" (Euroactive, 2007). The dialogue fundamentally involves cooperation on energy, long-term agreements, modernizing infrastructures, developing transport routes to Europe, mobilizing European investments, and developing environmentally friendly technology (European Union).[†] It provides an opportunity to raise questions of common interests relating to the energy sector, including the introduction of cooperation on energy saving, rationalization of production and transport infrastructures, European investment possibilities, and relations between producer and consumer countries. The 2000 Green Paper indicates the main objectives of the EU-Russia energy dialogue as follows: "to strengthen competition in the internal energy market, to defend sustainable development and guarantee external supply security" (Green Paper 2000, p.74). The Commission, in its communiqué, "The Energy Dialogue between the European Union and the Russian Federation between 2000 and 2004," underlines that a relationship of interdependence between the EU and Russia may include the "establishment predictable trade rules, improvement networks and encourage investments by promoting a more stable and transparent legal framework and encouraging key reforms in the Russian energy sector" (EU Commission, 2004, p.9). At the same time, one of the dialogue's main goals was to convince Russia to ratify the Energy Charter Treaty. I believe the Energy Dialogue could be a starting point for a bilateral cooperation to improve energy efficiency, address the need to modernize the Russian energy sector, and ensure stable energy markets and reliable and growing imports and exports. With the dialog, the EU and Russia have considered establishing five crucial issues of common interest: ensuring the European continent's security of energy supplies; developing the potential of the Russian economy, in particular Russia's energy resources sector; taking advantage of the opportunities of the pan-European market;

[*] For the Partnership and Cooperation Agreement Between Russia and the European Union, available at: http://www.delrus.ec.europa.eu/en/p 243.htm (Visited on: June 17, 2013).

[†] 'EU-Russia Energy Partnership.' For more information, see:http://europa.eu.int/scadplus/leg/en/lvb/l27055.htm

tackling the challenge of climate change; and setting the conditions framing the use of nuclear energy (EU Commission, 2001, p.1). The most important part of the ECT basics was fulfilled in the Energy Dialogue's program. Main directions of the Russia-EU Energy Dialogue, its achievements, problems, and prospects are highlighted on a regular basis in progress reports. In the 12th Progress Report of the EU-Russia Energy Dialogue, which was published in December 2011, the large share of Russia's energy imports in the European Union was emphasized and the last 10 years of developed relationships were mentioned. The Council stated that "the Energy Dialogue with Russia should be revitalized and become more open and effective in support of EU energy objectives, based on our mutual interdependence upon energy issues and thus the need for secure and predictable investment conditions for both EU and Russian companies and reciprocity in terms of access to markets and infrastructure as well as non-discriminatory third party access to pipelines in Russia, ensuring a level playing field in terms of safety, including nuclear safety, and environmental protection. There is a need for decisive efforts to complete the negotiation of the Energy Charter Transit Protocol and secure Russia's ratification of the Energy Charter Treaty" (EU Council, 2006, p.31). There were also various "round tables" on gas (December 2002), energy strategies (October 2003), and electricity (October 2003). In these round tables, the state of play of the electricity and gas markets, along with the energy strategies of the current year for both sides, were discussed and the latest developments in each sector communicated (EU Council, 2006, p.31). These round tables are designed to maintain a positive relationship between the EU and Russia during this ten-year period.

In general, the securitization of energy trade between Russia and the EU is a complex process caused by different factors, from high levels of dependence and negative history of supply networks to the personal motives of individual securitizing actors. For example, some EU member states are contributing to the securitization process by covering their interests under the needs of European energy security. However, this politicized context of the energy trade complicates the fulfillment of mutually beneficial projects due to the unnecessary security considerations (Khrushcheva, 2011, p.216). In terms of the Energy Dialogue, the main objective became the creation of a stable partnership and the maintenance of stability of oil and gas supplies (EU-Russia Energy Technology Centre). Both parties should take the essential measures to reduce the challenges and promote energy security and energy supply security, which was evidently the key element of the Energy Dialogue in Europe.

1.2. The 2006 and 2009 Russian-Ukrainian Gas Crises

Ukraine is geopolitically important for both Russia and the EU, as it is the main corridor for Russian gas to Europe. The country is especially important for the EU due to its role in European energy security, and therefore, also in its political stability and economic prosperity. Ukraine is also important for Russia, as it is the main gas corridor from Russia to Europe. In fact, around 80% of the EU's Russian gas imports pass through Ukraine,[*] with 300-350 million cubic meters of gas passing via Ukraine towards the EU every day. Furthermore, two-thirds of Gazprom's revenue comes from the sale of gas that crosses Ukraine, which in turn represents more than 20% of the growing European gas demand (Chow&Elkind, 2009, p.78). This clearly demonstrates how the Russian-Ukrainian relationship is important for energy security. However, January 2006 can be considered as the beginning of the "gas dispute" between the Russian gas supplier Gazprom and the Ukrainian gas company Naftogaz Ukrainy. On January 1st, 2006, Russia cut off its gas deliveries to Ukraine because of the failure to reach an agreement in gas prices, triggering similar effects to those in Europe during the 1973 Oil Crisis. As Sokov stressed that the reason behind the cut was Gazprom's[†] demand to increase gas prices from $50 to $230 per 1,000 cubic meters. This demand stemmed from Gazprom's decision, in 2005, that it was losing too much money from their arrangement at the time. In June of that year, it quietly proposed to set Ukraine's price at $160 per 1,000 cubic meters, and to pay for transit in cash rather than gas, at the rate of $1.75 per 1,000 cubic meters for 100 kilometers (Sokov, 2006, p.349). Gazprom claimed that during the Ukrainian Orange Revolution[‡] in the winter of 2004, 7.8 billion cubic meters of Russian natural gas had allegedly disappeared from Ukrainian storage facilities, despite this claim being rejected by Ukraine's gas giant Naftohaz.[§] Gazprom blamed Ukraine for siphoning gas, with Kiev claiming that no "unauthorized diversion" had taken place (Sokov, 2006, p.349). Therefore, the disappearance of 7.8 billion cubic meters of natural gas that Gazprom had pumped into underground gasholders in Ukraine for subsequent sale to Europe was the formal pretext for the 2006 dispute in relations between Russia and Ukraine (Yana, 2005).

[*] Historical background of Russian-Ukrainian gas disputes, 2009. The article is available at:
http://english.sina.com/world/2009/0106/209613.html

[†] Gazprom is the Russia's biggest company and the world's largest issuer on natural gas.

[‡] Following the fall of the Soviet Union, the democratization process, or the spread of the liberal democracies started all over the world, such as the Rose Revolution in Georgia in 2003, the Orange Revolution in Ukraine in 2004, the Tulip Revolution in Kyrgyzstan in 2005, and finally, the Arab Spring in the Middle Eastern and North-African countries in 2011.

[§] Naftogaz is the leading enterprise in Ukraine's fuel and energy complex and one of the biggest Ukrainian companies.

The Ukrainian government rejected these higher prices and, thereafter, the dispute lead to supply crises in Europe. After the cut off there were immediate supply shortages for a number of European countries. For example, Hungary was reported lose up to 40% of its Russian supplies, Austrian, Slovakian, and Romanian supplies were said to be cut down by one third, France by 25-30% and Poland by 14%, and Italy reported having lost 32 mcm, or around 25% of deliveries between during January 1st-3rd (Stern, 2006, p.44). In fact, Morelli claimed that "had the dispute between Gazprom and Ukraine lasted more than a few days, those European countries may have had a difficult time replacing that gas with a backup supply"(p. 25). On January 4th, 2006, Russia and Ukraine agreed on a new price for natural gas, set at $130 per 1,000 cubic meters, and the flow of natural gas from Russia to Ukraine was re-started. Gazprom also entered into a long-term contract for Russia's gas transit via Ukraine, with a price of $1.6/1000 cubic meters per 100 kilometers." Yet, after this crisis the concept of "energy security" became one of the core elements of the energy debate. The words of the Energy Commissioner, Andris Piebalgs, show the dominance of this new framing: "…over the past year we have seen the issue of security of energy supply become the issue of international relations. Across Europe, there has been a change in sentiment. Whereas previously the issue of security of supply was a technical issue reserved for the very specialized engineer or system operator, now the issue of energy security is on the table of every energy minister, as well as foreign, finance and industry ministers across Europe" (Piebalgs, 2006). The 2006 Russian-Ukrainian dispute demonstrates that Russia can use its energy power as a political tool to influence the EU's energy security. Therefore, if the EU can establish a common energy policy it may be able to take measures against being damaged by Russia's political energy manoeuvres. Additionally, in order to be free from dependence on external influence, it is more prudent to lessen dependency on Russia and increase the diversification of suppliers over time. In terms of the theory of securitization, the Union has taken some measures, which extend beyond normal politics, to avoid such a situation. However, the Ukrainian transit problem stands as a lack of coordination among the EU member states and Russia. Despite Russia confirming to continue legitimately working on the reduction of its dependency on the EU market on February 2007,[*] and to use the market as the basis for its relations with all countries rather than for political aims, the energy disputes between Europe and Russia have not yet been prevented, as proven by the recent 2009 Russian-Ukrainian Gas Crisis. This most recent, and probably the most serious, threat to the EU gas supplies was the last gas conflict between Russia and Ukraine and occurred from December 2008 to January 2009. This incident can be considered as the one that can lead directly to the securitization of gas supplies in the EU. This time the disruption was the longest and seriously affected several EU member states as the result of a dispute concerning debts and a new contract for gas prices and supplies between Naftogaz and Gazprom on January 1st, 2009. Once again, Russia cut off its gas deliveries to Ukraine and Europe experienced a serious shortfall of natural gas. The Russian Deputy Zubkov had previously written a letter to President Barroso and 27 member states to notify them of a gas supply dispute (European Commission, 2016, p.5). However, a day after the crisis, gas deliveries to several European members were affected, particularly to Poland, Slovakia, Hungary, Bulgaria, and Romania. Subsequently, on January 7th, 2009, all gas supplies from Russia to Ukraine and the EU were cut off (European Commission, 2006, p. 5). The French Industry, Energy and Digital Economy Minister, Eric Besson, claimed that "the gas crisis of January 2009, which affected more than half of [the] European countries, demonstrated the pertinence of a regional approach, in particular with regard to relations with non-EU countries" (European Files, p.9). Security of supply is also a major short-term issue. Once again, the crisis underlined the risks of dependence on Russia, with the Commission President Jose Manuel Barroso sharing his views on the Russia-Ukraine gas dispute's implications for the EU: "If the agreement is not honored, it means that Russia and Ukraine can no longer be regarded as reliable" (BBC)[†] In order to end the gas crisis, Barroso told the European Parliament that: "the dispute between Ukraine and Russia was most unacceptable and incredible. If agreements, sponsored by the EU, are not observed as a matter of urgency, he would advise energy companies that have deals with Gazprom and Naftogaz, to file lawsuits against them" (BBC). He emphasized that: "With both energy consumption and dependency on oil and gas imports growing and supplies becoming scarcer, the risk of supply failure is rising. Securing European energy supplies is therefore high on the EU's agenda" (Barroso, 2009). In fact, the January 2009 Gas Crisis led to the interruption of 30% of European gas imports for a period of over two weeks (Barroso, 2009, p.9). An agreement between Ukraine, Russia, and the EU was eventually signed to manage the gas transit in Russian and Ukrainian territory by independent monitors on January 9th. A new 10-year agreement was also signed on the purchase and transit of gas between Gazprom and Naftogaz. Finally, on January 20th, the dispute ended and gas deliveries from Russia to Ukraine re-started.

1.3. The Impacts of the Energy Crises

[*] Vladimir Putin's press conference for Russian and foreign media. Available at: http://www.kremlin.ru/eng/speeches/2007/02/01/1309_typ e82915_117609.shtml

[†] Barroso told the European Parliament that the dispute between Ukraine and Russia was "most unacceptable and incredible" and that, if agreements sponsored by the European Union are not observed "as a matter of urgency", he would advise energy companies that have deals with Gazprom and Naftogaz, to file lawsuits against them; reported on 14 January 2009. For more information, see, BBC news,*"EU warns of legal action over gas"*, at: http://news.bbc.co.uk/2/hi/europe/7827829 (Visited on: November 15, 2013).

The mentioned supply disputes acted as a catalyst for an extensive change in the EU energy policymaking, with the Commission, Council and Parliament all in complete agreement about the requirement of developing new legislation in order to deal with the security of gas supplies. Many discourses were made by EU actors, such as the Commission Staff Working Document on the January 2009 Gas Crisis between Russia and Ukraine, which is very explicit in presenting the EU's dependence on Ukrainian transit, highlighting that the EU depends on Ukraine for the transit of 80% of its Russian gas supplies approximately one-fifth of total EU gas supplies. It is clear that the risks of this dependence are not spread uniformly throughout the EU. While the Commission argues that during the 2009 supply disruption "a majority of member states were affected, directly or indirectly," it also highlights that a number of countries "notably Poland, Slovakia, Hungary, and above all Bulgaria and Romania," were most severely hit. In the same document, the Commission notes that "a repeat of the January 2009 gas supply crisis, from a similar or different cause, cannot be ruled out." In fact, during the events in early 2009, the Commission and the Presidency of the EU's Council were able to lead the EU's response without much divergence amongst the rest of the Union. However, the response was not entirely effective, with a subsequent Commission review identifying various problems related to information availability and coordination and a revision of the emergency measures that were under negotiation. However, the review reflected the Commission's overall approach to the crisis – invoking the crisis as a securitizing move. Indeed, after the disruption, the Commission organized the Gas Coordination Group and dispatched monitors to both the Russian and Ukrainian border with both governments' agreement to identify the causes of the disruption (Barroso, 2009). The gas industry also worked to transmit supplies to the worst affected regions in Eastern Europe and a consortium of companies backed by the German and Italian governments, attempted to work with Gazprom and Naftogaz to resume supplies (Pirani, 2009, p.47-49). Member states adopted several measures to support other member states, such as the UK exporting additional gas to mainland Europe and Greece sharing gas from its LNG terminal with Bulgaria (Platts, 2009, p.4-5). Additionally, after the gas dispute, some member states took more exceptional measures. For instance, Bulgaria and Slovakia restarted nuclear reactors to decrease their gas demand even if in violation of their EU accession treaties (Platts, 2009, p.3). Following the disruption, the extraordinary Energy council arranged a date, on January 12th, to discuss the crisis and called for the Commission's proposed revision of the 2004 security of gas supply directive to be furthered as a matter of urgency (EU Council, 2009, p.1). The Parliament also called for the quick adoption of new legislations in a resolution issued at the beginning of February (EU Parliament, 2009, p.12). To this, the Commission responded by indicating its intention to propose a regulation rather than a revised directive, which was accepted by the Council (EU Council, 2009, p.13). The Commission (2009) later stated that the main reason for this was that a directive could take a long time to be put into practice, while a regulation would be directly binding of member states and market participants (p.31-32). A few months after the proposals were issued the Council expressed its support for most of the measures (EU Council, 2009, p.2). Kurze argues that "since the gas dispute of 2006 there has been an increased attention towards energy matters from the European Council ―which signifies the increased importance of energy policy in the overall policy repertoire if the EU and that the ―securitization process generated more than heightened attention to a forgotten subject" (p.14). The Commission's proposals focused on the same areas as the 2004 directive, namely setting out a framework for harmonization of national policies, security standards, setting up community response mechanisms, and long-term contract reporting, which were not criticized by the Council and Parliament and were accepted without amendment. One of the security standards proposed by the Commission was an infrastructure standard, which would need member states to ensure that they if the largest infrastructure (i.e. transit pipeline) was disrupted, other infrastructure had to be able to allow for the delivery of enough gas to meet total gas demand (European Commission, 2009, p.12-13). The second was the supply standard, which explained that even if supplies were disrupted, member states had to be able to keep up gas supplies to "protected customers" for a period of 60 days (EU Commission, 2009, p.13-14). However, these standards were difficult for some of the Eastern member countries, which had less diversified supplies and were dependent on a single pipeline for their gas supplies. In addition, another concern was that if member states adopted higher standards they may be less eager to distribute gas to other member states during supply disruptions and privilege their own markets. To handle these issues, the Council and the ITRE committee made a cooperation, thus, the duration of the supply standard was reduced to 30 days, with member states allowed to set higher standards for themselves (Platts, 2010). Overall, it is clear that these negotiations were, in general, successful for the Commission. However, the Commission was not successful in transferring competences to the EU level in most aspects of the proposal.

Above all, the 2009 energy crisis was the most serious threat to the European gas supplies, which underlined the risks of dependence on Russia as a gas supplier. The crisis is especially important due to its results for the EU-Russia energy relations and the EU's energy security, demonstrating Russia and Ukraine to be unreliable energy suppliers from the European perspective. According to Vahtra (2009), with this crisis "both Russia's reputation as an energy supplier to Europe as well as Ukraine's reputation as an energy transit country was seriously damaged" (p.159). In regards to the securitization theory, Buzan states that "if we do not tackle this problem, everything else will be irrelevant because we will not be free to deal with it in our own way" (Buzan, Weaver&deWilde, p. 24). Therefore, the EU can legitimately securitize the issue of energy in order to deal with "the Russian energy threat." The EU also started the process of developing an energy policy to take common actions regarding energy and to act in unity as a result of the crisis. Even though there has been a slow progress, there is a trend towards the transfer of competence from the national to the EU level. Therefore, the EU energy policy has developed from an intergovernmental policy field to increasingly supranational one following the gas crises. In this respect, European member states have shifted the energy issue towards the community level rather than the national level. I term this situation as the representation of "Union-Centric Behavior." Accordingly, the supranational level has acquired new competences and has transformed the policy-making process by introducing new normative aspects to the field and opening up new dimensions for political action. Russia's energy policies towards the EU have started to be perceived as an existential threat by the European actors and, thus, energy has become an issue securitized at the European level. Member states have also started to take the issue more seriously and encouraged to establish a Common Energy Policy at the European level. Following the crisis there were many discourses made by member states and European actors towards the Russian energy policies, which can be seen as examples of "securitizing moves." As during the Arab Oil Embargo the Arab states used oil as a political tool towards the Western countries, some considered that the disruption of gas supply from Russia to Ukraine might be seen in that perspective and that Russia had used gas as a political tool towards EU members. In this way, Russia's manipulation of the gas market showed a serious security threat and justified a "securitizing" response, which is considered as a milestone for the Union, given its crucial effects on the European consumers and its members' national politics. It is very clear that, during all these energy crises, the EC/EU faced politically-motivated disruptions in energy supplies affecting its future energy vulnerability. Therefore, energy has gone from being a rather technical issue to a high political issue in the EC/EU agenda. Ultimately, as claimed by the Copenhagen School's scholars, the speech act stresses that the issue should be decisively dealt with by top leaders, before other issues (Buzan, Weaver&de Wilde). Energy is the most important, yet also the most concerned, issue for the EU, due to the high dependency on energy resources, especially of oil and natural gas with particularly few suppliers (for example, Russia for natural gas and the Middle East for oil). Starting with the 1973 oil crisis, continuing with the recurring problems arising from the Middle East, and finally culminating in the Russian-Ukrainian disputes, the issue of energy security has emerged as a key focus in the EU agenda. The 2006 and the 2009 energy crises have also highlighted the risks of this high dependency on imported energy, which lead to unstable energy supply, higher energy prices, and unreliable suppliers. The crises showed that Europe could face energy shortages and vulnerabilities arising from its dependence on limited suppliers and transit routes. Therefore, these energy disputes have been "alarming" for the EU and have made the EU more anxious and urgently focused on the issues of developing common internal and external energy policies, as well as diversifying the Union's energy supply in order to negotiate with energy suppliers. These crises have demonstrated the extent to which the EU energy security has been vulnerable to external events. Furthermore, as the result of the unreliability of the main energy suppliers (Russia and the Middle East), the European securitizing actors came to consider energy as high politics. They see these unstable suppliers as a threat to the EU's energy supply, which makes the issue of energy a legitimate securitization matter at the European level. The crises also refreshed the memories of EU decision makers and public opinion and revitalized the 1970s fears, which originated in the possibility that major exporters could use oil and gas supplies as political leverage. However, the EU's response to the brief halt of Russian gas supplies in 2006/2009 bears witness to the possible consequences of the securitization of this matter. Russia was accused of using its energy supplies as a tool with which to intimidate other states in order to achieve its foreign policy goals. Despite Russia having described these actions as exclusively economic in nature, the countries affected assessed them as being a device with which to achieve not only economic, but also political aims (Radoman, 2009, p. 39). The dispute, until recently considered by the EU as purely commercial, threatens a fresh breakdown in relations between Brussels and Moscow, with European Commission officials warning that Russia's reputation as a reliable partner is once again at stake (Gow, 2009). At the same time, the gas crisis built a new sense of urgency for action on a European energy policy, prompting EU policy-makers and government officials to reconsider the reliability of Russia as a secure supplier. Accordingly, the question of "how reliable an energy supplier is Russia?" has been seriously raised. On January 4th, 2006, Energy Commissioner Andris Piebalgs emphasized that "Europe needs a clearer and more collective and cohesive policy on security of energy supply… security of energy supply is only really considered at national member state level; but in reality we need a much greater European-wide approach as this issue" (The Word's Nuclear News Agency).

Furthermore, following the energy crises, member states have placed the energy issue at the Community rather than national level. Also, the EU has begun to pay more careful and explicit consideration to energy security, and has subsequently followed a plan to develop a coordinated approach to the policies of energy security. Additionally, in order to establish a sustainable solution to this problem, the EU has taken some crucial steps. For example, since March 2007, the EU has been negotiating with Ukraine an Association Agreement (AA) and a Deep and Comprehensive Free Trade Area (DCFTA) as an integral part of the AA. Given that 80%

of the EU's natural gas from Russia passes through Ukraine,[*] the EU signed a gas deal with Ukraine regarding including Ukrainian gas infrastructure and incorporating Ukraine in the EU's internal energy market. On March 23rd, 2009, President Barroso (2009) expressed: "So I am very glad to say that the Commission, the Government of Ukraine and representatives of three International Financial Institutions – the EIB, the EBRD and the World Bank – will shortly sign a joint declaration to move forward together on the key tasks of reforming the Ukrainian gas sector to bring it into the EU's internal energy market and for modernizing the Ukraine gas transit network." Moreover, there is a need to create a common energy policy at the EU level and the EU should pay attention to alternative energy routes to Russia, such as the Nabucco Pipeline Project,[†] which might increase the diversity of energy resources and even lead to alternative energy resources. The Union has set a number of targets for 2020 (the 20-20-20)[‡], including: sustainability, competitiveness, and security of supply, by reducing greenhouse gas emissions by 20%, increasing the share of renewables in the energy consumption to 20%, and improving energy efficiency by 20%.[§] As stated in the strategy paper: "The EU needs to intensify its efforts in developing an effective external energy policy; speaking with one voice, identifying infrastructure of major importance to its energy security and then ensuring its construction." Accordingly, these measures have been taken by the EU to secure gas supplies. It is also relevant to highlight that the recent gas crises were considered a milestone for the Union, given its crucial effects on the European consumers and the national politics of its members.

CONCLUSION

This study mainly analyzed the energy securitization process in the EU and its possible consequences at the European level. The primary aim was to represent the Copenhagen School's securitization approach with its conceptual tools and to show this approach within the European energy security policies from the 2006 to the 2009 Natural Gas Crises. Pursuing this aim, this study has analyzed the various discourses of the EU actors (Commission, Council, and Parliament) and the member states that took an active role in the securitization process. I compared the discourses made by these securitizing actors during this period and, thus, analyzed the policy initiatives in which securitization has potentially acted as a tool to promote Europeanization of the energy policies. Another goal of this study was to show that the enlargement process of the Central and Eastern European countries that brought several concerns into the EU agenda, thus forged securitization at the EU level during the 2006 and 2009 Russian-Ukrainian gas crises. After coping with the 2000s energy crises, the issue of energy has been considered by the European policy-makers as "high politics." The lack of energy resources itself can be identified as an existential threat as oil and natural gas are essential for the economic systems. This proves the fact that the states consider energy a vital and strategic sector for both national economy and security. Therefore, energy has become a securitized issue at the EU level and energy relations with Russia have involved specific problems contributing to the securitization process. Following the 2000s Natural Gas Crises the common threat perception corresponded with a common frame for action with the Commission and the member states. Indeed, after the disruption of gas supply in 2006, an intersubjective agreement emerged between the Commission, Parliament, and Council stating that gas supplies were at risk. Initially, the Parliament accepted that supplies were threatened, showing Russia as an "enemy" that could further Europe's "vulnerabilities" through the use of its "gas weapon." Member states also began to state such concerns in the lead up to the 2009 supply disruption, which was followed by a common agreement after supplies were shutoff. At this point, the Energy Commissioner Oettinger (2011) noted that the "challenges facing us are too overwhelming to be resolved by one member state." While the effects of the oil crisis on the EC policies were minimal, the effects of the recent gas crises pushed the EU policies forward. The Gas Crises possibly represented the most crucial threat to Europe's gas supplies, which underlined the risks of dependence on Russia. During the crises, energy supplies to the EU were interrupted, showing the member states' vulnerability to short-term disruptions. Several member states were seriously affected economically and, thus, the Union tried to arrange a common policy towards Russia in order to prevent major energy supply disruptions in the future. In fact, there has been greater interest in the idea of a CEP since the late 1980s. The common policies were formalized by the 1992 Maastricht Treaty on European Union, which confirmed that the Community would undertake measures in the sphere of energy and would contribute to the establishment and development of Trans-European Networks in energy infrastructures. The Community's decision to establish the single market comprised also on a common energy market, which would be subject to liberalization and integration by joint investment in infrastructure and supply networks across internal borders. The objective of the CEP was to bring Community actions together on energy with regard to the following main issues: security of supply by managing the growing external dependence of the

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[*] EU initials Ukraine agreement 'to keep momentum.' For more information please see the website: http://www.euractiv.com/europes-east/eu-initials-ukraine-agreement-ke-news-511882

[†] The Nabucco Pipeline Project, please see the website:

http://www.nabucco-pipeline.com/portal/page/portal/en

[‡] The 20-20-20 Targets, the source is available at: http://askjaenergy.org/category/electricity-market/page/3/

[§] The "20-20-20" targets. For more information, see the website:

http://ec.europa.eu/clima/policies/package/index_en.htm

Union on imports; competitiveness of the European energy industry in the world; protection on environment by implementing an energy policy compatible with sustainable development objectives; and common research and technological development in the energy sector. Indeed, one of the most important of the EU's deficiencies is the lack of a common energy policy. Being aware of this fact, the Commission prepared an introduction, which highlights the significance of having a common policy with respect to energy matters. Some of the main Commission findings include: the huge investment requirement for energy infrastructure; rising import dependency at the Union level; increasing reliance on few supplier countries; uncontrolled demand increase at the global level, which in turn causes oil and gas prices to rise; the threats of greenhouse gas emissions and global warming posed on the ecosystems; and, finally, the EU's inability to achieve fully competitive internal energy markets. Taking into consideration this scarcity of domestic natural resources, production-consumption imbalance, and the EU's dependency on energy imports, a CEP among the EU member states has turned out to be an important step. Accordingly, the gas disputes between Russia and Ukraine have lead to the creation of a new European impetus for a CEP, since the crises seriously threatened the EU's gas supply security as most of the gas supply reaching Europe flows through Ukraine. In my point of view, the roles of the main European actors have evolved significantly during the 2000s crises. For example, there has been an intensification of efforts to build an internal energy market and work towards a CEP at the EU level. They also agreed to take actions towards such crises jointly and to make long-term strategies in order to prevent future crises. Their capacity to securitize the issue of energy and their ability to take effective measures were thus better than in the previous crises. Although the successful energy securitization in the EU did not happen as extraordinary measures at the European level were not taken, the construction of a "new" security threat provided a common argument for deeper integration. It has fostered greater internal support for integration, which is apparent in the European public opinion survey: "… to face supply difficulties including disruptions of gas supply, 60% of Europeans answer that they would be better protected through coordinated measures with the other EU countries" (European Parliament Barometer, 2011, p.4). Due to its high public approval rates, energy has emerged as one of the most important policy fields in the EU agenda. Thus, dealing with energy security acquired priority not only because of perceived geopolitical risks but also because of its potential beneficial impact on the overall integration process. Here, the securitization of European energy policy gives way for much inter-state solidarity.

After experiencing the negative consequences of energy's usage as a political tool during the 2000s, energy security has gained more consideration for the EU. These facts may trigger greater energy efficiency and innovation at the EU level, as there is an urgent need for investment to meet expected energy demand and to replace ageing infrastructure. In that sense, to reduce energy dependence on energy suppliers (mainly on Russia), the EU has been developing various mechanisms for the security of its energy supply, most important of which are the single energy market and the diversification of energy suppliers. In order to decrease the higher dependency to the energy suppliers, diversification of energy becomes very crucial for the EU. While the technology of renewable energy is expensive today, the EU can improve the efficiency of its oil and gas resources through a good energy policy. It must give importance to alternative energy routes, especially those such as NABUCCO. In fact, the EU has established various mechanisms to diversify the transport routes of energy reaching the EU through the Trans-European Networks, the INOGATE Programme and the Energy Charter Treaty. The Commission firmly believes that increasing the diversification of the supply sources will enhance the security of supply. This may partly explain why there is an underlying preference for LNG terminals. Conventional pipelines are still pre-eminent in the EU gas supply and the addition of other means of supply seems especially valuable. Crucially, LNG terminals are also open to receive gas from a variety of locations, which means more choice and less dependency on any single supplier. Still, the preference for LNG terminals should not overlook the fact that gas pipelines have been the most important gas infrastructure and will probably continue to be so for the foreseeable future. Additional gas pipelines may take politically more reliable routes or tap new sources such as the Caspian region. A higher level of investments in pipelines may be particularly helpful in the context of the political territory battles between certain transit countries and supplying countries such as Ukraine and Russia. New pipelines could also have the essential benefit of linking member states with one another to balance out shortages. This should prove particularly beneficial to landlocked countries that might not have direct access to LNG deliveries themselves. The Commission seems aware of the importance of inter-state links as it mentions that NRAs could be set as a condition for the obligation to link a certain pipeline to other member states. However, it gives no specific guidelines regarding under what conditions this needs to be done, leaving it to the discretion of the national authorities (Roggenkamp&Woolley, 2012, p.123). In addition, coordination mechanisms with the Mediterranean countries through the Euro-Med Partnership with the Black Sea region states through the Black Sea Synergy, as well as other policy instruments to enhance energy cooperation with the Middle East and Africa, have been major EU attempts to create the ground for diversification of energy supplies. The EU has also attempted to manage its energy interdependency with Russia through mechanisms like the EU–Russian Energy Dialogue, with the ultimate aim of creating a unified front against Russia.

While reminding that the EU needs more natural gas supply diversity, the Commission states that the EU needs a common voice on energy policy to be a major player in international collaborations. However, the member states have been reluctant to transfer powers to the EU level for a strategically important issue like security of energy supply and have preferred to have bilateral relations with Russia, undermining the EU's joint policy efforts. To achieve this aim, interconnections should be developed, effective legislative and regulatory frameworks must be in place and be fully applied in practice, and Community competition rules need to be rigorously enforced.* Accordingly, member states have decided to move in the direction of the formation of a common energy policy, as it will facilitate the achievement of their purposes. In much of its discussion on the member states' risks, the EU frames the energy security risks as being only resolvable through a common and Europeanized approach between EU member states. Despite all diversities among member states, they have always shared a common vision over energy development and are aware that they have to make more targeted and coherent efforts to ensure their energy security to cope with their growing dependence on energy imports. Achieving a strong policy on energy dependence requires the unity of all EU members. Delors (2010) points out, in his recommendation to the future European energy policy, that "no added value can come from competition between member states vis-à-vis producer and transit countries. The European Union must therefore ensure that solidarity can function and that no third country can reduce supply in a targeted manner. Solidarity, instead of competing claims of national sovereignty, should be the guide in developing a European energy policy" (p.82). Thus, the energy import, production, and transfer rules are determined and drawn in a certain way. Both political and economic benefits will be provided through a common energy policy and the development of a CEP would help the EU to overcome the internal differences in attitude towards Russia and to prevent any possibility of manipulation of security threats as a way to prioritize national interests over the interests of the European Union as a whole. In a world of global interdependence, energy policy necessarily has a European dimension (EU Commission, Green Paper, 2006). I believe cooperation over energy policy, due to its strategic significance, has always been an important part of the relationship among member states. Rather than national interests, it is essential to act in an integrated manner, as the energy security of a state cannot be guaranteed by any global actor or region alone. Member states should therefore be aware that the only way to meet the energy challenges of the 21st century is through solidarity. To put it simply, the EU is aiming at unifying the internal market, increasing competition in the European energy market, enhancing energy supply security, diversifying its supply sources, enhancing energy efficiency, reducing greenhouse gas emission, and coordinating relations with the energy producers. These provisions are known as the Third Energy Package, which is supposed to ensure the EU's energy security.

Overall, the 2006/2009 gas crises accelerated the EU policies over the energy issues and, thus, energy securitization at the EU level has simultaneously pushed the process of Europeanization of energy and accelerated the CEP efforts among the member states. Consistent with the Commission and various Commissioners' identification of the referent object at the EU level, the proposed measures are also EU-wide and go in the direction of greater integration in the energy field. Therefore, the EU countries should not act selfishly. Additionally, having a stable energy supply and a reliable supplier for the EU is not only important for sustaining its high level economic performance, but also for being an active global player. The EU needs to guarantee supply of energy resources and has to control the stability in certain regions. Otherwise, without obtaining its necessary energy, it is almost impossible for it to be a competitor to existing or emerging powers, i.e. the US and Japan, India and China, or Russia.

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THE EU AND CENTRAL ASIA: REGIONAL DIALOGUE FOR ENHANCING ENERGY SECURITY

AB VE ORTA ASYA: ENERJİ GÜVENLİĞİNİ GÜÇLENDİRMEK İÇİN BÖLGESEL DİYALOG

Çiğdem ŞAHİN*

ABSTRACT

Energy security has risen as a vital issue for the European Union and member states since the Russia-Ukraine energy dispute in 2006. Realizing the fact that the EU must have reduced depending on Russia acutely which placed at risk energy security for Europe, Central Asia region has occurred as an alternative solution for diversifying energy supply. Since 2007, with the declaration of The EU and Central Asia: Strategy for a New Partnership, the Central Asia has been an outstanding partner in cooperation in the energy sector, especially through a regional energy dialogue. The aim of this paper is to explore whether this dialogue is maintained successfully or not in enhancing energy security for both sides. The paper refers to the elements of this dialogue, namely the Baku Initiative, INOGATE and other regulations, and suggests an overview on the situation that is resulted by the dialogue progression to date.

Keywords: The EU, Central Asia, energy security.

ÖZET

2006 yılında gerçekleşen Rusya-Ukrayna enerji anlaşmazlığının ardından, enerji güvenliği Avrupa Birliği ve üye devletler için çok önemli bir konu haline gelmiştir. AB'nin Avrupa için enerji güvenliğini risk altına alan Rusya'ya enerji bağımlığını azaltması gereğinin anlaşılmasıyla, Orta Asya bölgesi enerji arzının çeşitlendirilmesi için alternatif bir çözüm olarak belirmiştir. 2007 yılında AB ve Orta Asya: Yeni Bir Ortaklık Stratejisi'nin yayınlanmasının ardından, Orta Asya AB için enerji alanında işbirliği için önemli bir ortak haline gelmiş ve bir bölgesel enerji diyaloğu başlatılmıştır. Bu çalışmanın amacı, başlatılan bölgesel diyaloğun enerji güvenliğini güçlendirmede her iki taraf için de başarılı bir şekilde yürütülüp yürütülmediğini araştırmaktır. Çalışmada diyaloğun önemli unsurları olan Bakü Girişimi, INOGATE ve diğer yasal düzenlemeler ele alınmakta, diyaloğun günümüze kadar gelinen süreçte gelişimine ve sonuçlarına ilişkin genel bir değerlendirme yapılmaktadır.

Anahtar Sözcükler: AB, Orta Asya, enerji güvenliği.

1.INTRODUCTION

One of the terms that is used to describe the place of the Central Asia until the collapse of the Soviet Union in international politics is *terra incognito* (Melwin, 2008:1; Özalp, 2011:17; Sürücü, 2004). Despite the term is simply used for the areas or territories which have not been explored or mapped geographically, contemporary scholars have enabled the term to be used for the all kinds of study areas unexplored. So, this was the situation of the Central Asia until the collapse of the Soviet Union. As a Soviet territory, the region has not been on stage by/as itself, even after independence period and has been invisible for the most part of the world. What enabled the region visible a short while later was twofold: *powers* from outside and *energy resources* inside. These two factors have always had perpetual relations throughout history and on this account, Central Asia has risen as a partly non-terra incognita in recent years.

European Union (EU) is one the outside actors that had put the region on its agenda. Bu it was almost a late step. The region was open anymore in the early 1990s and the engagement of the Western states in Central Asia focused on energy and cultural issues. EU was more hesitant. (Melwin, 2008: 2). After starting to build up bilateral ties and signing Partnership and Cooperation Agreements with countries of Central Asia, it took a deliberate regional attitude, which was seen as a narrow approach (Erdoğan, 2011: 6). Eventually it adopted a Central Asia Strategy in June 2007 at the Brussels European Council (Council of the European Union, 2007b: 12).

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Before this development, another issue paved the way for raising the Central Asia to a more prominent concern of EU. The Russian-Ukrainian gas crisis in January 2006 directly affected many members of EU. Natural gas supply to Europe travelling through Ukrainian pipelines was entirely disrupted and the fall in gas volumes delivered to EU countries caused a loss all over Europe. In two days, Hungary was reported to have lost up to 40% of its Russian supplies, Austrian, Slovakian and Romania supplies were said to be down by one third, France 25-30% and Poland by 14%. Italy reported having lost around 25% of deliveries (Stern, 2006:8-9). This was perceived by EU as a wakeup call. Dependency to Russian resources issue was questioned and urgent measure necessities emerged. By adding up the internal energy market malfunctions, EU decided to implement a common energy policy. An Energy Policy for Europe document developed by the European Commission (Commission of the European Communities, 2007) and adopted by the Council in 2007 (Council of the European Union, 2007a: 13).

While Europe was searching for and making efforts to a common policy implementation, another gas dispute occurred again between Russia and Ukraine. By reason of two countries disagreed about the price for Russian gas supply to Ukraine and the tariff for the transit of Russian gas to Europe before 31 December 2008, Russia cut off its exports to Ukraine on 1 January. As a result, exports to 16 EU member states and Moldova via Ukraine were drastically reduced on 6 January and cut completely from 7 January. The European countries hit by cuttings and subjected to many vexations were mostly in South Eastern Europe- Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Former Yugoslav Republic of Macedonia, Montenegro, Romania, Serbia and Kosovo, some with serious humanitarian consequences for two weeks in the middle of winter (Pirani et al, 2009: 4, 60; Kovacevic, 2009: 2, 1015). Deliveries to both Ukraine and other European countries restarted on 20 January through signing of new contracts. These developments moved energy diversification and diversity in energy transport routes among the top issues of the EU agenda from now on. And, inevitably, the Central Asia became one of the focal regions, especially, for diversification of energy supplies. These are all the under the umbrella of the issue *energy security*. So, EU's regional dialogue with Central Asia, of which existence is a divisive issue, is more understandable within the realm of energy security.

2.ENERGY SECURITY AND EU

Energy security emerged as a policy issue at the beginning of the 20th century and became an academic concern in 1960s, having an upper interest with the oil crises of the 1970s. Finally interest is generated again in the 2000s driven by the rising demand in Asia, disruptions of gas supplies in Europe, and the pressure to de-carbonize energy systems (Cherp et al, 2014: 415). There is not a single definition of energy security because of different energy systems that vary from one place to another and the possibility to extend the concept to other energy policy areas like energy poverty or climate change.

One definition is "*the ability of an economy to guarantee the availability of energy resource supply in a sustainable and timely manner with the energy price being at a level that will not adversely affect the economic performance of the economy*", supported by *the 4 A's of energy security* perspective: availability, accessibility, affordability and acceptability (APERC, 2007: 6-42). These are the factors that can influence the *security* of energy supply. International Energy Agency, however, stresses the threats to energy security that must be tackled (2007: 10-11). These include rising global energy demand, the consuming countries' growing reliance on oil and gas imports from a small number of producing countries and higher energy prices. From this perspective, diversification of the energy mix, of the sources of imported oil and gas, and of supply routes, together with better emergency preparedness, especially through the establishment of emergency stockpiles and coordinated response mechanisms are proposed to safeguard energy security.

Another attempt that is by Clingendael International Energy Programme (CIEP) concentrates on the situations of sudden disruptions and/or price increases that put the security of energy supply in jeopardy (CIEP, 2004: 43-44). According to study, what turns a situation into a full-blown crisis that would threathens energy security is the context, size and the accumulation of incidents. As the energy security concept that cannot be easily translated into absolute numbers, the study sees to identify factors of risk to the security of supply easier, than to translate these risks into reliable predictions of the effects.

Apart from these general approaches, Baumann, at the Center for Applied Policy Research (CAP) initiates a deeper and multi-dimensional conception by following four different but at the same time overlapping dimensions, in defining energy security from the input side where private or political actors can add to a higher level of safety (2008: 5-10): Internal policy dimension, economic dimension, geopolitical dimension and security policy dimension. So, "*… these dimensions all together have to do with security as energy security already was designated as a prerequisite for economic processes as well as political stability and legitimacy. Although energy affects almost every aspect of our lives, the above listed are the key dimensions for stabilizing and safeguarding the supply of energy.*" (Bauman, 2004: 5)

The EU is one of the determining actors in world trade, so trade of energy. Energy figures and especially high import dependency make the energy security a *must* issue for EU (see Table 1 and 2).

Table 1. EU 28 Energy in Figures, Mtoe/GW/%

	1995	2000	2005	2010	2011	2012
Production	964.9	947.3	906.3	845.0	815.9	809.6
Net Imports	734.3	825.9	979.2	954.3	943.6	922.8
Gross Inland Consumption	1 671.0	1 726.9	1 824.2	1 759.7	1 699.5	1 683.5
Final Energy Consumption	1 078.7	1 131.0	1 188.5	1 159.8	1 108.0	1 104.5
byFuel/Product						
Solid Fuels	83.0	62.2	53.3	49.8	48.7	47.4
Petroleum and Products	464.2	489.6	504.9	458.2	445.3	431.3
Gases	247.2	267.5	281.2	273.0	244.6	252.8
Biomass and Renewable Wastes	42.5	47.2	54.0	76.1	74.4	77.1
Solar	0.3	0.4	0.7	1.5	1.7	1.8
Geothermal	0.4	0.4	0.6	0.5	0.5	0.5
Electricity	194.3	217.6	239.5	244.4	239.9	240.6
Derived heat	45.4	44.6	52.4	53.4	48.0	48.3
Wastes, Non-Renewable	1.5	1.3	1.8	2.9	4.8	4.6
by Sector						
Industry	329.5	332.3	329.7	290.7	289.4	282.8
Transport	306.7	345.1	369.6	363.7	361.9	351.7
Households	283.6	294.3	304.5	311.1	277.6	289.2
Services	115.3	116.9	143.7	157.3	146.5	148.7
Agriculture and Fishing	31.6	28.7	28.2	25.6	25.0	25.0
Other	12.1	13.6	12.8	11.6	7.6	7.2
Installed Capacity (GW)	618.5	681.1	758.1	884.8	922.9	952.1
Import Dependency (%)	43.0%	46.7%	52.2%	52.7%	53.9%	53.4%
on Solid Fuels	21.5%	30.6%	39.4%	39.4%	41.7%	42.2%
on Hard Coal	29.7%	42.6%	55.7%	57.9%	62.3%	62.5%
on Petroleum Fuels	74.0%	75.7%	82.1%	84.4%	85.1%	86.4%
on Crude and NGL	73.0%	74.5%	81.3%	84.6%	85.5%	87.8%
on Natural Gas	43.4%	48.9%	57.1%	62.1%	67.1%	65.8%

Source: European Commission, 2014a: 174.

Table 2. Energy Import Dependency Rate, EU-28, 2002–12 (%)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All Products	47.5	48.8	50.1	52.2	53.6	52.9	54.7	53.7	52.7	53.9	53.4
Solid Fuels	33.3	35.0	38.2	39.4	41.7	41.5	44.9	41.1	39.3	41.7	42.2
Crude Oil	76.3	78.5	80.7	82.3	83.8	83.5	84.9	84.1	85.1	85.9	88.2
Natural Gas	50.9	52.0	53.6	57.1	60.3	59.5	61.7	63.4	62.1	67.1	65.8

Source: Eurostat, 2014a.

Import dependency seems diversified in number of partners. But when it comes to dependency levels to each partner, the predominant place of Russia becomes transparent. In energy imports, Russia meets more than a quarter of solid fuels and more than one-third of crude oil and natural gas needs of EU (see Table 3). By remembering the energy crises of 2006 and 2009 and the massive energy relations with Russia (Godzimirski, 2014: 1-2), EU's import dependency to Russia generates a vital question in terms of energy security of EU, mainly security of supply.

Table 3. Main Origin of Primary Energy Imports, EU-28,
2002–12 (% of Extra EU-28 Imports)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Solid Fuels											
Russia	13.1	13.3	18.2	23.7	24.8	24.8	26.1	30.0	26.9	26.2	25.9
Colombia	12.1	11.8	12.1	11.7	11.5	12.7	12.3	17.4	19.9	23.6	23.7
United States	8.1	6.7	7.3	7.6	7.8	9.1	14.0	13.5	16.8	17.8	23.0
Australia	16.1	16.1	14.6	13.1	11.9	13.0	11.7	7.5	10.5	8.7	7.4
South Africa	30.1	29.9	25.4	25.0	23.2	20.1	16.5	15.8	9.6	7.7	6.3
Indonesia	6.6.	7.0	6.7	7.2	9.3	7.8	7.3	7.0	5.5	5.0	4.6
Canada	3.1	2.7	2.4	3.2	2.7	3.0	2.6	1.4	2.0	2.2	1.7
Ukraine	2.3	2.0	2.3	2.2	1.6	1.8	2.3	1.7	1.9	2.3	1.4

Venezuela	1.8	2.6	1.1	1.0	0.8	1.0	1.0	0.7	0.4	0.5	0.5
Others	6.7	7.9	10.1	5.2	6.3	6.7	6.2	5.0	6.4	6.0	5.5
Crude Oil											
Russia	29.5	31.2	32.5	32.9	33.8	33.7	31.8	33.5	34.7	34.8	33.7
Norway	19.3	19.1	18.7	16.8	15.4	14.9	15.0	15.1	13.7	12.5	11.1
SaudiArabia	10.1	11.2	11.3	10.5	9.0	7.2	6.8	5.7	5.9	8.0	8.8
Higeria	3.5	4.2	2.6	3.2	3.6	2.7	4.0	4.5	4.1	6.1	8.2
Libya	7.4	8.4	8.8	8.7	9.1	9.7	9.9	8.9	10.1	2.8	8.2
Kazakhstan	2.4	2.7	3.3	4.4	4.6	4.6	4.8	5.3	5.5	5.7	5.1
Iraq	3.0	1.5	2.2	2.1	2.9	3.4	3.3	3.8	3.2	3.6	4.1
Azerbaijan	1.0	1.0	0.9	1.3	2.2	3.0	3.2	4.0	4.4	4.9	3.9
Algeria	2.7	3.0	3.3	3.5	2.5	1.9	2.5	1.6	1.2	2.6	2.9
Others	21.1	17.7	16.4	16.5	16.8	18.9	18.7	17.6	17.1	19.1	14.0
Natural Gas											
Russia	45.2	44.1	43.6	40.7	39.3	38.7	37.6	33.0	29.5	31.6	32.0
Norway	26.1	25.5	24.3	23.8	25.9	28.1	28.4	29.4	27.5	27.4	31.3
Algeria	21.1	19.8	18.0	17.6	16.3	15.3	14.7	14.2	14.0	13.0	13.5
Quatar	0.9	0.7	1.4	1.5	1.8	2.2	2.3	5.5	9.7	11.0	8.4
Nigeria	2.2	3.1	3.6	3.4	4.3	4.6	4.0	2.4	4.1	4.3	3.6
Libya	0.3	0.3	0.4	1.6	2.5	3.0	2.9	2.9	2.7	0.7	1.9
Trinidad and Tobago	0.2	0.0	0.0	0.2	1.2	0.8	1.7	2.2	1.4	1.0	0.9
Peru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Egypt	0.0	0.0	0.0	1.6	2.5	1.7	1.7	2.1	1.3	1.2	0.6
Others	4.1	6.5	8.6	9.5	6.3	5.5	6.6	8.2	9.7	9.8	7.1

Source: Eurostat, 2014a.

By launching the *Energy Policy for Europe* in 2007, EU has defined three main challenges of energy namely, sustainability- security of supply-competitiveness, which would be tackled with the help of a new European Energy Policy (Commission of the European Communities, 2007: 3-6). As regards security of supply the European Council stressed *"… the importance of making full use of the instruments available to improve the EU's bilateral cooperation with all suppliers and ensure reliable energy flows into the Union*" (2007a: 14). A common external policy approach, diversification of fuel origin, transit routes and resources and common crisis management, based on solidarity and subsidiarity were the proposed solutions to energy security challenges. On the road to a energy policy, EU took several steps (European Commission, 2010; European Commission, 2014g) In 2011, the European Commission presented *Energy Roadmap 2050*, exploring *"…the challenges posed by delivering the EU's decarbonisation objective while at the same time ensuring* ***security of energy supply*** *and* ***competitiveness***." (European Commission, 2011: 2). It set out four main routes to a more sustainable, competitive and secure energy system in 2050, namely energy efficiency, renewable energy, nuclear energy and carbon capture and storage. It combined these routes in different ways to create and analyze seven possible scenarios for 2050.

And a last important step is mainly related to energy security (European Commission, 2014h). The rationale of *Energy Security Strategy* released in May 2014 is the fact that the EU imports more than half of all the energy it consumes (see Table 1). Many countries are also heavily reliant on a single supplier, including some that rely entirely on Russia for their natural gas. This dependence leaves them vulnerable to supply disruptions, whether caused by political or commercial disputes, or infrastructure failure. So, the aim of the Strategy is set as to ensure a stable and abundant supply of energy for European citizens and the economy (European Commission, 2014h: 2). The Russian-Ukranian gas crises are obviously reflected on this Strategy by carrying out so-called *Stress tests* by 38 European countries. The tests simulated two disruption scenarios: a complete halt in Russian gas imports to the EU and a disruption of Russian gas imports along the Ukrainian transit route. These represent the first short-term energy security measure taken under the terms of Strategy. Its recommendations will accompany other measures from the Strategy designed to improve the EU's security of supply (European Commission, 2014i) (See Annex).

3.EU AND CENTRAL ASIA ENERGY TRADE RELATIONS

A Regional Strategy Paper for assistance to Central Asia covers EC financial assistance for the period 2007-2013 to the countries of the region, both at bilateral and regional level. This document also pictures the overall external policy goals as a mutually beneficial partnership promoting stability and security in the region, enhancing relations with Central Asia and implementing the European Security Strategy, facing security challenges, diversification of energy supply and promoting the Millennium Development Goals (European Community, 2007: 4-7). As the part related to diversification of energy supply, EU stresses the importance of security of energy supply again:

"The growing dependency of EU member states upon external sources of energy and ensuring security of energy supply are issues of especial concern to the European Union. Central Asia, with its significant hydrocarbon resources and favourable geographical location for transport routes to European markets, will play an important role in ensuring the EU's energy supplies. Together with Russia, Kazakhstan, Turkmenistan and Uzbekistan possess the world's second largest reserves of oil and gas. Kazakhstan alone has double the oil reserves of the North Sea (with government figures estimating total reserves to be three times higher), whilst Turkmenistan's and Uzbekistan's gas reserves are believed to be the 5th and 8th highest in the world respectively. Moreover, both Kazakhstan and Uzbekistan have significant quantities of uranium, with the former constituting the world's third largest producer of uranium, and a major supplier to the EU. The challenge for the EU and its partners in Central Asia is to develop a mutually beneficial dialogue between energy producers, transit countries and consumers at both bilateral and regional level. Relations with the main producer countries, Kazakhstan and Turkmenistan, need to be enhanced. Regional cooperation in this sphere will be pursued…" (European Community, 2007: 5-6).

Below statistics (Table 4 and Table 5) show the oil and natural gas proved reserves, together with production and consumption quantities of three main countries of the region and EU, enabling a comparison with shares of world total.

Table 4. Selected Oil Statistics – until 2013

Proved Reserves (thousand million barrels)						
	At end 1993	At end 2003	At end 2012	At end 2013		
				Thousand million tonnes	Thousand million barrels	Share of WT
Kazakhstan	n/a	9.0	30.0	3.9	30.0	1.8%
Turkmenistan	n/a	0.5	0.6	0.1	0.6	< 0.05%.
Uzbekistan	n/a	0.6	0.6	0.1	0.6	< 0.05%.
European Union*	8.1	8.0	6.8	0.9	6.8	0.4%
Total World	**1041.4**	**1334.1**	**1687.3**	**238.2**	**1687.9**	**100.0%**
Production (thousand barrels daily)**						
	2003	2006	2009	2012	2013	2013 share of WT
Kazakhstan	1111	1403	1664	1724	1785	2.0%
Turkmenistan	203	187	211	222	231	0.3%
Uzbekistan	151	114	95	68	63	0.1%
European Union	3185	2468	2127	1528	1437	1.7%
Total World	**77639**	**82593**	**81262**	**86204**	**86754**	**100.0%**
Consumption (thousand barrels daily) ***						
	2003	2006	2009	2012	2013	2013 share of WT
Kazakhstan	183	210	188	274	287	0.3%
Turkmenistan	110	109	110	134	137	0.2%
Uzbekistan	145	103	89	69	70	0.1%
European Union	14866	15122	13977	12946	12770	14.5%
Total World	**80216**	**85325**	**85111**	**89931**	**91331**	**100.0%**

* Excludes Estonia, Latvia and Lithuania in 1993.

******Includes crude oil, tight oil, oil sands and NGLs.

***Inland demand plus international aviation and marine bunkers and refinery fuel and loss.

Source: Derived from BP, 2014: 6, 8, 9.

Kazakhstan has the larger proved reserves of oil, while the EU has only a one fourth of it. Also production and consumption level difference is of importance; table shows that Kazakhstan remains 1498 thousand barrels daily overplus which creates a trade power. Kazakh and Turkmen oil productions are together generates nearly one and half of EU production. In case of natural gas, Turkmenistan's proved reserves shows a great magnitude. It has more than ten times of EU's reserves but with a substantially lesser level of production. Natural gas reserves are huge in total three countries of Central Asia which make the region is of deep interest.

Table 5. Selected Natural Gas Statistics – until 2013

Proved Reserves (trillion cubic metres)						
	At end 1993	At end 2003	At end 2012	At end 2013		
				Trillion cubic feet	Trillion cubic metres	Share of WT
Kazakhstan	n/a	1.3	1.5	53.9	1.5	0.8%
Turkmenistan	n/a	2.3	17.5	617.3	17.5	9.4%
Uzbekistan	n/a	1.2	1.1	38.3	1.1	0.6%
European Union*	3.7	3.2	1.6	55.6	1.6	0.8%

Total World	118.4	155.7	185.3	6557.8	185.7	100.0%
Production (billion cubic metres)**						
	2003	2006	2009	2012	2013	2013 share of WT
Kazakhstan	11.1	13.0	16.4	18.4	18.5	0.5%
Turkmenistan	53.5	60.4	36.4	62.3	62.3	1.8%
Uzbekistan	52.0	54.5	60.0	56.9	55.2	1.6%
European Union	225.8	203.0	174.7	147.9	146.8	4.3%
Total World	**2621.3**	**2881.8**	**2981.0**	**3343.3**	**3369.9**	**100.0%**
Consumption (billion cubic metres) ***						
	2003	2006	2009	2012	2013	2013 share of WT
Kazakhstan	8.8	9.0	8.6	10.4	11.4	0.3%
Turkmenistan	14.2	18.4	19.9	26.4	22.3	0.7%
Uzbekistan	45.8	41.9	43.5	46.9	45.2	1.3%
European Union	476.7	490.1	465.4	444.1	438.1	13.1%
Total World	**2596.6**	**2839.6**	**2957.4**	**3310.8**	**3347.6**	**100.0%**

* Excludes Estonia, Latvia and Lithuania in 1993.

** Excluding gas flared or recycled. Includes natural gas produced for Gas-to-Liquids transformation

*** Excludes natural gas converted to liquid fuels but includes derivatives of coal as well as natural gas consumed in Gas-to-Liquids transformation.

Source: Derived from BP, 2014: 20, 22, 23.

Reserves are not the only dimension of energy relations between EU and Central Asia countries. There has been also an energy products trade flow, including the fuels have the biggest share in imports. Table 6 indicates key figures of EU trade with five Central Asian countries and Table 7 focuses on fuels' value and share in total trade for each country.

Table 6. EU, Trade with Central Asian Countries – Key Figures 2014

Rank as EU partner			**Share in EU trade (%)**			**Trade Value (Mio €)**		
Imports	***Exports***	***Total***	***Imports***	***Exports***	***Total***	***Imports***	***Exports***	***Total***
Kazakhstan								
15	39	26	1.4	0.4	0.9	23,900	6,754	30,654
Turkmenistan								
80	80	84	0.0	0.1	0.1	816	1,155	1,971
Uzbekistan								
116	74	88	0.0	0.1	0.1	235	1,575	1,810
Kyrgyz Republic								
134	128	135	0.0	0.0	0.0	79	402	481
Tadjikistan								
144	142	145	0.0	0.0	0.0	61	216	277

Source: European Commission, 2014b: 2; 2014c: 2; 2014d: 2; 2014e: 2; 2014f: 2.

Table 7. EU-Central Asian Countries – Product Groups in Imports

(Fuels in Focus) 2014

	Value (Mio €)	Share in Total (%)	Share in Extra-EU (%)
Kazakhstan			
TOTAL	23,900	100.0	1.4
Primary products	22,884	95.8	3.5
Fuels	*22,266*	*93.2*	*5.0*
of which petroleum and petroleum products	*21,763*	*91.1*	*6.2*
Manufactures	632	2.6	0.1
Other products	12	0.1	0.0
Turkmenistan			
TOTAL	816	100.0	0.1
Primary products	751	92.1	0.1
Fuels	*741*	*90.9*	*0.2*
of which petroleum and petroleum products	*741*	*90.8*	*0.2*
Manufactures	62	7.6	0.0
Other products	2	0.3	0.0
Uzbekistan			
TOTAL	235	100.0	0.0
Primary products	63	26.9	0.0
Fuels	23	9.8	0.0
of which petroleum and petroleum products	23	9.8	0.0
Manufactures	147	62.6	0.0

Other products	25	10.5	0.1
Kyrgyz Republic			
TOTAL	79	100.0	0.0
Primary products	53	66.9	0.0
Fuels	0	0.0	0.0
of which petroleum and petroleum products	0	0.0	0.0
Manufactures	11	13.5	0.0
Other products	16	19.6	0.0
Tadjikistan			
TOTAL	61	100.0	0.0
Primary products	45	73.8	0.0
Fuels	0	0.0	0.0
of which petroleum and petroleum products	0	0.0	0.0
Manufactures	16	25.9	0.0
Other products	0	0.3	0.0

Source: European Commission, 2014b: 6; 2014c: 6; 2014d: 6; 2014e: 6; 2014f: 6.

4.ENERGY POLICY FOR CENTRAL ASIA

Together with above prominent numbers, cooperation between EU and Central Asia on energy issues is being set as a broad area and ranges from promoting sustainable development of energy resources, diversification of energy supply routes, exchange of know-how to the actual development and use of new energy sources, especially of renewable energies. In this context, EU determines its policy objectives as:

- the convergence of energy markets through the harmonization of the relevant legislative and regulatory frameworks,
- enhancing the energy security of the Central Asian countries and the EU through closer cooperation,
- supporting sustainable energy development, including the development of energy efficiency and renewable energy sources,
- attracting investment for energy projects of common and regional interest (EU Commission External Relations, 2014:1).

EU prioritized two dimensions in its energy relations with the region. First one was the secure and sustainable energy supplies which were considered with other partners of EU- Eastern Europe and the Southern Caucasus- who forms a trans-Caspian scope, on the basis of a mutual interest. This aspect required a joint move of all sides to set up a framework for the flow of energy. The Southern Corridor was the focal point here. In 2008, Commission assessed the Southern Corridor a *must* issue as one the six priority infrastructure actions be accepted as Community priorities. Following the passage, a southern gas corridor:

> "*must be developed for the supply of gas from Caspian and Middle Eastern sources, which could potentially supply a significant part of the EU's future needs. This is one of the EU's highest energy security priorities. The Commission and Member States need to work with the countries concerned, notably with partners such as Azerbaijan and Turkmenistan, Iraq and Mashreq countries, amongst others, with the joint objective of rapidly securing firm commitments for the supply of gas and the construction of the pipelines necessary for all stages of its development. In the longer term, when political conditions permit, supplies from other countries in the region, such as Uzbekistan and Iran, should represent a further significant supply source for the EU. The feasibility of a block purchasing mechanism for Caspian gas ("Caspian Development Corporation") will be explored, in full respect of competition and other EU rules. Transit for the gas pipelines will need to be agreed with transit countries and notably Turkey in a way that respects both the basic principles of the EU acquis and their legitimate concern for their own energy security. The Commission will invite representatives of the countries concerned to a Ministerial level meeting to secure concrete progress and a timetable to reach agreement.*" (Commission of the European Communities, 2008: 4-5)

On 8th May 2009 representatives of EU, Azerbaijan, Georgia, Turkey and Egypt signed a declaration of support for the Southern Gas Corridor at the Prague Summit in the presence of the representatives of Kazakhstan, Turkmenistan and Uzbekistan. In the declaration, the contracting parties considered the Southern Corridor concept as *"… a modern Silk Road interconnecting countries and people from different regions and establishing the adequate framework, necessary for encouraging trade, multidirectional exchange of knowhow, technologies and experience*". In addition to several issues, parties declared that they "*attain the energy security of all parties including consumer and transit states, such as Turkey, Georgia and Azerbaijan, on the basis of commercial agreements that are in line with the Parties' international commitments*" (Commission of the European Communities, 2009: 1, 4). After having these steps, a number of pipelines were proposed for the

European part of the Southern Gas Corridor, including Nabucco, the Interconnector Turkey-Greece-Italy pipeline (ITGI), the South East Europe Pipeline (SEEP) and TAP, as a pipeline race. (HFW, 2013: 2-3).

Second dimension was the development of a regional energy market. It was seen as a necessity to ensure energy security in all of the Central Asian countries. EU committed to support further development of Central Asia's energy potential of hydrocarbon resources and to promote renewable energy, energy efficiency and energy saving and energy infrastructure development. (EU Commission External Relations, 2014:1). By covering the policy objectives and priority dimensions, EU set a twofold energy cooperation framework: Regional energy dialogue and bilateral cooperation. The following part focuses on regional dialogue.

5. ENERGY DIALOGUE AND REGION

For most of the 1990s Central Asia was not on the EU's foreign policy radar because EU neither had the resources nor the political interest to become active in the region (Warkotsch, 2011: 4). But after 2007, especially with the adoption of *The EU and Central Asia: Strategy for a New Partnership* (General Secretariat of the Council, 2007), EU appeared as a regional aspirant. The first-ever EU strategy developed for Central Asia was, according to Kassenova, *"… marked a real breakthrough in the relations between European and Central Asian countries*" and in the document an attempt was *"… made to go beyond the assistance programme with generic developmental goals based on the perceived needs of the region, to define European interests in the region, find prospective areas for cooperation and improve the approaches by making them more effective*" (2008: 1). In 2007, EU also declared conducting a regular energy dialogue with Central Asian states as an element within the framework of the Strategy (General Secretariat of the Council, 2007: 7).

Under the sub-heading *strengthening energy and transport links*, as part of strengthened EU approach, EU stresses the region's energy resources:

> "*The key elements for a long-term partnership based on common interests and reciprocity can therefore be established in the years to come: the exploitation of the energy resources of Central Asian States calls for substantial and sustained investment as well as for comprehensive policies addressing all the components of their energy sectors and facilitating access to most developed markets. The EU, for its part, is ready to consider all options for the development and transportation of these resources, in cooperation with other interested partners" ((General Secretariat of the Council, 2007: 19).*

Having this fact, EU commits in energy mainly three points. First, and the most notable, is a market-based approach to investment and procurement and transparent, stable and non-discriminatory regulatory frameworks guarantee, for all sources of energy, the best prices and increased opportunities for all stake-holders. This will be supported by conducting an enhanced regular energy dialogue with Central Asian States in the framework of the Baku Initiative, which was launched on the occasion of the Energy Ministerial Conference held in Baku on 13 November 2004 with the participation of the European Commission and the Black Sea and the Caspian Littoral States and their neighbours, namely Azerbaijan, Armenia, Bulgaria, Georgia, Iran (observer), Kazakhstan, Kyrgyz Republic, Moldova, Russian Federation (observer), Romania, Tajikistan, Turkey, Ukraine and Uzbekistan. As European Commission summarizes, Baku Initiative aims:

> "*to facilitate the progressive integration of the energy markets of this region into the EU market as well as the transportation of the extensive Caspian oil and gas resources towards Europe, be it transiting through Russia or via other routes such as Iran and Turkey. Indeed, secure and safe export routes for Caspian oil and gas will be important for the EU's security of energy supply by increasing the geographical diversification of the EU's external energy supplies. Supplying the EU market at competitive international prices will also be crucial for facilitating the economic, social and political development of countries of the Caspian region."(2015a)*

In Baku on 13 November 2004, Energy Ministerial Conference on Energy Co-operation participants agreed on:

• supporting the gradual development of regional energy markets in the Caspian Littoral States and their neighbouring countries,

• enhancing the attraction of funding for new infrastructures,

• embarking on energy efficiency policies and programmes,

• making progress towards a gradual integration between the respective energy markets and the EU market (European Commission, 2015b).

Following the Baku Initiative, the EU plans to focus cooperation with Central Asian States on converging of energy markets on the basis of the EU internal energy market principles taking into account the particularities of the partner countries; enhancing energy security by addressing the issues of energy exports/imports, supply diversification, energy transit and energy demand; transparency and capacity-building in statistics and in the governance of the energy sector; supporting and enhancing technological cooperation between the EU and the Central Asian States in the energy sector; supporting sustainable energy development, including the development of energy efficiency, renewable energy sources and demand side management; attracting investment towards energy projects of common and regional interest; supporting the rehabilitation of existing pipelines and the construction of new pipelines and electricity transportation networks inside the region and towards Europe; supporting the development of comprehensive action programmes aiming at the promotion of energy saving, energy efficiency and renewable energy, notably with a view to meeting commitments in the framework of the Kyoto protocol; supporting the 'Global Energy Efficiency and Renewable Energy Fund' initiative and encouraging the countries to take initiatives similar to those taken by the EU in the Action Plan for an Energy Policy for Europe ((General Secretariat of the Council, 2007: 20-21)

The second point EU commits in energy is supporting the exploration of new oil, gas and hydro-power resources and the upgrading of the existing energy infrastructure. To enhance EU security of energy supply, the EU will also support the development of additional pipeline routes and energy transportation networks and lend political support and assistance to Central Asian countries in developing a new Caspian Sea - Black Sea – EU energy transport corridor (General Secretariat of the Council, 2007: 19-20). And as the last one, the EU commits to promote the creation of an integrated Central Asian energy market and will support public-private partnerships which encourage EU investment.

CONCLUSIONS

A systematic framework cannot be seen clearly throughout Strategy. It is more an ambitious disposition based on concrete plans. This may be seen reasonable, as De Joung and Wouters states: "EU-Central Asia relations are still very much at the formative stage" (2011:27). The single certain actor which is observed on the lines is the energy-driven EU. The EU states explicitly its energy needs with reasons which are proven by the latest developments. But this makes the Strategy a one way exposition (EU) and it seems to reduce the needs and expectations of Central Asian a question of minor interest. EU should reveal mutual advantages of regional energy relations with Central Asia more open and bilateral. Future arrangements made in this context will provide more plausibility for the Strategy. A real regional energy dialog will then follow.

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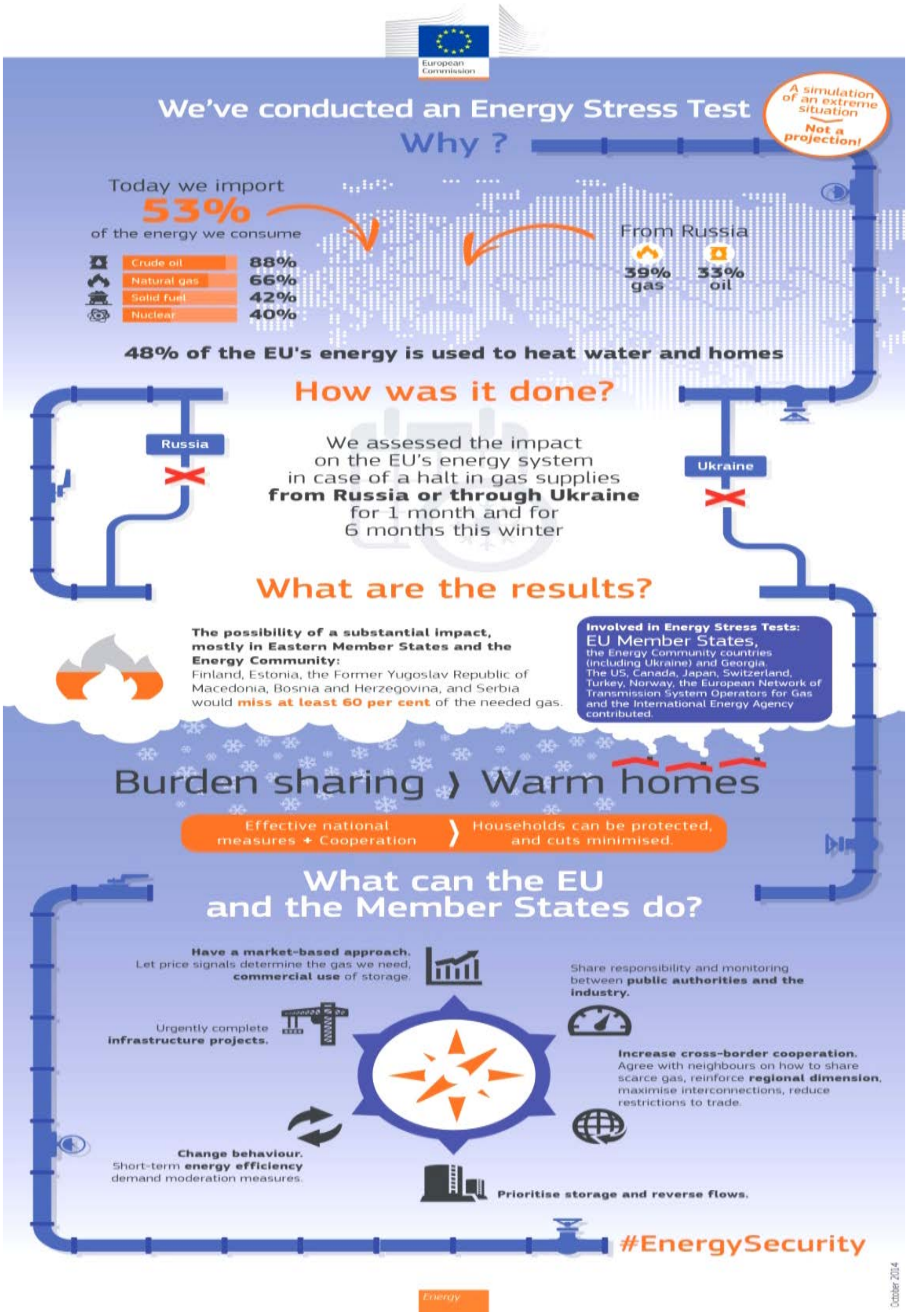
Annex: Energy Stress Test Poster



THE GERMAN RENEWABLE ENERGY ACT – RIGHT DIRECTION, WRONG WAY?

Gerd MORGENTHALER *

Introduction

Energy is a key factor in every modern economy. National energypolicies generally aim at a secure, cost-effective and eco-friendly energy supply. In Germany, the Energy Management Act (Energiewirtschaftsgesetz) emphasises these objectives in its§ 1. And onthe European level, the same objectives arec ontained in Article 194 (1)of the Treaty on the Functioning of the European Union (TFEU), the provision guiding the joint energy policy of the EU Member States.

We all know the challenges: a growing world population, economic production and number of machines used worldwide have rapidly increased the demand for energy in the last decades (International Energy Agency, 2014). At the same time, the bulk of the global oil and gas reserves are situated in a few, politically unstable regions of theworld (Planungsamt der Bundeswehr, 2012, pp. 11-14). National energy markets are usually cut off from eachother, monopolised, and therefore inefficient. And, last but not least, the traditional means of energy production, like the burningof fossil fuels or the use of nuclear power, threaten to cause long-lasting damage to the environment and toexhaust the available energy resources.

In this situation, the European Union has decided to adopt three guiding principles for the joint European energy policy: diversification for enhanced supply security, liberalisation of markets for a more cost-effective allocation of investments, and a turn toward ssustainable development for an eco-friendly supply. As energy production is commonly very capital-intensive, any legislation that aims at influencing the structural development of the energy sector has to have a long perspective. Despite many differences in detail (Fischer &Geden, 2015), the EU Member States agree upon a basic strategy: energy sources should be diversified both regionally and technically; the European energy market should be liberalised by there moval of intra-European barrieres and by privatisation; and the whole energy infrastructure should be reconstructed fo rmore sustainability by raising the percentage of renewable energies.In October 2014 the European Council agreed on a 2030 climate and energy policy framework which contains a binding domestic greenhouse gas reduction targetof at least 40% in the year 2030 compared to 1990, as proposed by the European Commission in January 2014. 27% of the EU's energy supply shall by then come from renewable sources (Eropean Council, 2014).

THE GERMAN RENEWABLE ENERGYACT

Accelerated by the nuclear accident in Fukushima, the German Federal Government has launched an "energy transition" (in German: "Energiewende") within the European energy policy framework that will totally reconstruct the national energy infrastructure during the decades to come. The energy transition will comprise a total phase-out from nuclear power (§ 1 No. 1 Nuclear Power Act [Atomgesetz]; see Wallrabenstein, 2011, andDi Fabio, Durner, Wagner, 2013), a decisive cutback in the burning of fossil energy sources by the introduction of emissions taxes or certificates (Energy Tax Act [Energiesteuergesetz], Electricity Tax Act [Stromsteuergesetz], Emissions Trading Scheme Act [Treibhausgas-Emissionshandelsgesetz], etc.; cf. Umweltbundesamt, 2004, andBundesministeriumfürUmwelt, Naturschutz und Reaktorsicherheit, 2008), and strong support for renewable energies. The latter aim is mainly pursued by the Renewable Energy Act (REA – Erneuerbare-Energien-Gesetz) of 2000 which, like its precursor, the Electricity Feed-in Act (Stromeinspeisungsgesetz) of 1991, strongly boosted the use of electricity from wind, hydro, solar, biomass, geothermal and other "green" sources in Germany. Due to this success, the main principles and the structure of the Renewable Energy Act served as a model for similar legislation in other countries (e.g., del Río Gonzalez, 2008; Munksgaard, Morthorst, 2008; for a precursor in the United States, the Public Utility Regulatory Policies Act, see Hirsh, 1999, and Rickerson, Grace, 2007).

According to its § 1 (1), the REA is intended to constantly increase the share of renewable energies used for producing electrical power during the next decades. § 1 (2) REA defines the following targets: in 2025 the share of renewables shall be between 40 and 45%, in 2035 it shall be between 55 and 60%, and in 2050 it shallexceed 80%.

In order to attain these targets, the Act introduces a set of specific instruments (cf. Altrock, 2002; Weck, 2004; Reshöft, 2009; Salje, 2012; Altrock, Oschmann, Theobald, 2013; Frenz, Müggenborg, 2013): Under the REA, the electricity network operator whose grid runs closest to a certain production site ofrenewable energy is obliged to connect the production site to his grid (§ 5 [1] REA) and to feed all the energy produced at this site

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into his grid (§ 8 [1] REA). According to the law, the renewable energies fed in this way have preference over electricity from conventional sources (like nuclear power, oil, coal, and gas); consequently, the non-renewable sources are increasingly crowded out of the market. Furthermore, the network operators have to pay the producers of green energy guaranteed feed-in tariffs (§ 16 [1] REA) which lie well over the market price. Thus the producers receive a 20-year, technology specific, guaranteed payment for their power generation.

But the funds needed for this financial support do not come from the state budget. Instead, by giving the producers a direct claim against the network operators, the REA supports investment in renewable energy sources without charging the public purse. As the network operators are usually able to turn over the costs so incurred to their customers, the end users of energy will finally pay the bill.

THE ECJ'S JUDGEMENT

In 2001, the European Court of Justice had to decide whether the Electricity Feed-In Act of 1991 was compatible with European Union law (ECJ Case C-378/98 – "PreussenElektra"). As mentioned earlier, the Electricity Feed-In Act had by then been replaced by the Renewable Energy Act of 2000, but the decisive questions were still relevant under the new legislation – and continue to be so today. The main question to be answered by the ECJ was whether the feed-in tariffs that the network operators had – and still have – to pay to the producers of renewable energies are to be qualified as "state aids" under Article 107 TFEU (formerlyArticle 92 EC Treaty)[*]. According to this provision, aids given to private enterprises by EU Member States are generally forbidden because they are incompatible with the internal market. But the ECJ did not consider the feed-in tariffs of the Electricity Feed-In Act as being "state aids" because, as the court put it, "only advantages granted directly or indirectly through State resources are to be considered aid within the meaning of Article 92 (1)" (ECJ Case C-378/98, n. 58).

There was another point which the ECJ had to cope with in its "PreussenElektra" case, referring to the guarantee of free movement of goods in the European internal market (now Article 28 TFEU). And further questions arise when we turn to the basic rights of electricity network operators and consumers, for example concerning their property right (Article 14 of the German Basic Law) or their right of free occupation (Article 12 of the German Basic Law). But let us concentrate on the question of "state aids" and analyse the ECJ's judgement in this respect first.

CRITIQUE OF THE ECJ'S JUDGEMENT

In the "PreussenElektra" decision the European Court of Justice quoted its own older case-law in order to show "that only advantages granted directly or indirectly through State resources are to be considered aid within the meaning of Article 92 (1)"(ECJ Case C-378/98, n. 58). The Court argued that "(t)he distinction made in that provision between 'aid granted by a Member State' and 'aid granted through State resources' does not signify that all advantages granted by a State, whether financed through State resources or not, constitute aid but is intended merely to bring within that definition those advantages which are granted directly by the State and those granted by a public or private body designated or established by the State"(ECJ Case C-378/98, n. 58).In other words, the ECJ understands the text of Article 107 TFEU as referring to financial aid only, and interprets the two alternatives mentioned in this provision as meaning: financial aid "granted by a Member State", and financial aid granted "in any (other) form whatsoever", the latter alternative includingany "public or private body designated or established by the State".

But the wording of Article 107 TFEU can also be read in a different way. When the text speaks of "any aid granted by a Member State" and opposesthis state support to "aid granted through state resources in any form whatsoever", the first alternative can also refer to aid given in other form then financial resources from the state budget, and "any aid granted by a Member State" must then be understood as comprising other means of help then direct state funding ("aid granted through State resources")favouring certain undertakings or the production of certain goods. In this interpretation, a norm granting certain investors financial benefits and obliging other market participants to carry the costs, as included in the Renewable Energy Act, also falls under the term of "state aid".

And in fact, this alternative grammatical interpretation seems to comply better with the provision's objective to safeguard the functioning of one of the European Union's core projects: As the text itself shows, Article 107 TFEU is intended to help to establish an "internal market". From many other provisions, like e.g., Article 3 (3) TEU and Article 26 (1) TFEU, we know that theEuropean "internal market" is intended to be developed into a "highly competitive social market economy". It comprises the removal of internal frontiers and

[*] The sequence and numbering of the treaty articles has been changed since 2001. But as the wording was not amended in the decisive passages, the treaty provisions are here quoted in the present (2015) treaty version.

the free movement of goods, persons, services, and capital (Article 26 [2] TFEU), a uniform European competition law (Articles 101-106 TFEU), and the approximation of laws (Articles 110-118 TFEU). The "internal market" itself forms the basis for the establishment of an "economic and monetary union whose currency is the euro" (Article 3 [4] TEU) that follows the "principle of a market economy with free competition" (Article 119 [1] TFEU).

Thus, a systematic and teleological interpretation of Article 107 TFEU in the context of the other provisions mentioned shows that it is meant to avoid not just financial aid, but state-induced market distortions of any kind (cf. for the same result: Altrock, 2002, pp. 39-85; for the opposite opinion: Weck, 2004, pp. 125-148).

ADDITIONAL ASPECTS

This result is supported by two additional arguments derived from the ideas of sustainable development and of freedom. Both ideas represent important principles of the European legal system and must be observed in the interpretation of any treaty provision.

According to Article 3 (3) TEU, the establishment of a European "internal market" shall "work for the sustainable development of Europe". Following the famous BrundtlandCommission's definition, development can only be called "sustainable" if it "meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987). The idea expressed in this principle is based on an ethics of intergenerational justice, and it has two main aspects: Human impact on the environment should exceed neither the carrying capacity of the ecosystems nor the reproduction rate of resources. It is obviously a priority task of legislators around the world to find regulatory mechanisms that keep the collective effects of individual behavior within the limits so defined.

The European primary law hints to an important element of sustainability when it emphasises in Article 191 (2) TFEU that the EU policy on the environment shall be based on the principles "that environmental damage should as a priority be rectified at source and that the polluter should pay." This means – in the terminology of the economists – that "external costs" must be "internalised", or – in other words, and referring to our precise question – that energy producers must be made liable for the material and immaterial losses they cause to the environment. Whoever burns coal, oil, or gas should pay for all damages caused by the emissions, and the operators of atomic power stations should come up for the costs of the entire present and future management of their nuclear waste. For several reasons, the traditional systems of tort law as developed under common law and civil law systems will not be sufficient vis-à-vis this challenge. Instead, innovative legislative solutions will be needed, including for example the installment of funds into which the polluters have to pay (in the form of environmental taxes or emissions certificates) and out of which persons who have suffered damages to their health or private property and even nature itself are fully compensated according to certain financial compensation schemes (Morgenthaler, 1994).

This legislative necessity is underlined and supported by another fundamental concept of the European legal order: According to Article 6 (1) TEU, the European Union "recognises the rights, freedoms and principles set out in the Charter of Fundamental Rights of the European Union". As prescribed in Article 6 (2) TEU, the EU has acceded the European Convention for the Protection of Human Rights and Fundamental Freedoms. Article 6 (3) TEU makes it clear that the fundamental rights, as guaranteed by this Convention "and as they result from the constitutional traditions common to the Member States, shall constitute general principles of the Union's law." Now, one of the "common values" and basic guarantees contained in the Charter, the Convention, and the constitutional traditions of all EU Member States alike, is the idea of freedom (cf., for example, Articles 6-19 of the Charter, Articles 9-12 of the Convention).

But what does "freedom" mean? In the mainstream discussion, the decisive point in this context seems to be the question whether the instruments in favor of the renewables included in the REA limit the right to self-determination of the network operators, competitors and customers too much (see Reshöft, 2009: Einleitung, n. 70-114; Altrock, Oschmann, Theobald, 2013: Einf., n. 63-97; Frenz, Müggenborg, 2013: Einleitung, n. 58-79).

No doubt, self-determination is a key element of freedom. Individual self-determination, the right to act according to one's own reason, and the possibility to emancipate from traditional institutions, were the core prerequisites and demands of European Renaissance and Enlightenment, and they still form the indispensable basis of any modern society. But throughout the history of Western thought, it was always clear for the philosophers that self-determination must correspond with responsibility. Only if the free citizen who acts according to his or her own will is obliged to take into account the reactions of others to his or her behavior, we can speak of "freedom" in the full sense. Georg Wilhelm Friedrich Hegel put it this way (Hegel, 1986): Only if the free citizens'will is "reflected", we can realistically hope that the acting person's personality will be developed in full freedom. Whereby the word "reflected" had a double meaning: the free person's will should be “mirrored” and “come back” to him or her so that he or she is forced to respond; and – hopefully – he or she will subsequently use this occasion for “reflecting” his or her own behavior (cf. Suhr, 1976 and 1978, and Morgenthaler, 1999). Using a more up-to-date terminology, we might also say that a feedback mechanism is indispensable if we want true self-determination instead of unrestricted egoism, and true freedom instead of a privilege.

When applied to our special question, these general considerations about the idea of freedom do not only support the results of our grammatical and systematic interpretation of the relevant provisions in the TFEU concerning state aids (Article 107) and environmental protection (Article 3 [3] TEU, Article 191 TFEU), but they promote a deeper understanding: Only if all producers of electrical energy are directly, transparently and fully made liablefor all the material and immaterial environmental damages they cause, we can expect that they will “reflect” and subsequently change their behavior.

CONCLUSIONS

From this we can conclude that theECJ’s“PreussenElektra” decision is based on a wrong interpretation of the decisive treaty provisions. The arguments discussed in the judgement miss the central questions. But what is worse is the fact that the Courtleft out a chance to point to the real challenges.

In fact, the Renewable Energy Act is incompatible with the European Union’s “internal market”. The feed-in tariffs which the network operators have to pay to the producers of renewable energies are “state aids” within the meaning of this term in Article 107 TFEU.

But what seems more important is the discovery that the EU institutions and the Member States may not confine themselves to giving subsidies or other forms of state aids to the producers of renewable energies if they want to comply with the fundamental ideas of freedom and sustainable development. Instead, they will have to develop a more sophisticated legislative strategy based on the aforementioned principles and to introduce the instruments needed for making the polluters liable and for compensating the victims for their damages.

The mechanism installed by the Renewable Energy Act turns the polluter-pays principle upside down. By giving financial support to the producers of renewable energies but failing to make the polluters of the environment liable, it subsidises the global energy production and thereby stimulates an energy consumption and demand for resources that is unsustainabile. Furthermore, the existing instruments that are commonly thought to “internalise external costs” are far too rudimentary. For example, the costs which polluters presently incur in the form of both environmental taxes and emission certificates are not bound to the amount of environmental damages they are theoretically intended to cover. Instead, the financial volumes of these taxes and certificates are fixed on purely “political” grounds. And the revenues are usually not used for restoring the environment. In practice, they flow into the general state budget and are often spent for purposes that cause even more damage to the biosphere and the atmosphere.

The ECJ’sdecisionconcerningtheElectricity Feed-In Actof 1991 was generallywelcomedbymostobservers in politicsand in academiabecauseitdid not interruptthegreatandimportantprojectof an “energytransition”. Nevertheless, closer examination shows that the Renewable Energy Act and its instruments should be re-discussed: They point to the right direction, but they follow the wrong way.

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TURKEY AND THE EURASIAN ENERGY BRIDGE: OPPORTUNITIES AND RISKS

Igor BELIKOV*

Keywords: Turkey, natural gas and oil transportation & pipelines, Turkish Stream project, Southern Gas Corridor, TANAP project, EU, Russia, Caucasus, Central Asia.

TURKEY'S ENERGY DREAM

History of mankind is full of mismatches. A major one among them is mismatch between location of major global economic centers, on the one hand, and location of major energy resources, on the other hand. For Europe, a major global economic center, this problem is especially acute. Despite massive efforts of the last decades at diversifying its energy consumption structure, the EU economy still vitally depends on hydrocarbons – gas and oil. In spite of significant progress in the use of alternative and renewable energy, for the next two or three decades Europe's economy seems to continue running on oil and gas.

Countries which are rich of gas and oil reserves are located mostly in Asia - Middle East, Caucasus and Central Asia. This economic geography makes Turkey a pivotal country in terms of hydrocarbon energy transportation between Europe and major oil and gas producing countries. In the third millennium, Turkey has made an impressive progress in realizing its unique geographic potential.

Central Asia is already recognized as a region with huge gas and oil reserves and with a number of major global companies having invested in production. However, almost all gas and oil supplies go through Russia to their main consumer, the European Union. Ukraine is the main transit route of Russian gas to the EU. Relations between the two neighbor Slavonic countries experience ups and downs, but nothing forecasts a drama in them. Quite a routine story of frictions exist about the price of gas which Moscow sells to Kiev and the transit tariffs Kiev charging Moscow for gas transit to Europe over its territory. Russia rapidly increases its own oil and gas production, soon to reach the status of a major global producer. Yet, it faces an uneasy problem of balancing its own oil and gas export shipments to the EU with those coming from the countries of the Caucasus and Central Asia whom it considers as its satellites. Both Russian and non-Russian oil and gas shipments are transported through same pipelines which have terminal capacities. This is a classical situation of a conflict of interests. For Azerbaijan and the countries of Central Asia revenues from oil and gas export are crucial for their budgets and they are increasingly concerned with finding new routes of shipping oil and gas to Europe. Following the basics of international politics, the EU discusses diversifying its energy supply routes and designs plans which may turn Turkey into a very important spot on a new map of energy supplies. Although first steps were already made by the EU in implementation of its energy supply diversification plan involving Turkey, future new routes are far from certain, obstacles are numerous and seems very serious. Russia remains a major supplier of oil and the major supplier of gas to the EU and seems to count on retaining this position for indefinite future.

Crude oil flows from Baku, the capital of Azerbaijan, to Ceyhan, a port on the south-eastern Mediterranean coast of Turkey and then is exported to EU. This is the first oil pipeline from the former Soviet Union whose route bypasses Russia and the second-longest oil pipeline in the former Soviet Union, after the Druzhba pipeline. Natural gas flows through the South Caucasus pipeline connecting Shah Deniz, gas field in the Azerbaijani sector of the Caspian Sea, and Erzurum in Turkey. The 600-mile oil pipeline carries crude oil from Kirkuk in Iraqi Kurdistan to the export terminal in the Turkish port of Ceyhan. Blue Stream, the major trans-Black Sea gas pipeline (with maximum annual capacity of 16 billion cu m), carries natural gas from Russia to Turkey. Just one month ago, Russian President Vladimir Putin came to Ankara and proposed to build another trans-Black Sea natural gas pipeline to Turkey, with capacity of 63 billion cu m, of which 16 billion cu m will be bought by Turkey at a good discount and the rest will be shipped to Europe. This gas pipeline, named "Turkish Stream", will have to replace the South Stream gas pipeline, which is supposed to ship Russian gas projected to Bulgaria and then further to Europe, leaving Turkey aside. Ankara has other major oil and gas pipeline projects up its sleeve. The most ambitious among them is the Trans-Anatolian Natural Gas Pipeline (TANAP) to ship natural gas from Azerbaijan and the countries of Central Asia to Europe through a connection with Trans-Adriatic Pipeline (TAP). Its initial capacity is 16 billion cu m with the prospect of increasing it up to 30 billion cu m and ultimately up to 60 cu m. The Trans-Caspian gas pipeline should be constructed to connect it with gas reserves in Kazakhstan and Turkmenistan. The discussions of increasing the capacity of South Caucasus pipeline

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and the Baku–Tbilisi–Ceyhan oil pipeline two or three times are under way. Materialization of all these projects will make Turkey not only the major transit country for land transportation of oil and gas between Europe and Asia, but also make it a real gas hub with a significant influence on gas prices in the mega-region of Eurasia and the key link in its energy structure. Some analysts add to this a prospect of, although looking quite distant for now, Iranian, Iraqi and even Egyptian gas reaching the Turkish border to be carried further to Europe. Scenarios of this sort will provide Turkey an enormous influence in the whole matrix of relations between the European Union, on the one hand, and Russia, the Middle Eastern countries, the Caucasus and the Central Asian countries, on the other hand. This configuration is capable of providing a powerful injection into Turkish economy, rocketing it into the top league of global economic players.

This paper is to identify and explore the factors which have a strong or even determining influence on the projects for transportation of natural gas and oil from Russia, the Caucasus and the Central Asia via Turkey. The focus of the paper is analysis of statements and actions by senior Russian politicians, Russian energy companies top executives, views, considerations and recommendations of Russian experts.

EU-Russia relations

The EU is the terminal point of all existing and would-be gas and oil transportation systems via Turkey on which Ankara dreams to build its status of Eurasia energy bridge. Russia and the former countries of the Soviet Union are considered as the main sources of gas and oil to feed the pipelines of these systems. In addition to its own huge gas and oil resources, Russia still has a strong leverage with regard to other oil and gas producing countries of the former USSR as well as the transit countries on the way of these shipments to the EU. So, the relations between the EU and Russia will, to a great extent, determine whether Turkey will really become the Eurasian energy bridge.

Geopolitical dimension

The issue of energy export and import is very politically sensitive probably more than any other area of international economic relations. There is little wonder about that. Dramatic cuts in energy supply can cause serious economic and social turmoil in dependent countries. Critical dependence on a major supplier or a major consumer not only makes the dependent party exposed in terms of prices and expected expenses/incomes, but also may tempt the party enjoying the dominant position for promoting its interests far beyond energy relations agenda.

The year 2014 brought a very serious crisis tension in relations between Russia and the West. The latter rejected Russia's takeover of the Crimean peninsula and put the blame on Russia for the armed conflict in south-eastern Ukraine. The European Union, the US and many other Western countries reacted to these events with economic sanctions which primarily targeted Russia's oil and military industries and banking sector in terms of financing and technology transfers. The key question is if this rift will be patched up and the relations between the major Western powers and Russia will return to the level before 2014, be it with some cooling down but without radical shift. Or the new post-Crimean normal in these relations will be much closer to those before Mikhail Gorbachev announced "perestroika" or the times when Soviet leader Nikita Khrustchev promised "to bury the capitalism". So, it is important to understand how the EU and the West at large, on the one hand, and Russia, on the other hand, see the causes of the conflict, how they advocate their stands on it and how they see future political relations between them.

The reaction of Washington has been the toughest. It is very much reflected in a comment by a Bloomberg View columnist: "…the world has changed: Post-Cold War rules no longer apply, and old enmities suppressed for a quarter-century are back in the open… A year ago, such a casual nuclear threat would have been impossible. Now Putin clearly wants the West to believe that he's at least as capable of using nuclear weapons as Soviet leaders were. … Putin has become an open, unapologetic enemy of the West, and he is not sufficiently weakened by the sanctions, or even by the plunge in the price of oil, to want to change that" (Bershidsky, 2015).

What seems to become a surprise for the Russian political elite is the reaction of Germany, which until very recently had been considered in Moscow as Russia's key political and economic partner in Europe. Berlin has taken a very tough stand on the situation and has become a rallying point for the European opposition to Russia's policies. Angela Merkel, German Chancellor, repeatedly stressed that she considered Russia's policy in Ukraine a threat to the whole European arrangement which has existed in Europe since the Second World War. Germany has become a very strong advocate of economic sanctions against Russia. Although Germany repeatedly rejected Washington's proposals to provide arms to Ukraine, the current German political leadership seemed to view the situation similarly to the US. This view, for instance, is described by Constanze

Stelzenmüller, German senior policy expert, in the following words: “It is not only an attack on our fundamental values but a direct challenge to our interests as well. For the foreseeable future Russia will stay a source of danger for the whole continent. To deal with it Europe will need a lot of courage and cautiousness… This conflict is the most acute challenge to the European security and the European project after the downfall of the Berlin wall and the breakup of the Soviet Union… If we do not want to stop Russia with arms we must use all means to make it stop crashing Ukraine. If we fail we will find ourselves on the battle field. We have all reason to fear such an outcome” (Stelzenmüller, 2015).

However, the EU is not united in relations with Russia after the Crimea and the Ukrainian crisis. The above stand is cemented by Germany, the UK, Poland, the Baltic countries (Estonia, Latvia and Lithuania), Norway, Sweden, and with certain reservations, France. Current leaders of Cyprus, Czech Republic, Greece and Hungary criticize the above tough stand on Russia and declare that Russia is too important for Europe and, in fact, it can be given free hands in the countries of the former Soviet Union (with exception of the above three Baltic countries). EU member states like Austria, Bulgaria, Finland and Italy are hesitant, prefer to limit the EU reaction of mild short-term sanctions and are ready to accept Russia’s political domination in Ukraine and other former republics of the USSR as a lesser evil comparing to further political and economic confrontation with Russia.

Speaking at an energy conference held in Berlin in May 2015, Norbert Rettgen, the head of the foreign policy committee of the Bundestag, said: “We must understand our responsibility (in the context of the Ukrainian crisis. – I.B.), it affects not only Ukraine... If someone in Russia has an illusion that the German business will be hesitant in making a choice between cooperation with the US and cooperation with Russia, it is a time to abandon it” (http://kommersant.ru/doc/2726153). However, the EU businesses have not been so determined to support the tough stand on Russia taken by the leaders of the EU major states. The reason behind is clear: losses suffered as the results of the EU sanctions against Russia and Russia’s counter-sanctions against the EU countries. According to the Russia’s Federal Customs Service, the trade volume between the EU and Russia dropped by 59 billion dollars in 2014 in comparison to 2013. Russia’s import dropped by 5 billion dollars from Germany, by 3 billion dollars from France and by 2 billion dollars from Italy. The European Commission estimated losses of the EU companies from Russia’s economic counter-sanctions (ban on import of certain imports to Russia from the EU) at 5 billion dollars. The downsizing in business relations and the amount of losses are not that large compared with total volume of foreign trade of the EU countries with other parts of the world. However, it looks like that with the European economy marking the EU businesses do not want to lose even these modest market opportunities.

The Western business community is very heterogeneous and even today one can find those among it those who want, or, at least declare their intention, to do business in Russia against all odds. For instance, 50 per cent of 500 global business leaders surveyed by AT Kearney, the Washington consultancy, in February 2015, still see Russia as a "viable” investment environment, according to the poll. “Russia is ‘uninvestable’ due to an unreadable outlook and ‘terrible’ relationship with the west… But many investors crave ‘business as usual’ because they enjoyed returns during the past decade”, said Timothy Ash, head of emerging market research at Standard Bank in mid-March 2015 (Bender Y. 2015). In its 2015 investor sentiment survey, the CFA Institute, a global association of investment professionals, named Russia one of the top markets for equity performance this year, along with the US, China and India (Global market investor sentiment survey 2015, p.8). The same Bloomberg View columnist, cited above, who vehemently criticized President Putin for the Crimean operation, assessed the economic situation in Russia, at the end of March 2015, in the following way: “Russia's economic managers, especially at the Central Bank and the Finance Ministry, should be given their due: In a difficult environment, they have avoided major mistakes and managed to keep open Russia's economy… Russia remains a major market economy that cannot be derailed by a few timid restrictions. That makes it both a bigger threat to weak neighbors such as Ukraine, as well as an underrated land of opportunity” (Bershidsky, 2015, March 27). How sincere these declarations are and to what extent those Western businessmen who make them are ready to walk the talk are an open-ended questions. However, they give the Russian political establishment a certain reason to believe that it will find partners in the Western business community and these partners will put pressure on the EU and the US political establishments in favor of softening their stand on Russia.

The explanations for the conflict between the West, including the EU, on the one hand, and Russia, on the other hand, provided by the Russian political establishment and by experts close to the Kremlin are focused on two major topics.

The first is the aggressive policy pursued by the West towards Russia after 1991 with a complete disregard for its political and security concerns as a power defeated in the Cold War. The expansion of the NATO towards Russia’s borders and military operations by the NATO in Yugoslavia (in 1999), in Libya (2011) and by the US-led coalition in Iraq (2003) are referred to as proofs that in its “democratic messianism” the West easily uses force against the regimes which do not fit into its global vision.

In his annual message to the Federal Assembly, December 4, 2014, President Putin stressed, "We remember quite well who supported separatism in Russia and even a outright terrorism… It became clear even at that time (the 1990s. – I.B.) that the more concessions we make and put us on the defensive, the more brazen are getting our opponents and the more they behave increasingly cynical and aggressive. Despite our unprecedented openness and treatment of our former enemies like close friends and almost allies, the support for separatism (in Russia. – I.B.) has become more apparent. We had little doubt that we (Russia. – I.B.) can be pushed along the Yugoslav scenario of a breakup and partition of the country with all tragic consequences for the peoples of Russia. We have not allowed that" (http://kremlin.ru/news/47173).

Senior Russian politicians stress that the major cause of the rift between Russia and the EU is the desire of the US to reassert its global power. As Sergei Naryshkin, speaker of the lower chamber of the Russian parliament, put it, "The US has been imposing its policy upon Ukraine and the EU… American plans include gaining access to natural resources of Eurasia and deployment of its new military bases there… America needs long-term sanctions policy (against Russia. – I.B.) and information hysteria to continue its policy of unpunished economic robbery…Its final goal … is a conclusion of a very rigid and all-embracing economic agreement with the EU in which the latter will have the status of a junior partner" (Naryshkin, S. 2015).

As Leonid Reshetnikov, retired lieutenant-general and head of the Russian Institute of Strategic Studies, a research and consultancy entity set up by a presidential decree[*], put it, "… there is a threat of a full-fledged "hot war"… If we give up to match to our size, our potential and own history, in my view, they (West. – I.B.) will not accept even the situation of the 1990s and will try to finish us off" (Reshetnikov L., 2015). The West must recognize Russia's security concerns, especially in the countries of the former Soviet Union and stop the policy of their integration into the Western alliance." "The only realistic way out of the crisis (in relations between Russia and the West. – I.B.), which will solve all present disputes and set up a long-term stability in Europe and in the countries of the former Soviet Union, is a new mini-Yalta[†] agreement. This can be an agreement between Russia and the EU on the rules of the game in this geo-political space and on a kind of new all-European system of collective security. This will mean recognition of Russia as a key European power, even though some politicians on the both sides of the Atlantics may not like it", writes Gevorg Mirzayan, Russian political expert (Mirzayan, G., 2015, March 8). The West must also accommodate with the current political regime in Russia in deals with domestic, political and economic issues. According to Sergei Karaganov, a well-known Russian foreign policy expert, "the West should, in fact, accept the specific features of Russian political and business practices" (Karaganov S, 2015). Sergei Naryshkin, speaker of the lower chamber of the Russian Parliament, describes present Russia as "a democratic law-based state and an open economy with market principles", thus rejecting "Western teachings" in these fields.

The other major source of tension between the West and Russia, according to the Russian political establishment and experts close to the Kremlin, is a deep rift in terms of moral and cultural values. According to them, over the recent period Russians have rediscovered traditional Christian values for themselves, while the West has drifted far away from them towards modernist and post-modernist ideology. According to Karaganov, "Russians have converted to traditional morale, to Christianity which was banned under communism, to national patriotism and conservatism. While the European elite has a bellyful of these values and increasingly considers them as outdated or even reactionary. Contemporary post-modernist Europe rejects many traditional moral values and even the Christian foundation of its civilization" (Karaganov S, 2015). As Reshetnikov put it, "… we (Russia. – I.B.) are undoubtedly a separate civilization. … The Western civilization is perishing, it is already not even a post-Christian but an anti-Christian civilization, if one can call it a civilization. And they feel that we have a special spiritual force…" (Reshetnikov L, 2015).

The Russian political elite and the experts supporting President Putin's foreign policy, who dominate Russian mass media, stress that Russia is very much determined to defend its interests by all means, including military force and not excluding nuclear arsenal as an ultima ratio, should the West persist with the policies towards Russia it has pursued after 1991. As Reshetnikov put it, "If the US bulldoze on Russia… it may happen that their cities will be hit with bombs and missiles. Does that mean that we are ready to be the first to make a nuclear strike on the US in case of an open war with the US? It will depend upon a particular situation". According to Mirzayan, "An alternative to such an agreement (mini-Yalta. – I.B.) is not just deepening of the

[*] http://www.riss.ru/en/

[†] At the conference held in February 1945 in Yalta (Crimea) US President Franklin D. Roosevelt, British Prime Minister Winston Churchill and Soviet leader Joseph Stalin agreed on a number of post-war political issues in Europe. According to the present interpretations by Russian experts and politicians close to the Kremlin, the Yalta agreements legitimized the Soviet zone of influence in Europe which embraced the Eastern Europe. In fact, the West recognized the Eastern Europe as the Soviet sphere of political and economic domination and that a direct support to anti-communist and anti-Soviet political forces in these countries by the West would be considered by the Soviet Union as a casus belli.

conflict in Ukraine but an eruption of new conflicts (for instance, in Moldavia) and a risk of a cold or even a hot Russo-European war". A Russian daily, claiming to represent experts' opinions, warns the EU against supporting Ukraine versus Russia: "What if the war will take over not only south-eastern Ukraine but is other territories and will spill over beyond the Ukrainian borders? It is unlikely that Europe and its neighbors will survive another war because the adversaries have such powerful weapon of mass destruction which will save nobody and turn the continent into a lifeless desert" (http://www.ng.ru/world/2015-04-07/3_kartblansh.html).

Dmitri Trenin, a well-known Russian political expert, sees the current situation in relations between the West and Russia in the following way: "The causes of the disruption between Russia and the West have a fundamental character. They cannot be easily fixed up… The key factors in this confrontation will be Russia's resources, on the one hand, and determination of the West, on the other hand. In terms of resources Russia is much inferior to its new-old opponents. But the stakes for the Russian leadership in the battle are much higher than those for the leaders of the West and in terms of determination the Kremlin is superior to the Western governments. So, the result of the battle is not pre-determined" (Trenin D, 2015).

However, in the current political confrontation with the West the Russian ruling elite counts not only on a declared moral superiority of the Russian nation and possession of nuclear arsenal, but on a number of realpolitik factors as well.

First, there are many countries in Europe, in which a part of their political elites is interested in weakening the control by the EU bodies, believes that it can gain more benefits even short-term ones playing upon the contradictions between the EU and Russia or believes that in exchange for accommodation with Russia it can solve problems consider to be of greater importance for these countries as compared with conflicts in the countries of the former Soviet Union. There have been a number of clear manifestations of this sort. For instance, the EU summit held in March 19-20, 2015 failed to make a consensus decision on prolongation of economic sanctions against Russia due to resistance of some of its members and postponed the decision till June 2015. In some of these countries the elite groups with declared EU-skepticism are already in power (Greece, Hungary) and in some they may come to power in a foreseeable future and thwart a concerted EU policies towards Russia in a number of areas vital for Russia (i.e. energy supplies). For instance, a part of Russian political establishment and experts believe that after Serbia and Macedonia, which have been historically sympathetic towards Russia, join the EU, it may strengthen Russia's political leverage with regard to the EU. At March 2015 the EU summit, leaders of Austria, Spain, and Slovakia sounded definitely unhappy with extending economic sanctions against Russia and the visits of Italian Prime Minister Metteo Renzi and Greek Prime Minister Alexis Tsypras to Moscow in March and April 2015 respectively are remarkable in this sense.

The fundamentalist Islam is increasingly seen as a major threat to Europe and Russia is perceived by many Western politicians as an important or even indispensable partner of the West against this threat. For instance, during his visit to Moscow, Italian Prime Minister discussed with President Putin how to settle the political turmoil in Libya which led to dozens of thousands of illegal migrants crossing the Mediterranean Sea to Europe, mostly via Italy.

Serious economic and social challenges in the West (like an economic and debt crisis of 2008-2009) will require full attention of the Western political elite and push it to compromise with Russia, the Russian ruling political elite apparently believes. This mood is fueled by regular optimistic statements by Western businessmen about their growing interests and stakes in doing business in Russia. "Russia has become even more interesting (for doing business in. – I.B.) and American businessmen are very practical people" said Alexis Rodzyanko, president of the American Chamber in Moscow speaking in March 2015. Managing partner of the EU in Russia described the interest of Western business in Russia even in a more optimistic way: "European and American business does not consider pulling out prospect. 41% of top executives of these companies forecast double digits growth pace (of their business in Russia. – I.B.) and 30% of them forecast a 10% growth" (http://www.asi.ru/news/34087/). Those Russian experts who do not share the above optimism have been on the margins in terms of influencing decision-making process in the Russian political establishment.

Energy dimension

The core of the energy strategy pursued by the European Economic Community and by its successor, the European Union (EU), has been to encourage domestic market competition and diversity in terms of sources of energy supplies. The first proposal for setting up the European Internal Energy Market (IEM) dates back to 1988-1991 and several energy directives were approved by the Community until 2003. However, these documents were proved to be insufficient for creating competition in the IEM. In order to amend these deficiencies, in 2009 a legislative package, which is called the EU's Third Energy Package, was adopted. The core elements of this legislation include demonopolisation in the energy production, supply and distribution through separation of companies' generation and sales operations from their transmission network and encouraging much greater coordination of energy policies of the EU countries through cooperation of the member states' energy authorities and providing greater power to the EU institutions in energy matters. Similar to any other legal act by the EU, this legislation provoked criticism from a number of experts and businesses arguing that the costs of its implementation may exceed desired benefits. However, since 2009, it has become the core of the EU energy policies primarily in the field of electricity and gas, both within the EU and with regard to energy supplies to the EU. At the time of its adoption, the Third Energy Package was not specifically aimed at Gazprom. However, Gazprom, with its share in overall gas import in the EU ranging from 22 to 30% after 2000, has actually become the major object of this regulation and it has become its major critic.

Gas disputes between Russia and Ukraine in 2005-2006, 2007-2008 and 2008-2009 made the EU pay more attention to its energy policy, especially in terms of energy security. The EU also intensified its policies of alternative energy use, expanding gas storage facilities and energy interconnection infrastructure. In 2011, the EU decided to speed up this process in order to create a fully integrated internal energy market by 2014. However, this goal was not reached by that time. In fact, dependence upon Russian gas did not fall down. On the contrary, it grew up from 22% in the total EU gas import up to 30% in 2013. During this time, North Stream natural gas pipeline was constructed to supply gas from Russia to Germany via the Baltic Sea. Nevertheless, the general direction of the EU policies provoked increasing irritation of Gazprom whose strategy had been to expand its role in the EU not only as the major supplier of gas, but also to become a strong player in gas distribution inside the EU through purchasing gas distribution assets.

The political crisis and military conflict of 2014 in Ukraine tolled a serious crisis in energy relations between Russia and the EU. The draft EU Energy Union strategy unveiled in March 2015 in Brussels included the following slightly veiled reference to Russia: “Energy policy is often used as a foreign policy tool, in particular in major energy producing and transit countries. This reality has to be taken into account when discussing Europe's external energy policy” (European Commission. Energy Union Package). This document did not list Russia among the countries and regions which are considered by the EU as its main energy partners.

According to the document, the EU should speak “with one voice” in negotiations with third countries on energy supplies to the EU member states. Specifically, this implies the right of the European Commission to be informed about the negotiation of intergovernmental agreements (IGA) between the EU member states and the energy suppliers from an early stage “so that a better ex ante assessment of IGA's compatibility with internal market rules and security of supply criteria is ensured.” According to the strategy, this principle should be applied not only to the IGA, but also to commercial gas supply contracts to be concluded by the companies of the EU member states. “Key features of the contracts should be aggregated and regularly published, in order to establish a transparent benchmark which could be referred to in future negotiations, ensuring at the same time the confidentiality of sensitive information” (European Commission. Energy Union Package). As both Western and Russian experts pointed out, the latter principle targets at Gazprom’s practice of concluding gas supply contracts with the EU member states with the support of Russian government, which often envisaged significant discounts and some other benefits to a particular country in exchange for its support for Gazprom’s policy in Europe or for Russia’s foreign policy initiatives.

Hungary, Slovakia, Czech Republic and Poland are considered as main beneficiaries of the EU Energy Strategy in terms of the EU investment in development of their energy infrastructure. On the one hand, these countries are most dependent ones on Russian gas. On the other hand, the first three of them often take a dissent stand on the EU’s tough policy towards Russia, especially with the coming of the Ukrainian crisis.

The idea of the European Commission to control the EU member states intergovernmental agreements on energy supplies with third countries, commercial energy contracts and to overrule them if these contradict the EU energy policy provoked criticism by a number of the national governments in the EU (reportedly Germany, Holland and Finland) and by a part of the EU businesses. For instance, the German Association of Energy and Water Industries (BDEW) issued a statement which stated that the association criticized the idea of a new bureaucracy to centrally organize the purchase of natural gas or other energy forms. “The supply of natural gas will be guaranteed best by an open, liquid, transparent and well-connected European gas market", it stressed (Amelang, Egenter, 2015).

The EU summit, held in March 19-20, 2015, approved the concept of the EU Energy Union strategy, although with some amendments. So far, the exchange of information on energy contracts will not cover commercially sensitive confidential information. Nor the parties of contracts will have to obtain the consent of the European Commission and the latter will have no veto power. The conclusions of the summit stressed the need for a “fully implementing and rigorously enforcing existing energy legislation” and for “ensuring full compliance with EU law of all agreements related to the buying of gas from external suppliers” (European Council Conclusions on the Energy Union). The resolutions also expressively stressed a call for “using all external policy instruments to establish strategic energy partnerships with increasingly important producing and transit countries, notably with a view to promoting energy security.” Analysts unanimously interpreted this point as a greater determination of the EU in taking actions to cut its dependence on Russian gas supplies.

The EU Energy Union strategy provides actions to be taken to increase the share of liquefied natural gas (LNG) to balance natural gas coming to the EU through pipeline systems. These actions include elaboration of an EU LNG strategy, full capacity use of gas storage and increasing LNG imports from the US and other LNG producers. A shale oil and gas boom in the US is considered in Europe an opportunity for a significant diversification of its energy supplies.

Karel De Gucht, Trade Commissioner for the EU, stressed a very high importance of energy import from the US to the EU: “It is important that we come forward with a position on that (energy agreement) as soon as possible, because maybe you may have noticed that some things are going on in Europe,” he said. “I think everybody would agree that energy is a little bit more urgent for the time being, and also, very much geostrategic” (U.S. Energy: EU’s Alternative to Russia?).

The EU Energy Union strategy also provides a set of policies which aimed at reducing consumption and demand for hydrocarbon products. These include more energy interconnections among the EU countries, high level of investment in renewable energy, coordinated capacity mechanisms that integrate renewables and gas at the regional level, higher energy efficiency of ageing housing stock, quicker deployment of smart grids and some others. All these can result in reduction of the total consumption by the EU of hydrocarbon and it looks like most of this would-be reduction will be made at the expense of imports from Russia.

Analysts point out that all the above policies come at a cost. The policy of favoring diversification in energy import and in kinds of energy has already contributed to Europe’s lag in industrial competitiveness and created failure to bring down high energy prices (Polak P, 2014). Massive investment in gas storage can push the cost of energy for EU industrial consumers up in the near future, thus, slowing down the pace of economic growth. The reduction in gas import from Russia, as the year 2014 proved, leads to under-utilisation of gas infrastructure, which creates little incentives for investment on additional capacity and on existing assets. Experts of the Institute of Energy Economics at the University of Cologne point out to weakness of this policy: “As infrastructure operators adjust to current demand levels, questions regarding Europe’s capacity to maintain current energy security levels will emerge. Can infrastructure operators generate cash flows to build, maintain and operate overcapacity under the current gas market design? In other words, are gas consumers willing to pay a risk premium for security of supply?” (Martinez, M. Paletar, M. Hecking, H., 2015). However, the EU leaders now look very much determined to pay this cost and go on with the policy of steadily reducing import of gas from Russia on a significant scale. Surely, it is an open question about the pace of this policy and likely modifications to it as a result of domestic economic problems in the EU and reaction of the European business to this policy.

It is not that all leaders of the EU member states and leaders of political parties in the EU member states have exactly same stand on energy relations with Russia. There are and will be differences among them at times rather significant and vociferous. The EU businesses do not sound enthusiastic about downsizing economic relations with Russia and replacing Russian gas with gas and other kinds of energy which are very likely to cost more, at least in the immediate future. However, it looks like the leaders of the EU, as an organization, are presently quite determined to pursue long-term policy of reducing its energy dependence on Russia. This policy is quite likely to become a critical part of the new normal in post-Crimea relations between Russia and the West at large and the EU in particular, at least for the foreseeable future.

Russia’s stand on energy cooperation with the West is based on the following, rather controversial, approaches. On the one hand, Russian government officials repeatedly stressed that the history of gas export from Russia to Western Europe goes as far back as late 1960s. The construction of a gas pipeline from the Soviet Union to West Germany in early 1970s was a remarkable milestone of a détente policy between the West and the Soviet bloc. The Urengoy-Pomary-Uzhgorod natural gas pipeline which connects gas fields in Western Siberia with Central and Western Europe was constructed in 1982-1984, at the period of tension between the Soviet Union and the West as the result of the Soviet invasion in Afghanistan. The construction was financed by a consortium of banks from Germany, France and Japan and the equipment was supplied by companies from Germany, France, Italy, Japan and the US.

On the other hand, the view of global oil and gas issues, their production, pricing, transportation and use, through a prism of global confrontation between oil and gas producing countries and the countries being major oil and gas consumers, has been widely shared, if not having been dominant, by the Russian political elite and the mainstream of Russian expert community. A remarkable example of this sort are books and reports produced by the National Energy Security Fund (NESF)[*] established in 2006, which is believed to be quite close to Gazprom and its head Konstantin Simonov. NESF analytical products are permeated with the postulates and conceptual statements like “Russian energy resources as a geopolitical weapon”, “control over Russian oil is the key factor of the global leadership”, “hydrocarbon prices as a political weapon”, “to put the stake on hydrocarbons instead of economy diversification” , “shale gas revolution is a PR campaign”, “alternative energy is a fairy tale”, “crusade for hydrocarbons”, “energy NATO as a stick for defiant energy suppliers”, “energy neo-colonialism”, and so on (Simonov, K. 2005, 2006, 2007, 2011; Reforms in European gas markets, 2014). In

[*] http://www.energystate.ru/eng/aboutus/

2006-2009, senior Russian government officials and numerous Russian experts (primarily political analysts and commentators) extensively referred to Russia as "the energy superpower". This term implies that huge oil and gas resources provide Russia with an opportunity to use them to become a major player in the global politics and economy and it should be used as a counterbalance to the use of technology and financial advantages of the West. The economic crisis of 2008-2009, which hit Russian economy, made recurrence to this concept much less frequent at the official level. However, this view is still very much widespread in the Russian political establishment and among experts close to it.

The reaction of Russian government and of Gazprom to the plans of the EU to reduce its dependence on Russian energy supplies, primarily gas supplies, is focused on two key points. The first is that the policy outlines in the EU Energy Union strategy will be much softened in the course of their implementation due to cumbersome nature of the EU bureaucracy, resistance of the above mentioned "dissident" political leaders of some EU countries and a part of the EU business community unwilling to bear losses. "The procedures of setting up the EU Energy Union and adoption of indispensable laws will take years and over this time the European gas market may change very much… Now the demand for Russian gas in Europe is diminishing according to the BP forecast, but the downfall in hydrocarbon in Europe after 2020 will result in an increase of Gazprom's share on the EU gas market", point out Russian commentators. – "It is not clear how long the East European countries like Lithuania and Poland will keep ready to pay higher price for non-Russian gas… If the European Commission interferes into gas business too much it may provoke a negative reaction by other gas suppliers to Europe, including the suppliers of LNG" (Barsukov, Yu. Dzaguto, V. Fomicheva, A, 2015). Many Russian commentators and analysts still believe that the current tension in political relations between the EU and Russia does not mean a fundamental change and the EU will not put politics ahead of economy in its policy on gas import. In his article titled "Bring capitalism back to gas business", Konstantin Simonov, head of the National Energy Security Fund, argues, "the idea of the EU Energy Union implies discrimination of the particular supplier – Russia - in favor of other supplies… The transformation of the European Commission into a state gas planning body is a purely socialist approach to economy… this is a direct challenge to capitalist relations in energy business" (Simonov, K. 2015, March 10). According to Dmitri Baranov, expert of Finam financial company, "keeping Russia as the key gas supplier would be a logical step within the policy of diversification (of gas supplies. – I.B.). And it would be strange to reduce dependence on Russian gas and to tie Europe to another supplier" (http://lenta.ru/articles/2015/03/06/newunion/). As Gazprom spokesman Sergei Kupriyanov puts it, "Under the pretext of fighting non-market behavior of Russia the EU rejects economically reasonable decisions in favor of a command management… Under the banner of promoting competition the market is closed for some suppliers and is opened for other ones" (Serov, M. Tretyakov, P. 2015, February 26). Russian experts also point out that gas transportation projects competing with those of Gazprom, like Trans-Adriatic Pipeline (TAP), have received exemption from the Third Energy Package while Gazprom's project has not (http://www.ng.ru/ng_energiya/2015-04-14/9_stream.html).

The second point in favor of keeping Russia as the key gas supplier to the EU, put by Russian politicians and experts, is that for the immediate and foreseeable future Europe will have no real sources of gas supplies to replace the supplies from Russia. A most detailed set of reasons against the EU Energy Union strategy and feasibility of alternative sources of gas supplies to Europe to replace Russian gas has been produced by the National Energy Security Fund (Reforms in European gas markets, 2014).

According to the National Energy Security Fund (NESF) experts, Norway and Algeria have passed the peak of their gas production and will not be able to increase their gas export to the EU. The switch from long-term gas contract to short-term ones and spot contracts will make the whole gas market very volatile and unable to increase gas supply in case of urgency rapidly and massively. Abandoning the previous practice of concluding long-term gas supply contracts, "take-or-pay" principle and the linking of gas price with oil price would create a risk for gas suppliers and traders to bear massive losses. "Either traders representing importers should leave the low-margin market ceding the right for direct contracts between consumers and producers, or suppliers should ensure gas deliveries at prices below spot prices, which is commercially unattractive and risky for gas producers, or, the pricing system should change regarding guarantees of profitability for importers". And further to add: "players with purely trader psychology and behavior on the market cannot and do not have to ensure reliable gas supplies… the reduction in long-term liabilities of suppliers will have long-lasting consequences in the sphere of investments in development of new reserves".

The shale gas revolution in the US, according to the NESF experts, "increasingly looks as a financial bubble": unreliable resource base, very heavy geology and loss-making economy of most shale projects over the recent years. The period of massive growth in shale oil and gas production in the US is over. So, in the foreseeable future the US will not be able to become a major exporter of oil and gas or its high price will make it uncompetitive. "It is much more important for the US to make an image of becoming a major LNG exporter than to become it in reality".

Both Canada and Mexico stand little chance to become major LNG exporters, at least till the end of the current decade.

Europe stands little chance at shale oil and gas revolution due to the following factors. First, due to lack of adequate geological data and specificity of its shale oil and gas deposits which make a simple transfer of shale deposit development technologies used in the US impossible. Second, due to a very strong environmentalist, "green", lobby in Europe which opposes the use of shale oil and gas production. A policy of massive subsidies for shale oil and gas exploration and production by the European Commission would make the cost of final products uncompetitive by price. A remarkable example of how an illusion of shale oil and gas revolution fades quickly away is Poland. Ukraine and Turkey are living through the same story.

China is very unlikely to become a major shale oil and gas producer either. The forecasts about huge shale oil and gas potential of China made by the US Energy Information Administration (EIA) are based on simple projection of forecasts for American deposits on deposits in China and are not based on adequate and sufficient Chinese geological data. Chinese shale deposits are located much deeper than those in the US and have more complex geological structure. To add, China suffers of water shortage and water is a key element of present shale oil and gas extraction technologies.

The US Energy Information Administration and International Energy Agency are very much politically biased organizations whose forecasts on shale gas and oil reserves, production and supplies are unreliable.

The conclusion made by the NESF experts: The "much-spoken-about shale oil and gas revolution" is largely a PR campaign initiated and persistently led by the US in order to strengthen the image of the US as the leading global energy power, to gain more influence on global relations between energy producers and energy suppliers and to strengthen the weight of the US in global geopolitics. With regard to Russia this campaign pursues the following goals: to make Russian government weaken its control over Gazprom through its restructuring and further privatization; to allow foreign investors to take a large role in developing gas resources in Russia on terms beneficial to them, to reduce the role of Russian gas in Europe and in countries of the former Soviet Union, to delink gas and oil prices in Europe and to bring down gas prices and Russia's revues from gas export. Those in Russia who believe in shale oil and gas revolution are, in fact, playing up to foreign interests.

Although at large Western and primarily the US political and business establishment discards the above analysis as politically motivated, in recent times admissions have been made in the West that at least some of the above conclusions live up to reality. For instance, in May 2015 Bloomberg published an article about the prospects of shale gas revolution in Europe titled "Shale Drillers Capitulate in Europe as Poland Proves No Texas" (Bauerova, L. 2015, May 12).

The above approach elaborated by the NESF seems to be shared and backed by Gazprom executives and by most Russian oil and gas experts. Speaking at the Saint Petersburg International Economic Forum, in May 2014, Gazprom CEO Alexei Miller said that after the signing of a large-scale gas contract between Gazprom and Chinese National Petroleum Company (CNPC) Europe will have to compete with the Asian-Pacific countries for Russian gas and this may push gas price in Europe up (http://www.gazeta.ru/business/2014/05/22/6044721.shtml). According to Vyacheslav Mischenko, vice president of Argus energy company, "the message by Russia to Europe is quite clear: if you do not want to buy Russian gas we will sell it to China. Russia is in a much more secure position in this situation" (http://www.gazeta.ru/business/2015/01/22/6383865.shtml). Aleksandr Pasechnik, head of analytical unit of the NESF, is very much optimistic about the prospects of Gazprom in Europe: "The project to build American LNG plants in Europe has failed, gas production in the EU has been stagnating and additional deliveries from Norway and Central Asia are very questionable. So, Gazprom will retain its market share in the region for at least for 5-10 years more. When the Eurozone starts to recover from economic recession it will need more gas" (http://expert.ru/2015/02/13/minsk-priotkryil-gaz-v-evropu/).

There are some Russian experts who see the prospects of energy relations between the EU and Russia in a much more pessimistic way. "The final draft of the EU Energy Union … can be much more dangerous for Russia then an early vague proposal on common gas purchases… The new draft strategy provides for a dramatic extension of the European Commission's powers... and this creates danger for the whole scheme of Russian gas supplies to Europe. Our sources and industry experts have doubts that all its ideas will be implemented. But a similar approach (to energy regulation. – I.B.) already works is the nuclear energy industry and the case of the Third Energy Package proves that the resistance of industry can be overcome" (Barsukov, Yu. Dzaguto, V. Fomicheva, A. 2015). Some Russian experts warn that "if the decision-making on issues of energy supplies will be transferred from the national governments to Brussels, this will make it possible to scrap market completely and to consider any energy supply to Europe from purely political point. Then, under certain conditions it will become politically more reasonable to buy expensive liquid gas from over the Atlantic instead of a cheaper gas supplied through existing natural gas pipelines. Energy supplies will become a sort of hostilities. If these policies are pursued for a long period this may ruin the global economic system and not only the economy of the country at which these moves were initially targeted" (http://www.ng.ru/editorial/2015-03-26/2_red.html).

Some Russian commentators go as far as to see the future in a really apocalyptic way: “The Energy Union means that new “institutions of confrontation” have been formed… With the support of Americans and despite higher production cost, liquid gas supplies (to the EU. – I.B.) will go on as well as similar actions. The option has been made in favor of the policy to dramatically reduce gas supplies from Russia in the next 2-3years to terminate them completely… The pressure (by the West on Russia. – I.B.) will grow, pushing the country (Russia. – I.B.) into a more desperate situation, if it (Russia. – I.B.) finds itself unable to give an adequate response to outer challenges. In this situation, it (Russia. – I.B.) will have only two options. A complete surrender on winners’ terms. Or, a real war as an act of despair and the last expression of national dignity. Under the last scenario those who are so much overtaken by the goal to corner Russia in Donetsk (Ukraine. – I.B.) will regret about their fierceness” (http://www.gazeta.ru/comments/column/bovt/6611033.shtml).

However, so far, judging by public statements by Russian politicians and assessments of the situation by many Russian experts, they believe that the EU will have little choice: it may reduce its energy import, primarily of gas from Russia, but will not seek to terminate it completely for a number of political and economic reasons, including implicit human instinct of self-preservation. The Russian government and Gazprom apparently believe that large-scale contracts on gas supplies to China, concluded in 2014, provide Russia with a very strong leverage with regard to Russian gas supplies to the EU. Speaking at the conference in Berlin, in April 2015, Gazprom CEO Alexei Miller said: “In the near future the Asian market will become a crucial factor for the European gas market”. In his words, Gazprom is ready to increase its supplies to the European market, but in exchange for guarantees of long-term demand. Otherwise, Gazprom will switch its gas to the Asian markets (http://tass.ru/ekonomika/1899923). The optimistic mood of Russia appears to be based on the belief of most Russian politicians and many experts that energy prices will go up soon.

Key projects to transport gas and oil from Eurasia to the EU via Turkey

Turkish Stream project

In December 2014, Russian President Vladimir Putin came to Ankara and proposed to build a natural gas pipeline to Turkey across the Black Sea with capacity of 63 billion cu m, of which 16 billion cu m will be bought by Turkey and the rest will be transported to Europe. After signing a memorandum of understanding with Turkish state-owned gas company Botas, Alexei Miller, the head of Gazprom, announced: “The South Stream gas project is dead”. Both, Russian government and Gazprom stated that the new pipeline will replace the South Stream gas pipeline which had been under discussion with the EU since late 2000s and was projected to connect Russia with Bulgaria and then go further into Europe. Gazprom had put very high stakes on the South Stream project in a hope to control its infrastructure through a network of joint ventures (with 51% of them belonging to Gazprom) in the transit European countries. However, this plan contradicted with the EU regulations of the European energy markets (the Third Energy Package). Years of talks have not brought Gazprom a desirable result – an exemption from the Third Energy Package regulations. The tension between the West and Russia following the Ukrainian crisis apparently made Russians give up the South Stream project and opt for a new pipeline project which they believe to be less exposed to the EU regulations and sanctions.

Analysis of statements and comments on the Turkish Stream project made by Gazprom CEO Alexei Miller over the period of December 2014-April 2015 give outlines of Gazprom’s strategy with regard to this project in the following way.

Gazprom declares that it has started construction of the Turkish Stream pipeline[*] without reaching a legally binding agreement with Turkey and without consultations on the project with the EU, and it plans to complete the first stage of the project by the end of 2016. The pipeline is to reach full capacity (4 lines) by the year 2020. The terminal point of the pipeline will be the Turkish-Greek border. For further connection of the pipeline, Gazprom leaves two options for the EU: the first is to construct all necessary transportation infrastructure from the Turkish-Greek border across South-Eastern Europe on its own, and the second is to admit Gazprom to construct this infrastructure, in accordance with the Third Energy Package rules, but with guarantees to Gazprom of long-term gas purchases. Speaking at a conference in Berlin, in April 2015, Alexei Miller stated that if the EU does not provide a clear answer to these proposals, Gazprom will go on with construction anyway, and after 2019 it will terminate completely its gas transit through Ukraine. According to his speech at the conference, if the EU does not accept a scenario from the above two, Gazprom can partially compensate the EU cuts in the volume of its gas delivery due to termination of gas transit via Ukraine by increasing gas shipments to

[*] In early May 2015 Gazprom CEO Alexei Miller said that the construction of both land and subwater parts of the pipeline “is going in accordance with the schedule” (https://news.mail.ru/economics/21955798/?frommail=1).

Europe through OPAL gas pipeline, a land section of North Stream pipeline, provided that the EU authorities will agree to that[*]. However, even if OPAL is used at its full capacity (35 billion cu m), it will not be able to fully compensate a complete termination of Russian gas transit through Ukraine (60 billion cu m in 2014). Alexei Miller's speech implies that Gazprom is very much determined to terminate its gas transit via Ukraine and after 2019 may unilaterally terminate gas supply agreements with the EU countries which receive Russian gas via Ukraine, and that Gazprom is ready to accept a reduction of its gas supplies to the EU till the EU constructs a pipeline to a would-be terminal point of the Turkish Stream on the Turkish-Greek border. "Our competitive advantage is that we can take and keep a pause (in gas deliveries to the EU. – I.B.), if necessary. And we will keep this pause if we are forced to do that… We will construct it (the Turkish Stream pipeline. – I.B.) and will wait", Gazprom CEO said (http://tass.ru/ekonomika/1899923). This stand is fully supported by the Russian Energy Ministry. "All our efforts are focused on construction of gas transportation infrastructure to Turkey, to the Turkish-Greek border and delivery of gas through this route to consumers in South Eastern and Central Europe", said Russian Energy Minister Alexandr Novak at the conference in Berlin (http://top.rbc.ru/business/13/04/2015/552bbb239a7947528538f07e). Sergei Chizhov, president of the Russian Gas Union, sees the situation in the following way: "In my view, we will reach agreements (with the South East European countries. – I.B.) on supplies of gas and oil but these agreements have to include a clause on collecting Russian gas from Turkey in future. It will be easier to come to accords with the European Commission when several EU member states will have framework agreements (with Russia. – I.B.)… Gazprom has a leverage in the form of an ultimatum to the Europeans to ensure technical capacities of collecting gas from a gas hub on the Turkish-Greek border" (http://expert.ru/2015/02/17/pochemu-vengriya-storonnik-turetskogo-potoka/?n=171).

In the above strategy Turkey plays the key role. However, the problem is that the legal basis for the project has not advanced beyond the memorandum of understanding. The talks between Russia and Turkey on the project have been slow-going, as Turkey persistently asks for major discounts off the price of gas. It seems that the Turkish authorities have other reservations and reasons for not rushing the Turkish Stream project. "The issue is not Turkish Stream alone, this is a whole package for Turkey's energy needs. We need to be a little bit patient," said Energy Minister Taner Yildiz. "Russia is very keen but it's very likely that [Turkish Stream] will be delayed to at least 2017," one Turkish industry executive said (Russia-Turkey Axis Could Ruin EU Pipeline Plans). In implementing gas transportation projects from the Caucasus and, prospectively, Central Asia, Turkey is pursuing the status of the buyer of major amounts of gas with subsequent reselling to the EU. This problem may arise with regard to the Turkish Stream project as well. As experts also point out that Turkey may press for a better price not only for gas to be transported from Russia through would-be Turkish Stream but also for gas transported through the Blue Stream gas pipeline and it may push for better term of ship-or-pay gas transportation agreements. The current economic crisis in Russia makes any significant price concession a very painful decision.

Some Russian experts warn that by putting very high stakes on the Turkish Stream project Russia makes itself dependent upon Turkey on a number of political issues. According to Gevorg Mirzayan, one should not exclude that Turkey may seek to play its transit card to make Russia change its stand on Nagorno-Karabakh, Armenia and the Caucasus at large. "It is a big question if Russia needs such an ally in strategic projects", he warns, "however, if the EU does not change its stand on the South Stream project Russia will have no other option in its gas transit" (Mirzayan, 2015, May 5).

The EU officials repeatedly expressed their concern about the project. One Western diplomat in Ankara said the wrangling over Turkish Stream was more about a tussle between Brussels and Moscow over maintaining influence over Turkey. "People are realizing more and more that Russia is a lost cause and that we need to find more allies to the east and south. Turkey is number one," the diplomat said. "Russia is drawing Turkey into its orbit, and if it is not stopped now, then it may be too late" (http://www.voanews.com/content/reu-russia-turkish-stream-gas-pipeline/2676370.html). Some EU officials express their concern that by using its strategic geopolitical location in terms of alternative gas and oil supplies routes Turkey may try to get ahead in negotiations with its EU partners in unrelated areas (Öğütçü, M. 2013, October 14). Some experts point out that EU officials may feel unhappy to switch from energy supply dependence on Russia to energy transportation dependence on Turkey and this concern can make the EU speed up talks on alternative delivery routes which bypass land Turkey, for instance, via Georgia and the Black Sea (Badykov, N. 2014, December 23).

The EU repeatedly stressed its great interest in safeguarding Ukraine's present status of the major gas transit country for Russian gas. The EU Energy Union package puts forward this goal quite clearly: "Particular attention will be paid to upgrading the Strategic Partnership on energy with Ukraine. This will address issues related to Ukraine's importance as a transit country as well as those related to Ukraine's energy market reforms, such as the upgrade of its gas network, the setting up of an appropriate regulatory framework for the electricity

[*] Presently, OPAL gas pipeline operates at 50% of its capacity due to the restrictions imposed by the Third Energy Package.

market and increasing energy efficiency in Ukraine as a means of reducing its dependence on imported energy" (European Commission. Energy Union Package). The US is fully behind this stand: "The EU must take a firm stand in enforcing the responsibility of Russia to comply with its contract to deliver gas to Ukraine, a responsibility that Putin seems to have deliberately neglected over the last six months. Further, Russia must not use its bilateral dispute with Ukraine as an excuse to disrupt gas delivery to Europe" (Polak, P. 2014, December 1). Maros Scefcovic, Vice President of the European Commission in charge of Energy Union, commented on the Turkish Stream as a complete alternative to the transit via Ukraine in the following way: "If everything will change like this, I do not think that it is a common procedure and that such a big customer like the EU should be treated like that" (http://top.rbc.ru/politics/17/03/2015/5508113a9a79475f7c9219de).

Nevertheless, Gazprom apparently hopes to co-opt Turkey to the project. By 2017, according to expert estimations, Turkey's gas demand will outstrip current contracted import volumes. Supplies from Azerbaijan, Iran or northern Iraq will not come on line by this time. Besides, securing gas supplies at a discounted price, significant transit fees and a prospect to become a gas hub for South Eastern Europe, Turkey may get other benefits should the project be implemented. For instance, according to Turkish energy specialist Muhdan Saglam, another significant, indirect consequence of the sale of Russian gas to Europe via Turkey may be an improvement in transit relations between Turkey and Greece, fueling hopes for possibly reaching an agreement over underwater energy reserves found in the Eastern Mediterranean. Such improvements in bilateral relations not only align with both Turkey's and Russia's interests in foreign policy, but could also help strengthen Greece's role in gas exports to Central Eastern Europe (Gafarli, O, 2014, December 17). Some experts also point out that Russian gas can be connected with the would-be Trans-Anatolian Natural Gas Pipeline (TANAP), as Azerbaijan will not be able to feed this pipeline to its full capacity and prospects for Turkmenistan's gas to feed TANAP are very uncertain (Russia-Turkey Axis Could Ruin EU Pipeline Plans).

Thus, the Turkish Stream project is a lot of politics, but it is not all politics. There are other important factors to be taken into account. One of them is financing the project. Normally, the projects of that scale are financed mostly with bank loans. For instance, the Nord Stream project, the 1, 222 km long gas pipeline from Russia to Germany, constructed in 2011-2012, by 70% was financed by loans provided by the European banks and the rest 30% of the financing was raised through equity capital provided by shareholders in proportion to their stakes in the project (51% - Gazprom and 49% - two German, one Dutch and one French energy companies).

According to Russian Energy Minster Alexandr Novak, the cost of just underwater works on the Turkish Stream project is estimated at 17 billion euros (http://top.rbc.ru/politics/17/03/2015/5508113a9a79475f7c9219de). Ruble devaluation, occurred in 2014, resulted in a jump of domestic prices for metal production, including pipes, for 25% up in 2014 only (http://www.vedomosti.ru/business/articles/2015/02/02/truba-v-kopeechku). This may affect the price of pipes for Gazprom's projects as well.

Although Gazprom has not been subject to Western economic sanctions, experts point out that it will not be easy for the company to raise funds in the West sufficient for financing the project or interest rates can be very high.

In addition to the construction of the Turkish Stream, Gazprom has committed to construct and commission a number of major natural gas pipelines from Russia to China within the next 4-5 years. The cost of the largest of it, Power of Siberia, 4, 000 km long with capacity of up to 60 billion cu m, is estimated at between 55 and 70 billion dollars. Experts say that the final cost of its construction may be even higher and the first line (32 billion cu m) is planned to start gas shipping in 2018. The cost of construction of 2, 700 km long Altai gas pipeline, with planned operation in 2019, is estimated at between 4,5-5 up to 10-13 billion dollars. The project to construct a third gas pipeline from the Russian Far East region to China is currently under discussion. Some experts estimate its cost at 30 billion dollars (http://www.gazeta.ru/business/2014/11/09/6295325.shtml).

Initially, it was expected that China will provide a $25 billion loan or prepayment to help Russia to finance field development and pipeline constructions. However, after signing the contract on Power of Siberia, Gazprom CEO Alexei Miller said that there will be no advance payment from China and Gazprom will finance the project from its own sources.

Most gas to these pipelines will be fed from new gas fields in East Siberia which also require multi-billion investments simultaneously with the pipelines' construction. Funding these projects through tax incentives may further slow down economic growth in Russia, some Russian experts warn (http://www.gazeta.ru/business/2014/07/09/6107453.shtml). China may provide some financing for these projects, but the history of Russo-Chinese talks on gas price which lasted from the year 2003 up to December 2014 has proven that China is an extremely hard bargaining negotiator.

The Russian government and companies have undertaken massive efforts to replace Western financing with the one from Asia, primarily from China. However, these efforts have not brought significant tangible results so far. China looks interested in expanding its economic cooperation with Russia, but many experts believe that this may take rather long time and full replacement of Western financing with the Chinese one is not possible at least for the foreseeable future.

As Russian expert Alexandr Gabuev points out, no breakthrough in Russo-Chinese energy projects, except for Power of Siberia, has been made so far; “Chinese have not entered as majority shareholders into oil and gas projects (in Russia. – I.B.)…. In face of threat of new economic sanctions by the West against investors in the Russian energy industry, unstable oil prices and often changing tax regime in Russia … Beijing does not rush to make decisions” (on investments in Russian oil and gas industry. – I.B.) (http://lenta.ru/articles/2015/05/12/ximoscow/). The cost of Asian financing is very likely to be higher than the cost of Western one. However, with the tension between Russia and the West mounting, the mood of the Russian political leadership may evolve towards much more reliance on China.

Gazprom has a very good reason to count on generous support from the Russian government. However, the economic crisis which hit Russia at the end of 2014 put stern limits on the government’s funds. Suffice it to say that in March 2015, Rosneft alone, the largest Russian state-owned oil company, applied for a financial support from the government in the amount of 1. 3 trillion (1,300 billion) rubles, which exceeded 20% of Russia’s National Wealth Fund[*]. Other major Russian state-owned and private companies and banks are also asking for help from the Russian government and some of them have a lobbyist potential equal to that of Gazprom. Some Russian experts warn that the National Wealth Fund can be completely depleted in 2016, if oil prices stay low and economic sanctions against Russia go on (http://slon.ru/posts/49458).

In addition to a submarine section of the Turkish Stream pipeline, which Gazprom promises to finance on its own, this project includes construction of an on-shore section of 250 km long to the Turkish-Greek border. Turkey is very likely to seek to obtain a large share in this section or to own it completely. But will Ankara be able to finance it? The period 2015-2019 is expected to be a decisive time for construction of the Trans-Anatolian Natural Gas Pipeline (TANAP). Currently, the Turkish state-owned companies BOTAS and TPAO are the founding members of the TANAP consortium with 15% and 5% of shares respectively, and by the completion of the TANAP, BOTAS plans to increase its share up to 30% which will require financing.

Gazprom, however, displays its confidence about its financial capabilities: In April 14, 2015, its CEO announced that the company will increase its investments in 2015 to reach more than 1 trillion rubles (approximately 20 billion dollars), 20% up as compared with the year 2014. The largest part of investments, 277 billion rubles will be spent on the Turkish Stream project, with the Power of Siberia project to receive only 31 billion rubles (http://kommersant.ru/doc/2709146). In 2015, Gazprom will pay out 92% of its profits in 2014 as dividends.

Some Russian experts point out that Russian oil and gas pipelines are much dependent on some important Western technologies (http://slon.ru/economics/esli_gazprom_cherez_4_goda_postavit_gaz_v_kitay_eto_budet_prosto_podvig_v_kvadrate-1104841.xhtml). The Nord Stream gas pipeline is equipped with Western-made compressors whose capacities are critical for gas transportation. Russia is unable to manufacture compressors of comparable capacities. Russkaya compressor station, the starting point for the Turkish Stream pipeline, is equipped with Western made compressors. As Mikhail Korchemkin, director of East European Gas Analysis Company, points out that it is only Western companies which can provide special technologies and pipe-lay ships which are indispensable for construction of the Turkish Stream (Serov, M. February 17, 2015). So, technical infrastructure of existing and would-be gas pipelines from Russia is exposed to Western economic sanctions, should these sanctions continue or, let alone, toughen.

The Russian Industry and Trade Ministry has set the target to reduce the share of import of oil and gas equipment from current 60% down to 43% by the year 2020 and down to 10% by the year 2035, provided that the government will massively support Russian manufacturers of such equipment (http://www.tpp-inform.ru/economy_business/5616.html). However, such ambitious targets are hard to reach, especially in terms of making Russian-made energy equipment comparable to Western-made one in terms of productive capacity, duration and serviceability. The current dependence of Russian companies on Western software related to oil and gas exploration, production and transportation is about 90%. Since 2000s, Russian oil and gas companies bought ready-made equipment and manufacturing licenses from the West and did not make significant investment in their own R&D divisions (http://top.rbc.ru/business/20/10/2014/5444eceecbb20f20bf739a4a).

[*] According to the Russian Finance Ministry, by March 1, 2015, The National Wealth Fund amounted to 4. 59 trillion (4, 590 billion) rubles. http://www.minfin.ru/ru/perfomance/nationalwealthfund/statistics/?id_65=27068&order_65=M_DATE&dir_65=DESC&page_65=1

During the first 5 months of 2015 import of machine-building products and equipment to Russia fell down much more dramatically than the country's industrial output.

Indicator	**As compared with 2014**				
	January 2015	*February 2015*	*March 2015*	*April 2015*	*May 2015*
Industrial output	+0,9%	-1,6%	-0,6%	-4,5%	- 5,5%
import of machine-building products and equipment to Russia	-44,6%	-33,5%	-36,7%	-46,6%	
Domestic output of machine-building equipment	0,1%	- 2,8%	- 1,9%	-6,5%	- 8,3%

Sources: https://slon.ru/posts/51641; http://newdaynews.ru/economy/533493.html; http://www.gks.ru/bgd/free/B04_03/IssWWW.exe/Stg/d05/115.htm

If this trends persists there is a risk to undermine import-substitution policy announced by the government. Presently, neither China, nor any other country is capable of replacing the West as the source of high capacity modern oil and gas hardware and software.

The list of major Russian companies capable of implementing large-scale construction of oil and gas pipelines is quite short. In November 2014, Gazprom management board member Vladimir Markov admitted: "We are facing the shortage of Russian pipeline construction companies. This is a problem in all projects. We have contracted all those who can work" (http://finance.rambler.ru/news/economics/157489593.html). As some experts point out that Gazprom faces a double risk: one is to place major contracts with few contractors who can be overloaded and fail to do work according to schedule and the other one is to distribute contractual works among too many middle and small contractors with limited capacities and hard to be keep under full control in terms of quality and schedule.

What are the forecasts of Russian experts on the future of the Turkish Stream project?

Konstantin Simonov, head of the NESF, believes that Gazprom is very much determined to terminate its gas transit via Ukraine and will push the Turkish Stream project to top priority, even if it loses a part of its revenue from sales to the EU. In his view, if the EU does not construct a pipeline network to be connected with the Turkish Stream terminal on the Turkish-Greek border by the year 2020, it will face a very serious gas shortage because neither Azerbaijan, nor Iran will be able to supply their gas to the EU in quantities the EU needs (http://www.gazeta.ru/business/2015/04/13/6637905.shtml). Ruslan Tankayev of the Russian Union of Oil Industrialists believes that the EU, technically, can build all necessary gas transportation infrastructure to the Turkish-Greek border within the time schedule set by Gazprom. According to Vyacheslav Mischenko, the contracts between Gazprom and its EU partners "must be revised (in terms of changing the transit from Ukraine to Turkey. – I.B.)" and Gazprom is in advantageous position in these negotiations due to no real alternative to its gas supplies (http://www.gazeta.ru/business/2015/01/22/6383865.shtml).

However, there are skeptical assessments of the project's prospects, at least for the near future. Some of them point out that Gazprom has not reached any tangible and legally binding agreement with the key countries for the project – Turkey and Greece. This may lead to a delay in implementation of the project beyond the year 2019 by which Gazprom wants to terminate its transit via Ukraine completely and force the EU to take its gas from the Turkish Stream. For financial reason, Gazprom cannot afford a complete termination of gas transit via Ukraine before the Turkish Stream is put in full operation (http://www.kommersant.ru/doc/2708580).

Pavel Zavalny, president of the Russian Gas Society[*], admits that Gazprom will continue to use gas transit via Ukraine if Gazprom's share on the European gas market is guaranteed at the level of 30% (Nikiforov, O. April 14, 2015). Mikhail Korchemkin, head of East European Gas Analysis Company, also believes that Gazprom may continue using gas transit via Ukraine (http://www.gazeta.ru/business/2015/04/13/6637905.shtml).

Sergey Agibalov, senior expert of the Energy and Finance Institute, assumes that the project will be realized only partially: by the year 2020, not 4 but only 2 pipelines, at best, will be constructed, with total capacity of 33 billion cu m, and Gazprom will continue to use its Ukrainian transit (http://www.gazeta.ru/business/2015/01/22/6383865.shtml). Some experts, who share this assessment, add that

[*] http://www.gazo.ru/

Gazprom will use the talks with the EU on its Ukrainian transit to obtain an exemption from the Third Energy Package of North Stream-OPAL gas pipeline and a right to use it at its full capacity (http://teknoblog.ru/2014/12/18/29387). If Gazprom succeeds with this, the amount of gas to be shipped through the Turkish Stream will be substantially smaller than it was initially announced.

One should not completely exclude a scenario, in which Russian gas shipped to Turkey will feed the TANAP pipelines or even the ones of Nabucco (if the latter is constructed). However, presently, this scenario looks the least acceptable to Russia because it implies that Gazprom loses its status of the largest gas supplier to the EU and will have to conform amounts of its gas supplies by this pipeline to other gas suppliers – Azerbaijan, Turkmenistan and, probably, Iran. The strategy of the EU of reducing Russian gas share on the EU market and bitter experience of Russian gas transit via Ukraine apparently make Russian government officials and Gazprom top executives fear that the EU may discriminate Gazprom from access to a gas transportation network over which Gazprom has no control.

Projects to transport gas and oil from the Caucasus and Central Asia to the EU via Turkey

In pursuing its strategy of energy supply diversification the EU puts a major stake on increasing gas and oil supplies via Turkey from the Caucasus, namely, Azerbaijan and the countries of Central Asia – Turkmenistan and Kazakhstan, Iran and, prospectively the Middle East countries, primarily Iraq. On the focus of this strategy the EU has put the Southern Gas Corridor initiative. Initially, its top priority projects included the Interconnector Turkey–Greece–Italy (ITGI), Georgia-Ukraine-EU gas pipeline (White Stream) and Nabucco pipeline, with Trans-Adriatic Pipeline (TAP) added later. However, presently the project of Trans Anatolian Natural Gas Pipeline (TANAP) has moved to the forefront of the EU policy of securing gas and, to less extent, oil supplies via Turkey. On 26 June 2012, President of Azerbaijan Ilham Aliyev and Prime Minister of Turkey Recep Tayyip Erdogan signed a binding intergovernmental agreement on the pipeline. The construction of the pipeline started in March 2015. The cost of the project is estimated at 10-11 billion dollars. According to the plan, by completion of its first stage in 2018, the pipeline will have capacity of 16 billion cu m and will be increased up to 23 billion cu m by 2023 and up to 31 billion cu m by 2026, and at the final stage up to 60 billion cu m will be able to transport additional gas supplies from Azerbaijan and from Turkmenistan, if the Trans-Caspian Gas Pipeline is constructed. The capacity of the TANAP will be increased by adding parallel lines if additional natural gas supplies are available. In fact, this pipeline will be an expansion of the South Caucasus Pipeline (Baku–Tbilisi–Erzurum Pipeline), a natural gas pipeline which was put in operation in 2006. It will be connected to Trans-Adriatic Pipeline (TAP) and one branch of it may go to Bulgaria. It is very likely that after TANAP is constructed, it will be added oil transportation pipelines, as it occurred in the case of Baku-Tbilisi-Ceyhan oil pipeline.

In contrast with the North Stream and South Stream, the EU has fully endorsed TANAP project and has exempted it (as well as TAP) from the Third Energy Package regulations. This decision has provoked a huge indignation of the Russian government and Gazprom, which accused the EU for pursuing the policy of intentional discrimination of Gazprom. The EU also has committed to provide all necessary finance to the project. Therefore, in terms of its legal basis and funding, TANAP project looks far more secure than the Turkish Stream project. However, it may face very serious obstacles which may dramatically cut amount of gas available for it, even making its implementation impossible. The core of these obstacles is a set of smoldering conflicts which may rekindle and turn into real wars on territories which existing and would-be gas and oil pipelines pass through.

The major of these conflicts is 26-year long conflict between Armenia and Azerbaijan over the Nagorno-Karabakh territory. After a long period of relative calmness, the conflict sparked off again recently and relations between the two countries came back to those resembling early 1990s, when armistice was regularly broken with military clashes. Over 20 years since the ceasefire agreement which was brokered by Russia, Azerbaijan has built up a much larger economic, financial and military potential as compared with Armenia whose economy has been in stagnation for almost all post-Soviet decades. If projects of large-scale oil and gas transportation from Azerbaijan and via its territory (from the Central Asia) are implemented, the temptation for Baku to bring back the Nagorno-Karabakh can rise fast. Russia has a military cooperation and defense treaty with Armenia and big military base there. Azerbaijan has strong cooperation with Turkey, a NATO member country, and the prospect of improving its relations with the EU and the US if gas and oil transportation projects via its territory, alternative to gas pipelines from Russia, are implemented. Although a new full-fledged war between Armenia and Azerbaijan is not inevitable, local military operations and raids of both parties of the conflict will put the projects under very high risks and can make the EU look for other sources and routes of energy supplies.

Another potentially explosive problem is recurrent political instability in Armenia with the opposition to the ruling regime of President Serj Sargsyan leaning more on the West. The mentality of the Armenian society due to the deep trauma of 1915 massacre makes most ordinary Armenians and the major part of the country's political elite rely on Russia as the ultimate protector. However, after the overthrow of pro-Moscow President Yanukovich in Ukraine in 2014, Russia reacts very nervously to any Western activity with regard to Armenia and other Trans-Caucasian[*] states. In this sense, Russia's reaction to the visit of Victoria Nuland, Assistant Secretary of State for European and Eurasian Affairs at the United States Department of State, to Armenia, Georgia and Azerbaijan in February 2015 was remarkable. It was covered in Russian media with streamers like "Blitz: US cook Maidan[†] in Armenia", "Armenia: Next color revolution being cooked" (http://rusvesna.su/news/1424294629; http://ren.tv/novosti/2015-03-15/sleduyushchuyu-cvetnuyu-revolyuciyu-gotovyat-v-armenii). A senior expert of the Russian Institute of Strategic Studies argues that "instead of a frontal attack, the US and the EU seek to weaken Russia along all azimuths of Russian borders. The assistant secretary has come to make troubles for Russia to settle which Moscow will have to spend its resources. Fueling the Nagorno-Karabakh conflict is just one of such attacks" (http://svpressa.ru/politic/article/114206/). According to Mikhail Aleksandrov, senior expert on military-political studies of the Institute of International Relations (MGIMO), Armenia is considered by the West as a "weak link" to be exploited for destabilizing the situation in the Trans-Caucasus. If the West finds that the pro-West local opposition in Armenia is not strong enough to make an "orange revolution", he argues, the US will seek to provoke an armed confrontation between the government and opposition with a next step "to nudge Baku to use this "beneficial" situation to solve the Nagorno-Karabakh problem by force" (http://www.rosbalt.ru/exussr/2015/02/24/1371142.html). Therefore, in case a political tension rises in Armenia and the West cultivates strong relations with local civic society activists and NGOs, who are perceived in Russia as "agents of the West", Russia's reaction may be targeted at what it sees as vital interests of the West in the region.

The military conflict with Russia in August 2008 and the subsequent process of integration of former Georgian territories of Abkhazia and South Ossetia to Russia, coupled with Georgia's rather advanced relations with the EU and the US, have made Russo-Georgian relations recurrently very tense. In mid-February 2015, Russian Minister Sergei Lavrov made a stern warning to Georgia with regard of its policy of close cooperation with the NATO.

In February 2015, Lenta.ru, a leading Russian online news agency and news portal, published a series of articles by and interviews with Mikhail Chernov, a senior expert of the Center for Political Conjuncture[‡] and a special envoy of the Association of Cross-Border Cooperation to the countries of the Caucasus and Central Asia (Chernov, M. 2015, February 4; 2015, February 7; 2015, February 26) He describes Russia's likely policy towards Georgia and in the Trans-Caucasus in the following way.

The military-political situation in the Trans-Caucasus may force Russia to take actions without waiting for a full deployment of NATO bases in these countries and particularly in Georgia, whose relations with the NATO are most advanced. Whatever presence of NATO in the countries of Trans-Caucasus, be it just a military training camp, is absolutely unacceptable for Russia and will be considered as a direct military threat. Continuous activities of the West in Georgia can make Russia take pre-emptive actions against Georgia. Russia has learnt how to use indirect policy tools in addition to military force. Georgia has a lot of inter-ethnic conflicts which can be easily exploited by Russia. After 1991, tens of thousands of ethnic Ossetians have been pushed out of their traditional areas of population and many of them have left for Russia. Public organizations and political parties of South and North Ossetia may and should press for these territories to be brought back to them. Ethnic Armenians, populating the Javakheti region of Georgia do not like the prospect of the NATO to come to Georgia. They like expansion of cooperation between Russia and South Ossetia and Abkhazia. The ethnic group of Mingrelians, a specific subethnic group of Georgians, "connect their future" with Russia. A number of ethnic Chechens and Avars, living in some areas of Georgia have already received Russian passports. Russia can conclude treaties with them modeled on those concluded recently by Russia and Abkhazia and South Ossetia which, in fact, made them independent of Georgia. These territories can be used to pave a direct land route from Russia to Armenia. Russia may also employ different economic approaches towards different regions of Georgia, encouraging their distancing from Tbilisi. So, if Georgia moves on with its policy of military cooperation with the West, it can break up. Pressure by the West on Russia to recall its recognition of Abkhazia and South Ossetia, according to Chernov, is a policy of provoking a real war in the Trans-Caucasus. "The US

[*] In Russia, the term Trans-Caucasus covers three states – Armenia, Azerbaijan and Georgia. Sometimes, these states are also called South Caucasus ones.

[†] Maidan of Independence – the central square in Kiev, Ukraine, where major opposition rallies against President Yanukovich were held in 2013. In Russian media, the term "Maidan has become a synonym of an overthrow of a regime in a former Soviet Union country masterminded and carried out with support by the West. The synonyms are "orange revolution" or "color revolution", because orange color was the symbol of pro-West opposition in Ukraine to pro-Russian President Yanukovich.

[‡] http://conjuncture.ru/about/

need a new war in the Trans-Caucasus and the worsening of political and inter-ethnic situation in the regions", he argues.

Not all Russian experts take as a tough stand as Chernov. In the view of Alexandr Skakov, another expert of the Center for Political Conjuncture, as long as Georgia does not join the NATO, Russia will limit its policy of consolidating relations with Abkhazia and South Ossetia. It is not Georgia but a possible resumption of hostilities between Armenia and Azerbaijan is the top concern of Russia in the region, keeping in mind political and military guarantees provided by Russia to Armenia (http://conjuncture.ru/frontnews-ge-09-02-2015/). However, recent warnings to Georgia by senior Russian officials are very stern. Speaking at a conference in Moscow in mid-April 2015, Chief of Staff of the Russian Armed Forces General Vladimir Gerasimov said: "Within the framework of long-term agreements with Abkhazia, Armenia… and South Ossetia the might of Russian military bases on their territories has been increasing". In his words, the countries who take part in anti-Russian moves "will not be able to feel secure" (https://news.mail.ru/politics/21745354/?frommail=1). The hard alternative for the countries of the region is put point blank by Rosbalt, Russian news agency: "Americans have been digging pits for the states of South Caucasus which seek for a balance between different centers of power…Russia, on its part, is also digging pits, otherwise it will break the parity of efforts, taken by the two poles of force in South Caucasus. The question is in which of these pits the South Caucasus states will fall in paying a high price for their geographic location and for the battle for them between Russia and America" (http://www.rosbalt.ru/exussr/2015/02/24/1371142.html).

It looks like that a geo-political stalemate is formed in the Trans-Caucasus. The West does not trust Russia and seeks to secure its political and economic interests through expanding its influence in Georgia, Azerbaijan and, partially, Armenia. Russia also has a deep mistrust for the West and considers its policy in the region as a continuation of the "orange revolution" policy which resulted in overthrow of President Victor Yanukovich in Ukraine and can go as far as to retaliate with moves which already resulted in separation of Abkhazia and South Ossetia from Georgia in 2008 and an armed conflict in southeast Ukraine. This situation may put insurmountable obstacles on the way of implementation of TANAP project and force the EU to make fundamental changes in terms of routes for its alternative energy supply.

If even TANAP is put into operation in strict accordance with the schedule, by 2023 it will be able to ship only 23 billion cu m of natural gas. A large part of this volume, if not the major one, will be taken by Turkey and the EU will receive an amount which will not help it to advance far in terms of diversification of its present natural gas supplies. Therefore, from the very beginning, the idea of natural gas supplies from other parts of the former Soviet Union as an alternative to Russian natural gas supplies, has been focused on connecting the gas (and, prospectively, oil) pipelines, starting from Azerbaijan, to gas and oil pipelines from the Central Asian countries, the most important among which are Turkmenistan (ranked 4th in terms of proven natural gas reserves and 28th in terms of proven oil reserves) and Kazakhstan (ranked 22^{h} in terms of proven natural gas reserves and 12th in terms of proven oil reserves) (http://www.businessinsider.com/countries-with-most-energy-reserves-2014-2?op=1). According to other estimations, proven natural gas reserves should put Kazakhstan in 18th position and Uzbekistan in 19th position (http://en.wikipedia.org/wiki/List_of_countries_by_natural_gas_proven_reserves). The discussions of this opportunity goes as far back as to early 1990s. However, with TANAP leaving the station, the issue of ensuring gas and oil supplies from the Central Asia has come to a practical agenda for the EU.

Experts debate on exact amount of gas and oil reserves extractable in the countries, a likely split of their gas and oil export between the EU and China, and as the latter is currently the major purchaser of it estimate different time schedules for these resources to become available for outer markets.

However, as in the case of TANAP, or even to a much greater degree, the destiny of Trans-Caspian Gas Pipeline and of Trans-Caspian Oil Transport System seems to be determined by the geopolitics of the Caspian Sea region.

As early as in 2006, in his book "Energy Superpower" Konstantin Simonov described Russia's strategic interests in the Central Asia and the Caspian Sea like this:

to ensure its control of transportation of hydrocarbon energy supplies to global markets;

to prevent a scenario under which Central Asia becomes major energy supplier to Europe, US and China alternative to Russia;

to prevent a scenario under which China becomes the dominant power in the region;

to reassert Russia's status of informal leader in the region and the model for the post-Soviet states there.

Russia's policy of deterrence with regard to China's economic expansion in the Central Asia has failed. Today, China is the major provider of finance, the major buyer of their oil and gas and a major economic partner of the countries of the Central Asia. Yet, China's political influence in the Central Asian countries is rather limited.

In order to prevent major oil and gas supplies from these countries to the European market via routes bypassing Russia, Moscow has proven to be quite effective. It is only Kazakhstan who has managed to ship a minor part (about 20%) of its total oil export to the EU by a route alternative to the one through Russia*. This route is expensive, logistically complicated and environmentally risky: crude oil is loaded onto tankers or barges at Kazakhstan's port of Aktau or the smaller Atyrau port and then shipped across the Caspian Sea, where it is loaded into the Baku-Tbilisi-Ceyhan pipeline for onward transport to Europe.

From logistical and financial aspects, transportation of oil and gas through subwater pipelines crossing the Caspian Sea is the optimal way. As the experience of Blue Stream and North Stream pipelines has proven, environment can also be protected provided that high standards and modern technologies are used. The main stumbling block on the way of similar projects across the Caspian Sea is the lack of agreement among 5 coastal countries of the Caspian Sea on its legal status and the rules to use its resources, water space and sea bed. A lot has been written on this issue. So, I will just remind the general framework.

Ever since the breakup of the Soviet Union, Russia and Iran, as legal successors to the signatories of the 1921 year treaty (Soviet Union and Persia respectively) which fixed the rules for the use of the Caspian Sea, have insisted that a new treaty on the sea must be signed by all coastal countries, i.e. Russia, Iran, Azerbaijan, Kazakhstan and Turkmenistan. As long as such a treaty is not signed, they insist that no coastal country must take any unilateral steps which may affect other parties' interests, specifically, such as a construction of pipelines across the sea. Russia has been especially insistent on that. More than 20 years of talks on the treaty have brought no results. So, it is of significant interest and importance to analyze statements, views and assessments of Russian politicians and experts on the prospect of construction of trans-Caspian oil and gas pipelines.

Commenting on the stand of Russian President Vladimir Putin towards the idea of Trans-Caspian gas pipeline which connects Azerbaijan with Turkmenistan and is backed by the EU, Yuri Ushakov, Russian President's assistant, said: "Vladimir Putin has explained the legal aspect of the Caspian issue: any decision whatsoever with regard to the Caspian Sea must be taken only on the basis of consensus of the "Caspian five" (all coastal countries. – I.B.). Otherwise these will be illegitimate and the EU must take that into account" (Mednikov, A. 2015, March 4). To make its reasons sound more persuasive, Russia has adopted the program of strengthening the capacity of its Caspian Sea navy flotilla: by the year 2020 it will receive 20 new warships (http://slon.ru/world/kak_rossiya_spasaet_kaspiyskoe_more_ot_nato-1171066.xhtml). Russia's flotilla is the strongest in the Caspian Sea with Iran's naval power coming the second and other coastal countries lagging far behind, but quickly increasing their expenses for their military potential in the sea.

Actually, no Russian expert expects that the present deadlock on the Caspian Sea status will be overcome in the foreseeable future. Therefore, the question is how the coastal countries who have the greatest interests in transportation of its hydrocarbon fuel to the EU and can benefit mostly from connecting their oil and gas resources with TANAP, after the latter is completed, may act.

"Legally, the stands of Turkmenistan and of Azerbaijan (on transportation of oil and gas across the Caspian Sea. – I.B.) are vulnerable, but Russia does not have much leverage with regard to them. Russia already concluded agreements with Azerbaijan and Kazakhstan which made possible to start developing reserves in the northern part of the sea. Baku and Ashgabat may act similarly, although they have a dispute between them over some oil fields… The recent initiatives by Turkmenistan show that the stand of Moscow does not determine the one of Ashgabat. The authorities of the republic (i.e. Turkmenistan. – I.B.) have been listening increasingly attentive to statements made by the West and with the South Stream project, patronized by Russia, having been cancelled, they talk more often on the need for a new southward gas corridor…" (Mednikov, A. 2015, March 4).

However, many Russian experts are sure that Russia has a very strong leverage with regard to competitors of Russian gas and oil in the Caspian basin and it should resolutely in promoting its strategic goal which is to prevent energy supplies across the Caspian Sea alternative to Russian ones, independent of Russia.

It was as early as in autumn 2011 that a number of Russian experts warned that if Azerbaijan and Turkmenistan, backed by the EU, proceed with construction of a trans-Caspian pipeline within what they see as their "national sea sectors", Russia may take military actions against them. According to Mikhail Alexandrov, expert of the CIS States Institute, Moscow cannot admit a de facto division of the Caspian Sea into national sectors, because "this may lead to non-Caspian countries setting up their military bases in the region". In his view, if Baku and Ashgabat push on with their projects disregarding Russia, Moscow may taking punitive military actions against them modeled on "Peace Enforcement" operation carried out by Russia against Georgia in 2008: "This time, one (Russia. – I.B.) has to force Ashgabat and Baku to respect international law. It can be done even with air strikes if they (Azerbaijan and Turkmenistan. – I.B.) do not understand other language… After what has been done by NATO in former Yugoslavia, Afghanistan, Iraq and Libya there is no moral or legal barrier against use of force by Russia in the Caspian Sea". As Konstantin Simonov put it, "act of force is the only possible response to this problem". In his view, Russia does not want to see Trans-Caspian gas pipeline and

* The major part oil export from Kazakhstan to the EU is transported via Russian pipelines.

diplomats have to ensure that, “but if they fail, Russia will have to use technical means, force or military means” (Kulikov, S. 2011, November 22). Some Russian experts sounded more cautious and considered that Russia would act in a more flexible way – by engaging international environmental groups under the banner of protecting environment of the Caspian Sea and offering Turkmenistan additional gas supplies to the EU via Russian gas pipelines.

Commenting the results of the 4th Caspian summits held in autumn 2014, which brought no solution to the problem of the Caspian Sea legal status, Evgeny Bazhanov, head of the Russian Foreign Ministry Diplomatic Academy, said that Russia cannot afford to lose its influence in the Caspian Sea, as “this would mean that the Caspian countries will be able to act independently, may invite Western countries for cooperation and thus will distance themselves from Russia…”. In his words, “Russia is not as weak as to admit changes in the Caspian unfavorable for it, although, it is not as strong as to lead an integration process” (in the Caspian Sea basin. – I.B.) (Solovieva, O. 2014, September 23)”.

Russian experts are skeptical of the appeal by Ashgabat to the UN to provide its guarantees for the project of gas export to Europe across the Caspian Sea. Some point out that this idea will not work as not all coastal countries have ratified the Energy Charter. Others argue that Turkmenistan is seeking to use a UN flag “to disguise a US military presence” (Magda, V. 2015, April 20). Some Russian experts insist that a genuine objective of the US is to thwart export of Turkmenistan’s gas to the EU, as a competitor to American LNG, and export of Turkmenistan’s gas to China, as America’s major global rival (Solovieva, O. 2015, April 6).

A number of Russian experts believe that in its opposition to a US expansion to Central Asia and to export of Turkmenistan’s gas to the West across the Caspian Sea Russia can make a united front with China who is believed to equally dislike the prospect of US presence in the region and to fear that gas export to the EU can provide Ashgabat with a strong leverage in negotiations on price of its gas export to China (Solovieva, O. 2015, April 6).

Shakhrat Kadyrov, senior expert of the Institute of Oriental Studies, argues that Russia could solve the present gas stalemate on Turkmenistan’s gas if it comes to agreement with the EU and Ashgabat on transportation of both Turkmen and Russian gas through a would-be Trans-Caspian gas pipeline network (http://www.ng.ru/cis/2015-03-05/6_turkey.html). However, such a scenario looks very much unlikely now. So far, Russia’s gas and oil supply strategy has been to keep full control over pipelines through which its hydrocarbons are shipped and not to share them with any other gas or oil producer. In early 2000s, Russia insisted upon Baku-Novorossiysk oil pipeline as the only possible route for oil from Azerbaijan and turned down proposal to join Baku-Tbilisi-Ceyhan project, despite warning by some Russian experts that this project is viable and will be implemented anyway (http://www.vipstd.ru/gim/content/view/41/197/; http://www.centrasia.ru/newsA.php?st=1018731660). In early 2015, Gazprom turned down a proposal by Kazakhstan to transport Russian gas to China via its territory (http://kommersant.ru/doc/2692967). It is worth noting that relations between Russia and Kazakhstan have always been much friendlier than those between Russia and Turkmenistan. Kazakhstan is a member of Russia-led Euro-Asian Economic Community and has never challenged Russia’s leadership in the community of the former Soviet republics and Russia’s stand on the legal status of the Caspian Sea and on the issue of trans-Caspian pipelines. It looks like the syndrome of Ukrainian gas transit makes Gazprom very much apprehensive of dependence upon any transit country, be if even currently friendly. It is also remarkable that China, despite its growing economic stakes in energy industry of Kazakhstan, reportedly also insisted that Gazprom transports gas to it directly across Russo-Chinese border bypassing any third country.

It is very much unclear what arsenal Russia may use in preventing gas and oil supplies from the countries of Central Asia via subwater pipelines across the Caspian Sea, which price it may request from the West for its consent and if the latter will be ready to pay it.

CONCLUSION

As it is seen from the above analysis, high level of mutual mistrust and tension in relations between Russia and the West puts very serious obstacles on the way for the projects to transport gas and oil from Russia to the EU via Turkey and especially – to transport these from the Caspian Sea basin and the Central Asia countries to the EU via Turkey. In a certain sense, these mistrust and tension today are higher than those between the West and the Soviet Union in late 1970s-1980s. This level of tension makes all major energy transportation projects, involving Turkey, very fragile, facing recurrent crises. As the result, the EU energy strategy can be revised to reduce significantly the share of gas and oil import from Russia and the Central Asia countries in the EU energy balance in a long run. Provided that no further dramatic deterioration in relations between Russia and the West occur, such reduction is more likely to be gradual rather than aggressive. However, one should not exclude an emergency scenario, under which the EU will have to resort to such moves as massive import of LNG and oil from the US, putting back into operation its nuclear power stations and directing massive investments in renewable energy sources. Today, a scenario, which is most desirable for Turkey, i.e. a new détente between Russia and the West looks rather unlikely. This means that Turkey's ambitious plans to secure long-term oil and gas supplies and benefits of the Eurasian energy bridge or hub may result in a quite a humble reality. As Turkey is an energy deficient country, miscalculation in terms of security of energy supplies, their volumes and prices may have a serious negative effect for the national economy.

In the meantime, Turkey could make a contribution to reducing tension in relations between Russia and the West, at least with regard to aspects related to their energy cooperation. Of all major NATO member states, Turkey has best relations with Russia. It has also maintained good relations with a number of other countries of the former Soviet Union who play important role in energy transportation projects, such as Azerbaijan, Georgia, Kazakhstan and Turkmenistan. So, it could use its position to encourage and sustain a permanent dialogue among all stakeholders of Eurasian gas and oil transportation projects such as the named countries, Russia, the EU and other interesting parties. For Russia Turkey may look as the best place for such kind of discussions outside Russia. So, Turkey could contribute to easing of political tension initiating a regular forum in Istanbul, Ankara or Izmir with agenda to discuss key geo-political and economic problems related to gas and oil transportation from Russia, Caucasus and Central Asia to the EU via the Turkish territory. To make such a forum a really meaningful event, senior and high-level senior policy-makers and their senior advisors from the stakeholder countries should be invited. Attendance of top Turkish politicians and experts might help to secure high level representation from other countries.

Geo-politics is very much important factor in determining the future of Turkey as the Eurasian energy bridge. There are other factors which make very important part of the basis for such a bridge to become a reality.

In the introduction to a new edition of the *BP Energy Outlook 2035*, a very influential report on global energy trends, BP CEO Bob Dudley wrote: "Today's turbulence is a return to business-as-usual. Continuous change is the norm in our industry. The energy mix changes. The balance of demand shifts. New sources of energy emerge (BP Energy Outlook 2035). The range of oil price (which determines gas price) volatility of the past gives little clue for forecasts of its price in future. Shale oil and gas and advent of LNG work for fundamental changes in energy landscape, both globally and in Europe. The domination of decades-long natural gas trade based on long term "take-or-pay" contracts and transportation through pipelines has been challenged by gas spot trade transforming market forces and encouraging new technologies.

The EU has embarked on a very ambitious strategy which provides for steadily reducing its dependence on hydrocarbon fuels and its tradition sources of supply in the decades to follow through decarbonizing its transport, making its household sector much less energy intensive, pushup in renewable energy production and encouraging cross border energy cooperation among the EU member states. November 26, 2014, REDstack BV Company inaugurated an experimental "blue energy" power plant in Afsluitdijk (Holland) which will produce electricity using difference in salt concentrations of sea and river waters. If this technology proves successful, it may revolutionize energy production more than any other energy production technology in the mankind's history.

All the above and other factors and trends require a high level of shrewdness and insight from the Turkish political establishment, business and expert community in analyzing and drafting the country's economic strategy and energy policy as its part. The cost of the mistake to put too much stake on would-be benefits from transit of hydrocarbons and disregarding newest trends in energy production and sue can be very high. The conference organized by the Izmir University, bring political, economic and energy experts from various countries could help to avoid such a mistake and produce a balanced insight and practical approach to issues of energy security for Turkey and contribute to establishing principles and practices of energy transportation across the Eurasia region from which all parties – producers, consumers and transit countries – would be able to benefit.

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NEW ENERGY EQUATION IN EURASIA: RUSSIA-CHINA ENERGY COOPERATION

AVRASYA'DA YENİ ENERJİ DENKLEMİ: RUSYA-ÇİN ENERJI İŞBİRLİĞİ

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ABSTRACT

Russia, as one of the world's most formidable energy suppliers, has been concluding new agreements on energy alliances regarding the strain caused by the Ukrainian crisis. China, as Russia's best alternative in these new energy alliances, has been concluding agreements and negotiating with Russia for developing cooperation in energy sphere. Russian-Chinese dialogue on energy cooperation have been uplifted to an agreement just after the Ukrainian crisis which opened new paths for further cooperation that is discussed to be deepened to a strategic partnership. The natural gas agreement concluded between Russian and Chinese energy corporations in May 2014 brought a dimension to the energy rivalry in Eurasia. Particularly the tension between Russia and the West sets up a fertile ground for a recalibration of energy equation in the region. This paper puts forward various aspects of Sino-Chinese energy cooperation. It also inquiries how could the Russian-Chinese energy cooperation influence the Eurasian energy equation and the Western-Chinese relations.

Keywords: Russia-Western Tension, Russia-China Natural Gas Agreement, Gazprom, Chinese Energy Policy

ÖZET

Dünyanın en önemli doğalgaz ve petrol üretici ve ihracatçılarından olan Rusya, Batı ile Ukrayna krizinden dolayı gerginleşen ilişkiler nedeniyle yeni enerji ittifakları bağlamında çeşitli anlaşmalar yapmaktadır. Enerji talebi hızla artmaya devam eden Çin, Rusya ile enerji alanında antlaşmalar yapmakta, iki ülke enerji alanında yeni işbirlikleri için uzun süredir görüşmeler yürütmektedir. Batı ile krizin başlamasından kısa bir süre sonra, Rusya-Çin enerji görüşmeleri anlaşma düzeyine getirilerek daha fazla işbirliğinin önü açılmış, artık stratejik ortaklık aşamasından söz edilmeye başlanmıştır. İki ülke enerji şirketlerinin 2014 Mayısında imzaladığı doğalgaz antlaşması, Avrasya'daki enerji rekabetine yeni boyutlar kazandırmıştır. Batı-Rusya ilişkilerinin gerginleşmesi bölgedeki enerji denkleminin yeniden oluşturulması için zemin hazırlamıştır. Çalışma, Batı-Rusya gerilimiyle başlayan Rusya ile Çin arasındaki enerji işbirliğinin boyutlarını ortaya koymaktadır. Rusya-Çin enerji işbirliğinin Avrasya'daki enerji denklemini nasıl etkileyebileceği ve bu gelişmelerin Batı-Rusya ve Batı-Çin ilişkilerine etkileri üzerinde durulmaktadır.

Anahtar Kelimeler: Batı-Rusya Gerginliği, Rusya-Çin Doğalgaz Anlaşması, Gazprom, Çin Enerji Politikası

Introduction

Eurasia, stretching from Europe to Japan, has always been under the hegemonic intercourse of great powers of the time. Mackinder, one of the most prominent researchers on geopolitics, called Eurasia as "Heartland", Spkyman called it as "rimland". Both of these definitions projected Eurasia as centre of power. American strategist Brzezinski (1997: 52) supported these definitions by claiming that Eurasia, as being the biggest continent, is a geopolitical axis. Dominating /controlling it means dominating/controlling two of the world's most fertile areas out of three.

Throughout the post-Second World War era, the importance of Eurasia has been increasing. Yet, the major reason for this is not its vastness but more about its other socio-economic elements, i.e. population, cultural diversity, energy demand and supply etc. With the end of the Cold War, Eurasia became even more important in global geostrategy due to rich energy fields in the Caspian Basin.

Another significant aspect of Eurasia is the hegemonic intermingling among its regional great powers, i.e. Russia and China. In the post-Cold period, these two powers on several occasions acted together against the US foreign policy moves. A few clear examples are in the UN embargos applied to Iraq after the 1991 intervention, NATO's expansion to the East, and also in the Kosovo intervention. Then, Russia and China acted together against the US-driven "western" policies. Such cooperation was crowned with the Shanghai Cooperation Organization (http://www.sectsco.org/), which was prospected to be transformed from Shanghai Five of Russia, China, Kazakhstan, Kirgizstan, and Tajikistan. With Uzbekistan's membership, it began to expand. In the coming years, with Iran, Pakistan, India and Mongolia's observer status, Russia and China will increase their influence in the region via Shanghai Cooperation Organization. For this Sino-Russian influence, the organization could also have a potential to be a politico-economic bloc against the US. The organization, on the other hand, facilitates and deepens Russo-Chinese cooperation in economy, security, and energy (Weits, 2014).

Another very significant relationship between Russia and China is in the energy sector. China relies heavily on outside energy sources and its huge demand in energy due to its production level makes this relationship almost natural. In 1993 China became an oil importer first time, in 2010 it became number one energy consumer and in 2011 number two oil importer in the world (www.eia.gov). Since, China's energy consumption does not seem to be lowered in the short run; it needs long term cooperation schemes with energy suppliers. Russia, in this sense, is the most suitable one at the moment. Such cooperation is also significant for Russia. As the world's most prominent oil and gas supplier, Russia needs to diversify its markets in order to increase its revenues. In addition to that, Russia's relations with Europe, or West in general, are not very smooth due to the crises in Crimea and Ukraine. This decimated Russia's revenues from its energy exports to Europe. This study underlines the short term consequences of Russia-Europe strain on energy. The study argues that one aftereffect of this strain is the deepening of Russo-Chinese cooperation with various means including comprehensive long term agreements.

Energy Rivalry in Eurasia and China's Place and Role

Global energy rivalry boosted due to the unstoppable energy demand, particularly from the developing countries. Eurasia with its currently vast energy resources has been inevitably in the very centre of this rivalry. The major actors in this rivalry are Russia, the US, China, and the US. Moreover, the ex-Soviet Republics within the Caspian Basin also became significant regional actors (Fatima and Zafar, 2014:629) due to the level of their energy sources.

Russia, as the most formidable one, has 1/3 of the world's natural gas reserves. It also has serious levels of oil and coal. What makes Russia, possibly, the most important actor in the energy equation in Eurasia is its geostrategic location, which enables it to transfer its energy sources to both East and West. Russia's geographical proximity to Europe enables it carry out ¼ of its natural gas export to this region together with administrating the pipelines and developing partnerships with European shareholders (Lough, 2011:6). Russia also influences same administrative and politico-economic relations between the Caspian states and the Europeans. Russian influence in the Caspian region has been expanding in searching, drilling, transfer of energy sources and know-how of energy related issues. Russia's effective infrastructural investments and influential oil firms have been easing this on behalf of Moscow.

Russia, under Putin's rule, utilized its energy sources both in economic recovery and development and boosting its national security aura. Russia has been running almost all of its energy businesses via public channels, which gives Kremlin a solid control on energy. Almost half of Russia's budget revenues and ¼ of its GDP have been coming from energy sources. With a centrist and authoritarian rule operating via a pragmatic and a multifaceted foreign policy, Putin has been performing very successful energy diplomacy (Zhiznin, 2010). Yet this successful picture has not been the same in the last few years regarding the developments in Crimea and Ukraine. Western financial embargoes and political sanctions led Russia to diversify its energy export market and to look for importers in South and East.

The US', as another significant actor in Eurasian energy equation, energy interest has various levels (Cohen, 2006). The US defined Caspian region as a vital region, so that it aims to be influential in the administration and transfer of energy basins in this region (Manning and Jaffe, 1998: 112-113). The US' security policies regarding Central Asia are also related to energy security issues. The US' energy outlook in Eurasia also influenced by Russia-West rivalry (Blank, 2007: 3). The US prefers to support energy transfer lines on a North-South Axis, which would prospectively sideline Russian influence. This North-South Axis is planned to cut across the Caspian Sea to the Arabian Sea or the Caspian Sea to Bengal Gulf. In this sense transferring Kazakh and Turkmen energy resources to Indian Ocean is within American national interests. Purging Russia in energy transfers means much more for the US than utilizing these energy resources for itself (Cohen, 2006). This makes American-Kazakh-Turkmen and American-Afghanistan-Pakistan cooperation more meaningful.

The EU heavily relies on foreign energy sources. In terms of energy consumption the EU very closely followed the US for a long time. 4/5 of its natural gas imports have been from Russia, Norway and Algeria (www.europa.eu). In the last few years, due to the above mentioned strain with Russia, the EU aims to diversify its energy imports (Ratner, Belkin &Woehrel, 2012: 325-329). The Caspian basin states became a very fruitful alternative in this diversification. The EU supports the US in terms of organizing a new energy transfer line from this basin to Europe, which prospectively reduce the influence of Russia.

China, in the Eurasian energy equation, is a new but a very ambitious actor. In its relations with the West and Russia, Beijing pays an attention not to tilt too much towards one side. Its economic development naturally creates an incremental increase in its energy demand. For satisfying its demand, Beijing has been concluding several energy agreements with various energy providers (Ma, 2015, 13). According to the International Energy Agency, China National Petroleum Corporation (CNPC) carried out 73 billion dollars of investment in the Middle East, North America, Latin America, Africa and Asia, between 2011 and 2013. Chinese energy companies are active in 42 countries, more than half of which are Middle Eastern and African countries (Palkin, 2012: 82-84). Particularly Iraq, which covered more than 26% of Chinese petrol consumption, became a key country of Chinese investments. Kazakhstan, Sudan are following Iraq in this respect (IEA, 2014: 13-14).

China’s incremental energy demand boosted its energy imports. In 2011, China became world’s biggest energy consumer and world’s second oil consumer after the US. The US Energy Information Administration reported in 2013 that China has taken the US’ position as being the world’s biggest oil importer (www.eia.gov). In addition to oil, the natural gas also boots China’s energy demand. Although China has a serious domestic production of rock gas, it does not cover its huge national demand. The rock gas could be an alternative to the natural gas but it still needs time to achieve the proper technology to extract fruitful amounts of it (www.eia.gov). The rock gas will be a meaningful determinant of China’s natural gas imports in the coming years. Until then, China will be trying to cover its demand via LNG through pipelines and sea route.

China is also very prominent coal consumer. Its consumption is almost half of total world consumption, which makes it world’s biggest coal consumer (www.eia.gov). Since it is a cheap and common energy resources, coal is being used from electric production to transportation. Such huge coal consumption brings up carbon dioxide emission problems as well.

China uses an exchange system with some countries for covering its energy demand. Beijing provides the capital necessary to establish energy infrastructure both for search and transfer in return for gas and oil. At the end of 2013, CNPC concluded agreements on oil – loan exchange with various energy exporters over 150 billion dollars Chinese agreements on this type of exchange have still been negotiated with Kazakhstan, Venezuela, Brazil, Ecuador, Bolivia, Angola, and Ghana. (IEA, 2014: 14).

Central Asian energy providers have a particular importance for Beijing due to their geographical proximity and potential to diversify China’s energy inflow (Ong, 2009: 319). Chinese interests in this region could be listed as follows (Chen, 2012: 35); firstly energy inflow from Central Asia will help sustainable development of western part of China; secondly, China expects that Kazakhstan, Turkmenistan and Uzbekistan would be its primary natural gas suppliers; thirdly, Kazakhstan and Uzbekistan could provide uranium and build up cooperation with China in nuclear capability development; fourthly, the significance of Central Asian energy transfer routes for China’s energy security perceptions; and finally, Kirgizstan and Tajikistan’s rich hydro energy potential.

China transforms these interests into functional cooperation schemes by concluding comprehensive agreements and investment projects (Fazilov and Chen, 2013: 39-42). China concluded an agreement with Turkmenistan concerning transfer of 40 billion cubic meters of Turkmen gas to China for 30 years. With complementary agreements this level rose up to 65 billion cubic meters. With the construction of Turkmenistan-Uzbekistan-Kazakhstan-China pipeline Turkmen gas began to reach China in 2010 February. 5000 kilometres of this line passes through China soil, which bypassed Gazprom considerably. In 2012, China got into a separate deal with Uzbekistan on natural gas (www.newsweek.com).

China-Kazakhstan relations got deepened due to Kazakhstan’s moves to diversify its energy transfer lines. Parallel to the CNPC increased its investments in Kazakhstan, i.e. buying the operating rights of PetroKazakstan in 2005 (Fazilov and Chen, 2013: 40-41). In 2013, Chinese investments in Kazakhstan rose up to 30 billion dollars covering natural gas and oil drilling and infrastructural investments (www.aljazeera.com.tr). In addition to oil and natural gas, China Guangdong Nuclear Power Group holdings concluded agreements with Kazatomprom in 2006, 2007, and 2008 on nuclear energy cooperation. With these, Kazakhstan became China’s biggest uranium and nuclear fuel provider. With the first half of 2014, Kazakhstan carried out 55% of its uranium exports to China (www.world-nuclear.org).

These agreements between China and the Central Asian energy providers have shaken Russian influence on the energy resources of the region. Russia was used to be the sole buyer of the Central Asian natural gas, but currently it is competing against China, Iran and the other regional actors. Yet this does not mean that China and Russia has not been cooperating in energy sectors. In the last decade, Russia and China concluded agreements on Chinese loans to Russian oil companies up to 50 billion dollars, which shows that accessing Russian oil (and gas) is quite favourable for China (http://www.bloomberg.com/).

Russia's Relations with the West and the Deepening of Sino-Russian Cooperation

One speculation on Russia's deepening strain with the West due to Crimean and Ukrainian crises was whether a new Cold War (Legvold, 2014) was on our doorsteps. The background of this Russo-Western crisis goes back to 2008 Georgian War. The crisis escalated with NATO's "Missile Shield Project", then with Syria and peaked with Ukraine. With the Russia's annexation of Crimea, Western countries, particularly the EU, began to diversify their energy inflow for reducing their dependencies on Russia. In this diversification process, European decision makers also consider (Legvold, 2014) to tend to nuclear energy and rock gas and increasing the level of imported of LNG.

Same strain with the West also led Russia to look for alternatives for its energy exports. One significant market for Russian oil and gas would be in the east. Chinese and Russian deepening cooperation in the last few years depends on this. The relations between these two have been developing since the beginning of the 1990s. The Sino-Soviet Border Agreement was one of the major turning points in the development of bilateral relations. In 1994 they concluded "Constructive Partnership Agreement", which turned into a declaration on strategic partnership in 1996 and crowned with the Treaty for Good Neighbourliness, Friendship and Cooperation in 2001. In 2008 they approved an action to deepen the 2001 Treaty procedures. In 2011, the bilateral relations were lifted up to the highest level of "comprehensive strategic cooperation and partnership". Since 2001, Russian and Chinese leaders signed more than 50 bilateral agreements (Bolt, 2014: 48-49).

Russian-Chinese partnership develops and deepens with reciprocal visits, expansion of partnership in energy fields, building up trade, arms sales, inter-societal relations, and diplomatic understandings and cooperation in regional and global affairs including the Middle East. A good example of this diplomatic understanding was on Chinese stance to Russia's annexation of Crimea in March 2014. Although Russian move put China in a difficult position, Beijing refused to commit itself either to the West or Russia. It abstained on a United Nations Security Council draft resolution condemning the Crimean referendum. Beijing's statements were non-committal and refraining from offending Ukraine or Russia (Bolt, 2014: 50).

Sino-Russian diplomatic understanding and co-acting seems more against the hegemonic attitude of the US. Russia and China act as counterbalancing actors against the US' influence particularly in Asia and the Middle East. Yet, Russia and China do not have the same weight in global economic affairs. Russia, as the world's 9th largest economy, needs China, as the world's 2nd largest economy, more in cooperative efforts. Western economic sanctions due to Ukrainian crisis necessitated this even more. Sanctions-affected Russian banks moved more into the Chinese economic zone. Chinese and Russian economic institutions have been in negotiations to use Yuan and Rouble in their interactions instead of US Dollars. These close relations between Moscow and Beijing, naturally, fuels anxieties in Europe and in the US /www.bloomberg.com).

Russian-Chinese energy cooperation speeded up with the 1990s. Yet, because of geographical reasons the level of energy import-export between Russia and China was limited. Russian energy basins are closer to the West and China's developing regions are mostly on the east. This necessitated heavy investments on energy transfer lines, particularly in natural gas. In oil export there has been a gradual increase in 2000s, but the natural gas exports stagnated. There were a few additional reasons in addition to the geographical concerns for this stagnation in natural gas exports. Russia and China could not come to an agreement on price and taxation, plus Chinese agreement with Turkmenistan also hindered natural gas exports (Grama, 2012: 45-46).

In oil exports one major project between China and Russia was the Eastern Siberia–Pacific Ocean oil pipeline extending from Eastern Siberia to the Daqing in North Eastern China. The construction of the pipeline started in 2008 was opened at the end of 2009. It is 2757 kilometres in length and its capacity is 1,6 million barrels per day. The pipeline also enables to export oil via sea-shipment to Japan, South Korea and a few other Asian countries (http://routemag.com).

In December 2012 Russian oil company Transneft finished the second section of the Eastern Siberia-Pacific Ocean (ESPO-2) pipeline, which runs between the Siberian city of Skovorodino and the Kozmino oil-loading port near the north-eastern edge of China. "Transneft" claimed that ESPO-2's annual capacity might be increased to 80 million tons by 2020. From the outflow, the American market will receive 35 percent of Kozmino oil, Japan will around 30 percent and China will 28 percent . The rest will go to Singapore, Malaysia and South Korea. "Rosneft" will be the main contributor of oil to the pipeline (http://routemag.com).

China, as one of the biggest natural gas consumers, has been experiencing extensive increases in its natural gas use. In 2000 the yearly average consumption was 24,5 billion cubic meters. It jumped up to 80 billion in 2008 and to 100 billion cubic meters in 2012. It is expected that this numbers will rise up to 300 billion in 2020 and to 400 billion in 2035. Although the share of natural gas in Chinese total energy consumption is 4,9%, investments and import ratios signal the future importance of natural gas in China's development plans. It is also expected that the share of natural gas in Chinese national consumption will rise up to 8% in 2015 and to 10% in 2020 (www.eia.gov). All these positive and negative developments between Russia and the West and Russia and China led Moscow and Beijing to conclude a more comprehensive treaty on natural gas.

ESPO 1 and ESPO-2 Pipelines

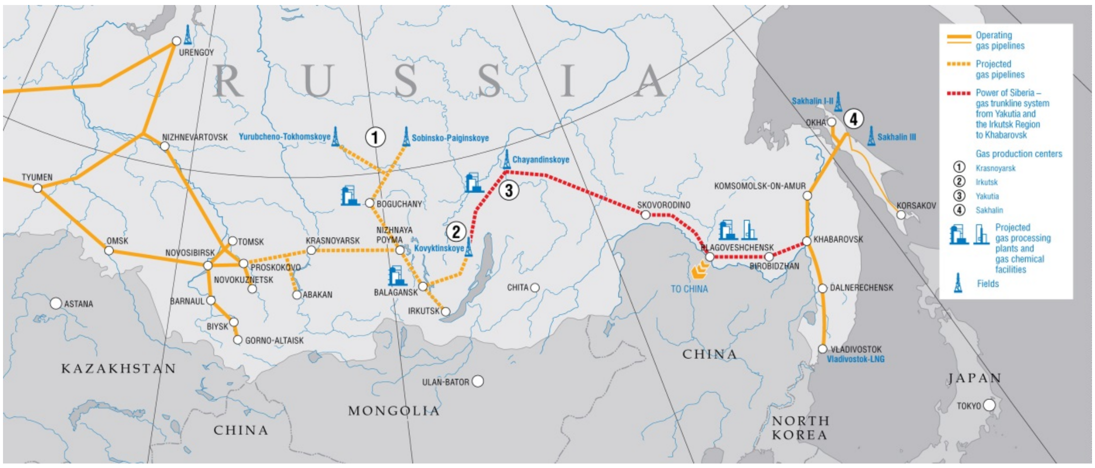
Source: https://routemag.files.wordpress.com/2013/01/espo-2.png

21 May 2014 Natural Gas Agreement and its Repercussions

The Agreement was signed between China's President Xi Jinping and Russia's President Vladimir Putin in Shanghai on 21 May 2014 after 10 years of negotiations. This agreement immediately paved the way for additional 49 cooperation agreements on transportation, and infrastructural investments (www.bloomberg.com). The May agreement was concluded between Gazprom and CNPC and prospected to transfer 38 billion cubic meters of Russian gas to China for the next 30 years. The overall value of agreement is 400 billion dollars. The agreement requires 55 billion dollars of Russian and 20 billion dollar of Chinese investments (http://rt.com). It is the most comprehensive agreement since the dissolution of the USSR.

In the negotiation process the major issue was the prices and payments. Even though, the arbitrated price has not been released, it was verbalised that Gazprom accepted a price significantly lower than the Europeans pay. The negotiations were between the Russian price of 400 USD/thousand cubic meters and the Chinese price of 300 USD/thousand cubic meters and the approximate price is somewhere around 350 USD/thousand cubic meters (http://rt.com).

Power of Siberia Gas Transmission System



Resource: http://www.gazprom.com/f/posts/74/805991/2014-06-26-map-sila-sib-en.jpg

Russian President Vladimir Putin and Chinese Vice-Premier Zhang Gaoli launched the construction of the first part of Gazprom's Power of Siberia Pipeline. In 2019, the pipeline will pump gas from Siberia to

China's populous northeast region as well as to Russia's Far East (http://rt.com). The pipeline will start from the Irkutsk Region, the Republic of Sakha (Yakutia) and will link up with the second section of East Siberia Pacific Ocean Pipeline.

The Agreement also brought up China's taking over Gazprom's 19% and taking a part in the Russian LNG terminal construction in Vladivostok. Although these are still not certain, it is clear that the energy cooperation between Moscow and Beijing will continue to deepen (http://www.gazprom.com). The Agreement will not only increase Russia's market share in Asian energy demand but also will contribute to the development of its eastern regions. According to the agreement, additional pipelines will pump gas from the eastern Siberia to Beijing-Tianjin-Hebei and to Yangtze River Delta. With the infrastructural investments required for these additional pipelines Russia could sell increased amount of gas to Japan, South Korean and other Asian countries (http://www.gazprom.com).

Even if the Agreement seems like a great success for Russia, which tries to diversify its oil and gas exports due to its strain with the West, it is more of a Chinese victory. (Downs, 2014). The flexible structure of the agreement and Yuan-based payments are both great successes. China's obligations to buy the Russian gas, according to the agreement, are not very rigid either. This gives Beijing a flexible choice among foreign energy providers. The profit margin of Gazprom is not very high.

In terms of the hegemonic intercourse in Asia, the Agreement is an important blow to the American influence due to its Yuan-oriented structure, which sidelined American dollar. China has been trying to turn Yuan into a convertible currency and then into a reserve currency. The Agreement paves the way for this.

The Agreement also paved the way for additional natural gas agreements between Russia and China. In November 2014 and May 2015 two more natural gas agreements were concluded (www.gazprom.com). These two agreements are prospected to cover 17% of China's total gas demand in 2020 (www.wsj.com.tr). With the finalization of the Power of Siberia, Russian share in the Asian energy market will rise up to 1/3.

Russia-China cooperation quickly expanded into other areas after the Agreement. In Hydroelectric sphere, China Three Gorges and RusHydro concluded a deal to construct a hydroelectric power plant. They also agreed on completing and administering Nizhne-Bureyskaya hydroelectric plant (www.gazprom.com).

Another important cooperation pattern between Russia and China is arms sales. China has been buying Russian arms in a gradually increasing sense. Although the US has been observing this with concern, increasing arms sales does not necessarily mean that Russia and China will develop a military power bloc against the US in Asia.

One output of such a vague Sino-Soviet tendency against the US, a possible aim to generate a psychological effect, was the Chinese official/military attendance to the Russian Victory Day parade on 9 May 2015. Similarly Russia and China held joint naval drills with in May in the Mediterranean Sea. These two moves gave concerning signals to the West about the "unpredictable" future of Sino-Soviet relations.

Conclusion

With the shift of energy dynamics from west to east makes Asia even more important in the global energy equation. The biggest energy providers and the biggest energy consumers are located here, which fuels the competition both in energy demand and supply. Russia, China, the EU, the US are the major actors of this competition. They have been within varying and intermingling coalitions in order to carve out as much as possible from the Asian energy basins. Even though the energy transfer lines have been operating from east to west or from north to south, with the enormous intervention of China they began to operate from west to east.

Russia's strain with the West not only complicated the global energy competition but also put pressure on both sides to diversify their energy imports/exports. For Russia the best option would be expanding to the East and especially deepen cooperation with China (Ministry of Energy of the Russian Federation, 23). With May Agreement in 2014, Russia shifted most of energy supply to China.

The agreement is not only an energy partnership scheme. It also underlines a developing understanding between Russia and China and almost as a strategic push against the US. Even if the acquisitions of Moscow and China are not even, the agreement is profitable for both of them. For Russia, the poorer eastern Siberia will be developed both in infrastructures and employment. The agreement also opens new and unutilized energy basins of Russia. Russia would like to compensate its lost market share in Europe with the help of this agreement with China. The finalization of the pipeline complex foreseen by the agreement will also enable Russia to increase its natural gas export levels to Japan, South Korea and other Asian countries. For China, the agreement not only provides legal and structural flexibility, it also maintains energy security. The agreement brings more profit to China since the payments will be made in Yuan.

In summary, the deepened and developing cooperation between Russia and China was caused the developments in the last decade, mostly due to the strain between the West and the East. The uneven structure of the agreement, historical mistrust between China and Russia, the US-China relations are all signalling that this cooperation has limits. There are so many variables in Sino-Russian relations depending on the balance of power in Asia, which can disturb this very profitable energy deal.

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TÜRKİYE'DE İKTİSADİ AÇIDAN NÜKLEER ENERJİ TERCİHİ

NUCLEAR ENERGY CHOICE FROM ECONOMIC PERSPECTIVE IN TURKEY

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ÖZET

Atom enerjisinin ticari amaçlarla kullanılmasıyla Nükleer Enerji Piyasası (NEP) doğmuş, nükleer santral teknolojisinin geliştirilmesi ile Nükleer Rönesans başlatılmıştır. WNA (2015) verilerine göre günümüzde 30'dan fazla ülkede 438 (=378,870 MWe) nükleer reaktör işletmede bulunmakta, 69 (=72,157MWe) reaktörün yapımı devam etmektedir. 2030 yılına kadar 184 (=202,440MWe) nükleer güç reaktörünün yapılması planlanmakta, 312 (=341,570MWe) yeni reaktörün yapılması öngörülmektedir. Nükleer enerji kullanan ve enerjiyi ucuz ve sürdürülebilir olarak kullanan ülkelerin ekonomilerinin gelişmiş olduğu gibi İnsani Kalkınmışlık Endeksinin (HDI) de yüksek olduğu görülmektedir. Türkiye, 2010 yılında elektrik talep artışında dünyada Çin'den sonra ikinci, Avrupa'da ise birinci sırada yer almaktadır. Gelişmiş ve gelişmekte olan ülkelerdeki eğilime paralel olarak Türkiye'nin enerji tüketim değerlerinde elektrik enerjisinin payı artmaktadır. Hızla artan nüfus ve değişen ve gelişen teknoloji, yükselen elektrik enerjisi ihtiyacını beraberinde getirmektedir. Toplam enerji ihtiyacının % 72'sini ithalatla karşılayan Türkiye, enerjide büyük oranda dışa bağımlıdır. Elektrik üretiminde kullanılan doğalgazın % 98'i, petrolün % 92'si ve kömürün % 20'si ithal edilmektedir. 2013 yılı sonu itibarıyla Türkiye'nin elektrik ihtiyacı yaklaşık yıllık 245 milyar kWh iken 2023 yılında 500 milyar kWh'a çıkması öngörülmektedir. Fosil yakıtların bilinen rezervlerin tahmini bitiş süreleri göz önüne alındığında, Türkiye mevcut enerji potansiyeli ile bu talebin ancak yarısını karşılayabilmektedir. Oluşan enerji açığını karşılamak amacıyla yapılan nükleer enerji tercihi ekonomik boyutuyla 3e konseptinde irdelenmektedir. GZFT Analizi yapılarak enerji sorununa yönelik öneriler sunulmaktadır.

Anahtar Kelimeler: Nükleer Rönesans, Enerji Arz Güvenliği, Enerji Yoğunluğu/Bağımlılığı, 3e(energy-economy-environment), Nükleer Enerji Ekonomisi

ABSTRACT

Nuclear Energy Market (NEM) was born with the use of atomic energy for commercial purposes, the "nuclear renaissance" has started with the development of nuclear power plant technology. According to WNA (2015) data; present in more than 30 countries 438 (= 378.870 MWe) nuclear reactors are in operation, another 69 (= 72,157MWe)is under construction. By the year 2030, 184 (= 202,440MWe) nuclear power reactors are planned, and another new 312 (= 341,570MWe) is envisaged for programme. It is seen not only economy of countries, using nuclear energy and using energy as cheap and as sustainable, is developed but also Human Development Index (HDI) is very high. Turkey, the increase of electricity demand in 2010, is the second in the world after China, which ranks first in Europe. Parellel to tendency in developed and developing countries, the portion of electric energy has been increasing in Turkey's energy consumption values. Rapidly increasing population and changing and evolving technology, brings the need for rising electricity together. Turkey, meets 72 percent of the needs of total energy with imports, is dependent on foreign energy significantly. 98% of the natural gas, 92% of oil and 20% of the coal used in electricity generation is imported. While Turkey's electricity demand is about 245 billion kWh in the end of 2013, it is envisioned to rise to 500 billion kWh in 2023. Taken consideration of completion time of the known reserves of fossil fuels, Turkey can meet only half this demand with existing energy potential. Nuclear energy choice made with the purpose of meeting energy gap which emerging, has been discussed in 3e concept with the economic dimension. SWOT Analysis has been made, proposals for the energy problem have been presented.

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Not: Yazarlar arasında nükleer enerji sosyal kaygılar boyutunda fikir ayrılıkları vardır.

Keywords: Nuclear Renaissance, Energy Supply Safety, Energy Density / Dependency, 3e (energy-economy-environment), Nuclear Energy Economics

1. GIRIŞ

Ağır atom çekirdeklerinin nötronlarla bombardımanı sonucunda parçalanması veya hafif atom çekirdeklerinin birleşme tepkimeleri, büyük bir enerjinin açığa çıkmasına sebep olmaktadır. Fisyon ve füzyon tepkimeleri ile elde edilen enerjiye "çekirdek enerjisi" veya "nükleer enerji" adı verilmektedir. Nükleer santraller nükleer enerjiyi elektrik enerjisine dönüştüren sistemlerdir. Temel olarak fisyon sonucu açığa çıkan nükleer enerji nükleer yakıt ve diğer malzemeler içerisinde ısı enerjisine dönüşür. Bu ısı enerjisi bir soğutucu vasıtasıyla çekilerek bazı sistemlerde doğrudan bazı sistemlerde ise ısı enerjisini başka bir taşıyıcı ortama aktararak türbin sisteminde kinetik enerjiye ve daha sonra da jeneratör sisteminde elektrik enerjisine dönüştürülür. Bu çalışmada uçak gemisi, denizaltılar ve gemilerde kullanılan raektörler hariç tutulmuştur.

Atom enerjisinin ticari amaçlarla kullanılması için ilk nükleer santralin 1954 yılında Rusya tarafından kurulmasıyla Nükleer Enerji Piyasası (NEP) doğmuş, nükleer santral teknolojisinin geliştirilmesi ile başta ABD olmak üzere Rusya, Fransa, İngiltere ve Kanada tarafından Nükleer Rönesans başlatılmıştır. Almanya, Japonya ve Güney Kore gibi ülkeler bu teknolojiyi daha da geliştirerek kendilerine özgü nükleer santral tasarımlarına sahip olmuşlardır.

Günümüzde 30'dan fazla ülkede 438 nükleer reaktör işletmede bulunmaktadır. Toplam 69 santralin yapımı devam etmektedir. 2030 yılına kadar 184 yeni nükleer santralin yapılması planlanmaktadır. Ayrıca, "Megaton to Megawatt" programı gelişen nükleer enerji piyasası için önemli bir dönüşümdür.

Türkiye enerji politikasının temel amacı; ekonomik büyüme ve sosyal kalkınmayı destekleyecek şekilde, zamanında, güvenilir ve yeterli miktarda enerjiyi çevrenin korunmasına yönelik önlemlerle beraber minimum maliyetle tüketiciye sunmaktır.

29 Ekim 1923 Türkiye Cumhuriyeti'nin kuruluşundan bir yüzyıl sonrası için belirlenen ulusal stratejiler (2023 Vizyonu);

- İlk on dünya ekonomilerinden biri olmak,
- 2 trilyon dolar gayri safi yurtiçi hasıla elde etmek,
- Yıllık 500 milyar dolara Türk ihracatını artırmak,
- Kişi başına düşen geliri 25000 dolara çıkarmak,
- 1 trilyon dolar dış ticaret hacmi sağlamak,
- İşsizlik oranını Yüzde 5 seviyesine düşürmek,
- Elektrik üretiminde % 43 olan doğalgazın payını % 30'a çekmek, yenilenebilir enerjinin payını % 30'a çıkarmak,
- Üç nükleer santral faaliyetini sağlamaktır.

Türkiye, 2010 yılında elektrik talep artışında dünyada Çin'den sonra ikinci, Avrupa'da ise birinci sırada yer almaktadır. Gelişmiş ve gelişmekte olan ülkelerdeki eğilime ve nüfus artışına paralel olarak Türkiye'nin enerji tüketim değerlerinde elektrik enerjisinin payı artmaktadır. Hızla artan nüfus, yükselen elektrik enerjisi ihtiyacını beraberinde getirmektedir. Son 10 yıl içerisinde Türkiyenin milli geliri hızla artarak dünyanın 17. büyük ekonomisi olmuştur. Ancak, elektrik tüketim talebi ekonomik büyümeden yaklaşık % 2'den fazla olmuştur.

Toplam enerji ihtiyacının % 72'sini ithalatla karşılayan Türkiye, enerjide büyük oranda dışa bağımlıdır. Elektrik üretiminde kullanılan doğalgazın % 98'i, petrolün % 92'si ve kömürün % 20'si ithal edilmektedir. 2013 yılı sonu itibarıyla Türkiye'nin elektrik ihtiyacı yaklaşık yıllık 245 milyar kWh iken 2023 yılında 500 milyar kWh'a çıkması öngörülmektedir. Fosil yakıtların bilinen rezervlerin tahmini bitiş süreleri göz önüne alındığında, Türkiye mevcut enerji potansiyeli ile bu talebin ancak yarısını karşılayabilmektedir. 2023 yılında bu talebi karşılayabilmek için yıllık 5000-6000 MW ek kapasite için 10-11 milyarUS dolar yatırıma ihtiyaç duyulmaktadır.

Türkiye, enerjide dışa bağımlılığı azaltmak, enerji arz güvenliğini sağlamak, ödemeler dengesi üzerindeki olası yükü azaltmak, bütçe açıklarını telafi etmek, enerji yoğunluğunu düşürmek, verimliliği artırmak, istihdam sağlamak, endüstri için minumum maliyetle enerji girdisi sağlamak, enerji arz ve talebini dengelemek gibi çeşitli nedenlerle "3-E" (Energy-Economy-Environment) konseptinde bir radikal seçim yapmıştır.

Bu kapsamda –bazı kaygıları unutmadan- nükleer enerjinin önemli avantajlarını göz önüne aldığımızda optimum seviye ikinin üzerinde nükleer santral tercihidir. Türkiye için nükleer enerji bir seçenek değil gerekliliktir ve mümkün olan en kısa zamanda üçüncü ve dördüncü Nükleer Enerji Santrali (NES) projelerini başlatmalıdır. Türkiye hiçbir NES'e sahip olmaması nedeniyle, önceki çalışmalarla bu bulguların karşılaştırılması mümkün gözükmemektedir.

ABD, Kanada, İngiltere, Rusya, Meksika ve İran gibi petrol / doğal gaz zengini ülkeler bile elektrik üretim portföyüne nükleer enerjiyi dâhil etmişlerdir. Fukushima Daiichi nükleer felaketinden sonra dahi ülkeler, NES inşa etmeye devam etmiştir.

Bu nedenlere ilave olarak bu çalışmanın gerekçeli ana sebebi, toplam enerji gereksiniminin yaklaşık % 72'sini ithalatla karşılayan Türkiyenin büyük oranda dışa bağımlı olmasıdır. Kaynak çeşitliliğinin sağlanması bakımından Türkiye, Vizyon 2023 hedefinde sosyal ve ekonomik olarak nükleer enerjiye ihtiyaç duymaktadır. Çünkü enerjiyi ucuz, kaliteli ve sürdürülebilir olarak elde edenülkeler, küresel ticaret ve kalkınma yarışında ön sıralarda yer almaktadır.

2. LITERATÜR

Teorik olarak, literatürde enerji tüketimi ve ekonomik büyüme arasındaki ilişki olup olmadığı çok fazla işlenmiş olsada bu iki değişken arasındaki nedenselliğinyönü hakkında tartışmalar vardır.

(Baumier vd., 1986) enerji tüketimi ve üretimi arasındaki dengenin tüm farklı enerji şeklinin kullanımına bağlı olduğunu ve herhangi bir enerji stratejisi için nükleer enerjinin kazanan olduğunu açıklamışlardır.

(Mahadevan ve Asafu-Adjaye, 2007)enerji tüketimi-GSYİH büyüme ilişkisini 20 net enerji ithalatçısı ve ihracatçısı ülkenin 1971-2002 yılları arasındakiverilerini kullanarak araştırdıkları Panel Error Correction modelde; enerji ihracatçıları arasında gelişmekte olan ülkelerde ekonomik büyüme ve enerji tüketimi arasında kısa dönemde iki yönlü nedensellik olduğuhalde gelişmiş ülkelerde hem kısa hem de uzun vadede aynı ilişki olduğu ve gelişmekte olan ülkelere kıyasla gelişmiş ülkelerin enerji tüketimindeki bir artıştan ekonomik büyüme bakımından tepki elastikiyetinin daha büyük olduğu sonucuna ulaşmışlardır.

(Hunt vd., 2008) enerji ve GSYİH arasındaki 100'den fazla ülke için tutarlı bir veri ve metodoloji kullanarak yaptıkları nedensellik testleriyle enerjinin tartışmasız ekonomik kalkınmada önemli bir rol oynadığını açıklamaya çalışmışlardır. Ayrıca, enerjiden GSYİH'ye nedenselliğin gelişen OECD üyesi olmayan ülkelere kıyasla gelişmiş OECD ülkelerinde daha yaygın olduğu görülmüştür.

(Yoo ve Ku, 2009) nükleer enerji tüketimi ve ekonomik büyüme arasındaki nedensel ilişkiyi 2005 yılına kadar 20 yıldan fazla nükleer enerjiyi kullanan 20 ülke arasından altı ülke verilerini kullanarak zaman serisi teknikleriyle araştırmışlardır. Ana sonuç, nükleer enerji tüketimi ve ekonomik büyüme arasındaki nedensel ilişki ülkelerde tek tip değildir. İsviçre'de nükleer enerji tüketimi ve ekonomik büyüme arasında iki yönlü bir nedensellik vardır. Bu nükleer enerji tüketiminde bir artış, doğrudan ekonomik büyümeyi etkiler ve ekonomik büyümenin nükleer enerji tüketimini daha da uyardığı anlamına gelmektedir. Tek yönlü nedensellik Fransa ve Pakistan'da herhangi bir geri besleme etkisi olmadan ekonomik büyümeden nükleer enerji tüketimine, Kore'de nükleer enerjiden ekonomik büyümeye doğruçalışır. Ancak, Arjantin ve Almanya'da nükleer enerji tüketimi ve ekonomik büyüme arasında herhangi bir nedensellik tespit edilmemiştir.

(Wolde-Rufael ve Menyah, 2010) ek değişkenler olarak sermaye ve emek içeren, 1971-2005 arası dönemde dokuz gelişmiş ülke için nükleer enerji tüketimi ve reel GSYİH arasındaki nedensel ilişkiyi Toda ve Yamamoto tarafından geliştirilen Granger nedensellik testi ile incelemişlerdir. Buna göre; Japonya, Hollanda ve İsviçre'de nükleer enerji tüketiminden ekonomik büyümeye çalışan tek yönlü nedensellik, Kanada ve İsveç'te ekonomik büyümeden çalışan nükleer enerji tüketimine zıt tek yönlü nedensellik ve Fransa, İspanya, Birleşik Krallık ve Amerika Birleşik Devletleri'nde ekonomik büyüme ve nükleer enerji tüketimi arasında çalışan çift yönlü nedensellik bulunmuştur. İspanya, Birleşik Krallık ve ABD'de alınan koruma önlemlerinin nükleer enerji tüketimini düşürmesinin ekonomik büyümeyi negatif etkileyebilmesi şeklinde algısına rağmen nükleer enerji tüketiminde artışlar ekonomik büyümede artışa neden olmuştur. Fransa, Japonya, Hollanda ve İsviçre'de nükleer enerji tüketiminde artışlar alınan enerji koruma önlemleri dolayısıyla ekonomik büyüme üzerinde büyüme düşüşlere neden oldu. Kanada ve İsveç'te enerji koruma önlemleri ekonomik büyümeye zarar vermeyecek şekilde nükleer enerji tüketimini etkilemektedir.

(Apergis ve Payne, 2010) nükleer enerji tüketimi ile ekonomik büyüme arasındaki ilişkiyi the panel vector error correction model ile 1980-2005 dönemini on altı ülke için incelemişler; uzun dönemde nükleer enerji tüketiminden ekonomik büyümeye doğru tek yönlü nedensellik bulunduğu halde kısa dönemde nükleer enerji tüketimi ve ekonomik büyüme arasında iki yönlü nedensellik olduğu sonucunu elde etmişlerdir.

(Wolde-Rufael, 2010) ekonomik büyüme ve nükleer enerji tüketimi arasındaki dinamik ilişkiyi Hindistan'da 1969-2006 döneminde emek ve sermaye için incelediğinde kısa ve uzun dönemde nükleer enerji tüketimi ve ekonomik büyüme arasında ilişkiyi incelemiştir. Nükleer enerji tüketiminden ve ekonomik büyümeye doğru geri beslemesiz çalışan pozitif ve yüksek tek yönlü nedensellik tespit edilmiştir. Hızla büyüyen bir enerji bağımlı ekonomi için bu ekonomik büyüme için geniş kapsamlı etkileri olabilir. Enerjisel koruma tedbirlerinin ekonomik büyüme üzerinde olumsuz etkilerine bakılmaksızın gerçekleştirilmesi halinde Hindistan'ın ekonomik büyümesinde hayal kırıklığı yaratabilecektir.

(Apergis vd.,2010) gelişmiş ve gelişmekte olan 19 ülkede 1984-1987 döneminde bir panel hata düzeltme model yapısı kullanarak CO2 emisyonu, nükleer enerji tüketimi, yenilenebilir enerji tüketimi ve ekonomik büyüme arasındaki nedensel ilişkiyi bulmaya çalışmışlardır. Ampirik kanıtlar emisyonlar, nükleer enerji, yenilenebilir enerji ve ekonomik büyüme arasında uzun dönemli bir ilişki olduğunu göstermektedir. Uzun dönemde nükleer enerji, nükleer enerji emisyonları düşürmekte, nükleer enerji tüketiminde % 1'lik bir artışla CO2 emisyonlarında % 0,477'lik bir azalma meydana gelmekte ve nükleer enerji CO2 emisyonlarının azaltılmasında önemli bir rol oynamaktadır.

Türkiye'de 1996:01-2004:04 dönemi üçer aylık periyodlar halinde (Aydın, 2010) tarafından sıradan en küçük kareler yöntemi ile test edildiğinde;enerji tüketimi ile ekonomik büyüme arasında pozitif yönlü bir olduğu ve enerji tüketimindeki %1'lik değişmenin ekonomik büyümede %1.03'lük bir artışa neden olduğu sonucuna ulaşılmıştır.

(Fei vd., 2011) Çin'de 30 ilde 1985-2007 döneminde enerji tüketimi ve ekonomik büyüme arasındaki ilişkiyi incelediklerinde ampirik sonuç, kişi başı reel GSYİH ve enerji tüketim değişkenleri arasında pozitif uzun dönem eşbütünleşik bir ilişki olduğunu göstermektedir.

(NEI, 2014) analizi, ortalama nükleer santraller tarafından harcanan her dolar yerel ekonomide 1,04 $, eyalet ekonomisinde 1,18 $ ve ABD ekonomisinde 1,87 $ yaratılmasına yol açtığını göstermektedir.

Nükleer enerji tüketimi ile ekonomik büyüme arasındaki nedensel ilişkiyi sanayileşmiş dört ülke olan ABD, Kanada, Japonya, Fransa için 1965-2010 döneminde inceleyen (Naser, 2015) Japonya'da, nükleer enerji tüketiminden ekonomik büyümeye doğru tek yönlü nedensellik olduğu,buna karşın Fransa'da artan reel GSYİH'nın ek nükleer enerji tüketimine neden olduğu, ABD ve Kanada'da, tarafsızlık hipotezini destekleyen kanıtlar olduğunu açıklamaya çalışmıştır. Dört ülkeden üçünde reel petrol fiyatlarının seviyesi, nükleer güç talebinin kaynağı olarak hayati bir role sahip gibi görünmektedir. ABD, Japonya ve Fransa'da küresel petrol piyasası nükleer enerji talebi belirlemede anahtar bir rol oynamaktadır. Bu, petrol ithal eden ülkelerde beklenmeyen petrol fiyatlarındaki artışın ekonomik büyümeyi olumsuz etkileyebileceği durumuyla yüzleşmek için nükleer enerji tüketimindeki sınırlamaların üstesinden gelmek için çaba gerektiği anlamına gelmektedir.

Çeşitli sosyal ve ekonomik gelişmişlik düzeyinde, yüksek gelirli devletlerden düşük gelirli ülkelere olan mesafede, temiz enerji ihtiyacı ve iklim değişikliği üzerinde artan endişelere ilave olarak maliyetler ve enerji güvenliği nükleer gücü çekici bir alternatif/tamamlayıcı olarak sunmaktadır. Hızla artan dünya elektrik enerjisi talebi nükleer enerjinin güçlü olmaya devam edeceğini öngörmektedir.

3. YÖNTEM

Bu çalışma, enerjiyi ucuz, kaliteli ve sürdürülebilir olarak elde eden ülkelerin, küresel ticaret ve kalkınma yarışında ön sıralarda yer almakta olduğuna odaklanmıştır. Ayrıca, Türkiye için nükleer santralin sosyo-ekonomik zorunluluğu açıklanacak, Türkiyenin neden nükleer enerjiye sahip olmak istediğine cevap aranacak ve nükleer enerjinin olası sosyo-ekonomik etkisi incelenecektir.

Türkiyenin nükleerden elektrik enerjisi üretme kabiliyeti yoktur. Bu yeni çalışma ile çalışma, nükleer enerji GZFT tahlili yapılarak Türkiye için enerji politikası ve stratejisine yönelik öneriler sunulacaktır.

Atom enerjisinin ticari amaçlarla kullanılması için ilk nükleer santralin 1954 yılında Rusya tarafından kurulmasıyla Nükleer Enerji Piyasası (NEP) doğmuş, nükleer santral teknolojisinin geliştirilmesi ile başta ABD olmak üzere Rusya, Fransa, İngiltere ve Kanada tarafından Nükleer Rönesans başlatılmıştır. Almanya, Japonya ve Güney Kore gibi ülkeler bu teknolojiyi daha da geliştirerek kendilerine özgü nükleer santral tasarımlarına sahip olmuşlardır.

(Kınalı, 2014) tarafından yapılan çalışmada; 1954 - 2013 arası toplam 582 reaktör yapıldığı reaktör inşaatı yıllık oranı 9,84 olup, ilk 5 ülke arasında kurulu kapasite oranı% 67,74 olduğu; ilk 5 ülke reaktör sayısı oranı% 61,10 olduğu; son 10 yıldır kapasite artış oranı % 1.26 iken gelecek 10 yıl için bu oranın yaklaşık% 24.61 olacağı; bu dönemde nükleer santral yapım oranıyıllık ortalama 9.84 iken bu oranın önümüzdeki 20 yıl sonunda yaklaşık 13.45 olacağı öngörülmektedir.

Bu bağlamda, 1954-2013 dönemi temel nükleer enerji eğilimine göre talep senaryolarına bakıldığında;

- Nükleer Enerji Piyasası gelişmekte ve genişlemektedir.
- Türkiyenin nükleer enerjiye ihtiyacı var.
- Optimal nükleer enerjinin belirlenmesi Türkiye ekonomisine katkıda bulunacaktır.
- Enerji bağımlılığı olmayan ülkeler bile nükleer enerjiyi portföyüne dahil etmişlerdir.
- Daichi Fukushima nükleer kazasından sonra dahi ülkelerin çoğu nükleer enerji programlarına devam etmişlerdir.
- Ucuz, kaliteli ve sürdürülebilir olarak enerji elde ülkeler, küresel ticaret ve kalkınma yarışmasında ön sıralarda yer almaktadırlar.

- Türkiye için nükleer odaklı enerji politikasının ve stratejisinin geliştirilmesi Vizyon 2023 hedefleri doğrultusunda önemli katkı yapacaktır.
- Sosyal kaygılar boyutunda ise nükleer enerji kullanan ve kişi başına enerji kullanımının yüksek olduğu ülkelerin Çok Yüksek İnsani Kalkınmışlık Endekslerine sahip olduğu görülmektedir.

Cari açığın azaltılması, ithal enerjiye bağımlılığın azaltılması ve enerji arz güvenliğinin sağlanması bakımından Türkiye için nükleer enerji büyük önem taşımaktadır. Türkiye'de, doğal gazın% 98’i, petrolün % 92’si ve kömürün % 20’si ithal edilmektedir. Böyle yüksek ithalat oranları rağmen Fransa'nın petrol (% 99) ve doğal gaz (% 97) Fransa'nın enerji ithalatı bağımlılığının oranı % 50 iken, bu oran ülkemizde yaklaşık 72% 'dir. Bunun temel nedeni, Fransa'da elektrik üretiminde nükleer enerjinin payı% 73.3 olmasından kaynaklanmaktadır. (WNA, 2014) verilerine göre Japonya, enerji ihtiyacının yaklaşık% 84’ünü ithal etmek zorundadır. Artan yakıt ithalatı yılda yaklaşık 40 milyar dolar maliyet getirmektedir. Nisan 2011 tarihinden itibaren Mart 2014 sonuna kadar toplam ticaret açığı 227milyar $ olarak gerçekleşmiştir. Elektrik üretim maliyetlerinde % 56 artış gözlemlenmiş ve Japon enerji şirketleri Fukuşima kazasından beri ithal fosil yakıtlara ek 93 milyar $ ek kaynak harcamıştır.

Nükleer enerji GZFT analizi ile tahlil edilmiş ve Şekil 1’de gösterilmiştir. Bu kapsamda;

Şekil 1: GZFT Analizi

Güçlü Yönler;

- Temiz ve ucuz enerji
- Verimlilik (Kapasite faktörü)
- Süreklilik
- Yakıtı Yeniden İşleme
- Ömür

Fırsatlar;

- Caydırıcılık
- Teknoloji
- İstihdam
- Enerji Bağımsızlığı
- Enerji Kaynak Çeşitliliği
- Çift kullanım (Sağlık, uzay, deniz suyu arıtılması, gemi ve denizaltılar)
- Yabancı Yatırımlar
- Ödemeler dengesi katkı
- Katma Değer Etkisi
- Yüksek nitelikli beyin göçünün önlemesi

Zayıf Yönleri;

- Yüksek Maliyet
    - Yüksek Yatırım Maliyeti
    - Yakıt Maliyeti
    - İnşaat Maliyeti
    - İşletme Maliyeti
    - Bakım Maliyeti
    - Test / Muayene / Kontrol Maliyeti

    - Atık ve Bertaraf Maliyeti
    - Tasviye Maliyeti
- İnşaat Zamanı
- Nükleer Atık
- Nükleer Yakıt Zenginleştirme

Tehditler;

- Nükleer Felaket
- Nükleer Güvenlik, şeklindedir.

Türkiye’de nükleer enerji konusunda (NEPUD, 2011;NEPUD, 2012; NEPUD,2013)yapılan çalışmalar ışığında GZFT Analizi değerlendirildiğinde;

Yenilenebilir enerji güvenlidir, ancak güvenilir (sürekli) değildir. Yılda 8760 saatin, bakım dönemleri çıkarılırsa, nükleer santral yaklaşık 8000 saatinde çalışabilmekte fakat hidrolikte bu ortalama 4000 saat; rüzgarda ortalama 3000; güneşte ise ortalama 2500 saattir.

Dünyada elektrik üretiminde kömür ilk sırayı alırken, ikinci sırada doğalgaz gelmektedir. Ülkemizde ise doğalgaz ilk, kömür ikinci sırada yer almaktadır. Dünya elektrik ihtiyacının yaklaşık % 13'ünü nükleer enerjiden karşılamakta iken Türkiye Nükleer enerji kullanmamaktadır. Nükleer santrale sahip 31 ülkeden 7’si net enerji ihracatçısıdır.

Türkiye’de petrol, doğalgaz ve kömürdeki yüksek ithalat oranına karşılık, yenilenebilir enerji kaynaklarının kurulu güç potansiyeli yaklaşık 136.600 MW, kullanılmakta olan 22.075 MW’dır. Kullanabiliryenilenebilir potansiyeli yaklaşık 114.525 MW olmasına karşın, kapasite faktörü nedeniyle fiilen kullanabilen, potansiyelin çok az bir kısmıdır. Ülkemizin enerji arz kaynaklarıdışa bağımlı ve kısıtlı iken, elektrik tüketim talebi sürekli olarak artmaktadır. Elektrik tüketim talebi yıllık olarak ortalama % 7-8 oranında artış göstermektedir. Bunu karşılamak için kurulu güce yıllık 4000-5000 MW ilave yapmak gerekmektedir. Türkiye, elektrik talep artışında dünyada Çin'den sonra ikinci, Avrupa'da birinci sırada yer almaktadır. 2012 yılında elektrik tüketim talebi 240 milyar kWh iken bunun 2023’te 500 milyar kWh’a çıkması öngörülmektedir. Ancak, yenilenebilir enerjide 2023 yılına ait hedeflere ulaşıldığındada (230 milyar kWh) 2023 yılında tahmini elektrik tüketim talebimizin (500 milyar kWh) ancak yarısını yenilenebilir karşılayacaktır.

2023 yılına kadar Akkuyu ve Sinop Nükleer Santrallerinin işletmeye alınması durumunda, yılda 80 milyar Kwh elektrik üretimiyle o zamanki kurulu gücümüzün %10’unu nükleer santraller oluşturacaktır. Akkuyu ve Sinop’ta kurulacak nükleer santraller sayesinde 16 milyar metreküp doğalgaz ithal etmekten ve dolayısıyla doğalgaza yıllık 7.2 milyar dolar ödememek ödemeler bilançosu üzerindeki yükü hafifletecektir.

Yaklaşık 550 bin parçadan oluşan nükleer santral projesi, diğer sektörlere de sağlayacağı dinamizmle ve istihdam imkanıyla birlikte ülkemiz sanayisine, teknolojisine önemli derecede katma değer sunacak, çoğaltan etkisi yapacaktır. Yaklaşık 470 Türk firmasının görev alması ve 1 MWe için istihdam parametresi 0,8 olarak öngörülmektedir.(Boyarkin, 2014)Akkuyu Nükleer Santralinde inşaatın en yoğun olduğu dönemde yaklaşık 10.000 kişi çalışacaktır. Santralin inşa aşamasında önemli iş imkânları doğacaktır. Bunlardan çok daha önemlisi ise büyük sanayi yatırımcıları tesislerini, 50-60 yıllık elektrik enerjisini garanti gördükleri bölgelere rahatlıkla kurmaları olacaktır. Bu, Türkiye'nin endüstriyel kalkınması açısından önemli bir avantaj sağlayacaktır. G. Kore örneğinde olduğu gibi nükleer teknolojiye sahip olmak için hem belirli bir zaman geçmesi ve hem de somut olarak nükleer santral projesine başlamak gerekmektedir. Nükleer enerji çalışmalarına 1956 yılında birlikte başladığımız G. Kore nükleer teknolojiyi 20 yıllık süre içerisinde yerelleştirmiş ve bugün Birleşik Arap Emirliklerine nükleer santral inşa etmektedir. G.Kore’deki nükleer endüstrinin gelişiminde ilk nükleer santralinde yalnızca %2 oranında bir yerel katkı bulunmaktayken, günümüzde, %98’i milli kaynaklarla inşa edilen nükleer santral projeleri tasarlayabilmektedir.

Turizm, tarım, balıkçılık ve sosyal kaygılar boyutunda ise nükleer enerjiyi yoğun kullanan ve kişi başına enerji kullanımı yüksek olan ülkelerin İnsani Kalkınmışlık Endekslerinin yüksek olduğu görülmektedir. (MoW, 2008)Nükleer santral sayısı bakımından dünyada en fazla iki ülke olan ABD ve Fransa’nın tarım ihracatında da dünyada en yüksek iki ülke olması anlamlıdır. ABD’nin, 42,8 milyar dolarla dünyada en fazla tarımsal ürün ihracatı yapan ülke olduğu bilinmektedir Yine, elektrik üretiminde nükleer enerjinin payı en fazla olan (%73,3) Fransa da en fazla tarımsal ürün ihracatı yapan 2. ülkedir. Dünyada en fazla tarımsal ürün ihracatı yapan ülkelerin dünyada bulunan nükleer reaktörlerin yarısından fazlasına bu ilk 10 ülkede kurulu olduğu görülebilir. Turizm gelirleri bakımından yüksek gelir elde eden ülkelerde turizm bölgelerinin nükleer santrallere yakınlığı yönünde Türkiye’de makul düzeydedir. Dünyada pek çok turizm ülkesi nükleer enerjiden faydalanmaktadır ve yine birçok nükleer reaktör turizm merkezlerine Akkuyu sahasında olduğundan çok daha yakındır. Akkuyu sahasının Antalya’ya uzaklığı 300 km civarındadır. Romanya’da bulunan Cernovoda santrali İstanbul’a 400 km uzaklıktadır. Ülkemizden çok daha fazla turist çeken ülkelerdeki nükleer santrallerin önemli turistik merkezlere uzaklığına bakıldığında; Fransa’da Paris’e 200 km’den daha yakın alanda 6 nükleer santral bulunmakta ve Nogent santralinin Paris'e uzaklığı sadece 70 km'dir. İspanya'da Madrid'e 200 km'den daha yakın alanda 4 nükleer santral bulunmakta ve Jose Cabreras santralinin Madrid'e uzaklığı sadece 50 km'dir. İngiltere'de Londra'ya 200 km'den daha yakın alanda 8 nükleer santral bulunmakta ve Bradwell santralinin Londra'ya yakınlığı 70 km'dir. Ayrıca, Fransa'da bulunan ve dünya kültür miras listesinde yer alan Loire Nehri üzerinde 14 adet nükleer güç santrali bulunmaktadır ve bu nehir üzerinde bot ile gezinti yapılması, çok yaygın turizm aktivitesidir veaynı zamanda nehrin etrafındaki arazilerde tarımsal faaliyetler de yürütülmektedir.(Dods, 2014) her enerji seçiminin negatif dışsallığı vardır.

Fukushima sonrası nükleer santrallerin geleceği konusu dünyada da sıkça tartışılan bir konu olmuştur. Fukushima kazasından sonra ülkelerin durumuna özetle bakıldığında; günümüzde WNA (2015) verilerine göre inşa halinde olan 69 nükleer santral bulunmaktadır. Yüzde olarak nükleerin payının en yüksek olduğu Fransa'da 1 ünite nükleer santral inşa halindedir. İngiltere 6 nükleer santral inşa etmeyi planlamaktadır. Çin'de 26 nükleer santral inşa halindedir. Birleşik Arap Emirliklerinde 4 nükleer santral inşaat halindedir ve ilk ünite 2017 yılında işletmeye alınacaktır. Diğer yandan, Almanya 17 santralden ömrü bitmiş olan 8 santrali kapatmış, kalan 9 santrali de 2022 yılında kapatmayı planlamaktadır. Japonya kapattığı nükleer santrallerden 2 tane reaktörü tekrar işletmeye almıştır. Japonya Fukushima Daiichi nükleer santrali 2'nci nesil nükleer santraldir. Günümüzde kurulan nükleer santraller 3 üncü nesil santrallerdir ve bu santrallerin güvenlik önlemleri daha da artırılmıştır. 2030'lu yıllar için bugün bazı ülkeler 4 üncü nesil nükleer santral tasarımı çalışmalarını yürütmektedir. 11 Mart 2011'de meydana gelen Fukushima kazasından hareketle nükleer santrallerde güvenlik önlemleri daha da geliştirilmiştir. Nükleer santraller, açığa çıkan radyoaktif maddelerin ve radyasyonun, normal çalışma veya kaza durumunda reaktör ve santralin dışına çıkmamasını ve çevreden yalıtılarak muhafaza edilmesini sağlamak üzere "Derinliğine Savunma" ilkesine dayandırılarak tasarlanır. Bu ilke, radyoaktif salıma karşı beş fiziksel bariyerin tasarımda yer almasını öngörmektedir.

Günümüzde nükleer santraller, elektrik sektöründen kaynaklanan sera gazı salımında yıllık olarak yaklaşık %17 azalmaya sebep olmaktadır.

Nükleer santrallerden çıkan atık miktarının çok az olmasıyla çok az yer kaplayacağından yer üstündeki depolarda güvenli bir şekilde depolanabilmektedirler. 1000 MWe gücündeki bir nükleer santralden yılda yaklaşık 30 ton nükleer atık çıkmaktadır. Kullanılmış nükleer yakıtlar yeniden işlenerek (reprocessing) enerji üretimi için kullanılabilirler. Radyoaktif fisyon ürünlerinin %3'ü ve ağır elementler, kullanılmış yakıttan ayrıştırılıp camlaştırılarak canlı yaşamından izole edilmiş şekilde güvenli ve sürekli depolanabilmektedir. Plütonyum ve uranyumu ihtiva eden geriye kalan %97'sinden ise yeni yakıt elementleri üretilebilmektedir. Bunun sonucunda, kullanılmış nükleer yakıtların büyük çoğunluğunun tekrar işlenebilmesi ile nükleer santraller için gerekli yakıt ihtiyacı uzun yıllar boyunca karşılanabilecek ve kullanılmış yakıtlardan kaynaklanan atık miktarı azaltılmış olacaktır. Nükleer yakıt maliyeti ve bunun sonucu olarak fiyatı istikrarlı sayılabilecek seviyededir. İşletme maliyetlerinde nükleer yakıtın oranı %30'larda olduğu için (bu oran kömür yakıtlı santraller için %77, doğalgaz için %90) nükleer yakıt fiyatlarındaki değişimin elektrik üretim maliyetine etkisi fosil yakıtlara oranla çok daha azdır. Yakıt fiyatlarının iki katına çıkması doğalgaz santralleriyle üretilen elektriğin maliyetine %66, kömür santralleriyle üretilen elektriğin maliyetine %31 oranında yansımaktayken bu oran nükleer santraller için sadece %9'dur.

Nükleer Güvenlik ve İleri Teknoloji kalite kültürünün ülkemizde yerleşmesine ve gelişmesine katkı sağlar.

Nükleer Santral işletme ömrü diğer santral türlerine göre daha uzundur. Güneş enerjisi sistemlerinin yaklaşık ömrü 20 yıl civarında seyretmektedir. Rüzgâr enerjisi santrallerinin ortalama verimli çalışma süresi 20 yıl olup, sistemin kullanım ömrü 30 yıl civarındadır.

Nükleer güç santralleri uzun yıllar boyunca ihtiyaç duyulacak nükleer yakıtları kolayca ve ekonomik depolamaya imkân verdiğinden enerji arz güvenliğinin sağlanmasına önemli katkı sağlar.

Hidroelektrik santrallerinin kapasite faktörleriyle ilgili olarak, yağış miktarlarında bir azalma meydana gelirse santralde daha az su toplanarak daha az enerji elde edilebilmesine sebep olacaktır. Kapasite, bir santralin ne kadar verimli kullanıldığını gösteren bir parametredir. Ayrıca bu santrallar fazla yer kapladıklarından fauna ve flora etkisi araştırılmalıdır.

Dünyada en fazla nükleer santralin olduğu Amerika Birleşik Devletleri'nde nükleer santrallerden dolayı halkın doğal radyasyona ek olarak aldığı miktar yılda 0,05 mSv'in altındadır. Halk için kabul edilebilir radyasyon dozu sınırı yılda 1 mSv'dir.

Deniz suyu, nükleer santrallerde reaktörü soğutmak için değil türbinden çıkan buharı yoğuşturmak için kullanılmakta ve hiçbir şekilde reaktörden gelen suya karışmamaktadır. Bu durumda, deşarjın yapıldığı deniz suyunun "o bölgede yaşayan balık ve diğer deniz canlılarını yok edebilecek seviyede" olması söz konusu değildir.

VVER-1200 tipi reaktörler, işletimde olan VVER-1000 tipi reaktörlerin mevcut işletme ömrü, gücü, termal verimi ve güvenlik sistemleri artırılmış modelleridir. VVER-1200 gibi 3. nesil olarak nitelendirilen başka reaktör tipleri de bulunmaktadır. Bunlara örnek olarak Güney Kore tasarımı APR1400, Fransız tasarımı EPR ve ABD tasarımı AP1000 verilebilir. Bu reaktörlerin hiç birinin işletme halinde bulunan bir örneği bulunmamaktadır. Bununla birlikte 2 ünite APR1400 Güney Kore'de, 1'er ünite EPR Finlandiya ve Fransa'da, 4 ünite AP1000 ise Çin'de halen inşa halinde bulunmaktadır. Bu reaktörlerin geliştirilmelerine temel teşkil eden Basınçlı Su Reaktörü (PWR) tipi reaktörlerin başarılı işletme deneyimleri, bahsi geçen 3.nesil reaktörlerin kurulmaları için yeterli referansı sağlamaktadır.

Nükleer enerjinin avantajları dezavantajlarına kıyasla göreceli olarak daha yüksek olduğunu gösteren GZFT Analizi göstermektedir ki: risk kabul edilebilir ve kontrol altına alınırsa, nükleer enerji santralleri iyi tasarlanmış, iyi inşa edilmiş, iyi yapılandırılmış, iyi işletilebilinir ve iyi bakımlanmış ise nükleer enerji sadece temiz değil, ama aynı zamanda, ucuz, emniyetli, güvenilir, dayanıklı ve rekabetçidir. Neden Türkiye'de Nükleer Enerji gereklidir;

Elektrik talebindeki artış

Enerji bağımsızlığı

Arz güvenliği ve kaynak çeşitliliği

Temel girdi ihtiyacı ve kullanılabilirlik,

Yakıt maliyeti stabilitesi

Çevre ve sera gazı emisyonları

(TPAO, 2011) göre dünyanın petrol rezervlerinin yaklaşık 46 yıl ve doğal gaz rezervlerinin yaklaşık 58 yıl içinde tükenmiş olacağı tahmin edilmektedir. Bu durumda, gelecekte enerji arz güvenliğini sağlamak için yeni kaynaklara ihtiyaçduyulacağı aşikârdır. 2035 yılında nükleer enerjiden elektrik üretiminde kurulu kapasitenin % 58 artması beklenmektedir.

Dünya enerji talebi,artan nüfus, değişen ve hızla gelişen teknoloji enerji konusunun önemini ortaya koymaktadır. Bu bağlamda, enerji gelecek talep tahminlerinin sağlamlığı büyük önem taşımaktadır.

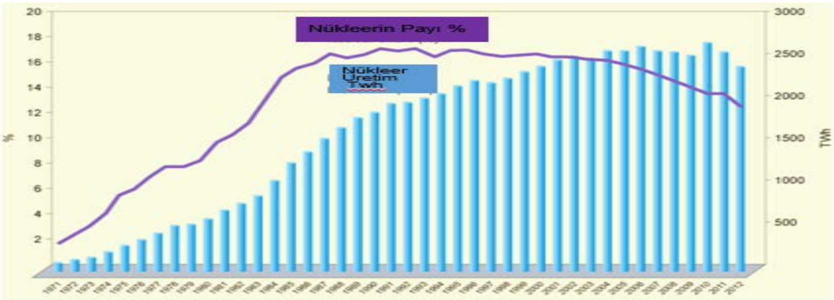
Türkiye, jeopolitik ve jeostratejik bakımından son derece önemli bir bölgede yer almaktadır. Yeni dünya düzeninde küresel bir enerji koridoru olarak hizmet vermektedir. Bu kapsamda, yüzde 72 düzeyinde olan enerji bağımlılığın geleceğini şekillendirecek, etkili makroekonomik strateji ve politikalar geliştirilmelidir. Gelişmiş ülkelerde, nükleer enerjinin hem siyasal faaliyetin şeklinde hem de toplam ekonomisiye katkıda bulunmada önemli bir rol oynadığı bilinmektedir. Küresel ölçekte bu alanda başarılı olmak birçok yönden avantajlı olacaktır.

4. TARTIŞMAVE BULGULAR

Atom enerjisinin ticari amaçlarla kullanılmasıyla Nükleer Enerji Piyasası (NEP) doğmuş, nükleer santral teknolojisinin geliştirilmesi ile başta ABD olmak üzere Rusya, Fransa, İngiltere ve Kanada tarafından Nükleer Rönesans başlatılmıştır. Almanya, Japonya ve Güney Kore gibi ülkeler bu teknolojiyi daha da geliştirerek kendilerine özgü nükleer santral tasarımlarına sahip olmuşlardır.

(WNA, 2015) verilerine göre günümüzde 30'dan fazla ülkede 438 (=378,870 MWe) nükleer reaktör işletmede bulunmakta, 69 (=72,157MWe) reaktörün yapımı devam etmektedir. 2030 yılına kadar 184 (=202,440MWe) nükleer güç reaktörünün yapılması planlanmakta, 312 (=341,570MWe) yeni reaktörün yapılması öngörülmektedir. Nükleer enerji piyasası gelişmekte ve genişlemektedir.1971-2012 yılları arasında dünya genelinde kurulan nükleer güç santrali sayısı ve toplam kapasitelerindeki değişim Grafik.1'de yer almaktadır.

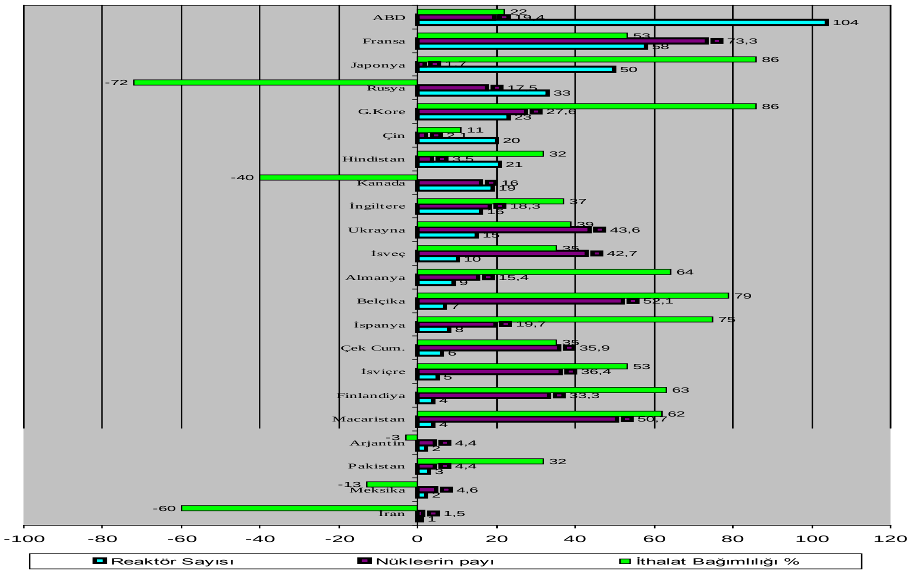
Grafik 1. Çalışmakta Olan Nükleer Güç Reaktör Sayı ve Kapasiteleri (1971-2012)



Kaynak: Rising,A, World Nuclear Associtation, INPP Summit, 30-31 May 2014

Güvenilir kaynaklardan enerjiyi sağlama arayışı, enerji sektörünün en önemli gündemi haline gelmiştir. Özellikle 1970'li yılların başında ortaya çıkan petrol dar boğazı güvenilir enerji kaynağı olarak nükleer enerjiyi ön plana çıkarmış ve 1980'li yılların ikinci yarısına kadar yüksek kapasiteli birçok nükleer reaktör kurulmuş ve işletmeye alınmıştır. 1980'li yılların sonuna doğru ise nükleer enerjiye olan talep artışı azalma eğilimine geçmiş ve 1990'lı yıllar boyunca durağan hale gelmiştir. Bunun nedeni Three Mile Island (1979, ABD) ve Çernobil (1986, Sovyetler Birliği) nükleer kazaları gözükse de, asıl neden dünya ekonomisindeki yavaşlama ve doğalgazın enerji pazarına girmesidir. Yine de Nükleer devamlı enerji kaynağı olarak önemini korumaktadır. 2011 Fukishima kazasından sonra Almanya hariç ülkeler nükleer santral programlarına devam etmişlerdir.

Grafik 2. Dünyada Nükleer Güç Reaktörleri, Üretimdeki Payı ve Enerji İthalatı

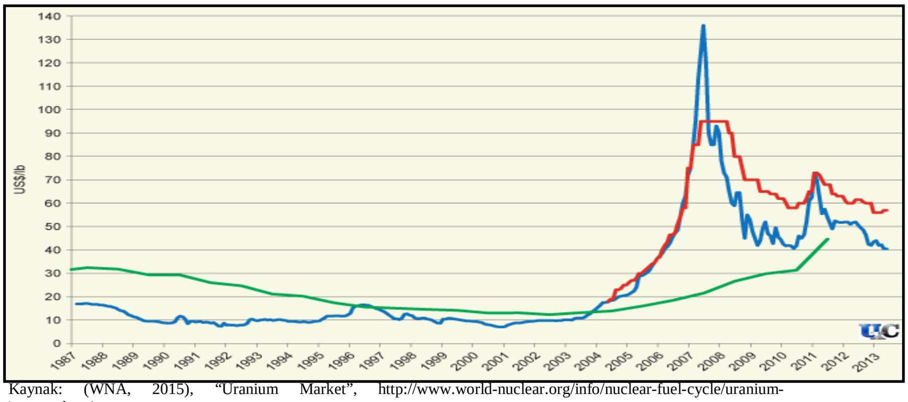


Kaynak: http://www.iaea.org/PRIS/WorldStatistics, NEPUD Yayın no:2

Sayı bakımından dünyada birinci ABD 104 reaktör ile elektrik üretiminin % 19,4'ünü nükleerden sağlamaktadır. İkinci sıradaki Fransa 58 reaktör ile elektrik üretiminin % 73,3'ünü nükleerden sağlamaktadır. 12 ülkede elektrik üretiminde nükleerin payı % 20'nin üzerindedir. Dünya elektrik ihtiyacının yaklaşık % 13'ünü nükleer enerjiden karşılamakta iken Türkiye Nükleer enerji kullanmamaktadır. Nükleer santrale sahip 31 ülkeden 7'si net enerji ihracatçısıdır.ABD, Kanada, İngiltere, Rusya, Meksika ve İran gibi petrol / doğal gaz zengini ülkeler bile elektrik üretim portföyüne nükleer enerjiyi dâhil etmişlerdir. Fukuşima Daiichi nükleer felaketinden sonra dahi ülkeler, NES inşa etmeye devam etmiştir.

Dünyada nükleer enerji teknolojisine sahip az sayıda ülke bulunmaktadır. Rusya, sadece kendi yaptığı santrallerde değil aynı zamanda dünyadaki çeşitli santrallere de nükleer yakıt sağlamaktadır. 1987-2013 arası Uranyum libre fiyatları grafik 3'te görülmektedir.

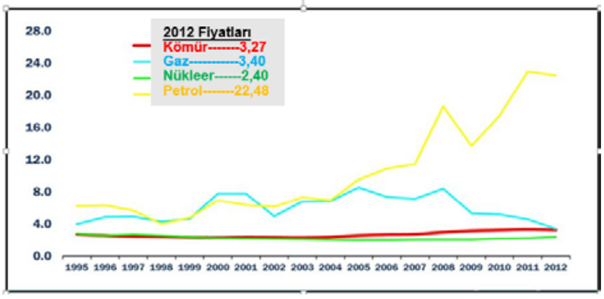
Grafik 3. Uranyum Fiyatları (1987-2013) US$/lb



Kaynak: (WNA, 2015), "Uranium Market", http://www.world-nuclear.org/info/nuclear-fuel-cycle/uranium-resources/uranium-markets/

ABD ve Fransa'da kullanılan yakıtın %30'u, İsviçre'de kullanılanların %100'ü Rus yapımıdır. Rusya, dünya zenginleştirme kapasitesinin %40'ına sahiptir ve dünyada kullanılan yakıtın %17'sini sağlamaktadır. 2025 yılında %25'e çıkarılması hedeflemektedir. WNA (2014) göre ABD ile Rusya arasındaki 'Megatons to Megawatts' Programı askeri uranyumun ticari nükleer güç santrallerinde ana yakıt kaynağı olarak kullanması üzerine odaklıdır. ABD'de enerji kaynaklarına göre enerji üretim maliyeti grafik 4'de yer almaktadır.

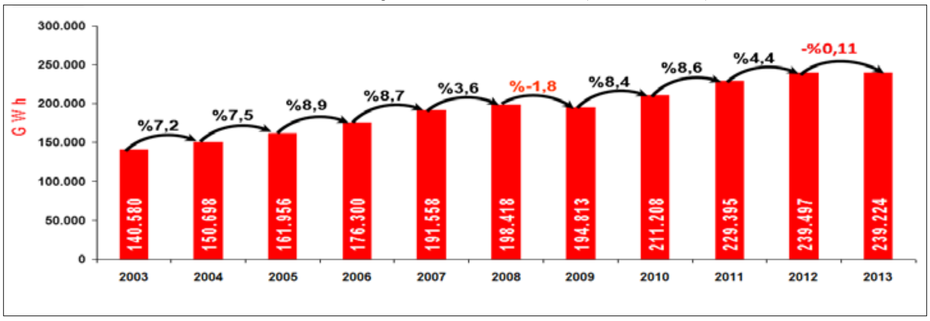
Grafik 4. ABD Elektrik Üretim Maliyetleri (1995-2012) Cent/kwh



Kaynak:www.nei.org

Çeşitli sosyal ve ekonomik gelişmişlik düzeyinde, yüksek gelirli devletlerden düşük gelirli ülkelere kadar mesafede, temiz enerji ihtiyacı ve iklim değişikliği üzerinde artan endişelere ilave olarak maliyetler ve enerji güvenliği nükleer gücü çekici bir alternatif olarak sunmaktadır. Hızla artan dünya elektrik enerjisi talebi nükleer enerjinin güçlü olmaya devam edeceğini öngörmektedir. Türkiyenin elektrik enerjisi talebi grafik 5'te yer almaktadır.

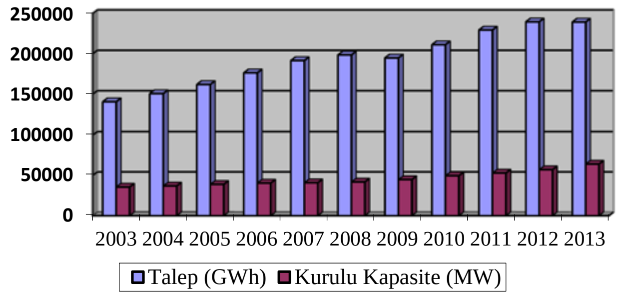
Grafik 5. Türkiye Elektrik Talebi (2003-2013)



Kaynak: www.enerji.gov.tr

Türkiyenin enerji talebi yıllık yaklaşık %6-8 olup 2030 yılına kadar ulusal hedefler doğrultusunda bu trendin devam etmesi beklenmektedir.Grafik 6'da Türkiye'de kurulu güç ve elektrik talebi yer almaktadır. Enerji açığı nedeniyle Türkiyenin nükleer enerjiye ihtiyacı vardır.

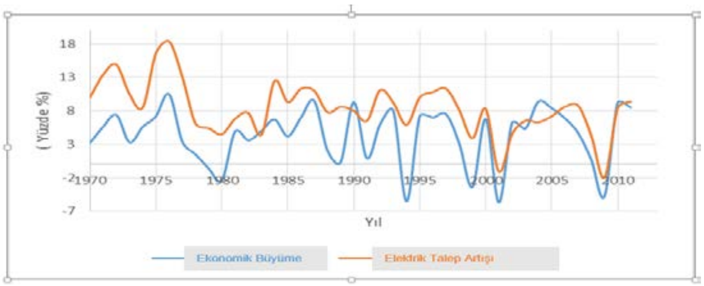
Grafik6.Türkiye'de Kurulu Güç ve Elektrik Talebi (2003-2013)



Kaynak: http://www.enerji.gov.tr, Eüaş

Türkiye, 2010 yılında elektrik talep artışında dünyada Çin'den sonra ikinci, Avrupa'da ise birinci sırada yer almaktadır. Gelişmiş ve gelişmekte olan ülkelerdeki eğilime ve nüfus artışına paralel olarak Türkiyenin enerji tüketim değerlerinde elektrik enerjisinin payı artmaktadır. Hızla artan nüfus, yükselen elektrik enerjisi ihtiyacını beraberinde getirmektedir. Son 10 yıl içerisinde Türkiyenin milli geliri 4 kat, kişi başına gelir 3 kat artarak dünyanın 17. büyük ekonomisi olmuştur. Ancak, elektrik tüketim talebi ekonomik büyümeden yaklaşık % 2'den fazla olmuştur. (Bakınız Grf.7)

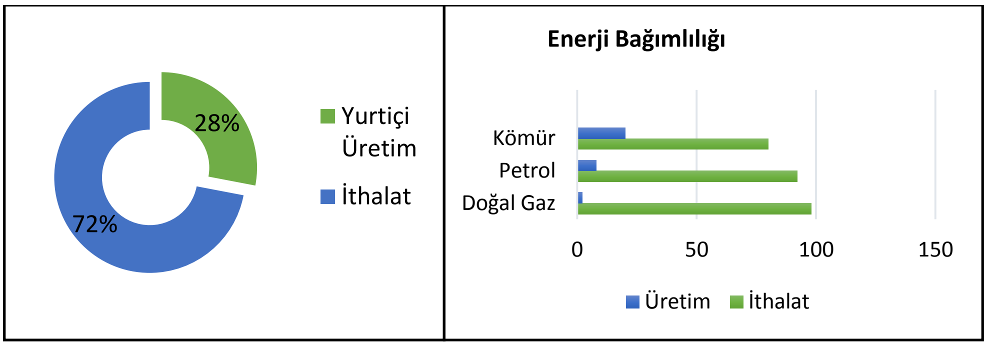
Grafik 7.Türkiye'de Elektrik Talebi ve Ekonomik Büyüme (1970-2010)



Kaynak:www.enerji.gov.tr

Toplam enerji ihtiyacının % 72'sini ithalatla karşılayan Türkiye, enerjide büyük oranda dışa bağımlıdır.(Bkz.Grf:8) Elektrik üretiminde kullanılan doğalgazın % 98'i, petrolün % 92'si ve kömürün% 20'si ithal edilmektedir. Böyle yüksek ithalat oranları rağmen Fransa'nın petrol (% 99) ve doğal gaz (% 97) Fransa'nın enerji ithalatı bağımlılığının oranı % 50 iken, bu oran ülkemizde yaklaşık 72% 'dir. Bunun temel nedeni, Fransa'da elektrik üretiminde nükleer enerjinin payı % 73.3 olmasından kaynaklanmaktadır.

Grafik 8.Türkiye'de Enerji Bağımlılığı



Kaynak:www.enerji.gov.tr

2013 yılı sonu itibarıyla Türkiye'nin elektrik ihtiyacı yaklaşık yıllık 245 milyar kWh iken 2023 yılında 500 milyar kWh'a çıkması öngörülmektedir. Fosil yakıtların bilinen rezervlerin tahmini bitiş süreleri göz önüne alındığında, Türkiye mevcut enerji potansiyeli ile bu talebin ancak yarısını karşılayabilmektedir. 2023 yılında bu talebi karşılayabilmek için yıllık 5000-6000 MW ek kapasite için 10-11 milyar dolar yatırıma ihtiyaç duyulmaktadır.

Dünyada elektrik üretiminde kömür ilk sırayı alırken, ikinci sırada doğalgaz gelmektedir. Ülkemizde ise doğalgaz ilk, kömür ikinci sırada yer almaktadır.(Bkz.Tablo:1)Petrol, doğalgaz ve kömürdeki yüksek ithalat oranına karşılık, yenilenebilir enerjide kurulu güç potansiyeli yaklaşık 136.600 MW olup kullanılmakta olan 22.075 MW'dır. Kullanılabilecek 114.525 MW potansiyelin kapasite faktörü nedeniyle fiilen kullanılabilen çok az bir kısmıdır.

Tablo 1. Kaynaklarına Göre Dünyada ve Türkiye'de Elektrik Üretimi

Kaynaklar	***Dünya***	***Türkiye***
Petrol	% 4,6	% 1.5
Doğal Gaz	% 22,2	% 43.7
Kömür	% 40,6	% 27,5
Hidrolik	% 16	% 24.2
Nükleer	% 13	% 0
Diğerleri (Yenilenebilir vb.)	% 3,7	% 3,1
Toplam	**24,431 TWh**	**240 *TWh***

Kaynak: Nükleer Enerji Proje Uygulama Daire Başkanlığı, Yayın No:2

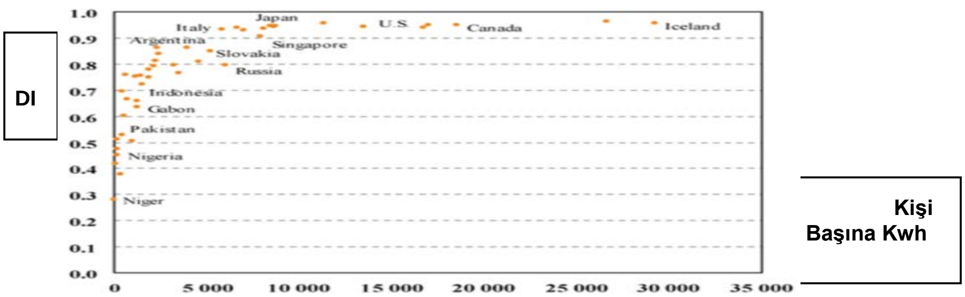
Enerji arz kaynaklarımız dışa bağımlı ve kısıtlı iken, elektrik tüketim talebimiz sürekli olarak artmaktadır. Elektrik tüketim talebimiz yıllık olarak ortalama % 7-8 oranında artış göstermektedir. Bunu karşılamak için kurulu gücümüze yıllık 4000-5000 MW ilave yapmak gerekmektedir. Türkiye, elektrik talep artışında dünyada Çin'den sonra ikinci, Avrupa'da birinci sırada yer almaktadır. 2012 yılında elektrik tüketim talebi 240 milyar kWh iken bunun 2023'te 500 milyar kWh'a çıkması öngörülmektedir. Ancak, yenilenebilir enerjide 2023 yılına ait hedeflerimize ulaştığımızda (230 milyar kWh) 2023 yılında tahmini elektrik tüketim talebimizin (500 milyar kWh) ancak yarısını yenilenebilir karşılayacaktır. Türkiye'nin nükleerden elektrik üretme kabiliyeti yoktur.

Fukushima Daiichi nükleer felaketinden sonra dahi Nükleer güç santralleri inşasına devam edilmektedir. VVER-1200 tipi reaktörler, işletimde olan VVER-1000 tipi reaktörlerin mevcut işletme ömrü, gücü, termal verimi ve güvenlik sistemleri artırılmış modelleridir. VVER-1200 gibi 3. nesil olarak nitelendirilen başka reaktör tipleri de bulunmaktadır. Bunlara örnek olarak Güney Kore tasarımı APR1400, Fransız tasarımı EPR ve ABD tasarımı AP1000 verilebilir. Bu reaktörlerin hiç birinin işletme halinde bulunan bir örneği bulunmamaktadır. Bununla birlikte 2 ünite APR1400 Güney Kore'de, 1'er ünite EPR Finlandiya ve Fransa'da, 4 ünite AP1000 ise Çin'de halen inşa halinde bulunmaktadır. Bu reaktörlerin geliştirilmelerine temel teşkil eden Basınçlı Su Reaktörü (PWR) tipi reaktörlerin başarılı işletme deneyimleri, bahsi geçen 3.nesil reaktörlerin kurulmaları için yeterli referansı sağlamaktadır.

Günümüzde kurulan nükleer santraller 3'üncü nesil santrallerdir ve bu santrallerin güvenlik önlemleri daha da artırılmıştır. 2030'lu yıllar için bugün bazı ülkeler 4 üncü nesil nükleer santral tasarımı çalışmalarını yürütmektedir. 11 Mart 2011'de meydana gelen Fukushima kazasından hareketle nükleer santrallerde güvenlik önlemleri daha da geliştirilmiştir. Nükleer santraller, açığa çıkan radyoaktif maddelerin ve radyasyonun, normal çalışma veya kaza durumunda reaktör ve santralin dışına çıkmamasını ve çevreden yalıtılarak muhafaza edilmesini sağlamak üzere "Derinliğine Savunma" ilkesine dayandırılarak tasarlanır. Bu ilke, radyoaktif salıma karşı beş fiziksel bariyerin tasarımda yer almasını öngörmektedir.

Sosyal kaygılar boyutunda ise kişi başına nükleer / enerji kullanımı yüksek olan ülkelerin İnsani Kalkınmışlık Endekslerinin çok yüksek olduğu görülmektedir.(Bkz.Şekil:2)

Şekil 2. İnsani Gelişmişlik Endeksi (HDI) ve Kişi Başı Elektrik Tüketimi



Kaynak: IAEA, "Nuclear Power and Sustainable Development", 2006

Nükleer enerji çalışmalarına 1956 yılında birlikte başladığımız G. Kore nükleer teknolojiyi 20 yıllık süre içerisinde yerelleştirmiş ve bugün Birleşik Arap Emirliklerine nükleer santral inşa etmektedir. G.Kore'deki nükleer endüstrinin gelişiminde ilk nükleer santralinde yalnızca %2 oranında bir yerel katkı bulunmaktayken, günümüzde, %98'i milli kaynaklarla inşa edilen nükleer santral projeleri tasarlayabilmektedir.G.Kore'de 23 nükleer reaktör çalıştırılmaktadır.

Tablo.2'de Türkiye'nin nükleer santral projeleri verilmektedir. Ülkemiz, 1956'dan bu yana geçen yarım asırlık süre içerisinde nükleer santral projelerine neden başlayamamıştır. Nükleer santral için açılan dört ihalenin dördü de iptal edilmiştir (1979, 1985, 2000, 2009). Bu nedenle, Hükümetler arası Anlaşma modeli ile 2010 yılında Rusya Federasyonu ile anlaşma imzalanmış ve bugün saha zemin-etüt çalışmalarının yapıldığı aşamaya gelmiştir. İnşaat hazırlık çalışmaları tamamlandıktan sonra ilk betonun 2016 yılında atılması, ilk ünitenin de 2020 yılında devreye alınması planlanmaktadır. Akkuyu Nükleer Santrali ile ilgili gerekli lisanslar, izin ve onaylar alındıktan sonra inşaatın 2016 yılında başlaması, ilk ünitenin 2020 yılında, diğer ünitelerin de birer yıl arayla devreye alınması öngörülmektedir.

Tablo.2:Türkiye Nükleer Güç Santrali Projeleri

Bölge/Proje Adı	***Tip***	***Kapasite***	***İnşa Başlama Yılı***	***Ticari Faaliyet Yılı***	***Maliyet***	***Kullanım Süresi***
Akkuyu NPP – 1	VVER-1200	1200 MWe	2016	2020	20 Milyar Dolar	60 Yıl
Akkuyu NPP – 2	VVER-1200	1200 MWe	2017	2021		
Akkuyu NPP – 3	VVER-1200	1200 MWe	2018	2022		
Akkuyu NPP - 4	VVER-1200	1200 MWe	2019	2023		
Sinop NPP - 1	ATMEA-1	1120 MWe	2019	2023	20 Milyar Dolar	60 Yıl
Sinop NPP - 2	ATMEA-1	1120 MWe	2020	2024		
Sinop NPP - 3	ATMEA-1	1120 MWe	2023	2027		
Sinop NPP - 4	ATMEA-1	1120 MWe	2024	2028		

Kaynak:www.enerji.gov.tr

Akkuyu NGS Projesi ile yaklaşık 20 milyar ABD Dolarlık Rus sermayesi, tüm riskler Rus tarafında olmak kaydıyla Türkiye'ye aktarılmaktadır. Söz konusu Proje kapsamında yaklaşık 4.800 MWe kurulu güç kapasite ile yıllık 40 milyar kWh elektrik üretilecektir. Bu üretilecek elektrik sayesinde doğalgaz ithalatında yıllık yaklaşık 8 milyar metreküplük miktarda, 3,6 milyar ABD Doları tutarında bir azalma olacaktır. Bu durum enerjide dışa bağımlılığımızı azaltan bir etki oluşturacaktır.

(WNA, 2014) verilerine göre Japonya, enerji ihtiyacının yaklaşık % 84'ünü ithal etmek zorundadır. Artan yakıt ithalatı yılda yaklaşık 40 milyar dolar maliyet getirmektedir. Bu rakam Türkiyenin nükleer santral proje bedellerini yansıtmaktadır. Nisan 2011 tarihinden itibaren Mart 2014 sonuna kadar toplam ticaret açığı 227milyar $ olarak gerçekleşmiştir. Elektrik üretim maliyetlerinde % 56 artış gözlemlenmiş ve Japon enerji şirketleri Fukushima kazasından itibaren ithal fosil yakıtlara $93 milyar ek kaynak harcamıştır.

Akkuyu Nükleer Santralinde inşaatın en yoğun olduğu dönemde büyük çoğunluğu Türk işçisi olmak üzere 10.000 kişi çalışacaktır. Akkuyu nükleer santral projesinde firmalarımız, sadece inşaat malzemeleri değil, kritik nükleer güvenlikle ilgili olmayan, makine-ekipman üretimi sürecinde de yer alacaktır. Bu da yaklaşık 8 milyar dolarlık miktara denk gelmektedir.

5. SONUÇ

Dünyada nükleer enerji kullanımı giderek yaygınlaşmakta ve artmaktadır. Önümüzdeki on yıl içinde elektrik talebindeki hızlı artış, nükleer enerjiye olan talebin güçlü olmaya devam edeceğini öngörmektedir. Vizyon 2023 amaçlarınıgerçekleştirmek için Türkiye'de nükleer enerji kullunılması zorunluluktur. 2030 yılına kadar Nükleer Enerji piyasası toplam hacminin 2 tirilyon dolar olacağı öngörülmektedir.

2003'den itibaren ekonomik kriz dönemleri dışında Türkiye'de elektrik talebindeki artış yıllık% 7-8 oranındadır. Bu eğilimin en az 2030 yılına kadar, bu yönde devam edeceği beklenmektedir.

ABD, Kanada, İngiltere, Rusya, Meksika ve İran gibi petrol / doğal gaz zengini ülkeler bile elektrik üretim portföyüne nükleer enerjiyi dâhil etmişlerdir. Ayrıca, petrol rezervi bakımından dünyanın beşinci, doğal gaz rezervleri bakımından dünyada dokuzuncu Birleşik Arap Emirlikleri, ilk ünitenin yapımı devam etmekte olan dört ünite 5.600 MW kurulu güç için Güney Kore ile bir sözleşme imzalamıştır.

Fukushima Daiichi nükleer felaketinden sonra dahi ülkeler, Nükleer Enerji Santrali (NES) inşa etmeye devam etmiştir. Almanya, 17 NGS'den ömrünü tamamlamış 8 NGS'yi kapatmış ancak Fransa ve Çek Cumhuriyeti'nden elektrik ithal etmiştir. Fukushima nükleer felaketinden sonra kapattığı NES'lerden dolayı ortaya çıkan elektrik enerjisi açığını telafi için Japonya her yıl yaklaşık $ 40 milyar kaynak ithal etmiş ve sonuçta 17 NES'yi açmak için süreci yeniden başlatmıştır. (Omoto, 2014) göre Fukushima'nın maliyeti 100 Milyar USD tutarında olacaktır.

Risk kabul edilebilir ve kontrol altına alınırsa, nükleer enerji santralleri iyi tasarlanmış, iyi inşa edilmiş, iyi yapılandırılmış, iyi işletilebilinir ve iyi bakımlanmış ise nükleer enerji sadece temiz değil, ama aynı zamanda, ucuz, emniyetli, güvenilir, dayanıklı ve rekabetçidir.

Enerjiyi ucuz, kaliteli ve sürdürülebilir olarak elde eden ülkeler, küresel ticaret ve kalkınma yarışında ön sıralarda yer almaktadır. Kişi başına enerji kullanımı yüksek olan ülkelerin İnsani Kalkınmışlık Endekslerinin çok yüksek olduğu görülmektedir.

Türkiye için nükleer enerji bir seçenek değil gerekliliktir ve mümkün olan en kısa zamanda üçüncü ve dördüncü NGS projelerini başlatmalıdır / reaktör sayısı artış değerlendirilmesi tekrar çalışılmalıdır. Yapılacak olan Uçak gemisi için nükleer güç reaktörleri düşünülmelidir. Türkiye sosyal ve ekonomik olarak nükleer enerjiyeihtiyaç duymaktadır.

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ÇEVRESEL KUZNETS EĞRİSİ: AVRASYA EKONOMİLERİ İÇİN MEKÂNSAL BİR EKONOMETRİK UYGULAMA

The Environmental Kuznets Curve: A Spatial Econometrics Application for Eurasian Economies

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ÖZET

Bu çalışmanın amacı, kişi başına düşen gelir ile karbon salınımı arasında ilişki kuran Çevresel Kuznets Eğrisi (ÇKE) teorisini, mekânsal ekonometrik yöntemlerle Avrasya ekonomileri için test etmektir. 1995-2010 dönemi için yıllık verilerin kullanılacağı çalışmada, 24 Avrasya ekonomisi ele alınacaktır. Çalışmanın literatüre beklenen katkısı, ÇKE teorisi kapsamında Avrasya ekonomileri için mekânsal panel veri analizi yönteminin kullanılacak olmasıdır.

Anahtar Kelimeler: Çevre İktisadı, Kuznets Eğrisi, Mekânsal Ekonometri

Jel Kodları: Q50, Q56, C21

ABSTRACT

The aim of this study is to test the Enviromental Kuznets Curve (EKC) theory which relate per capita GDP and carboon emission with spatial econometrics tehniques for Eurasian economies. Annual data for the time period of 1995-2010 for 24 Eurasian economies will be used in this study. The expected contribution to the literature is its use of spatial panel econometrics techniques in the context of EKC theory for Eurasian economies.

Key Words: Environmental Economics, Kuznets Curve, Spatial Econometrics

Jel Code: Q50, Q56, C21

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1.Giriş

Kapitalist üretim sürecinde girdi kullanımının zamanla orantısız bir biçimde artması ve çevresel politikaların dikkate alınmaması, hedeflenen büyüme trendini de sürdürülemez bir hale getirmiştir. Bu nedenle, son yıllarda ekolojik niteliği dikkate alan ekonomi politikaları nispeten uygulanmaya çalışılmaktadır. Politika yapıcıların çevreye yönelik bu tutumu, ilgili literatürün gelişmesine katkıda bulunmuştur. Bu bağlamda gelir dağılımı adaletsizliği ve büyüme arasındaki ilişkiyi ortaya koyan Kuznets eğrisi zamanla, çevresel faktörleri de içerecek şekilde genişletilerek "Çevresel Kuznets Eğrisi (ÇKE) Teorisi" haline gelmiştir. ÇKE teorisine göre, ülke ekonomisi başlangıç aşamasında tarıma dayalı bir ekonomik yapıya sahip olup daha az karbon salınımı gerçekleştirmektedir. Ülke ekonomisinin zamanla tarıma dayalı üretim sürecinden, sanayiye dayalı üretime geçmesiyle birlikte; karbon salınımı giderek artmaktadır. Belirli bir üretim düzeyine ulaşılmasıyla, karbon salınımının giderek azalması beklenmektedir.

Bu çalışmanın amacı 24 Avrasya ekonomisinin 1995-2010 dönemi için, ÇKE teorisi bağlamında ülkeler arasında mekânsal ardışık bağımlılığın test edilmesidir. Çalışmada mekânsal panel veri analizi yöntemi kullanılmıştır. Yapılan literatür taramasında analize dahil olan ülke grubu için, ÇKE teorisi kapsamında mekânsal ardışık bağımlılık analizine rastlanmaması nedeniyle, ilgili literatüre katkı yapılacağı düşünülmektedir.

Çalışmada ilk olarak konuyla ilgili literatür taranmış olup, teorik arka plana yer verilmiştir. Daha sonra çalışmada kullanılan veri seti, tanımlayıcı istatistikler yardımıyla ele alınmıştır. Kullanılan yöntem ana hatlarıyla ifade edilip, analiz sonrası elde edilen bulgular alt başlıklar halinde incelenmiştir. Sonuç bölümünde ise, çalışmanın genel bir değerlendirmesi yapılarak politika önerilerinde bulunulmuştur.

2.Literatür Taraması

Kalkınma sürecinin maliyetlerinden biri olan çevre kirliliği sorununun ortaya çıkması bu konuya olan ilgiyi artırmıştır. Bu açıdan bakıldığında ÇKE hipotezinin varlık gösterdiği alanlar tarım ağırlıklı ülkelerden çok sanayi ağırlıklı ülkeler olmaktadır. Bu hipotezin geçerlilik kazanması ancak ki sanayileşmenin artması ile birlikte olmuştur. Böylelikle ÇKE hipotezinin iktisat yazınına girmesi ve artan ilgi odağı olması 90'lı yıllar ile birlikte gerçekleşmiştir. ÇKE hipotezine ilişkin çalışmaların başlangıcı 1991'de Grossman ve Krueger'ın çalışması olarak kabul edilmektedir ancak ÇKE teriminin ilk kullanımı 1993'te Panayotou'nun çalışması ile literatüre girmiştir.

ÇKE eğrisinin geçerliliğine ilişkin yapılan çalışmalarda, eğrinin şekli vedönüm noktalarında, kullanılan değişkenler ve modellerin yanı sıra ele alınan dönemlere ve ülkelere bağlı olarak farklıklar ortaya çıkmaktadır. Bunun yanı sıra kirletici seviyeleri yerine yoğunlaşmasının kullanılması daha düşük dönüm noktasına neden olurken, döviz kuru yerine satın alma gücü paritesinin kullanılması ise dönüm noktasının çok daha yüksek olmasına yol açmaktadır (Akbostancı vd., 2009: 862).

Tablo 1: ÇKE Yazın Taraması

Yazar	Bağımlı Değişken/ler	Veri	Metodoloji	Sonuç
Grossman ve Krueger (1991)	SO_2 (Sülfür dioksit) Partikül Maddeler (PM)	42 Ülke 1977, 1982, 1988	Panel tesadüfi etkiler	4500$, 9000$ Ters-U
Shafik ve Bandyopadhyay (1992)	SO_2, kişi başına CO_2, PM	149 Ülke 1960-1990	EKK	3700$, 7000000$ 3300$ Ters-U
Panayotou (1993)	Ormansızlaşma, SO_2, NOx (Nitrojenoksit), PM	55 Ülke 1980	Panel regresyon analizi	823$, 5000$, 5500$, 4500$ Ters-U
Selden ve Song (1994)	SO_2, NO_X, PM, CO_2	30 Ülke 1979-1987	Panel regresyon analizi	10391$, 13383$ 12275$, 7114$ Ters-U
Holtz-Eakin ve Selden (1995)	CO_2	130 Ülke 1951-1986	İkinci dereceden polinom modeli	35400$ Ters-U
Moomaw ve Unruh (1997)	CO_2	16 Ülke 1950-1992	Panel veri analizi	N şeklinde 8884$
Kahn (1998)	Otomobil hidrokarbon emisyonu	ABD 1993	EKK	25.000$ Ters-U
Taskin ve Zaim (2000)	Toplam CO_2emisyonu	52 Ülke 1975- 1990	Kernel regresyonu	5000$ Ters-U

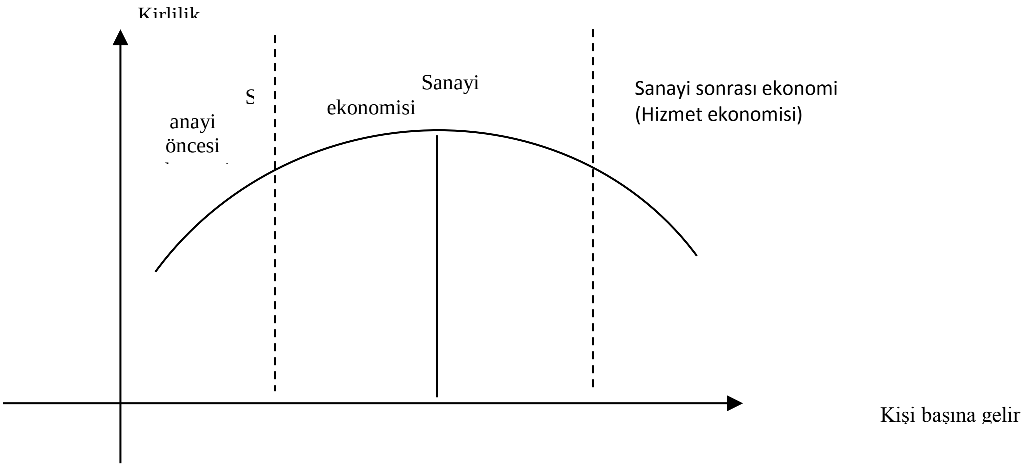
Heil ve Selden (2001)	Kişi başına CO_2	135 Ülke 1951-1992	Panel veri analizi	36,044$ Monotonik artan
Vollebergh, Dijkgraaf ve Melenberg (2005)	CO_2	24 OECD 1960 - 1997	Panel sabit etkiler	13172$ Ters-U
Cialani (2007)	CO_2	İtalya 1990-2002	Ayrıştırma analizi endeksi (IDA)	26900$ Ters-U
Song, Zheng ve Tong (2008)	Atık gaz, atık su, katı atıklar	Çin 1985-2005	Panel eşbütünleşme ve FMOLS (Dinamik en küçük kareler yöntemi)	29017 yuan, 9705 yuan, 28296 yuan Ters-U
Donfouet, Jeanty ve Malin (2013)	Kişi başına CO_2	AB Ülkeleri 1961-2009	Dinamik mekânsal panel	Ters U şeklinde mekânsal bağımlılık

3.Teorik Arka Plan

Grossman ve Kruger (1991) ile Dünya Bankası'nın (1992) yayınlamış oldukları çalışmada çevresel niteliğe ilişkin bazı önlemlerin; kişi başına gelir düzeyinin düşük olduğu ülkelerde ekonomik büyümede bozulmaya neden olduğu, yüksek olduğu ülkelerde ise iyileşmeyi sağladığı tespit edilmiştir. Fakir ülkelerde ekonomik büyüme ile birlikte çevre kirliliğinde artışlar, zengin ülkelerde ise iyileşmeler gözlemlenmiştir. Kuznets(1955) tarafından ileri sürülen eşitsizlik ve gelir modeline yüzeysel olarak benzerliği nedeniyle, kirlilik ve gelir arasındaki bu ilişki "Çevresel Kuznets Eğrisi" (ÇKE) olarak nitelendirilmektedir (Levinson, 2000:1).

Kişi başına gelir ve çevresel bozulma arasındaki ters U biçimindeki ilişki, Şekil.1'de gösterilmiştir.

Şekil 1: Çevresel Kuznets Eğrisi



Kaynak: Haulman, 2012: 5.

Söz konusu ilişki sırasıyla üç aşamada gerçekleşmektedir:

i. Başlangıçtaüretim düzeyi, tarım ve hafif montaj sanayinedayanmakta olup; kirlilik düzeyi nispeten düşüktür.
ii. Üretim süreci ağır sanayiye doğru yönelmekte, kirlilik düzeyi nispeten yüksek olmaktadır.
iii. Son aşamada, yüksek teknolojiye sahip sanayi üretimi baskın olup; kirlilik düzeyi nispeten düşük düzeye gelmektedir (Webber ve Allen, 2010:2-3)

ÇKE'nin artan kısmı, diğer koşullar sabit kaldığında (ceteris paribus) üretim artışının çevre kirliliğini arttıracağı olgusuyla açıklanabilir. Söz konusu ceteris paribus koşulları ihlâl edildiğinde, ÇKE eğrisinde azalma meydana gelmektedir. Çevre kirliliği izleyen nedenlerden dolayı azalmaktadır. Ekolojik kaliteye olan talebin gelir artışıyla paralel olması, daha katı çevre politikaları ve ölçeğin artan getirisinin zengin ülkelerin ortalama maliyetlerini düşürmesine imkân tanımasıdır. Bu nedenler ampirik kanıtlar ile desteklenmektedir. ÇKE'nin yükselen kısmı ampirik olarak kısmen doğrulanmaktadır. Çünkü kirli endüstriler gelişmiş ülkelerden, gelişmekte olan ülkelere doğru kaymaktadır. Son olarak yapısal değişiklikler ve gelir dağılımının ÇKE üzerine etkileri küçüktür, ancak anlamsız değildir (Lieb, 2003: 2).ÇKE'yi etkileyen diğer faktörler ise aşağıdaki şekilde sıralanabilmektedir. Bunlar;

1.Üretim ölçeği üretimin genişlemesini, üretilen ürünlerin ve kullanılan ürün girdilerinin çeşitliliği ve teknolojik düzeyin sabit kalmasını ifade etmektedir.

2.Farklı sanayiler farklı kirlilik yoğunluğuna sahiptir ve ürün çeşitliliği ekonomik kalkınma sürecine bağlı olarak değişmektedir.

3.Girdi çeşitliliğindeki değişimler, ekolojik açıdan daha az zarar veren üretim girdilerin ikamesini kapsamaktadır.

4.Teknolojik düzeydeki gelişmeler, ürün başına kullanılan girdilerin ve üretim sürecinde girdi başına daha az kirletici madde salınmasını içermektedir (Stern, 2004:519).

Ayrıca ekonomik büyümenin ekolojik kalite üzerine etkilerinin hesaplanmasında mekânsal etkilerin de önemli olduğu bilinmektedir. Kirlenmiş suyun, hava kirliliğinin ve istilacı türlerin yayılması istatistikte mekânsal otokorelasyon problemine neden olmaktadır. Gerçekte, ÇKE'yi tahminde kullanılan çoğu veri seti ülkelerin tekrarlanan gözlemlerinden oluşmaktadır. Diğer yandan ülkeler arasında ticaret, teknolojik yayılım, sermaye akımı ile ortak ekonomik ve çevresel politikalar gibi kanallar aracılığıyla birbirleriyle güçlü bir etkileşim içerisindedir. Bazı çalışmalar ÇKE'nin şeklinin ticaret kanalı aracılığıyla yüksek gelirli ülkelerin kirlerini düşük gelirli ülkelere ihraç etmesinden kaynaklandığını savunmakladır. Bu gibi durumlarda, mevcut dışsallıklar ülke sınırlarını aşmakta ve ekonomik büyümeyi etkileyen çevresel etkilerin açıklanmasına katkıda bulunmaktadır. Anselin ve Rey (1991) önemli mekânsal bağımlılık durumlarında yayılma etkilerini tanımlayıp, mekânsal etkinin göz ardı edilmesi durumunda anlamlı sonuçların elde edilmesinin zorlaştığını ifade etmişlerdir (Wang vd., 2013: 16).

4.Veri Seti ve Metodoloji

4.1.Veri Seti ve Tanımlayıcı İstatistikler

Çalışmada kullanılan değişkenler, Dünya Kalkınma Göstergeleri (WDI) 2015'den elde edilmiştir. Dönem aralığı olarak verilere sağlıklı biçimde erişilen, 1995-2010 yıl aralığı tespit edilmiştir. Avrasya ekonomileri olarak da; Arnavutluk, Azerbaycan, Bulgaristan, Çek Cumhuriyeti, Ermenistan, Gürcistan, Hırvatistan, Kazakistan, Kırgızistan, Letonya, Litvanya, Macaristan, Makedonya, Moğolistan, Moldova, Özbekistan, Polonya, Romanya, Rusya, Slovakya, Slovenya, Tacikistan, Türkiye, Ukrayna olmak üzere 24 ülke olarak belirlenmiştir. ÇKE teorisinden hareketle tahminlenen model aşağıdaki gibidir:

$$\ln(CO_2) = \alpha_{it} + \beta_1(\ln TO)_{it} + \beta_2(\ln POP)_{it} + \beta_3(\ln GDP)_{it} + \beta_4(\ln GDP)^2_{it} + \beta_5(\ln GDP)^2_{it} + \varepsilon_{it}$$

(1)

CO_2 : Kişi başına karbon salınımı (metrik ton)

TO : Ticari açıklık (% GSMH)

POP : Nüfus (milyon)

GDP : Kişi başı gayri safi yurt içi hâsıla (2005 sabit fiyatı ile ABD doları)

Çalışmada kullanılan tüm serilerin doğal logaritmaları alınmıştır. Böylece tahmin edilen modelin tam logaritmik olmasıyla, açıklayıcı değişken katsayıları esneklik kavramı yardımıyla açıklanabilmektedir.

Tablo-1'de modelde kullanılan değişkenlerin tanımlayıcı istatistiklerine yer verilmiştir. Buna göre CO_2 salınımı yaklaşık olarak en düşük -0.42, en yüksek 1.07 değerini almaktadır. Analize dahil olan ülkelerin ticari açıklığı ise 1.68 ve 2.16 aralığındadır. Nüfusun ülkeler arası dağılımına bakıldığında, en düşük 0.20 ve en yüksek 2.12'lik bir değer almaktadır. Ülkelerin kişi başına düşen gayri safi yurt içi hâsılaları ise en düşük 2.46 ile en yüksek 4.21 arasında değişmektedir. Ayrıca CO_2, nüfus ve kişi başına gayri safi yurt içi hâsıla değerleri ülkeler arasında yüksek bir standart sapmaya sahiptir. Özellikle kişi başına gayri safi yurt içi hâsılanın standart sapmasının yüksek olması, ülkeler arası gelir adaletsizliğinin yüksek olduğunu göstermektedir.

Tablo 2: Tanımlayıcı İstatistikler

Değişkenler	Ortalama	Standart Sapma	Minimum	Maksimum
Yıl	7.5	0	7.5	7.5
Ülke	12.5	7.071068	1	24
CO_2	0.5684419	0.3901225	-0.4153089	1.069922
TO	1.953883	0.1306738	1.67715	2.161604

POP	1.747748	0.4768708	0.201757	2.124427
GDP	3.444057	0.4938545	2.46147	4.207984
GDP^2	12.10784	3.32476	6.070268	17.71213
GDP^3	43.3543	17.09668	14.99809	74.57435

4.2.Metodoloji

Çalışmada kullanılan mekânsal panel veri analizi yönteminin teorik alt yapısı aşağıda alt başlıklar halinde incelenmiştir.

4.2.1.Mekânsal Bağımlılık ve Mekânsal Ağırlık matrisi

Mekânsal bağımlılık *i.* gözleminin bir yer veya bölgedeki gözlemlenen değerini ifade etmektedir ve yakın bölgelerdeki komşu gözlemlerin değerlerine bağlı olmaktadır. $i=1$ *ve* $j=2$ komşu olduğunu varsayalım (muhtemelen sınırları birbirlerine değmekte), bu durumda bir veri üretme süreci aşağıdaki biçimde olmalıdır (LeSage ve Pace, 2009:2);

$$y_i = \alpha_i y_i + X_i \beta + \varepsilon_i$$

(2)

$$y_j = \alpha_j y_i + X_j \beta + \varepsilon_j$$

$$\varepsilon_i \sim N(0,\sigma^2) \quad i=1$$

$$\varepsilon_j \sim N(0,\sigma^2) \quad j=2$$

Bu durum, eş zamanlı veri üretilmesi sürecini göstermektedir. y_i'nin değeri y_j'nin değerine bağlıdır ve tersi durumda geçerlidir. Uzaydaki bir noktada gözlemlenen örnek verinin, diğer bir yerdeki gözlemlenen değere bağlı olmasının yaygın iki nedeni vardır. İlki, ilçe, eyalet, posta kodu, nüfus sayımı gibi mekânsal birimlerle ilişkili toplanmış verilerin, ölçüm hatalarını içermesidir. Bu durum, toplanan bilgi için idari sınırların, örnek verinin üretilmesi süreci altındaki gerçekliği yansıtmaması durumunda ortaya çıkmaktadır. İkinci belki de en önemli neden, sosyo-demografik, iktisadi veya bölgesel faaliyetlerin mekânsal boyutu, modelleme probleminin önemli bir yönü olan mekânsal bağımlılık olabilmektedir. Çünkü bölgesel bilimde, beşeri coğrafya ve piyasa faaliyetlerindeki işlerde mekân ve mesafe önemli bir güç olduğu öncülüne dayanmaktadır (LeSage, 1999: 3-4).

Ekonometrik çalışmalarda mekânsal ardışık bağımlılığı, yani komşuluk ilişkisini ifade etmek için genellikle mekânsal ağırlık matrisi tanımlanmaktadır. Bu ağırlıklar; etkileşim veya yayılmanın bir ölçüsünü ifade etmektedir. Bu ağırlıklara bağlı olarak mekânsal ekonometrik model oluşturulur ve daha sonra modelin tahmin aşaması gerçekleştirilmektedir (Zeren, 2010: 22).

Mekânsal ekonometride ağırlık matrisi, önemli bir rol oynamaktadır. Modelde, mekânsal etkinin varsayıldığı değişkenleri içermektedir. Genellikle, ağırlık matrisinin modelde dışsal olduğu varsayılmaktadır. Tercihen, ağırlık matrisinin yapısı, veride bulunan mekânsal unsurlardan ziyade ilgili teoriye dayandırılmaktadır. Genel anlamda, gözlemlerin coğrafik yapısına göre düzenlenmektedir. Genelde, bir ağırlık matrisinin yapısı (Gerkman, 2010: 3);

$$W = \begin{pmatrix} w_{11} & \cdots & w_{1n} \\ \vdots & \ddots & \vdots \\ w_{n1} & \cdots & w_{nn} \end{pmatrix}$$

(3)

şeklindedir. W matrisi, $n \times n$ boyutunda bir matris olup n, gözlem sayısını göstermektedir. Ağırlık matrisi, sistemdeki diğer birimlerin bazı özel yerlerdeki (komşu olduğu düşünülen) gözlemlenen değerleri etkilediğini ifade etmektedir. Bağımlı değişkenin$i$birimi, yalnızca j, k ve$m$ komşularına sahip olduğu varsayıldığında Wmatrisinin i.sırasında yalnızca üç unsur sıfır olmayacaktır. Bunlar, w_{ij}, w_{ik}, w_{im}'dir. Ağırlık matrislerinin en basit biçimi, ikili ağırlık matrisidir (binary weight matrix). Bu matris türünde j, k ve m i'nin komşusu olduğu düşünülüyorsa, w_{ij}, w_{ik}, w_{im} hepsi bir olmaktadır. W matrisinin i. sıradaki diğer tüm elemanlar ise, sıfır olmaktadır. Bir ağırlık matrisinde, bir eleman (eyalet, bölge vs) kendisiyle ilişkili olamayacağından diyagonali (köşegeni) daima sıfırdır. Komşuluğun tanımı, coğrafik mesafeye ya da birimler ya da komşular arasındaki farklılığa dayandırılmaktadır. Veri setindeki birimler, fiziki bir alana sahip olduğunda, ortak bir sınırı paylaşan iki birim komşu olarak tanımlanmaktadır. Bununla birlikte komşuluğun birkaç tanımı bulunmaktadır. Bunlar;

Doğrusal Komşuluk: Eğer i birimi sağ ya da sol tarafında j ile ortak bir sınırı paylaşıyorsa $w_{ij}=1$, olarak tanımlanır.

Kale Komşuluğu: Eğer i birimi sağ, sol, aşağı veya yukarından j ile ortak biri sınırı paylaşıyorsa, $w_{ij}=1$ tanımlanmaktadır.

Fil Komşuluğu: Eğer i birimi j ile bir noktada komşu olursa, $w_{ij}=1$ tanımlanmaktadır.

Vezir Komşuluğu: Eğer i birimi j ile ortak bir sınır ya da köşeyi paylaşıyorsa, $w_{ij}=1$ tanımlanmaktadır (Gerkman, 2010: 3-4). Bu çalışmada ağırlık matrisi olarak vezir komşuluğundan yararlanılmıştır.

4.2.2.Mekânsal Panel Veri Analizi

Son zamanlarda, mekânsal ekonometri literatüründe yatay kesit veriden ziyade panel veriye dayanan uygulamaların giderek arttığı gözlemlenmektedir. Panel veri setinin, kesit veriye dayalı uygulamalara göre daha avantajlı olması, literatürdeki eğilimin önemli nedenlerinden birisidir.

Panel veri genellikle daha bilgilendiricidir, daha çok değişim (varyasyon) barındırır ve değişkenler arasındaki bağımlılık daha azdır (Elhorst, 2011: 6). Panel veri analizinde ilk olarak, belirli bir mekânsal etkiye sahip basit bir havuzlanmış (pooled) doğrusal regresyon modeli dikkate alınmaktadır. Ancak burada, mekânsal bir etkileşim (SAR veya SEM) bulunmamaktadır. Buna göre,

$$y_{it}=x_{it}\beta+\mu_i+\varepsilon_{it}$$

(4)

şeklindedir. i, yatay kesit boyutu için (mekânsal birimler) bir indeks olup, $i=1,\dots,N$ 'dir. t ise zaman boyutu olup, $t=1,\dots,T$ 'dir. y_{it}, i ve t durumunda bağımlı değişkeni göstermektedir. X_{it}, $(1,K)$ sıralı bağımsız değişkenlerdir. β ise, sabit vektör $(K,1)$ ile eşleşen ve değeri bilinmeyen bir parametredir. ε_{it}, ortalaması sıfır ve varyansı σ^2 olan birbirinden bağımsız ve aynı dağılıma sahip hata terimidir. μ_i ise belirli bir mekânsal etkiyi göstermektedir (Elhorst, 2010: 378).

Mekânsal birimler arası etkileşim tanımlanacağı zaman, model, bağımlı değişkeni mekânsal gecikmeli ya da hata terimlerinde mekânsal bir otokorelasyonun olduğu süreç olarak tanımlanan mekânsal gecikmeli model (SAR) ve mekânsal hata modeli (SEM) şeklinde (Elhorst, 2010: 378). Mekânsal gecikmeli model (SAR), bağımlı değişkenin gözlemlenen yerel özelliklerden oluşan komşu bağımlı değişken üzerinde bir etkisi olduğunu varsaymaktadır.

$$y_{it}=\delta\sum_{j=1}^{N}w_{ij}y_{it}+x_{it}\beta+\mu_i+\varepsilon_{it}$$

(5)

Burada δ, mekânsal otoregresif katsayısını ifade etmektedir. w_{ij} ise, örneklem içeresindeki mekânsal düzenine göre tanımlanan mekânsal ağırlık matrisini ifade etmektedir. w'nin, N gözlem sayısı kadar daha önce tanımlanmış negatif olmayan bir matris olduğu varsayılmaktadır. Mekânsal hata modelinde ise, mekânlar arası ilişkili hata terimlerinden oluşan yerel özelliklere sahip bağlı değişkenin olduğu varsayılmaktadır. Buna göre,

$$y_{it}=x_{it}\beta+\mu_i+\phi_{it}$$

(6)

$$\phi_{it}=p\sum_{j=1}^{N}w_{ij}\phi_{it}+\varepsilon_{it}$$

şeklindedir. ϕ_{it}, mekânsal otokorelasyonlu hata terimini, p ise mekânsal otokorelasyon katsayısını ifade etmektedir (Elhorst, 2010: 378). Belirli bir mekânsal etkiye sahip olan modeller, sabit ve rassal etki olmak üzere iki alt başlıkta incelenmektedir.

4.2.3.Mekânsal Sabit Etkiler Modeli

Mekânsal sabit etkiler modelinin tahmin edilmesi, Anselin (1988) ve Anselin ve Hudak (1992)'in geliştirmiş oldukları tekniklerle gerçekleştirilmektedir. Fakat ilk olarak regresyon denkleminin indirgenmiş olması gerekmektedir. Bu model nispeten daha basittir. Parametrelerin rassal olması problemi, metodolojik bir sorundur. Kısa paneller için, *T* sabit ve *N* sonsuza giderken, mekânsal sabit etkili katsayılar tutarlı bir şekilde tahmin edilmeyebilmektedir. Bu problem, mekânsal sabit etkiler olmaması durumunda, önemli değildir. Ayrıca, *N*'nin sabit, *T*'nin sonsuz olması durumunda bu problem görülmemektedir (Elhorst, 2003: 264).

4.2.4.Mekânsal Rassal Etkiler Modeli:

Mekânsal rassal etki modelinin tahmin edilmesi, özel bir yöntem gerektirmesine rağmen, maksimum olabilirlik yöntemiyle analiz edilebilmektedir. Rassal etkili mekânsal gecikmeli modelinin tahmin edilmesine göre rassal etkili mekânsal hata modelinin log olabilirlik fonksiyonunun maksimize etmek için gerekli iki aşamalı tekrarlayan yöntem daha kolaydır. Rassal etkili mekânsal gecikmeli ve hata modelinin parametreleri N ve T sonsuza giderken ya da, N sabit iken T sonsuza giderken tutarlı bir şekilde tahmin edilebilmektedir. Rassal etkiler modeli, gözlemlerin mekânsal birimler üzerinde düzensiz bir şekilde dağıldığını tanımlayan bir yöntem olmayabileceğinden, bir sorun oluşturabilmektedir. Ayrıca, açıklayıcı ve rassal etkili değişkenler arasında korelasyonun (ilişkinin) sıfır olduğu varsayımı, kısmen kısıtlayıcı olabilmektedir. Bu yüzden, sabit etkili model, N'nin büyük ve T'nin küçük oluğu durumda bile kullanılabilmektedir (Elhorst, 2003: 264).Ayrıca, çalışmada yararlanılan mekânsal ağırlık matrisi, sınır komşuluğuna dayanmaktadır.

4.2.4.Mekânsal Durbin Modeli:

Anselin (1988) tarafından, artık otokorelasyonuna sahip zaman serisi durumunu ifade eden Durbin modeline benzerlik kurularak geliştirilen Mekânsal Durbin Modeli (SDM) izleyen denklem sisteminde ifade edilmiştir (Lesage, 1999: 82);

$$(I_n - pW)y = (I_n - pW)X\beta + \varepsilon \tag{7}$$

$$y = pWy + X\beta - pWX\beta + \varepsilon$$

$$\varepsilon \sim N(0, \sigma^2 I_n)$$

Burada y, $N \times 1$ boyutunda bağımlı değişkenler vektörünü temsil etmektedir. β_1 parametre vektörüyle ilişkilendirilen, açıklayıcı değişkenleri içeren $n \times k$ boyutundaki veri matrisi ise X ile ifade edilmektedir. SAR ve SEM modellerine benzer bir şekilde, W mekânsal ağırlık matrisini yansıtma olup, p ise bağımlı değişkenin mekânsal gecikme katsayısıdır. WX matris çarpımı kullanılarak, β_2 parametreleri ile ilişkilendirilen ilave açıklayıcı değişkenlerin mekansal gecikmelerinin modele eklenmesiyle SDM modeli aşağıdaki biçime dönüşür (Lesage, 2014: 8).

$$y = pWy + X\beta_1 + WX\beta_2 + \varepsilon \tag{8}$$

$$\varepsilon \sim N(0, \sigma^2 I_n)$$

5. Bulgular

Çalışma da tümdengelim yöntemi kullanılarak, SAR ve SEM modelleri sabit ve rassal etkili olarak tahmin edilmiştir. Buna göre, SAR modeli için Hausman testi istatistiğinin boş hipotezi kabul edilip, rassal etkili model tercih edilmiştir. Diğer taraftan, SEM modeli için de Hausman test istatistiği boş hipotezi reddetmekte ve sabit etkiler modeli kabul edilmektedir. Daha sonra, SAR ve SEM modellerinin anlamlılık geçerliliği (χ^2 testi) test edilmiş olup, mekânsal anlamda ülkelerin hem mekânsal gecikmeli model (SAR) hem de mekânsal hata modeli (SEM)'ne sahip olduğu tespit edilmiştir. Her iki modelin geçerli olması durumunda SDM (Mekânsal Durbin Model)dikkate alınmaktadır. Bu durumda SDM'yi tahmin ettiğimizde Tablo 4'te görülen sonuçlar elde edilmiştir. SDM'nin sabit ve rassal etkili modelleri ayrı ayrı tahmin edilmiş olup, Hausman testi aracılığıyla sabit etkiler modellinin geçerli olduğu sonucuna varılmıştır. Elde edilen bulgulara göre, sabit etkiler modelindeki tüm bağımsız değişkenlerin istatistikî olarak anlamlı olduğu görülmektedir. Ticari açıklıktaki yüzde 1'lik bir artış, CO_2 salınımını yüzde 0.11 oranında arttırmaktadır. Nüfustaki yüzde 1'lik bir artış ise CO_2 salınımını, yüzde 0.634 oranında arttırmaktadır. Ticari açıklık ve nüfus değişkenleri iktisadi beklentileri doğrulamaktadır. Fakat kişi başına gayri safi yurt içi hâsıla değişkeni için, ÇKE teorisine aykırı sonuçlar elde edilmiştir. Buna göre, kişi başına GSYİH'daki yüzde 1'lik bir artış, CO_2 salınımını yüzde 7.45 oranında azaltmaktadır. Kişi başına

GSYİH'nin parabolik ve kübik formuna göre, CO_2 salınımı önce yüzde 2.25 artmakta daha sonra yüzde 0.212 oranında azalmaktadır. Mekânsal değişkenlere (komşu ülkelerdeki değişkenlere) bakıldığında, modelde kullanılan değişkenlerin tamamı farklı güven aralıklarına göre istatistikî olarak anlamlı sonuçlar elde edilmiştir. Buna göre, komşu ülkenin ticaret hacmindeki yüzde 1'lik bir artış, ülkenin CO_2 salınımını yüzde 0.13 oranında arttırmaktadır. Ayrıca, komşu ülkenin nüfusunda ki yüzde 1'lik bir artış, ülkenin CO_2 salınımını yüzde 2.95 oranında arttırmaktadır. Komşu ülkenin kişi başına GSYİH'de ki yüzde 1'lik bir artış, ülkenin karbon salınımı yüzde 14.5 oranında azaltmaktadır. Kişi başına GSYİH'nin parabolik ve kübik formuna göre, komşu ülkenin GSYİH'deki yüzde 1'lik bir CO_2 salınımı önce yüzde 4.13 artmakta daha sonra yüzde 0.038 oranında azalmaktadır. Mekânsal etki katsayısı olan p (rho)'nun istatistikî olarak anlamlı çıkması elde edilen tahmin sonuçlarını doğrulamaktadır.

Tablo 3:SAR ve SEM Model Tahmin Sonuçları

	SAR						**SEM**					
	Sabit Etkiler Modeli			**Rassal Etkiler Modeli**			**Sabit Etkiler Modeli**			**Rassal Etkiler Modeli**		
Değişkenler	**Katsayı**	**Standart Hata**	**Olasılık Değeri**	**Katsayı**	**Standart Hata**	**Olasılık Değeri**	**Katsayı**	**Standart Hata**	**Olasılık Değeri**	**Katsayı**	**Standart Hata**	**Olasılık Değeri**
TO	0.0956176	0.0496934	0.054**	-0.0059716	0.0470998	0.899	0.0831709	0.0489542	0.089	0.0046914	0.0451004	0.917
POP	0.3757554	0.2252672	0.095***	-0.0395913	0.1183288	0.738	0.2286453	0.2538602	0.368	-0.162159	0.1145807	0.157
GDP	-5.802122	1.891662	0.002*	-7.400998	1.617551	0.000*	-5.771483	1.948131	0.003*	-7.293946	1.78715	0.000*
GDP^2	1.876147	0.5570179	0.001*	2.336144	0.4835743	0.000*	1.878807	0.5748895	0.001*	2.317966	0.5359865	0.000*
GDP^3	-0.1842376	0.0547726	0.001*	-0.2351139	0.0477093	0.000*	-0.185502	0.0566453	0.001*	-0.232315	0.053183	0.000*
c				7.906235	1.743594	0.000*				7.96968	1.940511	0.000*
p	0.114797	0.0619992	0.064***	0.2207026	0.0567551	0.000*						
λ							0.148833	0.0785012	0.058***	0.3408143	0.0635905	0.000*
R^2	0.1902			0.4780			0.2790			0.4964		
σ^2	0.00288	0.0002084	0.000*	0.0034041	0.0002562	0.000*	0.002869	0.0002084	0.000*	0.0032395	0.000247	0.000*
N	384											
Log Olabilirlik	577.5540			469.6198			577.5819			475.2082		
Hausman Testi				9.84		0.0800	20.27		0.0011*			
χ^2 anlamlılık testi	83.84		0.000*				84.16		0.000*			

*p<0.01, ** p<0.05, ***p<0.1

Tablo 4:SDM Modeli Tahmin Sonuçları

	SDM					
	Sabit Etkiler Modeli			Rassal Etkiler Modeli		
Değişkenler	Katsayı	Standart Hata	Olasılık Değeri	Katsayı	Standart Hata	Olasılık Değeri
TO	0.1051184	0.0469654	0.025**	0.0581149	0.0465016	0.211
POP	0.6365468	0.2225948	0.004*	-0.3868699	0.1644087	0.019**
GDP	-7.453238	2.050933	0.000*	-4.389833	2.157344	0.042**
GDP^2	2.252473	0.6138714	0.000*	1.397809	0.6484181	0.031**
GDP^3	-0.2121707	0.0612388	0.001*	-0.1342421	0.0649226	0.039**
c				8.111572	2.987709	0.007*
$W_X TO$	0.1320003	0.0832669	0.113***	-0.0376458	0.0731196	0.607
POP	2.945189	0.3497557	0.000*	1.177418	0.3105907	0.000*
GDP	-14.50257	3.65666	0.000*	-4.26666	3.601189	0.236
GDP^2	4.13207	1.074468	0.000*	1.233335	1.070609	0.249
GDP^3	-0.03860991	0.1046432	0.000*	-0.1239638	0.1051581	0.238
p	0.107497	0.0661355	0.104***	0.2945184	0.0580537	0.000*
R^2	0.0342			0.2332		
σ^2	0.0023651	0.0001712	0.000*	0.0029191	0.000229	0.000*
N	384					
Log Olabilirlik	615.5356			490.5991		
Hausman Testi	56.11	0.000*				

$*p<0.01$, $**p<0.05$, $***p<0.1$

6. Sonuç

Küreselleşme süreciyle birlikte ülkelerin uyguladıkları üretim tabanlı büyüme politikalarının artık sürdürülemeyeceği ve tahrip edilen ekolojik yapının tekrardan hayata döndürülmesi gerekliliği gün geçtikçe önem kazanmaktadır. Bu alandaki ilgili literatürün giderek artması ve yeni teorilerin ortaya konulması, söz konusu durumun en önemli göstergelerinde biri haline gelmektedir. 1955 yılında Kuznets'in ileri sürdüğü gelir dağılımı adaletsizliği ve büyüme arasındaki ilişki, zamanla çevreye uyarlanarak Çevresel Kuznets Eğrisi haline gelmiştir.

Ülkelerin giderek birbirine daha entegre hale gelmesiyle uygulanan politikaların sadece ilgili ülke ekonomilerini etkilemeyip, komşu ülkeleri de etkilediği görülmektedir. Bu çalışmada Çevresel Kuznets Eğrisi teorisi kapsamında, Avrasya ülkeleri mekânsal bir ardışık bağımlılığın varlığı araştırılmıştır. Özellikle Avrasya ekonomilerinin dikkate alınmasındaki neden, batılı ekonomilere göre bu ülkelerin büyüme politikalarının uygulanmasında, ekolojik yapının göz ardı edilme eğiliminin nispeten daha fazla olmasıdır.

Yapılan çalışmalar sonucunda elde edilen bulgulara göre, 24 Avrasya ekonomisi arasında mekânsal ardışık bağımlılığın oldukça önemli olduğu görülmektedir. Ülke dinamiklerinden ziyade, komşu ülkelerin dinamiklerinden olumsuz yönlü etkilenilmesi, ülkeler arasında ortak bir çevresel politikanın uygulanması gerekliliğini zorunlu hale getirmiştir. Ayrıca, bulunan sonuçların ÇKE teorisini reddettiği ve ÇKE'nin U biçiminde olduğu tespit edilmiştir.

Sonuç olarak, bu çalışmada Avrasya ekonomileri için ileri sürülen mekânsal bağımlılığın varlığı hipotezi ispatlanmış olup, uygulanacak politikalara yol göstermesi beklenmektedir. Sonraki çalışmalarda, ülkelerin uygulamış oldukları çevresel politikaların komşu ülkeleri nedenli etkilediğinin belirlenmesine yönelik olması tavsiye edilmektedir.

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GÜNEŞ ENERJİLİ TRAMVAY UYGULAMASI
A TRAM APPLICATION WITH SOLAR ENERGY

Bilgehan TOZLU[*]

ÖZET

Bu çalışmada; yenilenebilir enerji kaynaklarından güneş enerjisi, toplu taşımada enerji kaynağı olarak kullanılmıştır. Çalışmada 20 kişilik bir tramvay gerçekleştirilmiş olup, ayrıca tramvayın hareket edeceği 100 m. uzunluğunda portatif bir ray hattı imal edilmiştir. Tramvayı hareket ettirmek için dc motor seçilmiştir. Oluşturulan tramvay sistemi prototip olduğu için motor gerekli enerjiyi tramvay üstünde kurulu sabit bir enerji nakil hattından değil, akülerden temin etmektedir. Akülerden kullanılan elektrik enerjisi ise tramvay üzerine yerleştirilmiş fotovoltaik panel (PV) ile üretilmekte ve böylelikle aküler şarj edilerek tekrar doldurulmaktadır. Bu proje ile, tramvay gibi toplu taşıma sistemlerinde güneş enerjisi kullanımının oldukça kullanışlı ve ekonomik olduğu gösterilmiştir.

Anahtar Kelimeler: Güneş enerjisi, elektrikli araç, tramvay

ABSTRACT

In this study; renewable solar energy is used for energy source in public transportation. In this Project a tram for 20 people has been built with 100 m. portable railway. A Dc motor is chosen for drive train. Motor obtains the required energy from solar panel charged batteries. By this Project, it is indicated that using of solar system is quite effective and economic in public transportation systems like tram.

Keywords: Sun power, tramvay

1.GİRİŞ

Enerji, insanoğlunun vazgeçemeyeceği ihtiyaçlarından biridir. Enerji üretimi bugün bütün dünya ülkelerinin en önemli gündem maddelerinden birini oluşturmaktadır. Gelişen teknoloji ve sürekli artan enerji ihtiyacı ve fosil yakıtların hızla tükeniyor olması, insanları alternatif enerji kaynakları aramaya yöneltmiştir.

Alternatif enerji kaynaklarının başında hiç şüphesiz güneş enerjisi gelmektedir. Güneş enerjisi (solar enerji) yenilenebilir enerji kaynaklarının en kolay uygulanabilir türüdür. Herkesin dilediği gibi üretip kullanabileceği bir enerji kaynağıdır.

Güneş pili (fotovoltaik pil) yüzeyine gelen güneş ışığını içerdiği yarı iletkenler sayesinde elektrik enerjisine dönüştürmektedir. Şekil 1.a.'da solar hücre ve bu hücrenin genel yapısı Şekil 1.b.'de gösterilmiştir.

Şekil 1.a. Solar Hücre

Şekil 1.b. Solar Hücrenin Genel Yapısı

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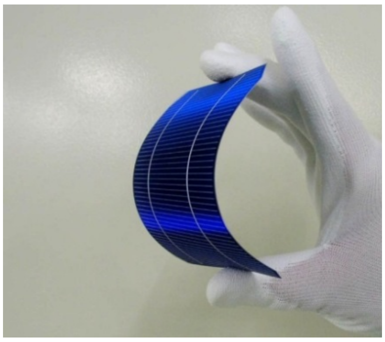
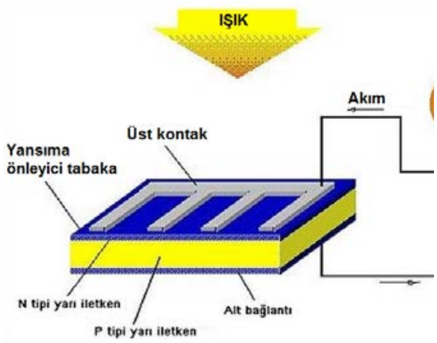
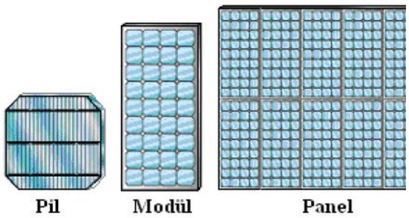




Güneş pilleri, kurulan sisteme bağlı olarak birkaç Watttan birkaç MW'a kadar elektrik üretebilmektedir. Şekil 2.a.'da güneş pili, modülü ve paneli gösterimleri ve Şekil 2.b.'de güneş panelleri ile oluşturulmuş bir güneş tarlası gösterimi verilmiştir.

Şekil 2.a. Güneş Pili, Modülü Ve Paneli



Şekil 2.b. Güneş Tarlası

Güneş enerjisinin avantaj ve dezavantajları şunlardır:

Avantajları:

- Güneş enerjisi tükenmeyen bir enerji kaynağıdır.
- Güneş enerjisi, temiz bir enerji türüdür. Hiçbir atığı yoktur, dolayısıyla atmosfere ve canlılara zarar vermemektedir.
- Güneş enerjisi yeryüzünün bütün noktalarında mevcuttur. Enerji nakil problemi yoktur.
- Güneş ışığı miktarına bağlı olarak üretim miktarı farkı olmakla birlikte bütün ışık seviyelerinde elektrik enerjisi üretimi vardır.
- Güneş enerjisi ile elektrik üretimi çok karmaşık bir iş değildir. Yüksek teknoloji gerektirmemektedir. Üretimi kolaydır.

Dezavantajları:

- Bu enerji türü sadece gündüz üretilebilmektedir. Gece kullanımı ancak üretilen enerjinin akülerle depolanmasıyla mümkün olabilmektedir.
- Güneş enerjisi her zaman aynı miktarda değildir. İstenilen anda istenilen yoğunlukta bulunamayabilir.
- Güneş enerjisinden elektrik enerjisi üretmek için kullanılması gereken teçhizatın kurulum maliyeti yüksektir.

- Üretilen elektriği depolamak için kullanılan akülerin kullanım ömrü 3-5 yıl kadardır ve günümüz teknolojik şartlarında akü maliyetleri oldukça yüksektir.

Üretilen elektrik enerjisi 12-24V (Volt) gibi küçük dc gerilimlerdedir. Fakat kullandığımız çoğu elektrikli cihaz 220V ac ile çalışmaktadır ve 12V dc gerilimi 220V ac gerilime dönüştürmek için kullanılması gereken invertörler oldukça pahalıdır.

Güneş enerjili araç çalışmaları oldukça fazladır. Ancak bu çalışmalar ekseri elektrikli otomobil üzerine olmuştur (Demir ve Yıldız, 2009; Koç ve Aksal, 2012; Başoğlu vd., 2009). Aynı şekilde solar enerjili bot çalışmaları da yapılmıştır (Mahmud vd., 2014; Spagnolo vd., 2012). Paris'ten Amsterdam'a giden hızlı tren hattının Belçika içindeki 3 km. uzunluğunda bir tünelinin üzeri 16.000 adet güneş paneli ile kaplanmıştır ve tren burada üretilen elektrik enerjisi ile çalışmaktadır (Mahony, 2015).

Bu çalışmada tramvay gibi bir raylı sistem toplu taşıma aracı güneş enerjisi ile çalışılmış olup, sistemin gerçeğe uygulanabilirliği araştırılmıştır. Sonuç bölümünde fotovoltaik panellerle çalıştırılacak bir tramvay ile ilgili değerlendirme yapılmıştır.

2- YAPILAN ÇALIŞMA

Çalışmada üretilen tramvay 3,4 m. uzunluğunda 1 m. eninde ve 2,4 m. yüksekliğindedir. Tramvayın hareketi için, birbirine takılıp sökülebilen 3'er metrelik yaklaşık 100 m. uzunluğunda ray hattı yine tarafımızca imal edilmiştir.

Tramvayı hareket ettirmek için 1 kW'lık bir dc seri motor kullanılmıştır. Motor gerekli enerjiyi akülerden temin etmektedir. Akülerden kullanılan elektrik enerjisi, tramvay üzerine yerleştirilen güneş paneli ile tekrar üretilmektedir.

Tramvay üzerine 40 Watt'lık bir güneş paneli yerleştirilmiştir. Güneş paneli hem yapılan çalışmanın eğitim amaçlı olduğundan hem de maliyetinden ötürü düşük güçlü seçilmiştir. Mevcut haliyle kullanıldığında akülerden harcanan enerji, güneş paneli tarafından tramvayın kullanım süresinin 25-40 katı sürede üretilmektedir. Ancak bu süre tramvay üzerine başka güneş panelleri eklemek suretiyle 1e 1 oranına çekilebilir. Gerekli güneş paneli kurulumu yapıldığı takdirde, tramvay harcadığı enerjiyi anlık olarak güneş panellerinden temin edebilir.

Üretilen tramvaya "HİTİTRAY" ismi verilmiştir. Aküsüz ağırlığı 500 kg. olan HİTİTRAY, aküleriyle birlikte yaklaşık 15-20 kişiyi, ortalama yaya hızı olan 5 km/saat hızla taşıyacak şekilde tasarlanmıştır.

Şekil 3.de HİTİTRAY'ın yapım aşamasındaki bir fotoğrafı verilmiş olup, Şekil 4. ve Şekil 5.de HİTİTRAY'ın kullanılabilir hâlinin fotoğrafları verilmiştir.

Şekil 3. HİTİTRAY Yapım Aşamasında

Şekil 4. HİTİTRAY

Şekil 5. HİTİTRAY Kullanımda

SONUÇ

Bu çalışmada güneş enerjisi ile hareket eden bir tramvay uygulaması gerçekleştirilmiştir. Güneş enerjisinin tramvay gibi bir toplu taşıma aracında kullanılabilirliği test edilmiş ve sistemin günlük hayatta uygulanabilirliği gösterilmiştir. Kullanılan motor yerine daha güçlü bir motor seçilerek hız ve taşıma kapasitesini artırmak mümkündür.

Aracı çalıştıran motorun harcadığı elektrik enerjisi, araç üzerine yerleştirilen güneş paneli tarafından ücretsiz olarak üretilmektedir. Bu sayede tramvay ücretsiz olarak kullanılabilmektedir.

Tramvay üzerine yerleştirilen güneş paneli kullanımı ile, sabit bir hatta bağımlılık da ortadan kalkmıştır. Bu sayede sistemin gerçeği oluşturulduğunda, kurulum maliyeti de oldukça aşağı çekilmiş olacaktır.

Teşekkür

Bu çalışma Hitit Üniversitesi Osmancık Ömer Derindere Meslek Yüksekokulu bünyesinde Elektronik ve Otomasyon Bölümü'nde Sistem Analizi ve Tasarımı 1-2 derslerinde proje ödevi olarak yapılmıştır. Öğrencilerim: Yavuz BİÇER, Ömer KAYA, Battal YILMAZ, İbrahim TÜRKOĞLU, Emrah TOPÇU, Burhan PAYDAR, Berk KARA, Mehmet AKGÜN ve Tolga KILIÇ'a teşekkür ederim.

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TÜRKİYE'DE YENİLENEBİLİR ENERJİNİN ÖNEMİNE SWOT ANALİZİ YÖNTEMİ İLE GELECEK PERSPEKTİFLİ BİR BAKIŞ

SWOT ANALYSIS METHOD OF IMPORTANCE IN TURKEY WITH RENEWABLE ENERGY FUTURE PERSPECTIVE AT A GLANCE

Burak YÜKSEL[*]
Kübra YÜKSEL[†]

ÖZET

Tüm canlıların ortak ihtiyacı olan enerji canlıların oluşturduğu toplum organizması olan ülkeler içinde büyük önem taşımaktadır. Özellikle sanayi devrimi sonrası giderek artan bu ihtiyacın karşılanması için çeşitli yöntemler ve enerji kaynakları kullanılmaktadır. Bu enerji türlerinin başında fosil yakıtlar gelmekte ancak dünya üzerindeki rezerv dağılımlarının dengesizliği ve kullanımları sonucu ortaya çıkan çevresel zararlarının telafi edilemez noktalara ulaşması tüm ülkeleri alternatif arayışlara yöneltmiştir. Özellikle çevre bilincinin gelişmesi ile bulunan alternatiflerin başında yenilenebilir enerji kaynakları gelmektedir. Teknolojide yaşanan gelişmelerle birlikte yenilenebilir enerjinin kullanım olanakları hızla artmaktadır. Fosil yakıtlar açısından enerjide dışa bağımlı olan Türkiye için yenilenebilir enerji çok önemli potansiyel arz etmektedir.

Türkiye'nin ekonomik büyümesinin ve sürdürülebilir kalkınmasının sağlanması için enerjide dışa olan bağımlılığının azaltılması hatta kendi kendine yeten bir konuma ulaşabilmesi ve enerji hatları üzerindeki jeopolitik konumu etkili kullanabilmesi için enerji politikalarına büyük önem vermesi gerekmektedir.

Çalışmada Türkiye'nin enerji ihtiyacının karşılanmasında yenilenebilir enerji imkanları ve önemi günümüz ve gelecek için ayrı swot analizleri yapılarak ortaya konmaya çalışılarak gelecek perspektifli etkin bir enerji politikası oluşturulması gerekliliği vurgulanacaktır. Çalışmada literatür taraması ve planlan politika stratejilerinden faydalanacaktır. Türkiye'nin enerji ihtiyacı tahminlerinden yola çıkılarak sahip olduğu yenilenebilir enerji kaynaklarının bu ihtiyacı karşılama potansiyeli araştırılacaktır.

Anahtar Sözcükler; Yenilenebilir Enerji, Swot Analizi, Enerji, Dünyada Enerji, Türkiye'nin Yenilenebilir Enerji Kaynakları

ABSTRACT

All partners need to live in countries with which energy is of great importance to society posed by living organisms. In particular, a variety of methods and sources of energy to meet the growing needs of the post-industrial revolution is used. Come on fossil fuels at the beginning of this energy imbalance in the distribution of species, but must reserve in the world and to reach the point of irreparable environmental damage resulting from the use of all countries has led to the search for alternatives. In particular, comes at the beginning of alternative renewable energy sources available with the development of environmental awareness. Use of renewable energy facilities with developments in technology is

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increasing rapidly. Which is dependent on foreign energy in terms of fossil fuels poses potential of renewable energy is very important for Turkey.

Reduction of Turkey's economic growth and reliance on foreign energy to ensure sustainable development even reach a self-contained location and geopolitical position on the power lines must give great importance to energy policy in order to use effectively.

In meeting Turkey's energy needs in the study of renewable energy and the importance of present and future opportunities for the future by trying to separate SWOT analysis revealed an effective energy policy making perspective establishing requirements will be highlighted. The study will benefit from the literature review and plan strategies. Estimates that the needs of Turkey's energy needs with renewable energy sources as the basis of their potential to meet will be investigated.

Keywords; Renewable Energy, Swot Analysis, Energy, World Energy, Turkey's Renewable Energy Sources

1.GİRİŞ

Canlıların vazgeçilmez temel ihtiyaçlarının başında enerji yer almaktadır. Enerji, sanayileşen ve küreselleşen dünyanın temel unsurunu oluşturmakla birlikte ihtiyacının karşılanması ve sürekliliğinin sağlanması büyük önem arz etmektedir.

Kısaca maddenin iş yapabilme yeteneği olarak tanımlanabilen enerji, sanayileşme ve küreselleşmeyle birlikte artan uluslararası rekabetle ülkeler için büyük önem taşımaya başlamıştır.

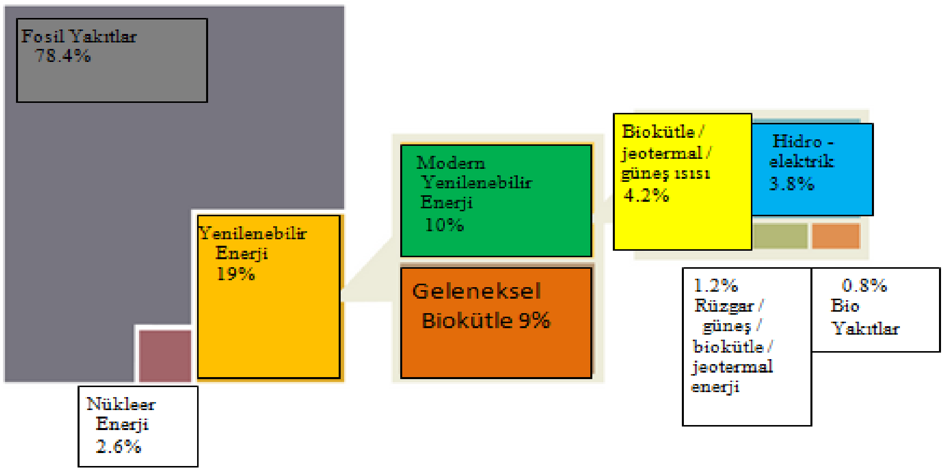
Enerji ihtiyacının ilk olarak fosil kaynaklı yakıtlardan sağlanması, bu kaynakların dünya üzerindeki dengesiz dağılımı, kullanımın ortaya çıkardığı çevresel sorunlar ve bu sorunların uluslararası boyutlara ulaşması alternatif enerji kaynaklarına yönelinmesi gerekliliğini ortaya çıkarmıştır. Sanayileşmenin yüksek enerji gereksinimi ve enerji arz güvenliğinin önemi yerli enerji kaynaklarının tercih edilme sebeplerinin başında yer almaktadır. Artan çevre bilinci ve duyarlılığı yenilenebilir enerji kaynaklarının önemini arttırmıştır.

DÜNYADA ENERJİ GÖRÜNÜMÜ

Hızlı sanayileşme rekabeti ve nüfus artışı dünyada enerji üretimini ve tüketimini hızla arttırmaktadır. Küresel enerji tüketiminin artış hızı 1998 yılı ile kıyaslandığında 2035 yılında iki kat 2055 yılında ise üç kat artacağı tahmin edilmektedir (Özkaya, 2004:8).

REN 21 isimli kuruluşun yayınladığı raporda 2012 yılı küresel enerji dağılımı görünmektedir. Fosil yakıtlar en önemli enerji kaynaklarının başında yer almaktadır. Ancak yenilenebilir enerji kaynaklarını öneminin artması bu oranı gün geçtikçe düşürmektedir.

Şekil 1: 2012 Küresel Enerji Görünümü

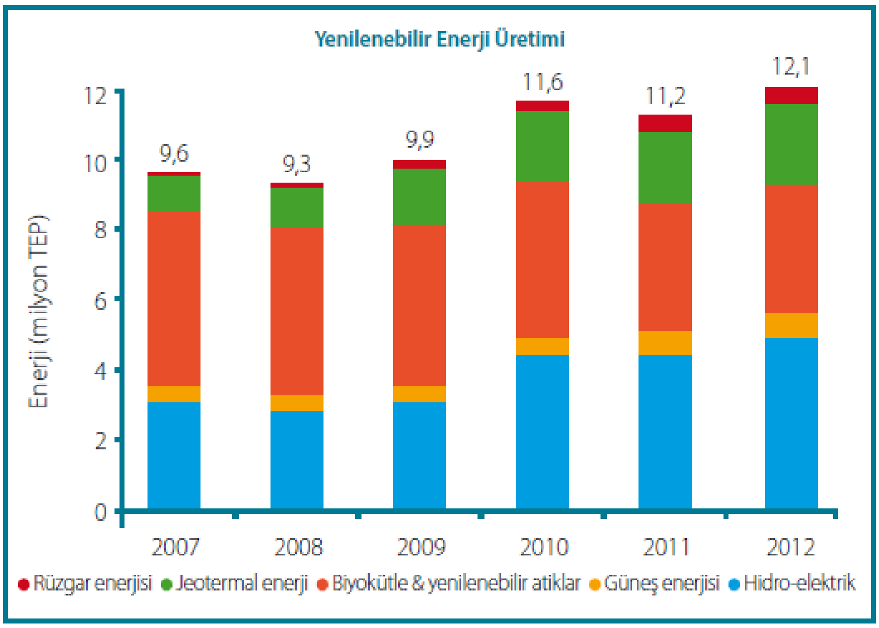


Kaynak: REN 21, 2015:21.

TÜRKİYE'DE YENİLENEBİLİR ENERJİ

Fosil yakıt kaynakları bakımından zengin olmayan Türkiye gerekli olan enerji ihtiyacını ithal enerji yöntemleriyle karşılamakta ve hem ekonomik hem de politik risklerle karşı karşıya kalmaktadır. Ancak yenilenebilir enerji kaynakları açısından çeşitliliğe sahip olan Türkiye için bu kaynakların kullanılmaya başlanması büyük önem taşımaktadır. Bu bölümde Türkiye'nin yenilenebilir enerji kaynakları ve kullanım imkânları değerlendirilecektir.

Şekil 2: Türkiye Yenilenebilir Enerji Üretimi

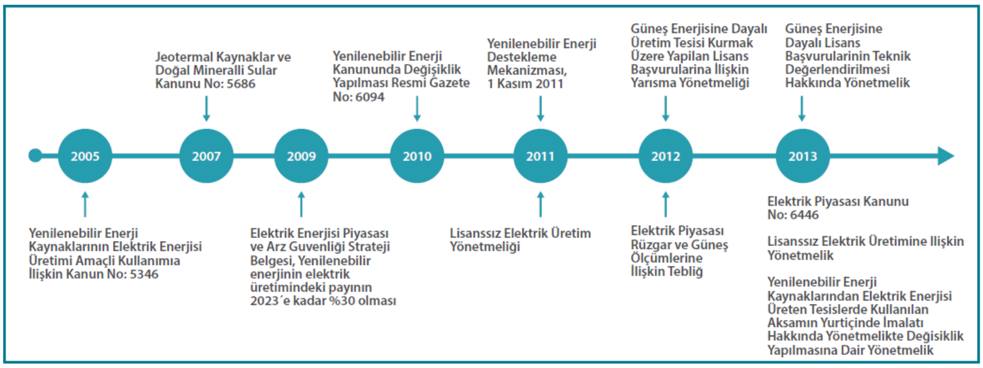


Kaynak: Türkiye Ulusal Yenilenebilir Eylem Planı, 2014:9.

Şekil 2'de Türkiye'de yenilenebilir enerji kaynaklarından elde edilen enerji miktarı kaynak dağılımına göre gösterilmiştir. Şekilden anlaşıldığı gibi Türkiye yenilenebilir enerji kaynakları bakımından çeşitliliğe sahiptir. Bu kaynakların üretimde daha etkin ve verimli kullanılması büyük önem taşımaktadır.

Türkiye'nin yenilenebilir enerji konusundaki düzenleme ve politikaları incelendiğinde tarihsel olarak yakın bir süreçten bahsedilebilir. Bu yenilenebilir enerji kaynaklarının öneminin geç fark edilmesinden kaynaklanmaktadır.

Şekil 3:Türkiye'nin Yenilenebilir Enerji Düzenlemelerinin ve Politikalarının Gelişimi

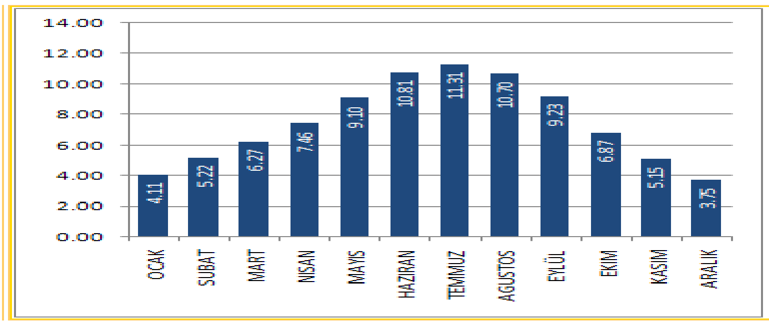


Kaynak: Türkiye Ulusal Yenilenebilir Eylem Planı, 2014:11.

1.1. Güneş Enerjisi

Alternatif ve yenilenebilir enerji kaynaklarının başında güneş enerjisi yer almaktadır. Coğrafi konum açısından Türkiye "güneş kuşağı" içerisinde yer almaktadır (Atılgan, 2000:36). Devlet Meteoroloji İsleri (DMİ) Genel Müdürlüğü'nce 1966-1982 yıllarını kapsayan dönemde gerçekleştirilen güneşlenme süresi ve ısınım şiddeti ölçümleri neticesinde Türkiye'nin yıllık ortalama güneş ışınımı 3,6 kWh/m^2.gün ve güneşlenme süresi 2640 saat olduğu belirlenmiştir(YEGM).

Şekil 4:Türkiye'nin Aylık Güneşlenme Süreleri(saat)



Kaynak:YEGM.

Şekil 3‘te görüldüğü Türkiye’nin aylık güneşlenme süresi özellikle yaz aylarında oldukça fazladır.

Tablo 1: Türkiye’nin Yıllık Toplam Güneş Enerjisi Potansiyelinin Bölgelere Göre Dağılımı

Bölgeler	**Toplam Güneş Enerjisi (KWh/m^{2}yıl)**	**Güneşlenme Süresi**
Güneydoğu Anadolu	1460	2993
Akdeniz	1390	2956
Doğu Anadolu	1365	2664
İç Anadolu	1314	2628
Ege	1304	2738
Marmara	1168	2409
Karadeniz	1120	1971

Kaynak: YEGM.

Türkiye’nin yıllık toplam güneş enerjisi potansiyelinin bölgelere göre dağılımını gösteren Tablo 1 incelendiğinde güneş enerjisi potansiyelinin en yüksek olduğu bölge Güneydoğu Anadolu Bölgesi, en düşük olduğu bölge ise Karadeniz Bölgesidir. Bölgeler arasında genel bir karşılaştırılma yapıldığında güneş enerjisi ve güneşlenme süresi değerleri birbirine çok fazla uzak değildir. Bu açıdan Türkiye güneş enerjisi yoğun bir ülkedir.

Türkiye’de güneş enerjisi yaygın olarak su ısıtma sistemlerinde kullanılmaktadır. Sıcak su elde edilmesinde kullanılan bu sistemler yoğunlukla Akdeniz ve Ege bölgelerinde bulunmaktadır.

1.2. Rüzgâr Enerjisi

Türkiye’nin önemli yenilenebilir enerji kaynaklarından bir diğeri rüzgar enerjisidir. Türkiye coğrafi konumu nedeniyle soğuk ve sıcak hava kütlelerinin karşılaştığı bir alandadır. Avrupa’da rüzgâr enerjisi bakımından en zengin ülkelerden biri Türkiye’dir.

Tablo 2: Türkiye’nin Bölgelere Göre Ortalama Rüzgâr Gücü Yoğunluğu

Bölge Adı	**Ortalama Rüzgâr Gücü Yoğunluğu (W/M^2)**
Akdeniz Bölgesi	21,36
İç Anadolu Bölgesi	20,14
Ege Bölgesi	23,47
Karadeniz Bölgesi	21,31
Doğu Anadolu Bölgesi	13,19
Güneydoğu Anadolu Bölgesi	29,33

Marmara Bölgesi	51,91

Kaynak: Nezihe Akgün, "Yenilenebilir Enerji, Rüzgâr Enerjisi", Dört Mevsim Meteoroloji Bülteni, www.meteor.gov.tr,s.38.

Tablo 2'de görüldüğü gibi ortalama rüzgâr gücü yoğunluğunda ilk sırada Marmara Bölgesi gelmektedir. Ortalama rüzgâr gücü yoğunluğu bakımından en düşük yoğunluğa sahip bölge Doğu Anadolu Bölgesidir.

Şekil 5: Türkiye'de Rüzgâr Enerjisinden Elektrik Üretimi (MW/Yıl)

Kaynak: Türkiye Rüzgâr Enerjisi İstatistik Raporu Ocak 2015, s.5.

1998 yılında başlanan rüzgâr enerjisinden elektrik üretimi 2007 yılında hız kazanarak her yıl artan oranda devam etmektedir. Ocak 2015 itibariyle lisanslı 143 adet Rüzgâr enerji santralinin toplam güç kapasitesi 4.720,5 MW'tır.

1.3. Jeotermal Enerji

Türkiye'nin bol miktarda sahip olduğu bir diğer yenilenebilir enerji kaynağı jeotermal enerjidir. Türkiye'nin jeotermal enerji potansiyeli 31.500 MW'tır. Türkiye dünyada jeotermal enerji kapasitesinde 14.sırada, enerjinin doğrudan (elektrik dışı) kullanımında ise beşinci sırada yer almaktadır. Türkiye'nin jeotermal enerji potansiyelinin 1.500 MW'lık bölümü elektrik enerjisi üretimine uygun olduğu değerlendirilmektedir. 2013 yılı sonu itibari ile jeotermal enerji ile elektrik üretim kapasitesi 310 MW, elektrik üretimi ise 1.364 GWh'tır.

Türkiye de jeotermal alanları Ege Bölgesi'nde yoğunluktadır. Bu bölgede özellikle kaplıca turizminde ve ısınmada jeotermal enerjiden faydalanılmaktadır.

1.4. Biyokütle Enerjisi

Türkiye'nin yüksek potansiyele sahip olduğu bir diğer yenilenebilir enerji kaynağı biyokütle enerjisidir. OECD tarafından yapılan araştırmaya göre Türkiye de tarım atıkları, orman sanayi atıkları ve hayvan atıklarının toplamı 12,8 milyon ton petrole eşdeğer olduğu, Türkiye'nin enerji kullanımının %40'ını karşılayacak kapasitede olduğu görülmüştür (Ataman, 2007:240). İthal yakıtlara bağımlılığı fazla olan Türkiye'nin bu bağımlılığından kurtulmasında biyokütle enerjisi çok önemli bir konumdadır.

1.5. Hidrojen Enerjisi

Türkiye'nin temiz ve alternatif enerji olarak kullanabileceği yenilenebilir enerji kaynaklarından biri de hidrojen enerjisidir. Hidrojen elde edilmesi için Türkiye'nin yenilenebilir enerji kaynaklarından faydalanması mümkündür. Rüzgâr, güneş, jeotermal ve su gibi enerji kaynakları kullanılarak hidrojen üretimi yapılabilir.

Türkiye hidrojen üretimi konusunda çok önemli avantajlara sahiptir. Bunlardan ilki yukarıda bahsettiğimiz coğrafi konuyla sahip olduğu kaynaklarla hidrojen üretimi yapabilmesidir. İkinci avantajı ise hidrojenin depolanmasında kullanılan bor elementinin dünya toplam rezervinin %72,2'si Türkiye'dedir. Türkiye'nin diğer bir avantajı Karadeniz'in tabanında kimyasal biçimde depolanmış hidrojen bulunmasıdır(Uğurlu,2006:176).

1.6. Hidroelektrik Enerjisi

Türkiye'nin coğrafi konumu ve yükseltili yapısıyla öne çıktığı bir diğer yenilenebilir enerji kaynağı hidroelektrik enerjisidir. Türkiye su gücü bakımından dünyada önemli bir konumdadır. Türkiye'de su kaynaklarının enerji üretimi açsından debisi 186 km^3 düzeyindedir. Türkiye'nin teorik hidroelektrik enerji potansiyeli 433 milyar kWh, teknik yönden değerlendirilebilir potansiyeli 216 milyar kWh ekonomik hidroelektrik potansiyeli ise 140 milyar kWh'dir. Türkiye dünyadaki teorik hidroelektrik potansiyelinin %1'ine, ekonomik potansiyeli ise Avrupa ekonomik potansiyelinin %16'sına sahiptir(EİE,2015).

31 Ağustos 2012 tarihi itibari ile Türkiye toplam elektrik kurulu gücü 55.380 MW'a ulaşmıştır. Bu toplam içinde, termik yakıtlı santrallerın payı % 63 (34.656 MW) ve yenilenebilir yakıtlı santraların payı % 37 (20.724 MW) dir.

2. SWOT ANALİZLERİ

Sanayi devrimi ve küreselleşme ile artan enerji ihtiyacı, küresel ısınma ve iklim değişikliği gibi uluslararası boyutlu sorunların, cari açık gibi ekonomik sorunsalların çözüm yolu olarak alternatif enerji kaynaklarının kullanımı büyük önem taşımaktadır. SWOT (Strenghts - Weaknesses - Opportunities - Threats) analizi ile yenilenebilir enerji kaynaklarının uygulanabilirliği ve uygulanması sonucu ortaya çıkabilecek sonuçları belirlenen hedefler ve bu hedeflerin gerçekleştirilmesi ile oluşacak durum ve yeni hedeflerin belirlenmesi sırasıyla iki ayrı senaryo olarak incelenecektir.

5.1. Senaryo 1:Yenilenebilir Enerji Kaynaklarının Türkiye Açısından SWOT Analizi

Güçlü Yönleri (Strenghts):

1. Türkiye'nin yenilenebilir enerji kaynak potansiyelinin yüksek olması
2. Türkiye'nin yenilenebilir enerji kaynaklarının çeşitliliği ve arz güvenliği
3. Sera gazı etkisinin azaltılmasıyla çevreye olumlu etkisi
4. Ekonomik olarak katma değer yaratması ve istihdama olumlu etkisi
5. Yasal düzenlemeler ve ulusal politikalar
6. Enerji darboğazının çözümüne etkisi
7. Ekonomik ve kırsal kalkınmaya olumlu etkisi
8. Yenilenebilir enerji kaynaklarına ve teknolojilerine yönelik Ar-Ge çalışmalarının artması
9. Yenilenebilir teknolojilerinin gelişmesi
10. Üniversite, enstitü, kamu ve özel sektörün çalışmaları ve kurulan çeşitli birlik ve derneklerin kuruması

Zayıf Yönleri (Weaknesses):

1. Yenilenebilir enerji kaynaklarının ilk yatırım maliyetlerinin yüksekliği
2. Yenilebilir enerji kaynaklarının değişkenliği
3. Kalifiye eleman eksikliği
4. Doğalgaza yönelimin hız kazanması
5. Yasal zeminin daha sağlıklı hale getirilmesi gerekliliği ve teşviklerin eksikliği
6. Ölçüm ve verilerin daha sağlıklı hale getirilmesi gerekliliği
7. Ar-Ge çalışmalarının yetersizliği
8. Bilinçli tüketici eksikliği
9. Yenilenebilir enerji konusunda çalışma yürüten kurumların koordinasyon eksikliği
10. Fiyat rekabetinin olmaması ve finansal kaynak eksikliği

Fırsat Yönleri (Opportunities):

1. Cari açık üzerindeki olumlu etkisi
2. Sürdürülebilir kalkınmanın sağlanmasına olumlu etkisi
3. Karbon ticareti
4. Enerji maliyetlerinin yüksekliği
5. Kaynakların verimliliği
6. Ar-Ge destekleri
7. Halk sağlığına olumlu etkisi
8. Doğal kaynakların ve çevrenin korunması
9. Yeni Pazar olanakları
10. Avrupa Birliği müktesebatına uyumun sağlanması

Tehditler (Threats):

1. Nükleer enerji yatırımları
2. Finansal istikrarsızlık
3. Yatırım piyasalarındaki dalgalanma
4. İstikrarlı üretim yapılamaması
5. Bilgi eksikliği
6. Deneyim eksikliği
7. Küresel ısınma ve iklim değişikliği
8. Türkiye’nin nüfus artış hızı
9. Teknolojik eksiklik

10. Yüksek ilk yatırım maliyeti

Senaryo 1'e göre Türkiye'nin enerji ihtiyacının büyük oranda karşılanması ve enerjide dışa bağımlılığının azaltılmasında yenilenebilir enerji kaynakları büyük önem taşımaktadır. Yenilenebilir enerji kaynaklarının kullanılmaya başlanması ekonomik yönden cari açığın kapatılmasında yapacağı desteğin yanı sıra çeşitli istihdam olanakları sağlayarak birçok ekonomik ve sosyal problemin çözümüne olanak sağlamaktadır. Yenilenebilir enerji konusunda bilgi eksikliğinin giderilmesi ve kalifiye eleman yetiştirilmesi gerekliliği ortaya çıkmaktadır. Kaynak çeşitliliğinin fazlalığı ve arz güvenliğinin sağlanması açısından yenilenebilir enerji kaynaklarının kullanımı ve desteklenmesi gerekmektedir.

5.2. Senaryo 2: Yenilenebilir Enerji Kaynaklarının 2023 Yılı Hedefleri Gerçekleştirildiği Zamanki Durumun SWOT Analizi

Güçlü Yönleri (Strenghts):

1. Enerjide dışa bağımlılığın azalması
2. Sürdürülebilir ve temiz çevre
3. Karbon ticareti
4. Enerji arz güvenliğinin sağlanması
5. Politik istikrar
6. Ar-Ge çalışmaları
7. Jeopolitik konum
8. Nitelikli eleman
9. Bilinçli toplum

Zayıf Yönleri (Weaknesses):

1. İstikrarsız üretim
2. Teknolojik yetersizlik
3. Hızlı nüfus artışı

Fırsat Yönleri (Opportunities):

1. Uluslararası politik güç
2. Jeopolitik konum
3. Temiz çevre
4. Sürdürülebilir kalkınma
5. İstihdam olanakları
6. Yeni pazarlar
7. Sürdürülebilir ekonomik büyümenin sağlanması

Tehditler (Threats):

1. İstikrarsız üretim
2. Nükleer enerji yarışı

3. İstikrarlı üretim yapılamaması
4. Küresel ısınma
5. İklim değişikliği

Senaryo 2 Türkiye'nin yenilenebilir enerji hedeflerini gerçekleştirmesi durumunda ekonomik ve siyasal olarak daha olumlu bir atmosfer içine gireceğini ve küresel güç olma açısından yenilenebilir enerji kaynaklarının taşıdığı önemi göstermektedir. Türkiye, nüfus ve ekonomi olarak daha güçlü bir konuma ulaşacağı tahmin edilmektedir. Türkiye'nin 2023 yılı nüfusu yaklaşık 90 milyon ulaşması öngörülmektedir. Hızlı nüfus artışının ve hızla devam eden sanayileşme hamlelerinin Türkiye'nin enerjiye olan ihtiyacının büyük oranda artış göstereceği tahmin edilmektedir. Bu artışın küresel ısınma ve iklim değişikliğinin etkilerini azaltmak ve enerjide dışa bağımlılığın artmasını önlemek için yenilenebilir yerli enerji kaynaklarından karşılanması zorunludur. Tablo 3'te 2023 yılı hedeflenen enerji üretimi ve kaynakların planlanan kuru gücü gösterilmiştir. İlk kurulum maliyetlerinin de senaryo 1'deki hedeflerin yakalanması ile büyük oranda düşürülmesi ve her alanda yerli ürünlerin kullanımının sağlanması hedeflenmektedir.

Tablo 3: Türkiye'nin 2023 Yılı Yenilenebilir Enerji Kurulu Güç ve Elektrik Üretim Hedefi

Enerji Kaynağı	Kurulu Güç (MW)	Elektrik Üretimi (GWh)
Hidroelektrik	34.000	91.800
Rüzgar	20.000	50.000
Jeotermal	1.000	5-100
Güneş	5.000	8.000
Biyokütle	1.000	4.533

Kaynak: Türkiye Ulusal Yenilenebilir Enerji Eylem Planı, 2014:18.

6. SONUÇ

Hızla artan enerji ihtiyacının çevreye zarar vermeden ve sürdürülebilir şekilde karşılanması büyük önem taşımaktadır. Ülkelerin ekonomik ve siyasal açıdan daha iyi bir konuma gelmeleri için yerli enerji kaynaklarının kullanımı büyük önem arz etmektedir. Yapılan farklı çalışmalarda yenilenebilir enerjinin önemine dikkat çekilmektedir.

Küresel ısınma ve iklim değişikliğinin önlenmesi, sera gazı salınımının azaltılması ve enerji arz güvenliğinin sağlanarak yerli enerji kaynaklarının kullanılması uluslararası alan etkin bir politika yapıcılığının ve ekonomik etkinliğin önünü açmaktadır.

Türkiye'nin fosil enerji kaynakları bakımından zengin olmaması, hızlı nüfus artışı ve sanayileşme atakları enerjiye olan ihtiyacının temel göstergeleridir. Enerji alanında konusunda uzaman personel yetiştirilmesi, Ar-Ge çalışmalarına önem verilmesi ve en önemlisi toplumun bilinçlendirilerek etkin teşvik yöntemlerinin kullanılması büyük önem taşımaktadır.

Yapılan SWOT analizlerinin gösterdiği gibi Türkiye'nin sürdürülebilir kalkınma ve büyüme ivmesini kazanması ve cari açık sorunun etkin çözümü için en önemli harcama kalemi olan enerji ithalatını yerli kaynaklarla, temiz, sürdürülebilir şekilde yeni istihdam ve Pazar olanaklarını kullanarak aşması bölgesel ve küresel açıdan çok büyük öneme sahiptir.

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FOSİL ENERJİ TÜKETİMİNİN ÇEVRESEL ETKİLERİ
ENVIRONMENTAL EFFECTS OF FOSSIL ENERGY CONSUMPTION

Anıl Çağlar ERKAN[*]

ÖZET

Teknolojinin gelişimiyle birlikte artan enerji tüketimi günümüzde ekonomilerin gelişmişliği başta olmak üzere birçok anlamda güç göstergesinin gereklilikleri arasında sayılmaya başlanmıştır. Bu doğrultuda güçlü olmayı hedefleyen devletler de her geçen gün enerji tüketimlerini arttırmışlardır. Enerji kullanımının birçok konuda faydaları olduğu gerçektir fakat aynı doğrultuda zararlarının olduğu da gözden kaçırılmamalıdır. Enerji kaynaklarına bağımlılık bu zararların en başında gösterilmesine rağmen çevresel zararların bu konuda daha öncelikli olarak gösterilmesi gerekmektedir. Özellikle yenilenemeyen enerji kaynakları olarak adlandırılan fosil ve diğer bazı yakıtların neden olduğu çevresel zararlar ve etkileri konunun öneminin anlaşılmasında yeterli delilleri bize sunmaktadır. Ayrıca öncelikli amacımız dünyamız yaşamının devamıdır. Gelişim ve güç endişesiyle artan söz konusu enerji kaynaklarının kullanılmasındaki artışın olumsuz etkileri ise bu yaşamı etkiler boyuta ulaşmakta ve yaşamı tehdit altına sokmaktadır.

Anahtar Kelimeler: Fosil Enerji Kaynakları, Kirleten Enerji Kaynakları, Enerji Tüketimi, Çevre Sorunları.

ABSTRACT

Increased energy consumption withthe technological development, nowadays has started to be counted among the many meanings of the power indicator and requirements of the economy. In this direction, states aim to be strong, have also been increasing their energy consumption everyday. Energy use is the fact tha tmany housing benefits but should not be overlooked that there are losses in the same direction.Dependence on energy resources and environmental damage have been shown at the beginning of this harm must be shown to this issue as a priority.Environmental damage and effects that especially the so-called non-renewable energy sources and other fosil fuels is causing some offer ssufficient evidence for us to understand the importance of this issue.Inaddition, our world, our primary goal is the continuation of life.Development and power effects of increased growth in the use of energy resources is putting the question to reach a size affects the life and her life threatened.

KeyWords: Fossil EnergySources, Dirty Energy Sources, Energy Consumption, Environmenta Problems.

GİRİŞ

İnsanoğlunun içerisinde yaşadığı doğa ile etkileşimi antik çağlardan beridir düşünce tarihinin en temel konularından birisi olagelmiştir (İzci, 2004 2005: 59). İnsan yaşamını mümkün kılan doğa (çevre), gelişen teknolojiyle birlikte dünyanın insan hayatını

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destekleyecek kapasitesinin her daim süreceği iddiasıyla bilinçsiz davranışlarla dünyada insan yaşamının etkilenmesine varacak kadar doğa çürütülmüştür. Uzun yıllar boyunca insanoğlunun bilinçsiz davranışlarıyla birlikte doğanın çürütülmesinin önlenebilmesi yönünde önlemlerin alınmamasına ek olarak teknolojik gelişimlerle doğru orantılı olarak dünya fosil enerji kaynakları tüketiminin artması, doğanın olumsuz etkilenmesinin en önemli nedenlerinden birisidir. Bir toplumun enerji tüketiminin fazlalığı günümüzde ekonomik gelişmişliğin göstergelerinden sayılmaktayken, başta kirli olarak adlandırılan fosil yakıtların (petrol, kömür) enerji kaynaklarının bilinçsiz tüketimi de çevre konusunda uzman kişiler tarafından da gelişmişliğin düzeyi, çevreye verdiği zararın büyüklüğü ile doğru orantılı olarak ilişkilendirilmiştir.

Son yıllara kadar enerji kaynaklarının bilinçsiz ve ekosistemi etkileyecek düzeyde fazla tüketilmesinin ekonomiye sağladığı yarar doğrultusunda enerji–ekonomi ilişkisi kurulmaktadır. Günümüzde artan çevre bilinci doğrultusunda bilinçsiz çevre kullanımının ekosistemin dengesini bozacağı görüşü (İzci, 2004-2005: 59), yaşanan tecrübeler sonrasında kabul görmüş ve toplumsal-ekonomi ikilisi yerini ekonomi-enerji-çevre üçlüsüne bırakmıştır. Ekonomide sağlanacak olan gelişim enerji kaynaklarının bilinçsiz olarak tüketimi ve tüketim oranda ekosistemi insan yaşamını olanaksız kılacak derece etkilemesinin sonuçları da ekonomi-enerji-çevre arasındaki bağlantıyı güçlendirmiştir.

Makalenin inceleme konusunu belirtilen ekonomi-enerji-çevre arasındaki bağlantının gücü ve bu bağlantının çevreye olan zararları oluşturmakta ve özellikle fosil yakıt kullanımının çevreye olan zararları incelenmektedir. Belirlenen konular ve genel inanışın aksine enerji kullanımının çevreye olan zararları sadece fosil enerji kaynakları ile sınırlandırılmayarak bazı yenilenebilen enerji kaynaklarının da kullanımları sonucunda çevreye olan zararları da inceleme konuları arasında yer alacaktır. Çevre ve enerji konusundaki bir takım temel tanımlamalarla birlikte makalenin inceleme konusunu enerji çevre bağlantısının zararları genel olarak oluşturmaktadır.

1.ÇEVRE KAVRAMI

“Çevre” ya da “ekoloji” siyaset ve sosyal bilimlerde yoğun olarak kullanılan ancak çoğu zaman tanımlanamayan bir kavramdır (Brauch, 2008: 35). 20.yüzyılın son dönemine kadar çevresel ve iklimsel kaygılar güvenlik tehlikeleri ve kaygıları olarak veya insanlığın bekasına zarar verecek tehditler olarak algılanmamışlardır (Brauch, 2008: 35).

Doğa bilimleri ve sosyal bilimlerde ana terim ve temel kavramlardan olan “çevre” ve “ ekoloji” farklı okullar, kavramsal çerçeveler ve yaklaşımlarda ve ulusal, uluslar arası yönetişimde yol gösterici kavramlar olarak kullanmışlardır (Brauch, 2008: 35). Birçok tanımlama da bu kavramlar için kullanılmıştır. Çevre yasasında yer alan çevre tanımı bu tanımlamalardan birisidir ve yasaca çevre; “*canlıların yaşamları boyunca ilişkilerini sürdürdükleri ve karşılıklı olarak etkileşim içinde bulundukları biyolojik, fiziksel, sosyal, ekonomik ve kültürel ortam*” diye tanımlanmaktadır (Kaypak, 2012: 208).

Günümüzde çevre konusunda yapılan tanımlamalara birçok yerde karşılaşılmakta ve her geçen gün yapılan tanımlar modern hayata uygun olarak içerikleri gelişim göstermektedir. Modern tanımlamada çevre şunları içermektedir; a)abiyotik ve biyotik çevrede, b) organizmalar arası etkileşimler, c) enerji, madde ve bilgi akışındaki bağlantılar (Brauch, 2008: 35). Ayrıca çevre evrensel değere sahip nitelikte ve insanlık için ortak değer olarak nitelendirilmektedir. Fakat çevrenin ortak insanlık değeri olarak nitelendirilmesi insanlığın kendisini çevrenin efendisi olarak görmesi anlamına gelmemekte ve bu yanlış anlayış günümüzde birçok çevre sorununun yaşanmasına zemin hazırlamaktadır.

2.ÇEVRE SORUNU OLARAK ÇEVRE KİRLİLİĞİ

Bir kavram olarak çevrenin yaşamımızda daha sık olarak kullanılmaya başlanması 20. Yüzyılın sonlarına doğru olsa da, çevresel kaynakların kullanılması ve tüketilmesi, bu tüketim sırasında insanın kendisini doğanın efendisi olarak görmesi yeni değildir (Uğurlu, 2009: 12). Dolayısıyla insanlığın çevreye üzerindeki etkisi de yeni bir durum olarak değerlendirilmemektedir. İnsanlığın çevreyle ilişkisi ve etkisi ilk tanışmalarına dayanmakta fakat etkinin olumsuz zarar haline hızlanarak dönüşmesine son birkaç yüzyıllık dönemde rastlanmaya başlanmaktadır.

Çevre ve insan ilk zamanlardan bu yana ayrılmaz bir bütün olarak düşünülmektedir. Çevre üzerindeki insan etkisi bu nedenle yadsınamaz bir gerçektir ve en önemli etken olarak gösterilmektedir. İnsanların ihtiyaçlarını karşılamak amacıyla giriştikleri faaliyetlerin sonucunda ortaya çıkan atıkların çevreyi kirletme hızı doğanın kendisini doğal olarak temizleme hızının çok üstüne çıkmasıyla (Alnıak ve Öztürk, 2010: 403) bu etki çevre sorunlarına zemin hazırlamış ve bu sorunlar günümüzde ciddi boyutlara ulaşarak küresel bir hal almıştır.

İnsanlık ortaya çıkan çevre sorunlarının insanlık yaşamını etkiler duruma gelmesiyle çevre konusunda bilinçlenmesi ve bir takım önlemler alınması yönünde adımlar atılmasına neden olmuştur. Sorunun küresel anlamda etkilerinin olabileceği nedeniyle ortak insanlık sorunu olarak nitelendirilmesi ve ortak bilinç çağrıları atılan öncelikli adımlardandır. Sonuç olarak da 1970'li yıllarda çevre sorunlarıyla ilgili uluslararası düzeyde ortak bilinç oluşmaya başlamış ve buna bağlı olarak konuyla ilgili uluslararası toplantılar, konferanslar yapılmaya, bilimsel örgütlenmeler ortaya çıkmaya başlamıştır. Günümüzde yaşanmakta olan başlıca çevre sorunları ise; hava ve su kirlenmesi, ormansızlaşma, gürültü kirliliği, erozyon, hayvan ve bitki türlerinin yok olması, nükleer atıklar, sanayi atıkları, iklim değişikliği ve küresel ısınma olarak birçok neden temelinde ifade edilmiştir.

2.1.Çevre Sorunlarının Kaynakları

Çevre küresel bir sorun olarak tüm insanlığı ilgilendirmektedir (Akif Çukurçayır, s. 258). Çevre konusunda birçok sorun tespit edilmiş ve bu sorunlar üzerinde önemli çalışmalar gerçekleştirilmiştir. Yapılan anket araştırmaları bu konuda açıklayıcı olmuş ve kirlilik problemi de yapılan anket çalışmaları sonucunda öncelikli olarak önemli çevre problemlerinden gösterilmiştir. Belirlenen kirlilik öncelikli çevre sorunları da birçok görüş ışığında insan etkisi ve endüstrileşme etkilerinde belirtilmiştir.

Uluslararası İklim Değişikliği Paneli insan etkinliğinin 1750'den beridir dünya iklimi üzerinde ısınma etkisi yarattığını kabul etti (Shiva, 2012: 17). İklim değişikliğinin küresel bir sorun halini aldığı günümüzde panelde benimsenen görüş dolayısıyla bizlere iklim sorunlarının dolayısıyla önemli bir çevre sorununun antropojenik yani insan kaynaklı olduğunun anlaşılmasında yeterlidir. Dünyamızda her şeyin öncelikle insan temelli kaynaklandığı göz önüne alındığında yaşanan küresel çevre sorunlarının da öncelikli olarak insanlık faaliyetlerinden kaynaklandığının kabul edilmesi gereklidir.

İnsan etkileri, özellikle evsel ve endüstriyel yanma olayları sonucu havanın doğal bileşiminin, yapısının ve fonksiyonlarının bozulması neticesinde çevre sorunu oluşmaktadır (Elkoca, 2003: 368). Bu bağlamda öncelikli olarak bakıldığında çevre sorunu oluşturan başlıca kaynaklar endüstriyel kuruluşlar, kentlerdeki konutlar ve taşıt araçları olarak insan temelli etkenler arasında gösterilebilmektedir. Dünya nüfusunda yaşanan artış ve artışa paralel olarak gelişen şehirleşme ve endüstrileşme gibi etkenler de bu kaynakların insan ile birlikte sorunlara olan katkılarının temelini oluşturmaktadır.

2.2.Çevre Kirliliği

Her zaman vurgulandığı gibi, toplumların doğayı kullanıp bozması, değiştirmesi özellikle sanayi devrimiyle hız kazanmış; doğaya kendi kendisini yenileyebilme kapasitesinin üstünde bir yük bindirilmiştir (Keleş vd, 2009: 155). Çevre özellikle 1950'li yılların sonrasında artan dünya tüketimi ve yaşanan gelişmeler sonrasında yaşanan sanayileşmeyle birlikte üstündeki var olan yükü daha da taşıyamaz hale gelmiştir. Bu yük sonrasında karşımıza önemli bir çevre sorunu, çevre kirliliği olarak çıkmıştır.

Çeşitli şekillerde tanımlanan çevre kirliliği, genel olarak insanların her türlü faaliyetleri sonucunda suda, toprakta ve havada meydana gelen olumsuz gelişmelerle ekolojik dengenin bozulması ve böylece ortaya çıkan kötü koku, zehirlilik, radyasyon, gürültü, hava kirliliği ve arzu edilmeyen diğer sonuçlar olarak tanımlanabilir (Oğun, 2008: 87). Çevrenin bileşenleri olarak adlandırılan bu değerlerin hiç biri yaşamsal ve toplumsal olarak vazgeçilmez nitelikte olan hava, su, toprak gibi yaşam kaynakları, olumsuz etkilenen ve kirlenen ortamların başında yer almaktadır.

2.3.Hava Kirliliği

Dünyayı canlıların yaşamasına uygun duruma getiren, dünyayı çevreleyen atmosferdir. Canlıların yaşamını sürdürebilmesi için gerekli olan solunum, sindirim, fotosentez gibi süreçlerin temel girdisi havadır. Hava ise atmosferi oluşturan gazların bir karışımıdır (Keleş vd, 2009: 160). Yaşanan gelişmeler ve insan faaliyetlerinin çevreyi etkilediği son dönemlerde daha da önemli hale gelen hava, hava kirliliği sorunu ile ele alındığında önemli bir küresel sıkıntı olarak ortaya çıkmaktadır.

İnsan temelli nedenler başta olmak üzere birçok nedenden kaynaklanmakta olan hava kirliliği farklı şekillerde tanımlanabilmektedir. Kabul edilebilir tanımlamalar olmasına karşılık bizlerce en kabul edilebilir tanımla hava kirliliği, belli bir kaynaktan atmosfere bırakılan kirleticilerin, havanın doğal bileşimini bozarak, onu canlılara ve eşyaya zarar verecek bir yapıya dönüştürmesidir. (Keleş vd, 2009: 161). Bir başka deyişle hava kirliliği; havada katı, sıvı ve gaz şeklindeki yabancı maddelerin insan sağlığına, canlı hayatına ve ekolojik dengeye zarar verecek miktar, yoğunluk ve sürede atmosferde bulunmasıdır. İnsanların çeşitli faaliyetleri sonucu meydana gelen üretim ve tüketim aktiviteleri sırasında ortaya çıkan atıklarla hava tabakası kirlenerek, yeryüzündeki canlı hayatı olumsuz yönde etkilenmektedir (http: 2).

Genel olarak bakıldığında hava kirliliği, ısınmadan, motorlu taşıtlardan ve sanayiden kaynaklanan hava kirliliği olarak üç gurupta incelenebilmektedir ve her biri insan yaşamını aynı ölçüde tehdit edecek niteliktedir. Söz konusu kaynakların neden olduğu etkiler bu noktada önem taşımakta ve açıkça belirtilmesi gerekmektedir. Öncelikle kirli hava, insanlarda solunum yolu hastalıklarının artmasına sebep olmaktadır. Örneğin; kurşunun kan hücrelerinin gelişmesini ve olgunlaşmasını engellediği, kanda ve idrarda birikerek sağlığı olumsuz yönde etkilediği, karbon monoksit (CO)'in ise, kandaki hemoglobin ile birleşerek oksijen taşınmasını aksattığı bilinmektedir. Bununla birlikte kükürt dioksit (SO2)'in, üst solunum yollarında keskin, boğucu ve tahriş edici etkileri vardır. Özellikle duman akciğerden alveollere kadar girerek olumsuz etki yapmaktadır. Ayrıca kükürt dioksit ve ozon bitkiler için zararlı olup; özellikle ozon, ürün kayıplarına sebep olmakta ve ormanlara zarar vermektedir (http: 3).

Fosil yakıtlar açısından bakıldığında durum hiç de farklı değildir. Sanayi, endüstri ve ısınmada kullanılan fosil yakıtlar ile ormanların tahribi ve arazi değişmesi sonucu, atmosferdeki karbondioksit miktarının %5 oranında arttığı tespit edilmiştir. Bunun ise küresel ısınmaya yol açabileceği öngörülmektedir (http: 3).

2.4.Toprak Kirliliği

Hava ve su gibi, canlıların yaşaması için vazgeçilmez unsurlardan bir diğeri de topraktır. Toprak, bitki örtüsünün beslendiği kaynakların ana deposudur. Toprak yerküreyi kaplayan çeşitli mineral ve organik maddelerin karışımından oluşan, bitkiler için bir mekân ve besin kaynağı olan, bünyesindeki mikroorganizmalarla birlikte canlı bir ortam olarak ele alınabilecek bir tür varlıktır. (Şimşekli, 2005: 94). Toprak organik ve inorganik maddelerden meydana gelir* (Şimşekli, 2005: 95). Kısacası, toprağın üst tabakası insanların ve diğer canlıların beslenmesinde temel kaynak teşkil etmektedir. Bir gram toprağın içerisinde milyonlarca canlı bulunmakta ve ekosistemin devamı için bunların hepsinin ayrı önemi bulunmaktadır.

Yirminci asrın başından itibaren modern tarıma geçilmesi ve sanayileşmenin hızlanması ile birlikte, toprak kirliliği de bir çevre sorunu olarak ortaya çıkmaya başlamıştır. Daha önceki asırlarda kullanılan güç ve enerji kaynaklarının yetersiz olması, nüfusun azlığı, endüstrileşmenin henüz gelişmemesi sebebiyle diğer çevre faktörlerinde olduğu gibi toprakta da herhangi bir kirlenme söz konusu değildir. Özellikle yirminci yüzyılın ortalarına doğru hızlı nüfus artışı ile birlikte, tarım ve diğer alanlardaki sanayi ve teknolojinin hızla gelişmesine paralel olarak toprak kirliliği de artmaya başlamıştır (http: 4). Toprak kirliliği her geçen gün daha da ciddi boyutlara ulaşan önemli çevre problemlerinden birisini teşkil etmektedir. Bu sorun çeşitli şekillerde tanımlanmaktadır. Bu tanımlamalardan birisi Emrullah Güney tarafından yapılmıştır. Emrullah Güney'e göre *"Toprağın kirlenmesi, toprağın fiziksel, kimyasal, biyolojik, jeolojik yapınsın planlanan kullanım amacına aykırı düşecek bir biçimde insan uğraşları sonucunda bozulması olayıdır."* (Güney, 2004: 100).

Toprak tüm kimyasal ekosistemlerin, hatta su ekosistemlerinin dengeli olarak çalışabilmesini sağlayan bir ekosistem öğesidir. Besimlerimizin %78'ini oluşturan bitkisel besin maddelerinin doğrudan doğruya, geri kalanlarının da dolaylı yaratıcısı ve kaynağıdır (Şimşekli, 2008: 95). Bu nedenle toprak kirlenmesi diğer çevre kirlenmesi süreçleriyle doğrudan ilişkilidir (Şimşekli, 2008: 95). Dünyadaki bütün ekolojik dengeleri bozan hava ve su kirlenmesiyle, aşırı nüfus artışı ve sanayileşme gibi süreçler, toprak kirlenmesinin başlıca nedenleri olarak sıralanabilir (Şimşekli, 2008: 95). Bu bağlamda, toprağın kirletilmeden korunması, üzerinde önemle durulması gereken bir konudur.

2.5.Su Kirliliği

Su, canlıların yaşaması için hayati öneme sahiptir. En küçük canlı organizmadan en büyük canlı varlığa kadar, bütün biyolojik yaşamı ve bütün insan faaliyetlerini ayakta tutan sudur. Dünyamızın%70'ini kaplayan su, bedenimizin de önemli bir kısmını oluşturmaktadır (http: 5). Su canlıların yaşaması için hayati öneme sahiptir. En küçük canlı organizmadan, en büyük canlı varlığa kadar, bütün biyolojik hayatı ve bütün insan faaliyetlerini ayakta tutan sudur. Hayatımızı idame ettirebilmemiz için en önemli besin kaynağımız olan su, dolaşım ve sindirim sistemlerinin çalışmasında temel unsur olduğu gibi, vücudumuzdan artık ve zehirli maddelerin atılmasında da mühim bir vazifeyi yerine getirir (http: 6).

Artan dünya nüfusuyla birlikte suya duyulan ihtiyaç da her geçen gün artmaktadır (Özdemir ve Uçan, 2006: 123). Dünya nüfusunun %40'ını barındıran 80 ülke şimdiden su sıkıntısı çekmektedir. Çünkü nüfusun hızla artması, buna karşılık su kaynaklarının sabit kalması sebebiyle su ihtiyacı her geçen gün artmaktadır. Dünyadaki mevcut suyun

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* Topraktaki minarel madde miktarı %47, Organik madde %3, Hava %25, Su %25.

hacmi 141 milyar m3 tür. Bu miktar dünya yüzeyini 3 km. kalınlığında bir tabaka halinde sarabilecek büyüklüktedir. Bu suyun % 98'i okyanuslarda ve iç denizlerde bulunmakta, fakat tuzlu olduğu için, içme suyu olarak kullanıma, sulamaya ve endüstriyel kullanıma uygun değildir. Dünyadaki suların ancak %2.5'i tatlı sudur. Bunun da %87'si buzullarda, toprakta, atmosferde, yeraltı sularında bulunur ve kullanılamaz durumdadır (http: 5).

Yeryüzünü saran ve okyanuslarda, denizlerde, göllerde, akarsularda ve yeraltı sularında bulunan sularla atmosferdeki su buharının tümüne hidrosfer (su küre) adı verilir. Yeryüzündeki sular, güneş enerjisi etkisi ile sürekli bir dolaşım içinde bulunur. Yeryüzünden buharlaşarak atmosfere çıkan sular yoğunlaşarak tekrar yeryüzüne dönerler. Bu dolaşma *"Hidrolojik devre"* denir. İnsanlar yaşamlarını sürdürebilmek ve ekonomik ihtiyaçlarım giderebilmek için suyu bu dolaşımdan alır, kullandıktan sonra yine aynı dolaşıma iade ederler. Bu olaylar sırasında suya karışan maddeler suların fiziksel, kimyasal ve biyolojik olarak özelliklerinin değişmelerine neden olurlar. Su kirliliği olarak adlandırılan bu özellik değişimleri, aynı zamanda sularda yaşayan çeşitli canlı varlıkları da etkiler. Böylece su kirlenmesi suya bağlı eko sistemlerin etkilenmesine, dengelerin bozulmasına ve giderek doğadaki tüm suların sahip oldukları kendi kendini temizleme kapasitesinin azalmasına veya yok olmasına yol açabilir (http: 7).

Sonuç olarak kirli sular, içme ve kullanma, rekrasyon, tarım ve endüstriyel faaliyetler için uygun değildir. Kirli sular içme sularının zehirlenmesine, ötrofikasyon[*] nedeniyle akarsu veya göl ekosistemlerinin bozulmasına, su canlılarının ölmesi sonucunda biyolojik çeşitliliğin azalmasına ve çeşitli çevresel problemlerin ortaya çıkmasına neden olur (Çınar, 2013: 2). Kirliliğin yaratacağı bu olası sorunlar da insanlık yaşamı başta olmak üzere tüm dünya canlı yaşamının zarar görmesine neden olabilmektedir.

3.KİRLİ ENERJİ KAYNAKLARI VE ÇEVRESEL ETKİLERİ

3.1.Kavram Olarak Enerji ve Enerji Kaynakları

Enerji, bir sistemin, kendisi dışında etkinlik üretme yeteneğidir (Civelekoğlu, 2008: 8). Enerji maddede var olan, eyleme geçmeyi olanaklı kılan (Akdoğan, 2008: 7) ve ısı ve ışık biçiminde ortaya çıkan güçtür. Üretilemeyen, ancak mevcut bir formdan diğerine dönüştürülebilen enerji, Yunanca kökenli bir sözcük olup *"en"* iç, *"ergon"* iş kelimelerinden oluşmuştur (Gooch, 2011: 268). Dolayısıyla enerji, içeride oluşan bir *"içiş"*tir. Sözcük, daha sonraları sosyal bir nitelik kazanmış, iş üretme becerisi, dinamizm, kuvvet, kudret, etkinlikle eş anlamda kullanılmaya başlanmıştır (Demirbaş, 2002: 1). Diğer bir deyişle enerji sözcüğü, Yunanca *"energia"* sözcüğünden alınma olup *"etkiyenkuvvet"* anlamında kullanılmaya başlanmıştır (Özdamar, 2000: 133).

Kaynak kelimesi, Türk Dil Kurumu güncel sözlüğünde *"Herhangi bir enerjinin oluşup çevreye yayıldığı yer"* olarak tanımlanmaktadır (http: 1). Tanımlamadan anlaşıldığı üzere belirli bir enerjinin oluşabilmesi için bir kaynağa ihtiyaç olmaktadır.Bu bağlamda enerji kaynakları, iş yaptırma yeteneğinin yerine getirilebilmesindeki yeteneğin harekete geçirilmesine kaynaklık eden varlıklar olarak tanımlanmaktadır.

3.2.Enerji Kaynaklarının Sınıflandırılması

Enerji kaynakları birçok şekilde sınıflandırılabilmektedir. Enerji kaynaklarını madde haline göre, güneş temeline göre, depo edilebilirliğine göre, yenilenebilirliğine göre,

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[*] Göl ve haznelerin, su hayatını besleyecek azot ve fosfor gibi elementlerle zenginleşerek kalitesinin bozulması olayına ötrofikasyon adı verilir.

dönüştürülebilirliğine göre, kullanılabilirliğine göre gibi başlıklar altında sınıflandırabilmek mümkün olmaktadır. Ayrıca enerji kaynaklarını enerjinin sağlandığı kaynaklar, kullanma yer ve amaçlarına göre, bazı ölçütler göz önüne alınarak iş görme bakımından, orijin bakımından, elde edilme biçimine göre, ticari olan ve ticari olmayan enerji kaynakları, devamlılığına göre enerji kaynakları olarak sınıflandırmak mümkün olmaktadır.

Enerji kaynaklarına ilişkin bir diğer sınıflandırma ekosisteme verdikleri zararlara göre yapılmıştır. Buna göre enerji kaynakları kirli ve temiz enerji kaynakları olmak üzere sınıflandırılmıştır (Uğurlu, 2009: 151). Bu sınıflandırılmanın kabul edilebilirliğinin güçlü olması incelenen konu açısından önem taşımakta ve enerji kaynaklarının kullanabilirliklerinin etkilerinin anlaşılmasında kolaylık sağlamaktadır. Daha açık bir deyişle, yenilenebilen enerji kaynaklarının bir kısmının kirletici etkiye sahip olması bu sınıflandırmayı gerekli kılan önemli unsurlardandır.

3.2.1.Temiz Enerji Kaynakları

Bu sınıflandırma içerisinde incelenebilecek olan enerji kaynakları genel olarak yenilenebilir enerji kaynakları olarak adlandırılmakta fakat tamamı temiz enerji kaynakları arasında tanımlanamamaktadır. Doğanın kaynakları olarak tanımlanan yenilenebilir enerji kaynakları, doğal kaynaklardan elde edilebilen ve sürekli olarak kendini yenileyebilen enerji kaynaklarıdır (Khalil, 2012: 64), ve dünya var oldukça tükenmeyecek olan kaynaklar olarak da adlandırılmaktadır. Doğadan gelen fakat doğa olayları dâhilinde de enerji üretimine kaynaklık edebilecek olan yenilenebilir enerji kaynakları birçok şekilde karşımıza çıkmaktadır ki güneş enerjisi yenilenebilir enerji kaynaklarının en önemlilerinden bir tanesidir.

Kaynakların tamamının doğadan gelmesi ve kısa vadede tükenmez olması bu sınıf kaynakları önemli kılarken tamamının temiz enerji kaynakları olarak görülmesi önemli olmalarına karşılık kabul edilebilir değildir. Kaynakların yenilenebilir olması ve doğadan gelmesi temiz olması anlamına gelmemekte ve nükleer enerji su enerjisi ile birlikte bu sınıf kaynakların tamamının temiz olmadığının istisnai örnekleri arasında yer almaktadır. Bu bağlamda temiz enerji kaynaklarını çevreye etkisinin olumlu yönde olduğunu ve güneş, termal, hidrojen ve rüzgâr enerjisi gibi enerji kaynakları temiz enerji kaynaklarından bazılarıdır.

3.2.2.Kirli Enerji Kaynakları ve Çevresel Etkileri

Ekosisteme verdikleri zararlara göre yapılan enerji kaynaklarının sınıflandırılmasındaki bir diğer küme kirli enerji kaynaklarıdır. Çoğunluğunu yenilenemeyen ve fosil enerji kaynakları olarak da adlandırılan kaynakların oluşturduğu bu kümenin içerisinde yenilenebilir enerji kaynakları da yer almaktadır. Büyük barajlı su gücü, bu sınıflandırmada yer alan yenilenebilir enerji kaynaklarındandır. Diğer kirli enerji kaynakları ise, kömür, petrol, nükleer ve doğal gazdır. Küresel anlamda tüketimi en fazla olan enerji kaynakları bu sınıflandırmada yer almakta ve zararları her geçen gün artmaktadır.

3.2.3.Kirli Enerji Kaynakları ve Çevresel Etkileri

Teknolojik gelişmeler, dünya nüfusunda yaşanan artış ve dolayısıyla enerji tüketiminde gözlemlenen artışlar çevre başta olmak üzere birçok alanda olumsuz etkilere neden olmaktadır. Söz konusu bu tehditler doğrudan olarak doğa ve insan yaşamını tehdit etmektedir (Omer, 2008: 2273). Bu tehdit açıkça bilinmekte ve insanlığın davranışlarının temel olarak tehdidin kaynağını oluşturduğu da her ortamda dile getirilmektedir. Genel anlamda çevre kirliliği başta olmak üzere birçok alanda çevre sorununa neden olabilen ve insan temelli olarak bilinen bu sorunlar birçok nedenden kaynaklanmaktadır fakat enerji kaynaklarının kullanımı sorunların temel nedenlerinin başında yer almaktadır.

Enerji kaynaklarının kullanımı ve insan davranışlarının neden olduğu çevresel sorunlar sadece ozon tabakasında yaşanan değişimlerden ibaret değildir (Omer, 2008: 2275). Emisyon salınımlarında yaşanan artışlar, hava kirlilikleri, ormanların yok olması, insan yaşamındaki gözlenen değişimler, temiz kaynakların kirlenmesi, dünyanın yaşanabilir özelliğinin yok olması enerji kaynaklarının neden olduğu çevresel sorunların önemlilerindendir (Omer, 2008: 2275). Sözü edilen çevre sorunları önemli bir kesimi etkileyebileceği konusu sorunlarla birlikte endişe yaratan unsurlar arasında yer alırken, enerji temelli bakıldığında gelişmiş endüstriyel ekonomiler bu durumun sorumlusu gösterilmekteyken, fakir toplumlar, kadın ve çocuklar bu enerji kaynaklı çevre sorunlarından öncelikli olarak etkilenecek kesimler olarak gösterilmektedir. Enerji temelli meydana gelen ve gelebilecek olası felaket senaryolarının etkileyeceği taraflarının etkinin boyutlarıyla anlaşılabilmesi için söz konusu enerji kaynaklarının etkilerine değinmekte yarar vardır.

3.2.4.Kirletici Enerji Kaynakları ve Çevresel Etkileri

İnsanoğlunun uygarlığın nimetlerinden yararlanabilmesini sağlayan temel öğe de enerjidir. Teknoloji ilerledikçe enerjiye daha da bağımlı hale gelmektedir. Petrol, kömür vb. başkalaşıma uğramış bitkisel artıklardır ve bunlardaki enerji kullanılarak binalar ısıtılmakta, otomobiller çalıştırılmakta gereğinde elektrik enerjisi elde edilmektedir. Ancak fosil yakıt kaynakları sınırlıdır. Üstelik fosil yakıtların yanmalarına bağlı olarak önemli çevre sorunları ortaya çıkmaktadır (Güler ve Çobanoğlu, 1997: 15).

3.2.4.1.Petrol ve Çevresel Etkileri

Petrol kendine has bir kokusu olan, 0,80gr/cm3 ile 0,95gr/cm3 arası değişen yoğunlukta, çok koyu renkli ve hidrokarbonlardan meydana gelen rafine edilmemiş tabii mineral yağ olarak tanımlanmaktadır (Önertürk, 1983: 14, Aktaran: Yüce, 2006: 54). Kimyasal yönden petrol oldukça karmaşık bir hidrokarbon karılımı olup nitrojen, oksijen ve sülfür birleşiminden oluşmaktadır (Doyuran, 2005: 62). Rafine edilmiş petrolden ayırt etmek için ham petrol diye isimlendirilen sıvı petrol, ticari açıdan en önemli olanıdır. Ham petrol başlıca sıvı hidrokarbonatlarla, değişen oranlarda çözünülmüş gazlardan, katranlardan ve katkı maddelerinden oluşmaktadır (Devlet Planlama Teşkilatı (DPT), 2001: 4, Aktaran: Doyuran, 2005: 62). Siyah ve koyu yeşil renkte görünümü ve içermiş olduğu çeşitli maddeler nedeniyle pis kokulu olan petrol, adını ilk bulunuşunda kayalar arası sızıntı yağları olması sebebiyle Latince *"Petra (Kaya)" ve "Oleum (Yağ)"* kelimelerinden almaktadır. Petrolün ana bileşenleri hidrojen ve karbon olması dolayısıyla "hidrokarbon" olarak adlandırılmaktadır. Petrol kavramı ayrıca, hem birincil(ham) hem de ikincil(rafine edilmiş) ürünleri içermektedir.

Oluştuktan sonra milyonlarca yıl korunabilen petrol, 500 milyon yıllık bir jeolojik zaman diliminde meydan gelir. Petrol, denizde ve nadiren karasal çökeltilerin içerisinde yer almaktadır (Acar vd, 2007: 12).

Temel sanayi sektörü girdisi olan petrol yaşamımızda birçok alanda kullanılmaktadır. Günümüzde petrolden çok fazla ürün elde edilmektedir. Ulaşım ve sanayi sektörü başta olmak üzere tarım ve kozmetik sektöründen gıda sektörüne birçok alanda kullanılan petrolün öncelikle işlenmesi gerekmektedir. Ham petrolün çıkarılması ve işlenmesi çok maliyetli ve zahmetli bir süreçtir. Yapılacak olan birçok arama çalışmasının ardından yapılacak olan sondaj işlemiyle ulaşılacak olan rezervlerden alınacak numuneler sonucunda petrolün çıkarılmaya değer olup olmadığının yapılması sonucunda karar verilmesi, başka bir deyişle, fayda-maliyet analizinin olumlu olması sonucunda kurulacak tesislerle çıkarımın başlaması yeterli olmamaktadır. Çıkarılmış olan ham petrol rafinerilere gönderilerek arıtılmalı ve işlenmelidir. Ham petrolün rafinerilerde arıtılması ve işlenmesi sonucunda, ortalama olarak %43 benzin, %18 fueloil ve motorin, %11 LPG (sıvılaştırılmış petrol gazı, propan veya propan-bütan karışımı), %9 jet yakıtı, %5 asfalt ve %14 diğer ürünler elde edilmektedir (Çetingöz, 2006: 30). Yapılan işlemlerin ardından işlenmiş petrol, boru hatları ve tankerler yardımıyla nakliye edilip taşınarak kullanıma sunulmaktadır. Dünya petrolünün de yaklaşık %40'ı petrol boru hatları ile taşınmakta ve geri kalan kısmı ise büyük tankerler yardımıyla deniz yoluyla ve yine tankerler yardımıyla kara yoluyla taşınmaktadır (Çetingöz, 2006: 30).

Petrol, tartışmasız olarak insanlık için ihtiyaçtan öte bağımlılıktır. Fakat bütün enerji kaynakları gibi yararlarının yanında zararları da vardır ve bu zararlı yönler, petrolün çıkarılması, iletilmesi ve depolanması süreçlerinde bir takım ciddi önlemler alınmasını gerektiren olumsuz etkilerdir. Petrol yanıcı ve organik bir kirletici olması nedeniyle ilk olarak çevre kirliliğine ve biyolojik dengenin bozulmasında etkin bir rol oynamaktadır. Petrolün yol açmış olduğu ve günümüzde de yaygın olarak görülen çevre kirliliği özellikle deniz üstüne kurulan petrol platformlarından ya da petrolün deniz yoluyla taşınması sırasındaki kazaların neden olduğu deniz kirliliğidir (Uğurlu, 2009: 155). 2010 yılında Meksika Körfezi'nde yaşanan çevre felaketi en güncel örneklerin başında gelmektedir. Körfezdeki petrol platformunun çökmesi sonucunda önemli miktarda petrolün denize akmaya başlamasıyla birlikte, denize yayılan petrol bir hafta gibi kısa bir süre içerisinde 900 km2'lik bir alana yayılmış, 85 gün sonra durdurulabilen sızıntı toplamda 4 milyon varil petrolün suya akmasıyla sonuçlanarak büyük bir çevre felaketine sebebiyet vermiştir.

3.2.4.2.Kömür ve Çevresel Etkileri

Türk Dil Kurumu'nun Büyük Türkçe Sözlüğüne göre kömür, karbonlu maddelerin kapalı ve havasız yerlerde için için yanmasından veya çok uzun süre derin toprak katmanları altında kalıp birtakım kimyasal değişmelere uğramasından oluşan, siyah renkli, bitkisel kaynaklı, içinde yüksek oranda karbon bulunan katı yakıt olarak tanımlanmaktadır (http: 10). Kömür çoğunlukla karbon, hidrojen ve oksijenden oluşan az miktarda kükürt ve nitrojen içeren, kimyasal ve fiziksel olarak farklı yapıya sahip olan maden ve kayaçtır ve homojen yapıya sahip olmamakla birlikte, kompakt, çoğunlukla lignoselülozik bitki parçalarından meydana gelmektedir (Türkiye Kömür İşletmeleri (TKİ), 2010: 1). Genellikle bataklıklarda oluşan ve siyah ya da kahverengi tonlarında yanıcı fosil yakıt olarak adlandırılan kömürün oluşumu için çok uzun sürelerin geçmesi gerekmektedir.

Kömürün yanıcı bir madde olarak bilinmesi milattan öncesine kadar dayanmaktadır. M.Ö. 320'de ilk çağ bilginlerinden Aristo'nun eserlerinde maden kömürüne değinmesi, Aristo'nun öğrencisi Theophrasto'nun kömürden yanan taş olarak bahsetmesi, Plinius'un bakır filizini eritmek için ateşte kızıllaşan taşlar olarak eserlerinde yazması, kömürün ilk çağlardan beri bilindiğine işarettir (Ersin: 2006: 23).

Dünyamız çok geniş kömür rezervlerine sahiptir. Dünya toplam kömür rezervi 826 milyar ton olup, en büyük rezerv miktarı 238,3 milyar ton ile ABD'ye aittir (Türkiye Kömür İşletmeleri (TKİ), 2010: 4). Bu ülkeyi, 157 milyar ton ile Rusya, 114,5 milyar ton ile Çin, 76,2 milyar ton ile Avustralya, 58,6 milyar ton ile Hindistan, 33,9 milyar ton ile Ukrayna, 31,3 milyar ton ile Kazakistan ve 30,4 milyar ton ile Güney Afrika izlemektedir (Türkiye Kömür İşletmeleri (TKİ), 2010: 4). Bunların dışındaki ülkelerde ise toplam 85,8 milyar ton kömür rezervi bulunmaktadır (Türkiye Kömür İşletmeleri (TKİ), 2010: 4). Ayrıca, dünya enerji üretiminde %40'lık bir paya sahip olan kömür enerjisinin 2020 yılında %48'e yükseleceği de tahmin edilebilmektedir (Karaman, 2006: 4).

Kömür, termik santralde, elektrik enerjisi üretiminde, ulaştırmada, konutlarda, ısınma amaçlarıyla, sanayide, demir-çelik ve çimento imalatında, endüstriyel süreçlerde buhar üretmek amacı ile kullanılmaktadır. Birçok ülkede elektrik üretiminin önemli bir bölümü kömürden elde edilmektedir. Kömür kullanımıyla elektrik enerjisi üreten termik santrallerin günümüz atmosfere verdikleri karbondioksit gazı salınımı ve kül atıkları dolayısıyla insan sağlığı ve çevre üzerinde zararları bulunmaktadır. Örneğin termik santrallere yakın yerlerde birçok solunum yolu hastalığı vakaları görülmektedir. Ayrıca toprağa karışan atıklar erozyona neden olmakta ve bitki örtüsüne de zarar vermekle birlikte kömürün yakılması sonucu oluşan gazın asit yağmurlarına dönüşmesi yeraltı ve yer üstü suları da zarar görmektedir. Zararlı etkileri nedeniyle son zamanlarda termik santrallerin geliştirilmesi amacıyla yeni yöntemler aranmakta ve kirletici gazların kaynakta tutulması ile çevreye verilen zararlar da önlenmeye çalışılmaktadır.

3.2.4.3.Nükleer Enerji ve Çevresel Etkileri

20. yüzyılın en önemli buluşlarının başında yer aldığı iddia edilen nükleer enerji ise, kısaca; bir atom çekirdeğinin bölünmesi (fisyon) veya radyoaktif bozunumu sonrası, kütlelerin toplamı farkından dolayı açığa çıkan bir enerji olarak ifade edilmektedir (Gülay, 2008: 10). Tepkimeler sırasında atom taneciklerindeki bölünme veya birleşme olayları sırasında açığa çıkan enerjiye nükleer enerji denmektedir.

Nükleer enerji konusunda yapılan çalışmalar sonucunda tesadüfen keşfedilen radyoaktivite çalışmalarından 15 yıl sonra 1911 yılında Britanyalı bilim adamı Ernest Rutherford, radyumun çürümesiyle ilgili elde edilen ısı enerjisine dikkat çekmiştir (Bodansky, 2005: 22). Elde edilen ısı enerjisinin, diğer kimyasal tepkimeler sonucu elde edilen ısı enerjisinden çok daha farklı ve çok daha fazla olduğuna vurgu yapılarak, elde edilmiş olan ısı enerjisinin atomların parçalanması sonucu olduğunu belirtmiştir (Bodansky, 2005: 22). Daha sonrasında yeni fark edilmiş olan bu yeni enerji kaynağına fazla eğilim göstermeyen Rutherford'un çalışmaları 1938 yılında fisyon reaksiyonunun keşfi ile yeni boyutlara taşınmaya başlamıştır (Bodansky, 2005: 22). 19.yüzyılın sonlarında radyoaktivitenin ve radyoaktif atomların keşfinden sonra, bilim çevrelerinde bu yeni keşfe yönelik büyük ilgi ve merak oluşmuştur (Ağaroğlu, 2008: 31). 1934 yılında, İtalyan fizikçi Enrico Fermi'nin, nötronların birçok atom türünü parçalara ayırdığını ve bu nötronların uranyum maddesiyle tepkimeye girdiğinde beklenen elementlerden daha fazla hafif elementin ortaya çıktığını keşfetmesi, 20. Yüzyılın yeni enerji kaynağının temelini atan olay olmuştur (Gülay, 2008: 11).

2 Aralık 1942 tarihinde Enrico Fermi, O. Hahn, F. Strassman, L. Meitner, O Frisch, N. Bohr ve L. Szilard sekiz yıllık çalışmaları sonucunda Chicago Üniversitesinde kurdukları uranyum düzeneğinde zincirleme tepkimeyi gerçekleştirip, nükleer enerjinin büyük miktarlarda, sürekli ve kontrollü bir şekilde ortaya çıkarılabileceğini göstermeleriyle nükleer çağı başlatmışlardır (Ağaroğlu, 2008: 32). Fakat nükleer çağın başlangıcının ardından, ABD tarafından "Manhattan Projesi" adı altında geliştirilen "Little Boy" atom bombasının Hiroşima'ya, "Fat Boy" atom bombasının da Nagasaki şehrine atılması çok büyük boyutta felakete yol açmıştır. Böylece dönemin teknolojisinde önemli bir gelişme olan nükleer enerji kullanımı, daha insanlık yararına kullanılamadan, 2.Dünya Savaşı sırasında insanlık zararına kullanılmıştır.

Tarihin iki kez tanıklık etmiş olduğu nükleer enerjinin insanlık zararına kullanımının 1962 Küba Krizi'yle tekrarlanabileceğini gören uluslararası kamuoyu nükleer enerji kavramına tepkiyle yaklaşmaya başlamasının kısa bir süre sonrasında yaşanan nükleer santral kazaları nedeniyle nükleer enerji kullanımına karşı çıkmaya başlamıştır. Nitekim "Three Miles Island" nükleer santrali kazası, uluslararası kamuoyunun güvenlik konusunda yaşamış olduğu şüpheleri doğrular nitelikte olmuştur. İnsan hatasından kaynaklanmış olan “Three Miles Island” kazası sırasında çevrede radyasyon etkisine maruz kalmış olan kimselerin olmamasına rağmen, tarihte insan ciddi nükleer kaza olarak adlandırılan olay sonrasında, 1986 yılında yaşanmış olan “Çernobil” faciası, nükleer santrallerin güvenliğine olan inancı daha da zayıflatmıştır. Çernobil nükleer santrali kazasından 25 yıl sonra (Schreurs, 2012: 30). 11 Mart 2011’de Japonya’da yaşanan Fukushima nükleer santrali kazası, halen daha nükleer enerjinin tamamen güvenli olmadığını göstermiştir. Yaşanan bu gelişmelere karşın 400’ün nükleer santral günümüzde faaliyet göstermekte ve halen daha birçok nükleer santral inşası devam etmektedir. Ayrıca 31 ülke de nükleer santral işletmeye devam etmektedir (Gülay, 2008: 13).

Nükleer enerjiden tıp alanı başta olmak üzere birçok alanda yararlanılmasına karşın, nükleer santraller yardımıyla elektrik enerjisi üretiminde yararlanılması ülkeler açısından daha büyük önem taşımaktadır. Nükleer enerjiden yararlanılarak elektrik enerjisi elde edebilmek için nükleer santrallere ihtiyaç bulunmaktadır. Nükleer santrallerde zenginleştirme işlemi yapılır ve bir nükleer santralin çalışabilmesi için zenginleştirilmiş uranyuma ihtiyaç vardır (Börnstein, 2005: 4).

Nükleer enerji sanılanın aksine ucuz bir enerji kaynağı değildir (Uğurlu, 2009: 171). Nükleer enerjiden yararlanılabilmesi için kurulan santraller ve bu santrallerin faaliyet sürecinde çok büyük yatırımların yapılması gerekmektedir. Örneğin ABD gibi çok yüksek teknolojiye sahip ülkelerde ortalama elektrik enerjisi maliyeti kWh başına 2,5 sentken, ABD nükleer enerji santrallerinde ortalama elektrik enerjisi maliyeti ortalama 7,5 senttir ve 2003 yılında yapılan araştırmaya göre bu rakamlar kWh başına 11sent civarındadır (Shrader-Frechette, 2008: 14).

Nükleer santrallerin faaliyet sürecinde karşımıza çıkacak olan diğer bir maliyet ise nükleer atıkların saklanması sorunu ve nükleer atıkların saklanmasındaki maliyet sorunudur. Nükleer enerjiden elektrik enerjisi üretimi karbon dioksit salınım açısından daha kullanışlı olduğunu söyleyebilmek mümkündür fakat atıksız bir enerji kaynağı olduğunu söyleyebilmek mümkün değildir (Macfarlane, 2011: 30). Bu nedenle, tam anlamıyla radyoaktif olan bu atıklar tamamen güvenli bir şekilde saklanabilir olmalıdır ve ülkelerin nükleer santrallerin oluşum maliyetlerine atık saklama ve atık yönetimi gibi giderleri de hesaplarına katmaları gerekmektedir. Atık yönetimi ve bu yönetim sırasında oluşacak masraflar üretici firma yerine işletmecilerin sorumluluğunda olması nedeniyle (Hore-Lacy, 2011: 170), bu durum öncelikli olarak göz önüne alınmalıdır. Ayrıca, nükleer santrallerin atık problemi sadece santralin aktif olarak faaliyet göstermiş olduğu zaman dilimiyle sınırlı olmadığı da göz önünde bulundurulmalıdır. Çünkü Türkiye Atom Enerjisi Ajansı’nın vermiş olduğu rakamlara göre bir nükleer santralin ömrü 60 yıl kadardır.

İnsanlık yararına kullanılmasına karşın, Birleşmiş Milletler Güvenlik Konseyi’nin 5 daimi üyesinin nükleer silahlara sahip olduğu düşünüldüğünde (Nelson, 2010: 12), bu dehşet verici silahların her an insanlık zararına kullanılabileceği unutulmamalıdır ve nükleer enerji silah olarak kullanılmanın aksine, insanlık yararına kullanılacak biçimde bir denge üzerine oturtularak kullanılmalıdır (Abbott, 2012: 24).

3.2.4.4.Hidroelektrik Enerjisi ve Çevresel Etkileri

Hidroelektrik (hidrolik) enerjisi, hareket halindeki suların sağladığı güç anlamına gelmektedir (Safi, 2007: 22). Asırlardan bu yana suyun kinetik enerjisinden bir enerji kaynağı olarak faydalanılmaktadır ki (Tatar, 2007: 85) eski Mısır uygarlığı olan Babiller’in suyun kinetik enerjisinden yararlanarak tarlalarını suladığı ve bu enerji yardımıyla tahıllarını öğüttükleri bilinmektedir (Gatte, Kadhim ve Rasheed, 2011: 185). Tarihte ilkel yöntemlerle faydalanılan su enerjisi için 20.yüzyıl yeni bir çağ anlamına gelmektedir (Gatte, Kadhim ve Rasheed, 2011: 185).

Günümüzde elektrik üretimi için önemli bir yenilenebilir enerji kaynağı olan su enerjisinin kullanımı (IEA, 2010: 127), teknolojinin gelişimiyle birlikte başta Avrupa'da olmak üzere tüm dünyada her geçen gün artmaktadır. Üretim kapasitesi ve enerji verimliliği açısından kullanışlı olan su enerjisi, enerjisi üretiminde, yenilenebilir enerji kaynakları arasında öncelikli olarak yerini almıştır (Tatar, 2007: 85). Ve 2008 yılında dünya enerji üretiminin %15'ine (Koch, Prasch, Bach, Mauser, Appel ve Weber, 2011: 1509) katkıda bulunurken rakamlar günümüzde %20 (Özbay ve Gençoğlu, 2011: 119) seviyelerine kadar yükselmiştir.

Hidroelektrik enerjisi, doğal veya yapay baraj gölleri önüne ve su düşüş düzeyine göre bir hayli alçakta kurulmuş olan hidroelektrik santralleri yoluyla üretilmektedir (Safi, 2007: 22). Belli bir düşüş düzeyiyle cebri boru ile türbine gelen suyun potansiyel enerjisi türbinde kinetik enerjiye, türbine bağlı jeneratörde ise; elektrik enerjisine dönüşmektedir (Safi, 2007: 23). Elde edilen elektrik enerjisinin verimi günden güne artmaktadır. Hidroelektrik santrallerinin ilk kullanıldığı yıllarda elektrik elde etme oranı %9 civarındayken bu oran günümüzde %90'lara kadar ilerlemiştir. Gelişen teknoloji ve artan çevre bilincindeki gelişimle birlikte yenilenebilir enerji kaynaklarına yönelim bu gelişmelerin en temel nedenidir.

Hidroelektrik enerjisi yenilenebilir ve sürdürülebilir bir kaynaktır fakat bu durumun geçerli olabilmesi için alanında uzman olan elektrik mühendislerinin, mimarların, inşaat mühendislerinin, işletmecilerin hidroelektrik santrallerinin tasarımı, inşaatı ve işleve geçirildiği süreç sonrasında da bu süreçleri yönetmesi gerekmektedir. Hidroelektrik santrallerin de yapımları sırasında ve su tutma başladıktan sonra bir takım olumsuzlukları bulunmaktadır. Barajların yapımı sırasında çok fazla hafriyat meydana gelmekte ve bu durum hafriyatın depolanacağı alanların tespitinde problem oluşturmaktadır. Baraj gölünün kaplayacağı alan çok büyük olduğundan dolayı bu alan içerisinde kalacak olan verimli arazi parçaları, bitki örtüsü gibi doğal yerler yanında yerleşim birimlerinin varlığı ve bu yerleşim birimlerinde yasayan insanların tekrardan iskân edilmesi problemleri de önem arz etmektedir (Tatar, 2007: 89). Bu duruma ek olarak plansız hesaplamalar dolayısıyla ülkemizde de birçok defa karşılaşıldığı gibi arkeolojik değer olan yapıların sular altında kalması da hidroelektrik santrallerin olumsuz yönlerine ek örnek olarak gösterilmelidir.

Günümüzde hidroelektrik santrallerin olumsuz yönlerinin giderilmesi için çalışmalar yapılmakta ve bu çalışmalar bazı yöntemler kullanılarak en aza indirilmeye çalışılmaktadır (Uğurlu, 2009: 200). Hidroelektrik santrallerin gerek maliyet gerekse çevreye vermiş olduğu ya da vermiş olabileceği zararların önüne geçilmesini sağlayan yeni bir yaklaşım, küçük elektrik santrallerinin kurulmaya başlamasıdır. 1MW kurulu güçten aşağı olan hidroelektrik yapılara küçük hidroelektrik santrali (KHES) adı verilmektedir (Uğurlu, 2009: 201). Küçük hidroelektrik santralleri suyun yüksekten düşürülerek ve baraj inşaatı gerektirmeden küçük akarsulara dahi kurulabilen sistemlerdir.

Kırsal kesimlere elektrik götürülmesi açısından hidroelektrik santrallere göre daha avantajlı durumda olan küçük hidroelektrik santralleri ayrıca projelendirme yatırımları ve çevre etkiler düşünüldüğünde daha çekici olarak görülmekte ve büyük yatırımlara gereksinim duyulmadığı içinde bölgesel küçük paralarla inşa edilebilmektedir (Uğurlu, 2009: 200). Ayrıca geniş baraj göllerine sahip olmadıkları için, hidroelektrik santralleri gibi buharlaşmaya bağlı iklim değişikliğine, kentlerin ve tarım alanlarının sular altında kalmasına ve buna bağlı zorunlu göçe neden olmazlar (Uğurlu, 2009: 201).

SONUÇ

Enerji ve dolayısıyla enerji kaynakları insan yaşamının temel ihtiyaçlarındandır. Kas gücüyle başlayan enerji kaynaklarının kullanımı devamındaki süreçte fosil yakıtların kullanımına ve yenilenebilir enerji kaynaklarının kullanımına kadar geniş yelpazeye yayılmıştır. İnsanlık için gelişim olarak nitelendirilebilen enerji kaynaklarının kullanımı şüphesiz birtakım olumlu sonuçlar doğurmuştur fakat tersi durum olarak sonuçlara da zemin hazırlamıştır. Enerji güvenliği ve enerji güvenliğinin genişleyen kapsamında incelenen çevre güvenliği gözlemlenen olumsuz sonuçlardan genel olarak bazılarıdır.

Enerji kaynaklarının kullanımındaki genişleme öncelikli olarak insanlığın gelişimi, teknolojik gelişim, artan nüfus gibi birtakım nedenlere dayandırılmaktadır. Bu nedenler tüketimin artmasına da zemin hazırlayan gelişmelerin başında yer almaktadır. Bu durum enerji güvenliğini ve çevre güvenliğini tehdit eden hale dönüşmesi nedeniyle önemli sorunlar arasında yer almaktadır. 1973 petrol krizi sonrasında enerji kaynaklarının diplomatik yaptırım aracı bir silah olarak kullanılması enerji güvenliğiyle ilgili tehditken, kullanılan kaynakların çevreye olan zararları da çevre güvenliğiyle ilgili olan tehditlerin başında yer almaktadır. Bu tehdit algılamasından öte kanıtlanmış tehdit olarak tanımlanmalıdır.

Günümüz enerji kaynakları temelli birçok küresel tehditle karşı karşıyadır. Fakat bu tehdit hayati önem taşımasına karşılık enerji arz güvenliğinden kaynaklı tehditler kadar çözüm bulunabilir niteliğe sahip değildir. Enerji kaynaklarının dünya coğrafyasına eşit dağılmaması ve artan enerji tüketimiyle birlikte önemli bir diplomatik silah haline dönüşen enerji kaynaklarının yarattığı enerji güvenliği tehditleri önlem alınabilir niteliktedir. Alternatif tedarikçiler ve kaynak çeşitliliği gibi yöntemler bu önlemlerden bazılarıdır. Fakat çevre konusuna gelindiğinde durum önüne geçilebilecek bir hal almamaktadır.

Günümüzde küresel nitelikte yaşanacak olan güvenlik endişesi enerji güvenliği sorunlarıyla sınırlı değildir. Çünkü enerji kullanımındaki artış sadece tedarik konusunda güvenlik endişesine neden olmamakta ve daha önemlisi yaşanabilecek bir çevreyi olumsuz etkilemektedir. Kirlilik başta olmak üzere birçok çevre sorunu günümüz tehditlerinin başında yer almakta ve küresel ısınma sorunu, bu tehdidin yaşanabileceğini bizlere kanıtlamaktadır. Birçok nedenle birlikte bu sorunun temel kaynağı insan temelli olarak bilinmekte ve bizlerin enerji kullanımındaki cehaletimiz sorunu pekiştirmektedir. Çünkü enerji kaynaklarının özellikle kirletici enerji kaynaklarının kullanılmasının sonuçları insan temelli bu sonuçların nedenidir. Dünya yaşanabilir olmaktan insan etkisiyle birlikte uzaklaşmaktadır.

Fosil enerji kaynakları başta olmak üzere birçok enerji kaynağı çevresel olarak önemli ölçüde olumsuz etkilere neden olmaktadır. Bu sorunlar kaynakların taşınması, işlenmesi ve üretilmesi sırasında yaşanacak sorunlarla daha da ciddi boyutlara ulaşmaktadır. Meksika Körfezi kazası, Çernobil vb. durumlar bu sorunların örnekleri arasında yer almaktadır. Doğal gaz açısından bakıldığında da temiz enerji kaynağı olduğu tartışılmamaktadır. Fakat çevresel etkilerinin de olmadığı savunulamamaktadır. Bu kaynak daha çok enerji arz güvenliği temelinde karşımıza çıkmakta fakat çevresel güvenlik açısından bu denli önem taşımamaktadır. Bu durum önemli ölçüde yanlışlıktan öte bir durum olarak algılanmamakta ve insanlığın yaşamı için enerji kaynaklarından çok yaşanabilir bir çevreye ihtiyaç duymaktadır. Enerji kaynaklarının kullanımı bizlere kirlilikten öte hayati bir fayda sağlamamaktadır. Gelişen teknolojiyle birlikte artan enerji tüketimi ve neden olduğu çevre sorunları incelendiğinde yaşanan artış bu durumun göstergelerindendir. Bizler için yaşam enerji kaynaklarından önce gelmekte ve çevrenin insanlığın devam şartı olduğu unutulmamalıdır.

Sonuç olarak enerji kaynaklarının kullanımı ve bu tüketim artışının çevreye olumsuz ve geri dönülemez etkiler yarattığı bir açıktır. Bu durum ciddi bir sorun olarak algılanmakta ve algılanmalıdır. İnsan yaşamının bugünden ibaret olmadığı da algılamalarla birlikte unutulmamalıdır. İnsanoğlunun enerji kaynaklarının kullanımıyla birlikte yarattığı çevresel etkiler geri dönülmez olarak nitelendirilebilmekte fakat önlenemez olarak görülmemektedir. Bu önleme çalışmaları birçok şekilde mümkün olabilmekte ve küresel işbirliğinin tek görüşte toplanması bu mümkün olabilmeyi sağlayabilecektir.

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TÜRKİYE CUMHURİYETİ GENELKURMAY BAŞKANLIĞI HARP AKADEMİLERİ KOMUTANLIĞI STRATEJİK ARAŞTIRMALAR ENSTİTÜSÜ, (2009), Enerji Güvenliğinde Çözüm Arayışları, İstanbul: Harp Akademileri Basım Evi.

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ALTERNATİF ENERJİ KAYNAĞI OLARAK RÜZGÂR ENERJİSİ VE UYGULAMALARI

AS AN ALTERNATIVE ENERGY SOURCES "WIND POWER AND APPLICATIONS"

Selma USLUSOY ŞENYURT
Tuğçe PEKDOĞAN

Özet

Global ölçekte yaşanan çevresel ve enerjiye dayalı sorunlar, dünya nüfusundaki artış ve fosil yakıtların gelecekte tükenecek olmaları, alternatif enerji kaynakları arayışının ana temelidir. Pek çok ülkede, yaşanan bu sorunların çözümüne odaklı geliştirilen sürdürülebilir enerji politikaları, alternatif enerji kaynaklarının araştırma ve geliştirilmesi üzerindeki çalışmaların hızlanması ile sonuçlanmaktadır. Fosil yakıt kullanımına alternatif olması, sahip olduğu teknolojik kapasite, rüzgâr kullanımındaki yeni teknolojiler ve politik destekler, rüzgâr gücünün enerji üretim amaçlı kullanımını geliştirmekte ve yaygınlaştırmaktadır. İlk uygulama alanları, M.Ö. 5000'li yıllara dayanan ve 1970'lerde yaşanan enerji krizi ile birlikte alternatif enerji kaynağı olarak ele alınarak, günümüzde pek çok ülkede enerji sektörü haline gelmiştir.

Rüzgâr enerjisinden elektrik kazanımı için bu sektöre yapılan yatırım ve teşviklere bağlı olarak, rüzgâr türbinlerinin kullanım yöntemleri ve alanları gelişmektedir. İlk olarak kara parçalarında rüzgâr çiftlikleri olarak kurulan rüzgâr türbinleri, deniz üzerinde de(Alarge-offshore) kurularak enerji dönüşümü için alternatif çözümler sunmaktadır. Bunun yanı sıra rüzgar türbinleri, mimari yapıların alternatif enerji kullanım amacına yönelik olarak yapılara da entegre edilebilmektedir.

Çalışmanın amacı, rüzgârın enerji kaynağı olarak kullanım kapasitesinin ve günümüzdeki teknolojik gelişmelerin aktarılabilmesidir. Bu kapsamda rüzgâr enerjisinin önemi açıklanarak, rüzgârın enerji kaynağı olarak kullanılmasını sağlayan rüzgâr türbinlerinin farklı kullanım yöntemleri irdelenecektir. Rüzgâr enerjisinin kullanım yöntemleri olan rüzgâr çiftlikleri, deniz üzerinde kurulan sistemler ve yapılarda rüzgâr türbinlerinin kullanımı ele alınarak karşılaştırmalı olarak değerlendirilecektir.

Anahtar kelimeler: Alternatif enerji, Rüzgâr enerjisi, Rüzgâr türbinleri

Abstract

The problems which are related to environment and energy with globally scale, world population growth and fossil fuels becoming extinct in the near future that all these factors are based on investigation for alternative energy sources. In the most countries, sustainable energy policies have been developed that all these attempts have resulted in acceleration of research and development on the new alternative energy sources. Wind energy is one of renewable energy sources and it is also very important for electricity production. Being alternative to fossil fuels, having technological capacity and political supports, all of these factors make improve usage of wind energy to get electricity. The first applications of wind which dates back in B.C. 5000 years. With emerged energy crisis in 1970, then wind energy has become mainly energy sector in the lots of countries.

Wind turbine is used for getting energy from wind. Depending on investments on energy sector, using areas and methods for wind turbine applications are growing. Firstly, wind turbines have been founded as wind farms on the land and began to be established in the ocean. With establishing both on the lands and the oceans, wind turbines provide alternative solutions for transformation of the energy. Furthermore, it is integrated to architectural buildings to gain energy from wind. The aim of this study is to evaluate usage of wind turbines at wind farms (onshore), offshore and architectural buildings comparatively.

Key words: Alternative energy sources, wind energy, wind turbines

GİRİŞ

21. yüzyılda artmakta olan nüfus ve sanayileşmenin sonucu olarak mevcut kaynakların aşırı kullanılması, günden güne azalması, enerji talebi ve fosil yakıt rezervlerinin tükenmesi ile birlikte insanları farklı kaynak arayışına yönlendirmiş ve dünyada yenilenebilir enerji kaynakların kullanımını kaçınılmaz kılmıştır. Yeni dünya düzeninin getirisi olan yenilenebilir enerji kaynaklarının kullanımı tüm dünyanın geleceğini güvence altında tutmak için yaşamsal bir öneme sahiptir.

Yenilenebilir enerji kaynaklarını; güneş enerjisi, rüzgâr enerjisi, biokütle enerjisi , hidrojen ve hidrolik enerji, jeotermal enerji ve su enerjisi olarak sınıflandırmak mümkündür (Çukurçayır ve Sağır, 2007).Sürdürülebilir kalkınmanın bir parçası olarak yenilenebilir enerji kaynaklarında arasında en fazla bilinen ve hızlı bir ilerleme kaydeden enerji kaynakları güneş enerjisi ve rüzgâr enerjisidir (Savin, 2003). İnsanoğlunun ilk yararlandığı enerji kaynağı olarak bilinen rüzgâr enerjisi kaynağını güneşten almaktadır. Rüzgâr, güneşin yeryüzü ve atmosferi farklı derecelerde ısıtmasından dolayı oluşan basınç ve sıcaklık farkı sonucunda rüzgâr oluşur. Rüzgârın alçak basınç bölgesi ile yüksek basınç bölgesi arasında hareket etmesi sonucu bir hava akımı meydana gelir bu nedenledir ki rüzgâr enerjisi topografik yapıya ve mevsimsel şartlara göre farklılık gösterir bunun sonucu olarak da ülkelerin rüzgârdan enerji üretim potansiyeli farklı farklıdır (Kahraman vd., 2003).

Ülkelerin kendi potansiyelleri ölçüsünde yararlandığı rüzgâr enerjisi, çevre dostu olması dâhilinde ülkelerin dışa bağımlı olmalarını engelleme açısından büyük bir enerji sektörüdür. Yenilenebilir enerji kaynaklarının sınırsız kullanıma sahip olması açısından düşünüldüğünde rüzgâr enerjisinin kaynak çeşitliliğini artırmak amacıyla devletler tarafından teşvik edilmekte ve desteklenmektedir. Rüzgâr enerjisinin 2020 itibariyle dünya genelindeki elektrik tüketiminin %20’sini karşılaması hedeflenmekte ve bu yönde çalışmalar yapılmaktadır (Bayraç ., 2011).

1.Rüzgâr Enerjisinin Avantajları ve Dezavantajları

Rüzgâr enerjisi yenilenebilir enerji kaynakları içerisinde teknolojik olarak hızlı ilerleyen ve ticari olabilen enerji kaynağıdır.(Kanlı ve Denli, 2010) Diğer tüm alternatif enerji kaynakları gibi gerek kurulum, gerek işletim ve enerji dönüşümü evresinde avantaj ve dezavantajlara sahiptir.

Rüzgâr yerli, sürekli, çevre dostu ve yakıt maliyeti olmayan bir enerji çeşididir. Rüzgâr türbinlerinin çevreye olan en önemli katkısı, sera gazı emisyonu açısından çok düşük seviyelerde olmasıdır. Buna bağlı olarak enerji üretimi sürecinde fosil yakıtların tam tersine; zararlı gazlar, sera etkisi ve asit yağmurlarına sebep olmamaktadır. Bunun yanı sıra, kurulduğu bölge açısından istihdam ve bölgesel kalkınma sağlamakla beraber, başka ülkelere oluşan bağımlılığı ortadan kaldırır ve ekonomik, politik açıdan büyük ölçüde yarar sağlamaktadır.

Ancak, bütün bu avantajların yanında, arazi kullanım ve seçimi açısından istenilen her alanda kurulamaması, türbin kuruluş maliyetlerinin yüksek olması, kuş ölümlerine sebebiyet vermeleri de rüzgâr enerjisi santrallerinin dezavantajı olarak gösterilebilmektedir. Buna ek olarak rüzgâr türbinlerinin gürültü ve görüntü kirliliği yaptığı da tespit edilmektedir. Ancak türbin teknolojilerinin gelişmesiyle birlikte gürültü denetimi sağlanmakta olup mekanik gürültü, düşük hız soğutma fanlarının kullanılmasıyla, motor oturma yerine eklenilecek olan ses yalıtımı ve susturucularla giderilebilmesi olasıdır(Fıçıcı vd.,2007).

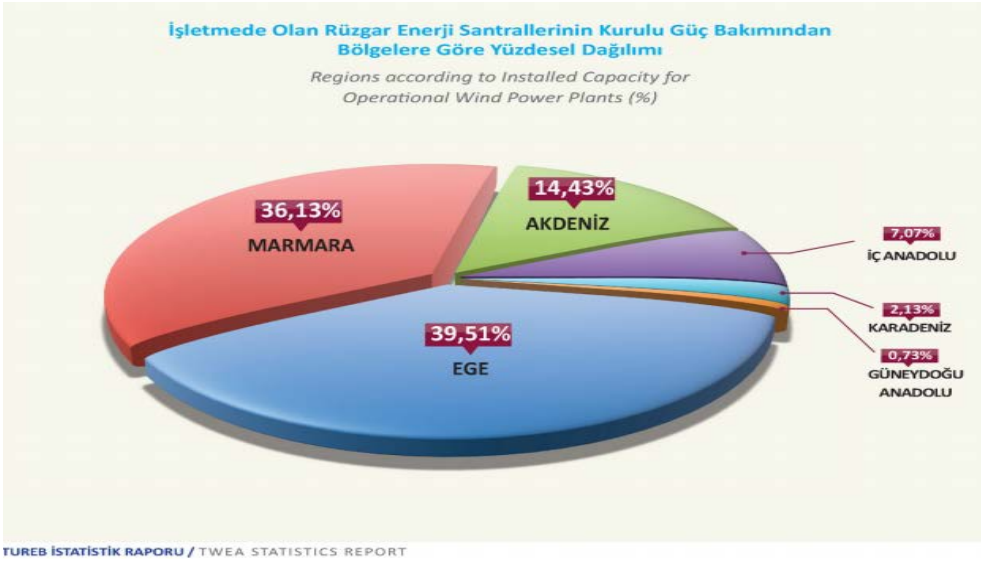
1.1. Dünyada Rüzgâr Enerjisi Kullanımı Ve Politikaları

Günümüzde dünya genelinde rüzgâr enerjisi kullanımı her geçen gün artmaktadır. Birçok ülkede rüzgâr enerjisi santrallerinin kurulumu ve kullanımı açısından doğrudan ve dolaylı olarak destekler sağlanmaktadır. Dünyada rüzgâr santrallerinin kurulu gücü açısından nümerik sonuçlara bakıldığında 1990 yılında 2160 MW iken 1994 yılında 3738 MW, 1995 yılında 4843 MW 1998 yılında 7500 MW a ulaştığı belirtilmiştir. Bu kurulu gücün % 60 Avrupa % 25 i Amerika tarafından üretilmektedir. (Fıçıcı vd., 2007) Dünyada 2010 yılı sonu itibariyle yıllık artış %20 olarak hedeflenmiştir ve 2014 yılı GWEC (GLOBAL WIND ENERGY COUNCIL) verilerine bakılacak olduğunda kurulu güç 369,553 MW olarak saptanmış olup 114,763 MW ile en çok kurulu güce sahip olan ülke Çin olurken Amerika 65,879 ile ikinci gelmektedir. Türkiye'nin 2014 yılındaki kurulu güç kapasitesine baktığımızda 3,763 MW olduğu görülmektedir.(GWEC, 2014) Dünyada belirlenen planlara göre 2020 yılına kadar 1,2 milyon MW a ulaşması beklenmektedir(Bayraç,2011).

Dünyada rüzgârın enerji kaynağı olarak kullanımı ve rüzgârdan yararlanma konusundaki gelişmeler hızla yayılırken ülkemizde önemi 1990'lı yıllarda anlaşılmış olup bazı küçük uygulamalar yap-işlet-devret modeliyle gerçekleştirilmiştir. Türkiye'de ilk rüzgar enerji santrali İzmir-Çeşme Germiyan Köyü'nde kurulmuştur. Enerji üretimine yönelik Alaçatı'da, Çanakkale-Bozcaada'da, İstanbul-Hadımköy'de rüzgâr türbinleri kurulumu genişletilmiştir.

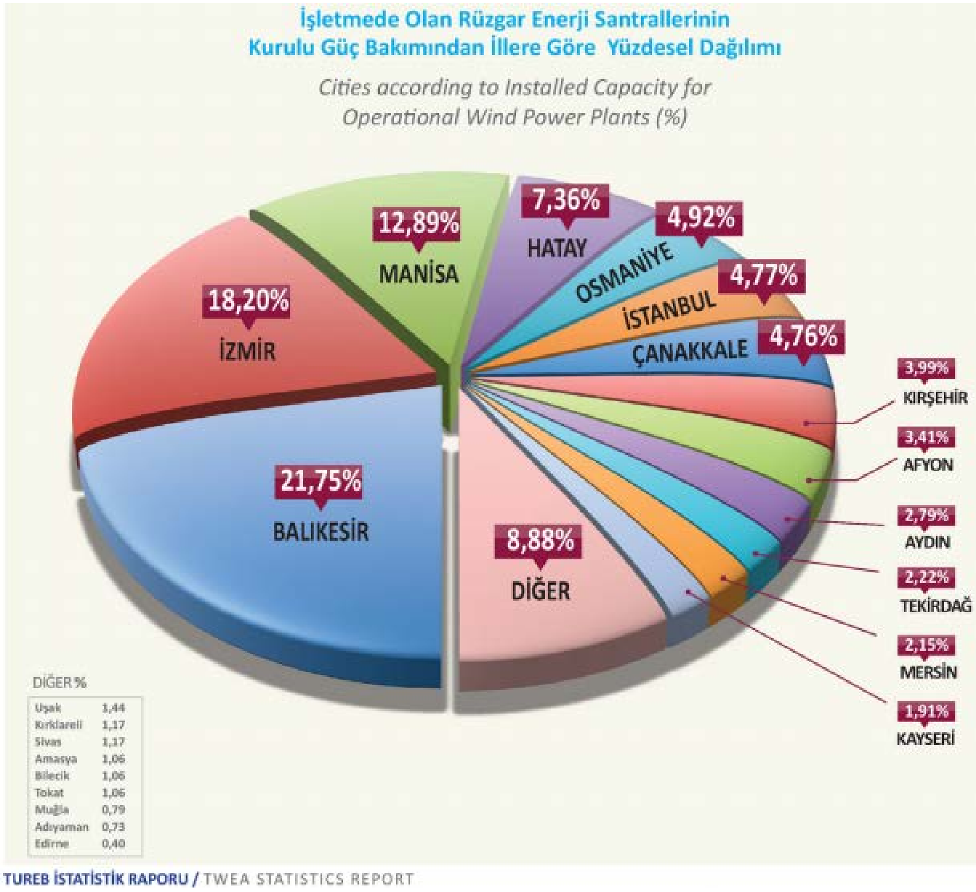
Türkiye rüzgâr enerjisi açısından oldukça şanslı bir coğrafyada yer almaktadır. Elektrik enerjisi elde etmek amacıyla kullanılmakta olan çevrim santralları için gerekli ortalama 2.5-4 m/sn başlangıç rüzgârı, 7 m/sn üretim hızının bulunabilirliği düşünülecek olduğunda Marmara Bölgesi, Ege Bölgesi, Güneydoğu Anadolu Bölgesi enerji üretme açısından büyük potansiyele sahiptir.(Gençoğlu ve Cebeci 2001) İşletmedeki rüzgâr enerjisi santrallerinin bölgesel açıdan değerlendirecek olursak %39,51 ile Ege Bölgesini %36,13 ile Marmara Bölgesi takip ederken %14,43 ile Akdeniz Bölgesi üçüncü sırada yer almaktadır.

Şekil 1. İşletmede Olan Rüzgâr Enerji Santrallerinin Kurulu Güç Bakımından Bölgelere Göre Yüzdesel Dağılımı



Türkiye’de Rüzgâr Enerjisi yatırımlarının gelişimi açısından son 10 yıllık veriler incelendiğinde 2005 yılında 30,9 MW’lık yatırım yapılırken 2014 yılında 803,65 MW’lık yatırım yapılmıştır. Ve Şuanda işletmede olan 101 adet rüzgâr enerjisi santralinden alınan verilere göre kaydedilmiştir. İşletmedeki rüzgâr enerjisi santrallerinin illere göre dağılımına bakılacak olduğunda %21,75 ile Balıkesir birinci sırada yer alırken %18,20 ile İzmir ikinci sırada %12,89 ile Manisa ili kurulu güç bakımında yüzdesel olarak dağılmaktadır. Türkiye’de rüzgâr enerjisinden elektrik enerjisi üretmek amacıyla 39 adet rüzgâr enerjisi inşa halinde olup bu projeler ile 1,210 MW enerji üretimi hedeflenmiştir.

Şekil 2. İşletmede Olan Rüzgâr Enerji Santrallerinin Kurulu Güç Bakımından İllere Göre Yüzdesel Dağılımı



İspanya, Çin, Brezilya, Kanada, Avusturalya, ABD, Danimarka, Japonya, Hollanda gibi çok sayıda ülkede gümrük vergisi, finansal vergi teşvikleri, ihracat kredileri kolaylıkları ve yardımları gibi destek mekanizmaları kurulmuş olup rüzgâr enerjisinin kullanımı cazip kılınmaktadır(Altuntaşoğlu, 2009). AB'de rüzgâr enerjisinde uygulanan destekleri mali, vergi ve üretim teşvikleri olmak üzere direktifler ve yönergeler hazırlanmıştır. Mali teşvikler, yatırım, hükümet teşviklerinde devlet %20 ile %40 arasında katkıda bulunmaktadır. Ayrıca bu şirketler rüzgâr türbinleri için getirilecek olan alet-teçhizat makine vb. gümrük vergilerinden de muaf tutulmaktadır. Yenilenebilir enerji kaynaklarının kullanılması ile enerji üretimi gerçekleştiren üreticiler için sabit fiyat ve kota sistemi gibi üretim teşvikleri de verilmektedir(Bayraç, 2011).

1.2. Türkiye'de Enerji Politikaları

Son yıllarda Dünya'da artan elektrik ve doğalgaz talebinin Çin'den sonra en fazla artış görülen ülkesi Türkiye olmuştur ve bu nedenle Türkiye'nin ekonomik ve sosyal gelişmeler çerçevesinde bazı önlemler alması gerekmektedir.(EÜAŞ, 2013) Hızla artan bu enerji talebine karşılık yenilenebilir enerji kullanımı yeterli düzeyde değildir. Rüzgâr enerjisi, sistem tasarımı, planlama, ölçüm ve kurulum süreçleri ile daha fazla uğraş, zaman ve maliyet gerektirmesine rağmen, Türkiye'de Rüzgâr enerjisinden ticari olarak yararlanılmasına yönelik talepler artmaktadır. Enerji kullanımında dışa bağımlılığı azaltmak üzere yenilenebilir enerji kaynaklarının kullanılması amacıyla teşvikler, kanunlar ve yönetmelikler mevcuttur. Enerji ve Tabii Kaynaklar Bakanlığı tarafından Türkiye'nin enerji politikası "Enerji tasarrufu ve verimliliği, enerji arz güvenliğinin sağlanması, dışa bağımlılık risklerinin azaltılması, çevrenin korunması ve iklim değişikliğine karşı mücadelenin etkinliğinin arttırılmasının sağlanması gibi 2023 yılına kadar 2011 yılına göre en az % 20 azaltılması" olarak hedeflenmiştir (ETKB, 2015).

Türkiye'de başta Rüzgâr enerjisi olmak üzere güneş, jeotermal, biokütle, biyogaz, dalga, akıntı enerjisi gibi yenilenebilir enerji kaynaklarını (YEK) elektrik enerjisi üretmek amacıyla kullanımının yaygınlaştırılması üzerine 5346 sayılı kanun 2005 yılında yürürlüğe girmiştir. Bu kanunla birlikte yerel üreticiler için elektrik enerjisi üretim olanağı sağlanmıştır ve bunun yanı sıra bu kanunda geçen uygulama esaslarına göre yatırım dönemi uygulamaları, arazi ihtiyacına ilişkin uygulamalar da mevcuttur. Bu teşviklerle birlikte fiyatların kaynak türüne göre farklılaştırılması ve yenilenebilir enerji kaynakları tesislerinde kullanılan malzemelerin belirli bir yüzdesinin yerli malı olması gereği getirilmiş ve 31.12.2015 tarihine kadar işletmeye girmiş veya girecek olan üretim tesislerine on yıl fiyat teşviklerinden yararlanabileceklerdir (ETKB, 2010).

2.RÜZGÂR TÜRBİNLERİNİN KULLANIM ALANLARI

Tarihte milattan önceki yıllarda da karşılaştığımız, itici güç olarak kullanımına başlanan rüzgâr enerjisi deniz taşımacılığında, yel değirmenlerinde, karalarda temel enerji kaynağı olmuştur. Özellikle buğday, mısır öğütme, bir yerden bir yere su pompalama gibi yaşama dair gereksinimleri uzun yıllar rüzgâr gücü kullanılarak çözülmüştür. Rüzgâr enerjisi kullanımı ilk olarak Orta Doğu'da M.Ö. 2800'lerde başlamış olup M.Ö. 17. Yüzyılda Babil Kralı Hammurabi döneminde Mezopotamya'da sulama amacıyla kullanılmıştır. M.S. 7. Yüzyılda yel değirmenleri ilk olarak Türkler ve İranlılar tarafından kurulmuş olup Avrupalılar ise ilk olarak Haçlı Seferleri'nde karşılaşmışlardır. 18. Yüzyılın ortalarında başlayan Endüstri devrimine kadar tüm dünyada yel değirmenlerinin yayılması buhar makinesinin icadı ile rüzgâr enerjisinden yararlanılması önemini kaybetmiştir. Bununla beraber rüzgâr enerjisinden elektrik üreten ilk türbin 1891 yılında Paul la Cour tarafından Danimarka'da inşa edilmiş olup 55 kW'lık bir kapasiteye sahiptir (Elibüyük ve Üçgül, 2014). Elektrik birim fiyatının yüksek olması yeni teknolojik gelişmelere yol açmış ve 1980li yıllardan günümüze kadar gelişen teknolojilerle rüzgâr türbinleri daha fazla elektrik enerjisi üretir hale gelmişlerdir.

Rüzgâr türbinleri genel olarak; kule, jeneratör, hız dönüştürücüleri, elektrik-elektronik elemanlar ve pervaneden oluşmaktadır. Rüzgâr türbinleri; dönme eksenlerine göre yatay ve dikey olarak, devirler güçlerine, kanat sayılarına ve kurulum konumlarına göre farklılık göstermektedir(Elibüyük ve Üçgül, 2014).

Rüzgâr türbinleri kurulum konumu açısından yaygın olarak karada, denizlerde ve yapılarda kullanılmaktadır. Kara üstü (onshore) uygulamalar için 70m, 80m, 120m rotor çaplı ve 3MW ve üzeri güç sağlanabilen rüzgâr türbinleri üretilmektedir. Karalar ve denizler Rüzgâr enerji potansiyeli bakımından düşünüldüğünde denizler daha verimli olarak düşünüldüğünden deniz üstü (offshore) Rüzgâr çiftlikleri kurulmaya başlanmış olup 5MW ve daha fazla kapasiteli Rüzgâr türbinleri, deniz üstü (offshore) uygulamaları için üretilmiştir. Avrupa 12 MW'lık deniz üstü Rüzgâr santrallerine sahipken bu kurulu gücün 180 MW olması planlanmaktadır (Çolak ve Demirtaş, 2008).

2.1.Kara Üstü Rüzgâr Santralleri (Onshore)

Rüzgâr türbinleri enerjisini, Rüzgâr enerjisinin rotora bağlı olan kanatları tahrik etmesi ile ve bu kanatların dönmesi ile oluşturur. Elde edilen mekanik enerji; hava yoğunluğuna, rötar alanına ve rötar hızına bağlı olarak değişmektedir. Rüzgâr türbinleri, Rüzgârdaki kinetik enerjiyi ev ve iş yerlerinde kullanılmak üzere elektrik enerjisine çeviren sistemlerdir. Elektrik üretmek amacıyla kurulan bu Rüzgâr santrallerinin kurulacağı yerin seçimi, üreteceği enerji kapasitesi ve çevresel etkileri açısından önem arz etmektedir. Rüzgâr paklarının kurulması amacıyla kullanılmak istene alanlar için ortalama ve saatlik Rüzgâr hızları meteoroloji istasyonlarından temin edilerek kurulmalı ve Rüzgâr santrallerinin planlanmasında Rüzgâr atlasları kullanılmalıdır. Rüzgar türbinlerinin çevresel etkilerinin azaltılması için yerleşim yerlerine 500 m'den daha fazla yaklaşmaması gerekmektedir.(YEGM, 2015).

Rüzgâr yönü, hızı ve dağılımı açısından topoğrafya önemli rol oynamaktadır. Dağ silsilesi, tepe ve kayalıklar, Rüzgâr profilini büyük ölçüde etkilemektedir. Rüzgâr türbinlerinin karada yerleşimi açısından en uygun yerleşim alanları; denize paralel, ,hakim Rüzgâr yönüne dik alanlar ve etrafı boş yerleşimler olmaktadır. Fakat üst-arka kısmı türbülans nedeniyle uygun olmamaktadır. Şiddetli basınç gradyanlı, düşük eğimli, sürekli Rüzgâr vadileri, şiddetli jeostrofik Rüzgâr alanlarındaki tepeler ve zirveler, şiddetli jeostrofik Rüzgâr veya termal gradyan alanlarına maruz kalmış kıyı şeritleri Rüzgâr enerji santralları için en uygun yer seçimleridir.

Rüzgâr santrali kurmak için seçilen arazide belirli enerji üretim çözümlemeleri, ölçümler yapılması gerekir ve bu ölçümler takriben bir yıl kadar sürmektedir. Rüzgâr enerjisi santrallarının uygulanabilir olması için ulaşım kolaylığı, ulusal şebekeye bağlanma kolaylığı, iletim hattı uzaklığı, trafo gücü, sit alanı veya doğal koruma, milli park alanı olup olmaması,yakınında uzun mesafeli alıcı- verici antenler ve link hatları bulunmaması gibi özelliklere dikkat edilmesi gerekir(Gençoğlu ve Cebeci 2001). Ayrıca arazinin yol ve diğer çalışmalar için işlenme kolaylığı, eğimi, büyüklüğü, kullanılış şekli, bitki örtüsü, yerleşim birimlerine olan yakınlığı, arazinin askeri, sivil radar ve buna benzer tesislere olan yakınlığı gibi göz önüne alınması gereken bir takım özelliklere de dikkat edilmelidir. Rüzgâr kaynağı değerlendirmelerinde elde edilen veriler;arazi ve çevresi için orografik ve topografik yapısı, yapılan ölçümlerle beraber geçmiş yıllara ait Rüzgâr verileri,Rüzgârdan ne kadar elektrik üretileceğinin belirlenmesinde önemli olmaktadır. (YEGM, 2015).

2.1.1.Kara Üstü Rüzgâr Santralleri (Onshore) Avantajları

Kara üstü Rüzgâr enerji sistemleri pek çok açıdan en uygun yenilenebilir enerji kaynaklarından biri olma avantajına sahiptir. İngiltere'de yapılan çalışmalara göre kara Rüzgâr türbinlerinden elektrik üretimi yaklaşık olarak her kWh için 7 ile 9 pound arasındadır ve bu değerler deniz üstü Rüzgâr türbinlerinin yarısı ve fotovoltaik panellerin ise dörtte biri kadardır. Ayrıca nükleer enerji ile kıyaslandığında hem çevresel hem de ekonomik açıdan daha uygun olmaktadır. Ancak kara üstü (onshore) Rüzgâr sistemleri enerji üretimi açısından hala fosil yakıtlardan pahalıdır fakat bunun önümüzdeki yıllarda düşmesi beklenmektedir. Kurulum ve işletme açısından deniz üstü Rüzgâr santralleri ile karşılaştırıldığında maliyeti daha düşüktür. Çalışma hızı bakımından da kara üstü Rüzgâr santralleri daha düşük kapasiteye sahiptir(Bassi ve Hicks, 2012).

2.1.2.Kara Üstü Rüzgâr Santralleri (Onshore) Dezavantajları

Kara üstü Rüzgâr enerjisi sistemleri çevresel açıdan değerlendirildiğinde; gürültü kirliliği, görüntü kirliliği ve kuş sürülerine zarar vermesi açısından dezavantajlara sahiptir. Bu problemin çözümüne yönelik Rüzgâr türbinlerinde geliştirilen teknolojiler ile oluşan gürültünün azaltılması hedeflenmektedir. Bu teknolojilerle birlikte Rüzgâr türbin yerleşiminin 150-200 metre yakınında dahi ortalama 40 dB seviyesinde ses olduğu belirlenmiştir.(Karacan, 2007) Bir diğer önemli sorun ise Rüzgâr türbinlerinden sürekli elektrik sağlanamamasıdır ve bu da üretilen enerjinin depolanmasını pahalı ve verimsiz kılmaktadır (Alcock, 2013).

2.1.3. Kara Üstü Rüzgâr Santral (Onshore) Uygulamaları

Bu bölümde, Rüzgârdan enerji elde edilmesi amacıyla karada kurulan Rüzgâr enerji santral örnekleri ele alınarak sahip olduğu enerji kapasiteleri açısından değerlendirilecektir.

2.1.3.1.Alta Rüzgâr Enerji Çiftliği

Şekil 3. Alta Wınd Energy Center

Kaliforniya'da Kurulu olan Alta Wind Energy Center (AWEC) Mojave Rüzgâr çiftliği olarak ta bilinen bu Rüzgâr santrali, dünyanın en büyük ikinci kara üstü Rüzgâr enerjisi projesi olmaktadır. Enerji üretim kapasitesi 1020 MW olan bu santralin kapasitesini 1550 MW seviyelerine çıkarmak amacıyla genişletme çalışmaları devam etmektedir. İlk üniteleri 2011 yılında kurulmuş olup Alta 11 olarak adlandırılan 11. Ünite 2013 yılında tamamlanmıştır Üretim kapasitesi 1550 MW olan bu Rüzgâr çiftliğinden üretilen elektrik enerjisi ile 450.000 evin ihtiyacı karşılanabilmektedir(Buzynski, 2013).

Şekil 4. Jiuquan Wind Power Base

Çin'de inşa edilmiş olan Gansu Rüzgâr Çiftliği aynı zamanda Jiuquan Wind Power Base olarak da bilinen Rüzgâr çiftliği, dünyada en çok üretim kapasitesine sahip Rüzgâr santralidir. 2008 yılında başlayan inşaat süreci İlk aşamasının tamamlanmasını 2010 yılında resmen duyurulmuş olup Kurulu güç kapasitesi olarak 5000 MW olduğu belirtilmiştir. Ayrıca 2014 yılı verilerine göre kurulu güç değeri 7965 MW olan bu santralde 2020 yılı için beklenen üretim değeri 20,000 MW'tır (Buzynski, 2013).

2.2.Açık Denizde Kurulan Rüzgâr Çiftlikleri (Offshore)

Küresel ölçekte yaşanmakta olan iklim değişikliği sorununun enerji çözümlerine odaklı ortaya çıkan yaklaşımlar, yenilenebilir enerji kaynaklarını teknolojilerindeki araştırma ve geliştirme faaliyetlerini artırmaktadır. Yenilenebilir enerji kaynakları arasında önemli yere sahip olan ve teknolojik yenilikler açısından gelişmelere açık olan Rüzgâr enerjisi, karada ve yapılarda kullanımının yanı sıra son yıllarda artan ivme ile denizlerde ve okyanus açıklarında kullanılmaktadır. Deniz ve okyanus açıkları sahip olduğu Rüzgâr enerjisi potansiyeli açısından enerji elde edilebilmesi için avantaj sunmaktadır. Rüzgâr türbinlerinin enerji kazancı için denizlere ve okyanus açıklarına yerleştirilmesi off-shore olarak tanımlanmaktadır. Kıyıdan uzak mesafelerde kurulan bu sistem her teknolojik gelişmenin içinde barındırdığı karşıtlık (küresel ısınmanın önüne geçilebilmesi için geliştirilen teknolojik sistemlerin doğal çevreye verebileceği zarar) ile mücadele etmek durumundadır. Çevresel yönetmelikler ışığında, uygun ölçekli olarak uygun yerleşimlerde geliştirilmesi çevreye verilen zararın azaltılması için önemli yer tutmaktadır.

Rüzgâr enerjisi teknolojilerindeki gelişmelerin çoğu karada kurulan Rüzgâr çiftliklerine odaklanırken, açık denizde kurulan çiftliklere ilgi ise her geçen gün artmaktadır. Bu teknolojilere yapılan teşvik ve yatırımların başlıca nedenlerinden biri deniz üzerinde Rüzgârın çok güçlü bir şekilde esmesidir. Rüzgâr bu yerleşimlerde daha yüksek hızlarda yakalanabilmektedir. Karada kullanımına kıyasla daha az gürültü oluşturmakta ve Rüzgârın hızını engelleyici etkenler azalmaktadır.

Açık denizde kurulan Rüzgâr çiftlikleri tasarımı karada kurulan sistemlerle benzer özellikler taşımaktadır. Fakat denizde kurulan sistemler karada kurulan sistemlerden farklı şekilde elektrik iletimi için denizden karaya uzanacak yüksek voltajlı kablo sistemi gerektirmektedir. Enerjinin karaya ulaşım zorluğunun yanında denizde kurulan Rüzgâr türbinleri teknolojilerindeki ana zorluk, zor hava koşulları karşısında türbinlerin ayakta kalmasını sağlayacak güçlü temellerin yaratılmasıdır. Bu temellerin ekonomik bir şekilde inşa sahasına taşınması ve deniz ile bağlantısının yapılabilmesi bu teknoloji için ilerlemesi gereken önemli noktalardır(Pelc ve Fujita, 2002).

Rüzgâr türbinleri sistemlerinin yerleşimin belirlenmesinde Rüzgâr potansiyeli önemli yer tutmaktadır. Rüzgâr hızının sahilden uzaklaştıkça artması enerji potansiyeli açısından uzak noktalarda kurulum için avantaj sağlamakta, aynı zamanda kurulumun yapılacağı yerin kentsel yük merkezlerine de makul mesafede olması gerekmektedir. Türbin sistemleri arasındaki kablo bağlantıları ve karaya olan bağlantıların tasarımında ve uygulanmasında mevcut gaz ve petrol endüstrisinin yöntemlerinden ve imkânlarından yararlanılmaktadır(Musial vd., 2006).

Açık denizde kurulan Rüzgâr sistemleri oldukça maliyetli olmakta ve projenin türüne göre farklılık göstermektedir. Türbinlerin;

- Temelleri,
- Taşınması,
- Kurulma işlemleri,
- Bakım masrafları,

- Çevresel etkenlere dayanıklılığı maliyeti arttıran faktörler olmaktadır.

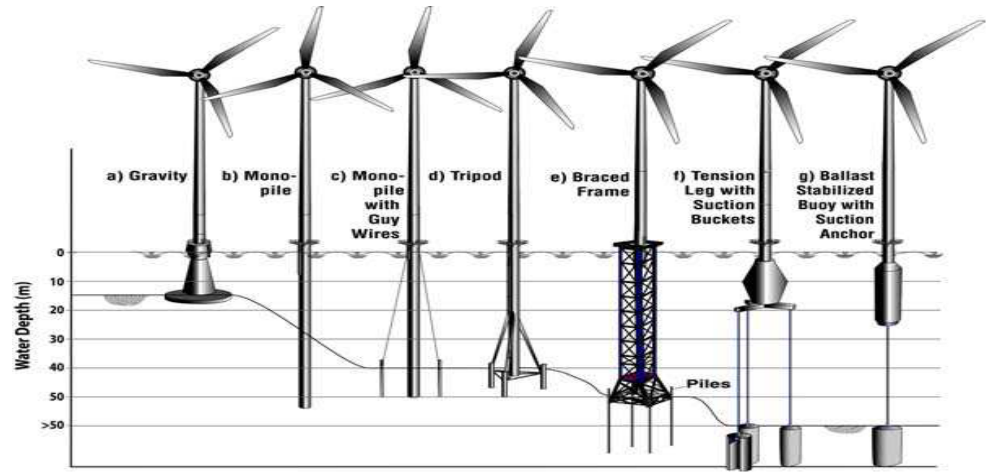
Maliyeti etkiyen çevresel faktörlerin başında korozyon problemi gelmektedir. Yüksekliği 10m'yi bulan tuzlu sular korozyona neden olmaktadır. Rüzgâr türbinlerindeki teknolojinin gelişmesi ile türbinler daha da derine kurulmaktadır. Bu durum maliyeti arttıran bir diğer etken olmaktadır.

Maliyeti düşürmek için yapılan çalışmalardan bazılarında çıkan sonuçlar şu şekildedir:

- Daha basit rüzgâr sistemi modeli olan yüzer sistemler ise sabit olan rüzgâr sistemlerine oranla daha ekonomik olmaktadır.
- Temel maliyeti tüm sistemin %23-30'unu oluşturmaktadır. Danimarka Enerji Ajansı tarafından ortaya konulan veriler ışında temelde beton yerine hafif çelik kullanımı ile maliyet 1/3 oranında azaltılabilmektedir ve aynı zamanda ulaşım maliyetini de düşürmektedir.
- Son dönemdeki mühendislik çalışmaları ise türbinlerin 15 metreye kadar derin sularda ekonomik olarak kurulabileceğini göstermektedir. Açık deniz Rüzgâr sistemleri üzerindeki optimizasyon çalışmaları ile maliyetin düşürülmesi hedeflenmektedir.

Açık deniz rüzgâr türbinleri temel yapısı incelendiğinde ise; Rüzgâr türbinlerinin denizde kullanımı için geliştirilen farklı sistemlerin geliştirildiği görülmektedir. Türbinlerin kurulacağı denizin derinliğine bağlı olarak türbin ayağı yani temeli farklılık göstermektedir.

Şekil 5. Türbin Temelleri

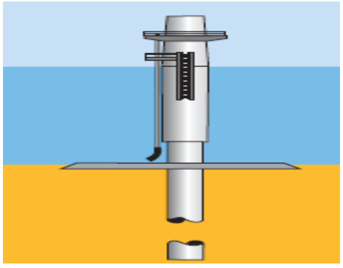


Türbinlerin temel sistemleri 4 ana başlık altında toplanmaktadır:

1.Tekil Temeller

En yaygın kullanıma sahip bu sistemler 25 metreye kadar olan derinliklerde kullanılmaktadırlar. Sistemin diğer temellere göre avantajı maliyet ve uygulama açısından daha uygun olmasıdır.

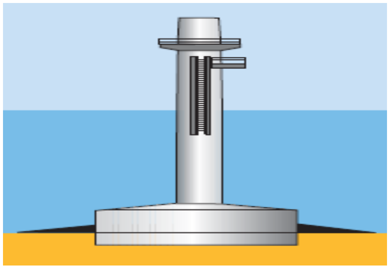
Şekil 6. Tekil Temeller



2.Yerçekimi Temel Yapıları

Bu temel yapıları 30 metre derinlikteki uygulamalarda kullanılmaktadır. Tekil temellerin aksine deniz yatağının derinliklerine değil yüzeyine yerleştirilmektedir. Sistemin avantajı daha derin noktalara, daha kolay biçimde monte edilebilmesidir(Right, 2012).

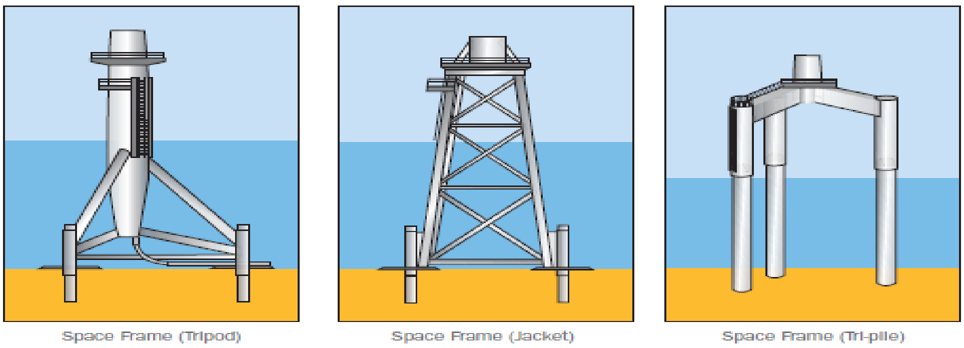
Şekil 7. Yerçekimi Temel Yapıları



3.Uzay Çerçeve Strüktürler

Daha derin uygulama alanlarında tercih edilmektedirler. Günümüzde yaygın olarak kullanılmayan bu sistemlerin gelecekte yaygınlaşacağı tahmin edilmektedir (Right, 2012).

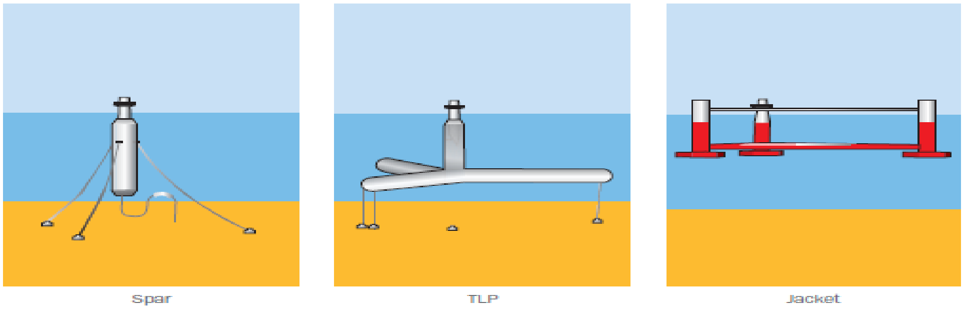
Şekil 8. Uzay Çerçeve Strüktürler



4.Yüzer sistemler

50 metre ve üzerindeki derinliklerde uygulanmaktadırlar. Henüz deneysel süreçte olan bu sistemlerin sahip olduğu pek çok avantaja bağlı olarak yaygınlaşacağı öngörülmektedir. Bu sistemlerin önemli avantajlarından biri esnek tasarıma sahip olmasıdır. Özellikle ekonomik ve teknik açıdan zorluğa sahip bölgeler için avantajlıdır. Sistemin en büyük zorluğu ise Rüzgâr türbinlerinin stabilizesinin sağlanabilmesidir(Right, 2012).

Şekil 9. Yüzer Sistemler



2.2.1.Açık Denizde Kurulan Rüzgâr Çiftlikleri(offshore) Avantajları

Karada kurulan Rüzgâr çiftlikleri ilk yatırım maliyeti açısından talep görürken, açık denizde kurulan sistemler sahip olduğu önemli avantajlar açısından destek kazanmaktadır. Bu avantajlar şu şekilde sıralanabilmektedir:

- Açık deniz Rüzgâr potansiyeli açısından oldukça zengindir.
- Rüzgâr hızı denizde karadakine oranla %20 daha fazladır.
- Rüzgârlar deniz üzerinde karadakine oranla daha hızlı ve istikrarlı esmektedir. Buna bağlı olarak türbinler daha az aşınmakta ve daha çok elektrik üretmektedirler.
- Rüzgâr türbinlerinin denizde kurulumunda Rüzgâr hızını engelleyici yükselti, yüksek yapı, vb. kısıtlayıcıların olmamasıdır.
- CO2 ayak izinin yok denecek kadar olmasıdır.
- Karada kurulan sistemlerin aksine daha az ses problemi yaratmasıdır. (Right, 2012)

2.2.2.Açık Denizde Kurulan Rüzgâr Çiftlikleri (offshore) Dezavantajları

- Rüzgâr türbinlerinin denize yerleştirilmesi için kullanılan temel sistemlerinin kompleks olması
- Bu sistemlerin yapım ve kurulum aşamalarının yüksek maliyet gerektirmesidir (Right, 2012).

- Açık denizlerde kurulan Rüzgâr çiftlikleri doğaya sonradan eklenen bir parça olarak diğer tüm yenilenebilir enerji teknolojileri gibi çevresel açıdan da sorgulanmaktadır. Denizde yaşan canlı türünün ve çevredeki diğer canlıların, enerji kazanımı amacıyla kurulan Rüzgâr sistemleri aracılığıyla yok olma riski, göz önünde bulundurulması gereken önemli bir çevresel sorun olmaktadır. Rüzgâr türbinleri kuruldukları deniz yatağındaki canlılara zarar verebilmektedir. Bunun yanı sıra göçmen kuşların geçiş koridorları üzerinde bulunan türbinler kuş ölümlerine sebep olabilmektedir. Türbinlerden kaynaklı oluşan vibrasyon ise denizde yaşan memeli hayvanlar üzerinde olumsuz sonuçlar doğurmaktadır. Rüzgâr çiftliklerinin denizlerde kurulumunda mevcut canlı türlerinin yerleşimi göz önünde bulundurularak projelendirme yapılması gerekmektedir (Pelc ve Fujita, 2002).

2.2.3. Açık Denizde Kurulan RüzgârÇiftlikleri (offshore) Uygulamaları

Açık deniz enerji sistemleri yüksek potansiyele sahip olduğu için özellikle Avrupa ülkelerinde son 10 yıl içerisinde Rüzgâr çiftliği araştırma ve uygulamalarına yönelik çalışmalar hızlanmıştır. Açık deniz Rüzgâr sistemleri başta İngiltere olmak üzere pek çok Avrupa ülkesinde kullanılmakta ve yeni teknolojiler üzerinde çalışılmaktadır. İngiltere Rüzgâr sistemlerinin deniz üzerinde kurulumunda öncü ülke olmaktadır. İlk Rüzgâr çiftliği Edinburgh Firth of Forth sahilinde kurulmuştur. Karada kurulacak çiftliklere yerli halkın karşı çıkması üzerine deniz üzerinde kurulan Rüzgâr çiftliklerinin araştırılması ve geliştirilmesi üzerine çalışmalar yürütülmektedir. Danimarka ise 2030 itibariyle elektrik üretiminin %40'ını açık deniz Rüzgâr santrallerinden karşılamayı hedeflemektedir. Bu kapsamda 5MW üretim gücüne sahip 2 adet Rüzgâr enerji santraline sahiptir. İrlanda denizinde yer alan 7 adet Rüzgâr türbininden oluşan Rüzgâr çiftliği enerji gücü ise 25,2 MW kapasiteye sahiptir. Her bir türbinin çapı 104 m, merkez yüksekliği ise 70m'dir. Toplam türbin ağırlığı ise 290 tonları bulmaktadır. Hollanda elektrik enerjisi üretimi için Rüzgâr çiftliklerini destekleyen Avrupa ülkeleri arasında yer almaktadır. Amerika Enerji Departmanı verilerine göre sahillerinde yer alan Rüzgâr çiftliklerinin enerji gücü kapasitesinin 54 GW olduğu tahmin edilmektedir(Pelc ve Fujita, 2002).

2.2.3.1. Açık Denizde Kurulan Rüzgâr Çiftlikleri(offshore) Tasarım Örnekleri

Bu bölümde denizde kurulan Rüzgâr türbinlerinin mevcut uygulamaları dışında, üretilen mimari çözümlerin tanıtılması amacıyla tasarım örnekleri irdelenecektir.

2.2.3.1.1. Wind Turbine Loft Concept

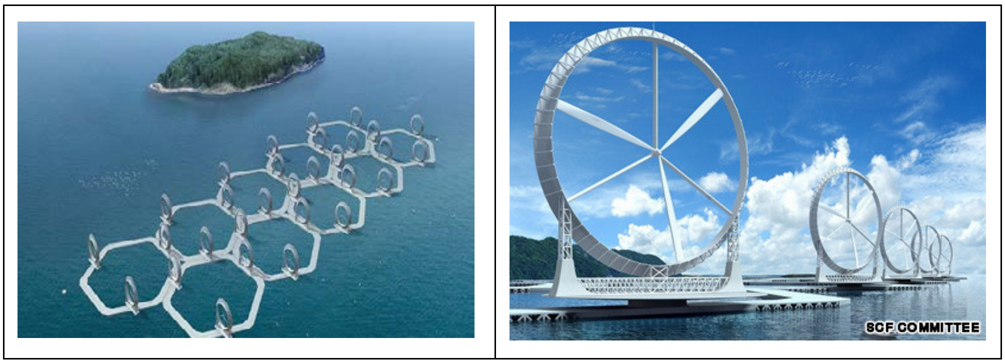
Bulgaristan tasarım şirketi Morphocade tarafından tasarlanan Rüzgâr türbinleri, enerji santrallerinin gelecekteki ihtiyaçlarına cevap verecek şekilde tasarlanmıştır. Rüzgâr türbinleri hem elektrik üretmek amacıyla hem de çalışanlar için yaşama alanı sunmak amacıyla geliştirilmiştir (Atherton, 2013). Tasarımın çıkış noktasını Avrupa Rüzgâr Enerjisinin sunmuş olduğu rapor temellendirmiştir. Rapora göre 2030 yılı itibariyle Rüzgâr türbinlerinde çalışanların sayısı 300.0002leri bulacaktır. Denizin ortasında kurulan bu sistemlerin karadan bağlantının zor olması düşünülerek yaşama alanı ile tasarlanan Rüzgâr türbinleri, çalışanların bakım ve onarım çalışmalarını kolaylaştırmaktadır.

Şekil 10. Wind Turbine Loft Concept Tasarımından Görünümler

2.2.3.1.2. Wind Lens

Japonya'da yer alan Rüzgâr çiftliği projesi farklı tasarım yaklaşımı sunmaktadır. 112 metre çapındaki türbinler altıgen biçimindeki yüzer sistem tabanına oturtulmuştur. Rüzgâr lenslerinin tasarımı hem gürültü hem de görüntü kirliliğinin azaltılmasına odaklanmaktadır. Rüzgâr lensleri, Rüzgârın çemberin merkezine yoğunlaştırılması ile enerji üretim kapasitesinin arttırılmasına yönelik tasarlanmıştır (Poole, 2010).

Şekil 11. Wind Lens Projesinden Görünüm



2.3.Yapılarda Kullanılan Rüzgâr Türbinleri

Yapılarda CO_2 emisyonunu azaltabilmek, gereken enerjiyi sağlarken çevreci yaklaşımda bulunmak, alternatif enerji kaynaklarının yapı ölçeğinde kullanımını önemli kılmaktadır. Bu açıdan Rüzgâr türbinlerinin Rüzgâr potansiyeline sahip bölgelerde yapılarda kullanımının yaygınlaştırılması gerekmektedir.

Rüzgâr enerjisinden yapılarda yararlanabilmek ve uygun Rüzgâr türbini seçimini yapabilmek için öncelikli olarak kurulacak bölgenin yerel Rüzgâr yapısı ve yönü belirlenmektedir. İkincil olarak Rüzgârın akışı ve devamlılığı açısından yakın çevredeki binaların konumu belirlenmelidir. Rüzgâr türbinlerinin yerleşiminde Rüzgâr akışının en verimli olduğu bölgenin seçilmesi gerekmektedir.

Rüzgâr türbinlerinin yükseklik artışına bağlı olarak enerji verimliliği de aynı oranda artmaktadır. Amerikan Rüzgâr Enerjisi Birliği (AWEA) verilerine göre yapılarda kullanılan Rüzgâr türbinlerinin maliyet etkin uygulama olabilmesi için en az 10 metre yükseklikte konumlanması gerekmektedir. Ayrıca etkin enerji kazancı için Rüzgâr türbinlerinin herhangi bir engelleyici ile arasında 30 metre mesafe olmalıdır (Leigh, 2015).

AWEA verilerine göre tipik bir Rüzgâr türbinin 400 watt ile 100 kilowatt arasında enerji üreteceği vurgulanmaktadır.

Rüzgâr türbinlerinin gerek enerji gerekse çevresel performansı açısından sahip olması gereken bir takım kriterler bulunmaktadır. Bunlar:

Yaşam alanlarına yakın olması sebebiyle gürültü sorununun minimum seviyede olması

Bakım ve kullanım evresinde kolaylık sağlaması ve dayanıklı olması

İyi performans göstermesi

Görsel açıdan yapı estetiğine katkı sağlayabilmesidir.

2.3.1. Rüzgâr Türbinlerinin Yapılarda Kullanım Yöntemleri

Rüzgâr türbinlerinin yapılarda kullanılarak enerji sağlanması için uygulanan iki yöntem bulunmaktadır. Bu sistemler:

- Binaya monte sistemler,
- Binaya entegre sistemlerdir.

2.3.1.1.Binaya monte sistemler

Bina-monte rüzgâr sistemleri, binanın mimari formundan bağımsız olan, yapıyı kule olarak kullanan türbinlerdir. Mevcut binalara sonradan eklenebilmektedirler ya da tasarım aşamasında kurgulanabilmektedirler. Minimal teknoloji ve kolay kurulum seçeneği avantaj sağlamaktadır. Binaya monte sistemler yatay ve düşey Rüzgâr türbinleri genelde yapının çatısına yerleştirilmektedir. Türbinlere gelen Rüzgâr akışını arttırmak için binanın şekli kullanılan yöntem olmaktadır. Türbinlerden kaynaklı sesten doğacak rahatsızlığın önüne geçebilmek için türbin yakınındaki fonksiyonların az kullanılan mekanlar olarak seçilmesi gerekmektedir.

2.3.1.2.Binaya entegre sistemler

Bina-entegre Rüzgâr türbinleri, tasarım aşamasında Rüzgâr enerjisinin kullanımının esas alındığı, yapı formunun Rüzgârın yönünü, hızını yönlendirecek biçimde şekillendiği sistem biçimidir. Bu sistemlerde yatay Rüzgâr türbinleri kullanılmaktadır. Rüzgâr türbinlerinin yer alacağı yapı yüzeyi Rüzgârı alacak biçimde, çevredeki yapıların konumlarının analizinin yapılması ile belirlenmelidir. Estetik kaygılar açısından kullanım tercihi daha fazladır. Cephede rüzgâr türbinlerinin kullanımında dikkat edilmesi gereken nokta türbinlere yakın mekânların organizasyonudur. Türbinlerden kaynaklı gürültü nedeniyle türbinlere yakın yerlerde sık kullanılmayan mekân organizasyonları yapılmalıdır (Günel, Ilgın ve Sorguç 2007).

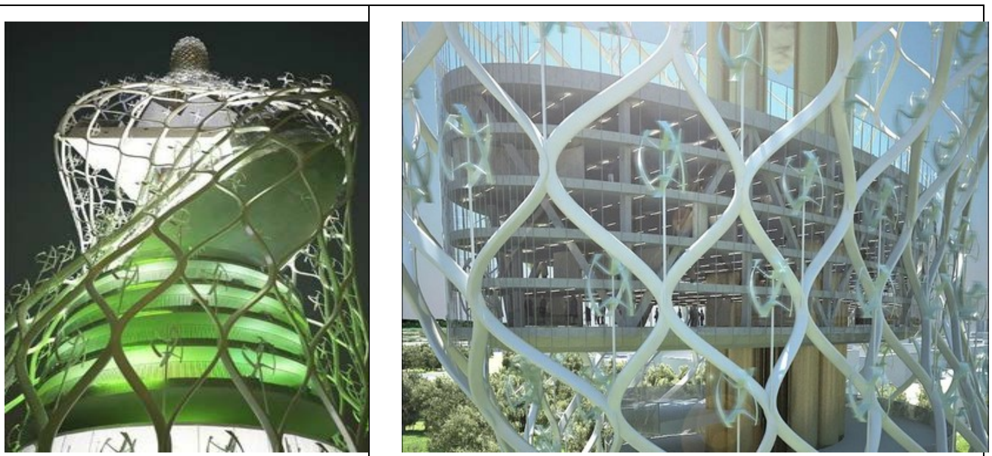
2.3.2. Yapılarda Kullanılan Rüzgâr Türbinleri Uygulamaları

Bu bölümde Rüzgâr türbinlerinin yapı ölçeğinde nasıl yer aldığını incelemek amacıyla örnekler ele alınmıştır.

2.3.2.1 Güç Kulesi

Tayvan'da NL Mimarlık tarafından tasarlanan gökdelen çift tabakalı cephe kurgusunun içerisinde 600 adet düşey Rüzgâr türbini barındırmaktadır. Cepheye entegre olarak dizayn edilen, sessiz çalışma özelliğine sahip 600 adet türbin 6 MG güç kapasitesine sahiptirler(Meinhold, 2011).

Şekil 10. Güç Kulesinde Yer Alan RüzgârTürbinlerinden Görünüm



2.3.2.2Logan Havalimanı

Boston'da yer alan terminal binası Amerika'nın ilk LEED GOLD sertifikalı terminal yapısı olma özelliğine sahiptir. Havalimanı içerisinde yer alan ofis binasının çatısına yılında, her biri kilowatt güç kapasiteli, 5 kanatlı, 20 adet Rüzgâr türbinleri monte edilmiştir. Estetik olarak yapı mimarisine katkı sağlayan türbinlerden kazanılan enerji yapının elektrik ihtiyacının %'sini karşılamaktadır.

Şekil 11. Logan Havalimanı Ofis Binasına Monte Edilen Rüzgâr Türbinleri

3.KARŞILAŞTIRMA

Tablo 2. Rüzgar Türbinlerinin Karşılaştırılması

	Kara üstü Rüzgâr çiftlikleri	Açık deniz Rüzgâr çiftlikleri	Yapılarda kullanılan Rüzgâr türbinleri
Gürültü	3	1	5
Görüntü kirliliği	5	1	1
Enerji verimliliği	3	1	5
Çevresel etkenler	3	5	1
Maliyet	3	5	1
Bakım	1	5	3

Rüzgâr türbinlerinin ele alınan kullanım alanlarını karşılaştırmak için gürültü, görüntü kirliliği, enerji verimliliği, çevresel etkenler, maliyet ve bakım onarım kriterleri açısından bir değerlendirme yapılmıştır.

Tablodaki veriler sırasıyla incelendiğinde; gürültü problemleri açısından açık deniz Rüzgâr çiftlikleri uygulamalarının yerleşim yerlerine uzak olması açısında avantaj sağladığı görülmektedir. Yapılarda türbinlerin kullanımı ise gürültü açısından sorun yaratmaktadır. Bu problemin çözümüne yönelik, ses yalıtım malzemesi kullanılabilir ve de ince kanatlı türbinlerle ses miktarı azaltılabilir.

Türbinlerin kullanımı görüntü kirliliği açısından değerlendirildiğinde ise açık deniz rüzgâr çiftlikleri ve yapılarda kullanılan türbinlerin daha avantajlı olduğu görülmektedir. Özellikler yapılarda türbinlerin tasarım aşamasında mimari eleman olarak kurgulanması estetik açıdan olumlu etki yaratmaktadır.

Enerji verimliliği açısından değerlendirme yapıldığında açık denizde rüzgâr hızı daha yüksek olduğu için üretim kapasitesi de daha yüksek olacaktır.

Çevresel etkenler açısından açık deniz Rüzgâr türbinleri hem hava hem de deniz yaşamını etkidiği için canlılara daha fazla zarar verebilmektedir. Bu açıdan türbinlerin yerleşim alanı önemli olmaktadır. Planlama aşamasında göç yollarına ve habitat alanlarına dikkat edilmelidir.

Bakım onarım ve maliyet söz konusu olduğunda açık deniz Rüzgâr türbinleri denizde durabilmesini sağlayan temel sistemlerinin kompleks ve maliyetli olması nedeniyle çok ekonomik olamamaktadır. Türbinlerin tuzlu su ile teması ise bakım masraflarını arttıran önemli bir etmendir.

SONUÇ

Enerji, insanoğlunun günlük faaliyetlerini gerçekleştirmesinde kullandığı temel taşıdır. Enerjinin artan talepler doğrultusunda yetersiz kalması, ayrıca yarattığı olumsuz çevresel etkenler ve de ulusal ve uluslararası düzeyde yapılan çalışmalar insanoğlunun alternatif enerji kaynakları üzerine yoğunlaşmasını zorunlu kılmaktadır. Bu bağlamda rüzgar enerjisi, sahip olduğu enerji potansiyeli, çevre kirliliği oluşturmaması ve teknolojik açıdan hızlı gelişmesi nedeniyle enerji kaynakları içinde enerji sorununa çözüm sunabilen bir kaynaktır.

Rüzgâr enerji sistemleri sunduğu teknolojik gelişmeler ve üretim kapasitesi sayesinde fosil yakıt kullanımı ile rekabet edebilme şansına sahip alternatif enerji sistemleri olarak gelişmektedir. Rüzgâr enerji sistemleri farklı uygulama alanlarında enerji üretimini gerçekleştirmektedir. Tablo incelendiğinde her sistemin kendi içinde avantaj ve dezavantaja sahip olduğu görülmektedir. Rüzgâr enerjisi potansiyeline sahip ülkelerin ya da yerleşimlerin kuracakları Rüzgâr enerji sistemlerinde sahip oldukları topografik yapı, Rüzgâr koşulları, maliyet en önemli unsurlar olmaktadır. Enerji üretiminin sağlıklı şekilde alternatif enerji kaynağı olan Rüzgâr enerjisinden sağlanabilmesi için tüm bu etmenler dikkatli bir şekilde analiz edilerek Rüzgâr türbinleri tasarlanmalıdır.

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TÜRKİYE VE DÜNYADA ISI KAYNAKLI GÜNEŞ ENERJİSİ KULLANIMI VE CSP STİRLİNG MOTORLU SİSTEMLERİN VERİMLİLİK DEĞERLENDİRMESİ

HEAT SOURCE SOLAR ENERGY USE IN TURKEY AND IN THE WORLD AND EFFICIENCY EVALUATION OF CSP STIRLING ENGINE SYSTEM

Mehmet Sait CENGİZ*
Mehmet Salih MAMİŞ†

Özet

Tüm dünya'da olduğu gibi ülkemizde de enerji önemli bir sorundur. Ülkemiz fosil enerji kaynakları bakımından yetersiz rezervlere sahip olduğundan enerjide dışa bağımlıdır. Ancak güneş enerjisi (GE) açısından ülkemiz zengin kaynaklara sahiptir. Avrupa Birliği (AB) ülkeleri, tüketicileri için güneşten elektrik üretiminde bilinçlendirme çalışmaları yaparak teşvikler aracılığıyla GE kullanımını yaygınlaştırmaya çalışmaktadır. Ülkemizde ise bilinçlendirme ve teşvik çalışmalarına gerektiği kadar önem verilmemektedir. Bu çalışmada ülkemiz ve Dünya ülkelerinin GE potansiyeli karşılaştırılarak kısa vadede yapılabilecek GE yatırımları, kamu tarafından verilebilecek teşvikler ve ekonomik anlamda ülkeye sağlayacağı katkılar incelenmiştir. Avrupa'da son 10 yılda CSP sistemleriyle ısı kaynaklı GE'den faydalanarak atılım yapan ve bu alanda Dünya 4.'sü olan İspanya örneğinin Türkiye için model olabileceğine dair değerlendirmelere yer verilmiştir. Sonuç olarak CSP sistemlerinden bireysel elektrik üretimi ve kullanımına uygun olan Stirling Motorlu Güneş Takip Sistemlerinin (SMGTS) ülkemizde yaygınlaştırılmasının gerekliliğine dair analiz ve değerlendirmeler yapılmıştır.

Anahtar Kelimeler: Güneş Enerjisi, Güneş Sistemleri, Güneş Potansiyeli

Abstract

Energy is an important problem in Turkey as well as the whole world. Since Turkey has insufficient sources in terms of fossil energy sources, it is dependent on foreign. However, Turkey has rich resources in terms of solar energy (SE). The European Union countries (EU) try to generalize solar energy through promotions performing studies for raising awareness for generation of electricity from the sun. In Turkey, required importance is not given to the studies to raise the awareness and promotions In this study, the SE investments that will be made in the long turn, the promotions that can be given by the public and the economic contributions made to the country are examined by comparing the SE potential of the world countries. Assessments on the fact that Spain, as a sample, which has made a move benefitting from heat source SE with CSP systems in the last decade and which ranks the 4th in this field in the world can be a model for Turkey is

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included. As a result, analysis and assessments have been made on that Stirling Engine Solar Tracking Systems that are appropriate for using and generating electricity individually among CSP systems should be generalized in Turkey.

Keywords: Solar Energy, Solar Systems, Solar Potential.

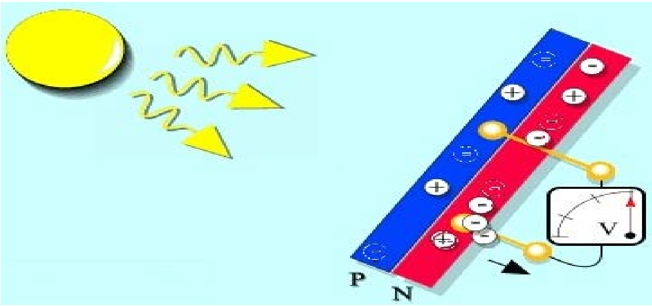
1. Giriş

Dünya'da sürekli artan enerji talebi ve buna paralel olarak mevcut enerji kaynaklarının hızla tükenmesi dünya ülkelerini yeni enerji kaynakları bulmaya zorlamıştır. Dünya Enerji Forumu'nun tahminlerine göre; fosil enerji kaynaklı petrol, kömür ve doğalgaz rezervlerinin günümüzdeki yöntemlerle kullanılması halinde önümüzdeki yüzyıl içerisinde bu yakıtlar tükenmiş olacaktır. Yine fosil enerji kaynaklı bu yakıtların tüketimi ile zehirli gazların salınımı atmosferde olumsuz etkilere sebep olmaktadır. Bu etkiler uzun vadede de küresel ısınmaya neden oldukları gibi havanın kirlenmesine, asit yağmurlarının oluşmasına, ozon tabakasının delinmesine, ormanların yok olmasına sebep olmaktadır. CO_2 salınımı 2002 yılında 2.6 milyar ton iken 2030 yılında, yıllık bu miktarın 6.8 milyar tona ulaşacağı tahmin edilmektedir (Kumar vd., 2010:2434; Solar Energy, 2015:03.04.2015).

Bu etkilerin önlenmesi için enerji verimliliğinin geliştirilmesi zorunluluk haline gelmiştir (Ceylan, 2014:doi:10.1155/2014/756326). Bu doğrultuda fosil enerji kaynaklı yakıt tüketiminin azaltılması ve çevre dostu enerji kaynaklarının yaygınlaştırılmasına yönelik önlemler alınmalıdır. Dünya'da, 2004 yılında elektrik üretimi 17,450 TWh iken, 2030 yılında bu üretimin 31,657 TWh'e ulaşacağı düşünülmektedir. Bunun anlamı enerji talebinin karşılanması için binlerce yeni güç santralinin yapılmasıdır (Güler, 2009:473). Bu nedenle, ülkeler YEK temelli enerji üretimini desteklemeli ve bu kaynaklardan elektrik üretimi yaygınlaştırılmalıdır. Türkiye'nin temel enerji kaynakları fosil bazlıdır (Solar Energy, 2015:03.04.2015). Ülkemizin elektrik üretimi, tüm enerji ihtiyacımızın 2009 yılında %52'si ne karşılık gelirken sadece 5 yıl sonra gelişen sanayi potansiyeliyle 2014 yılında yerli kaynaklardan üretilen enerji % 29'a gerilemiştir. Fosil kaynaklar açısından rezervleri az olan ülkemiz elektrik üretimi için doğalgaz, petrol ve kömür ithali yapmaktadır.

Günümüzde alternatif enerji kaynakları içinde elektrik üretiminde en fazla kullanılan yöntem güneşten fotovoltaik (FV) paneller aracılığıyla yapılan üretimdir. FV panellerin üretim maliyetlerindeki düşüş ve güneşin elektrik üretiminde temiz bir enerji kaynağı olmasından dolayı son yıllarda güneşten üretilen enerji miktarlarında önemli artışlar görülmektedir.

Güneş enerjisinden elektrik üretimi güneş pilleri ya da FV piller olarak adlandırılan yarıiletken maddeler ile sağlanmaktadır. Güneş ışınlarının, güneş paneline gelmesiyle güneş pilindeki yarıiletkenler sayesinde elektron alışverişi sonucu elektrik akımı üretilir. Bu paneller belli bir aralıktaki dalga boyunda bulunan ışınları, elektrik enerjisine dönüştürmektedir. Diğer dalga boylarındaki ışınlar ise güneş panelini oluşturan parçalar tarafından emilerek ısıya dönüştürülmekte ya da yansıtılmaktadır. Şekil 1'de güneşten FV panel ile elektrik üretiminin gösterilmektedir.



Şekil 1. Güneşten FV panel ile elektrik üretimi

Güneş pilleri pek çok farklı maddeden yararlanılarak üretilebilir. Bu alanda en çok kullanılan yarı iletken maddeler; kristal silisyum, amorf silisyum, galyum arsenit, kadmiyum tellürid, bakır indiyum diseleniddir. Doğada en çok bulunan silisyum, endüstride en fazla kullanılanıdır. Güneş pilleri; uzun ömürlü, dayanıklı, çevre kirliliği oluşturmayan çok az bakım isteyen yarıiletken ürünlerdir. Modüler yapıda olup, güneş pilleri birbirlerine seri ve paralel bağlanabilirler (Solar Energy, 2015:03.04.2015).

Güneş panellerinden %5 ile %20 arasında bir verimle elektrik üretimi yapılır. Günümüzde güneş pillerinde verim artışı için birçok yöntem geliştirilmiştir. Bu yöntemler kısaca; MPPT (Maksimum Güç Takibi) yöntemi ile maksimum güç noktasının izlenmesi, güneş takip sistemi ile güneşin doğuş ve batış saatleri baz alınarak güneşin izlenmesi gibi yöntemlerdir.

Günümüzde FV sistemler daha düşük maliyet ve çok daha yüksek verimle çalışabilmektedir (Rosental ve Lane, 1991:5; Parlakyıldız ve Hardalaç, 2013:584). İlk kullanılan FV sistemlerde %1-%2 oranında verim ile elektrik elde edilirken, günümüzde bu oran amorf hücreler için %17, tek kristalli hücreler için ise %25 seviyelerindedir. FV hücrelerinin maliyeti 1970'li yıllarda yaklaşık 200 $/Watt iken günümüzde 1 $/Watt seviyelerine gerilemiştir. Daha önce küçük pil hücrelerinin birleşmesi sonucu oluşturulan modüller, günümüz teknolojisiyle tek parça olarak üretilebilmekte ve yaklaşık 25 yıl bakım yapılmadan kullanılabilmektedir. Bu sayede panel başına düşen birim maliyet minimum seviyeye çekilmektedir (Muntasser vd., 2000:67; Al-Karaghulli ve Al-Sabounchi, 2000:145). Özellikle gelişmiş ülkelerin uyguladığı teşvikler ve ekolojik politikalar sayesinde FV panellerin ilk kuruluş maliyetini amorti etme süreleri 3–4 yıla kadar düşebilmektedir.

FV panellerden elektrik enerjisi kurulu gücü GW'lar seviyesindedir. Ayrıca, FV panellerden elektrik enerjisi kurulu gücü her geçen yıl hızla artmaktadır. Ancak Dünya'nın güneş enerjisi potansiyeli göz önünde bulundurulduğunda kurulu gücün henüz istenilen seviyelere ulaşmaktan çok uzak olduğu görülmektedir. Bunun temel nedeni FV panellerin maliyetlerinin henüz istenen fiyatlara inmemiş olması ve bilinçlendirme çalışmalarının yetersizliğidir.

FV panellerin üretim maliyetlerinin yüksek olması nedeniyle literatürde FV panellerden elektrik üretiminde verim artışına yönelik çeşitli teknikler geliştirilmiştir. Bu tekniklerin en önemlileri; güneş takip sistemleri, güneş panellerini soğutma sistemleri ve paneller üzerine gelecek gölge etkisinin azaltılması şeklindedir.

2. GÜNEŞ ENERJİ SİSTEMLERİ

2.1. Sabit FV Panel Sistemleri

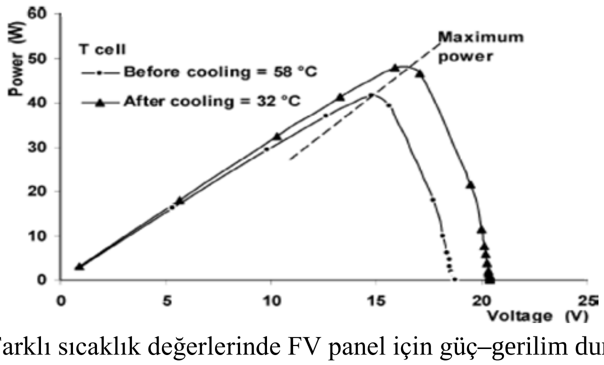
Sabit FV panel sistemlerine ait örnek uygulamalar Şekil 2'de gösterilmiştir.

Şekil 2. Sabit FV Panel Uygulamaları

2.1.1. Panel Soğutma Sistemleri

FV panellerin elektriksel verimini panel sıcaklığı olumsuz yönde etkilemektedir. Yani çalışma sıcaklığı arttıkça panelin elektriksel verimi azalmaktadır. Çünkü FV panellerin çalışma esnasındaki sıcaklığı ortam sıcaklığından daha yüksek değerlerdedir.

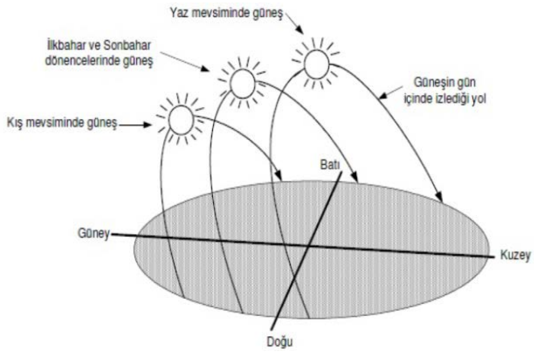
FV panelin sıcaklığını tayin eden ortam parametrelerinden en önemlileri hava sıcaklığı ve rüzgâr hızıdır (Rüstemli ve Dinçer, 2012:63; Cengiz ve Karakaş, 2015:123). Buna göre ortamın hava sıcaklığının artması panelin elektriksel verimini azaltmakta, rüzgâr hızının artması soğutucu etki yaptığından verim artışına katkı sağlamaktadır. Diğer bir deyişle panel sıcaklığı arttıkça olumlu yönde çok az bir akım artışı olsa da ciddi anlamda gerilim düşümü nedeniyle toplam güç %10'a kadar düşebilmektedir. Literatürde çeşitli iklimlendirme sistemleri kullanılarak FV panellerden %4 ile %10 arasında daha fazla elektrik üretilebileceğine dair çalışmalar bulunmaktadır. Yapılan bir örnek çalışmada farklı sıcaklık değerleri için herhangi bir FV panel tarafından üretilen gerilim – güç grafiği Şekil 3'te verilmiştir. Buna göre soğutma sistemi olmadan FV panelin enerji üretim faaliyeti esnasında çalışma sıcaklığı 58^{o}C yükselmiş ve bu esnada maksimum 41 W üretim yapılmıştır. Daha sonra FV panel soğutularak panel sıcaklığı 32^{o}C'ye kadar düşürüldüğünde üretilen maksimum gücün 49 W olduğu görülmüştür. Dolayısıyla FV panel sistemlerinin soğutulmasının verimlilik artışına katkı sağladığı görülmektedir (Odeh ve Behnia, 2009:499).



Şekil 3. Farklı sıcaklık değerlerinde FV panel için güç–gerilim durumu

2.2. Güneş Takip Sistemleri

Güneşlenmenin günün her saatinde en yüksek seviyede tutulabilmesi için FV panellerin güneşi takip etmesi gerekmektedir. Güneş ile panel yüzeyi arasındaki açı günün her saatinde dik olursa, verim en yüksek seviyeler de olur. FV panellerin güneşi dik açı ile görebilmesi için sabah gün doğumundan akşam gün batımına kadar güneşi takip etmeleri gerekir. Ancak gün boyu yapılan takip işlemi yılın her mevsimi için aynı kazancı sağlamaz. Çünkü dünyanın güneş eksenindeki hareketine bağlı olarak yıl içerisinde güneş her mevsim farklı yörüngeleri takip etmektedir. Güneşin mevsimlere göre izlediği yörüngeler Şekil 4'te verilmiştir (Bilgin, 2006).



Şekil 4. Güneşin mevsimlere göre izlediği yörüngeler

Güneş takip sistemleri, güneş ışınlarının FV panelin yüzeyine dik gelmesini sağlayarak elde edilen enerji kazanç miktarını arttırmaktadır. Bu sistemleri kullanarak FV panellerden elde edilen enerji kazancı yaklaşık olarak %35 oranında arttırılabilmektedir. Örneğin; NREL (National Renewable Energy Lab.) tarafından Denver, USA eyaleti için yapılan ölçümlere göre;

• Güneş takip sistemi olmayan sabit FV panellerden 5.5 kW/m2 yıllık elektrik üretilmiş,

• Tek eksen güneş takip sisteminde ise 7.2 kW/m2 yıllık elektrik üretilmiş,

• Çift eksen güneş takip sisteminde de 7.4 kW/m2 yıllık enerji üretimi yapılmıştır.

Güneş takip sistemleri özellikle yer kısıtlaması olan uygulamalarda nisbi olarak daha kullanışlı olmaktadır. Örneğin; gemi, karavan gibi araçlarda gerekli enerji elde etmek için kullanılacak panel sayısı güneş takip sistemleri ile daha az sayıya düşürülerek alandan tasarruf edilebilmektedir (Bilgin, 2006). Örnek bir güneş takip sistemi uygulamaları Şekil 5'te verilmiştir

Şekil 5. Güneş takip sistemi uygulamaları

2.3. Konsantre Güneş Enerji Sistemleri

CSP sistemleri büyük ölçekli enerji üretiminde kullanılabilen en önemli güneş teknolojisidir. Güneş enerjisi tam olarak tükenmezdir. Her yıl güneşten dünyaya 60.000

defa dünya elektrik tüketimine karşılık gelen 1.080.000.000 TWh güç ulaşır. Avrupa CSP birliğine (ESTELA) göre Güney Avrupa'da 2030 yılına kadar 62.000 MW CSP kurulabilir. Üretim miktarı 2030 yılında AB içinde üretilmesi öngörülen miktarın yaklaşık % 5 kadarına karşılık gelen 176 TWh/yıl olabilir. CSP santralleri yansıtıcı aynalar kullanılarak güneş enerjisini yüksek sıcaklıkla ısıya dönüştürerek elektrik üretir. Isı bir geleneksel generatöre aktarılır.

CSP sistemleri modülerdir, küçük ölçekli sistemlerden şebeke bağlantılı büyük sistemlere kadar imal edilebilirler. Dağıtık elektrik üretim sistemlerine uyumludurlar. Hibrit uygulamalar ile senkron çalışarak, tüm gün boyunca enerji sürekliliğine katkı sağlarlar. İşletme maliyeti açısından ekonomiktirler. CSP ile üretilen enerji direk olarak günışığına bağlıdır (Norm Enerji, 2014:04.04.2015) . Dünyada yaygın olarak kullanılan konsantre güneş enerji sistemleri şöyle sıralanabilir;

- **Parabolik oluk sistemleri**

Güneşin enerjisi parabolik oluk biçimindeki yansıtıcı ile bir alıcı boru üzerinde odaklanır. Bu enerji boru içinde akan yağı ısıtır ve bu ısı bir geleneksel buharlı generatörde elektrik üretmek için kullanılırlar. Oluk tasarımları geceleri de birkaç saat elektrik üretimini mümkün kılarak termal depolama ile birlikte çalışabilir. Hali hazırda tüm parabolik oluk santralleri hibrit santrallerdir. Hibrit santraller düşük güneş radyasyonu durumunda açığı kapatmak için fosil yakıtlar kullanır. Tipik olarak, bir doğal gaz ateşlemeli ısı veya gaz buhar ısıtıcı kullanılır, oluklar aynı zamanda mevcut kömür yakmalı santrallerle de entegre olabilir (Norm Enerji, 2014:04.04.2015). Parabolik oluk sistemi uygulaması Şekil 6'da gösterilmiştir.

Şekil 6. Parabolik oluk sistemi uygulaması

- **Kule (Baca) Sistemleri**

Bir güç kulesinde, güneş ışınımı birçok büyük ölçekli ayna kullanılarak kulenin tepesindeki bir alıcıya odaklanır. Alıcı içindeki bir ısı transfer akışkanı buhar üretmek üzere ısıtılarak bir geleneksel türbin-generatörde elektrik üretmede kullanılır. Örnek Kule (Baca) sistemi uygulamaları Şekil 7'de gösterilmiştir.

Şekil 7. Kule (Baca) sistemi uygulamaları

- **Stirling Motorlu Parabolik Çanak Sistemleri**

Bir çanak güneş radyasyonunu alıcıya odaklar. Sistem güneşi takip eder. Toplanan ısı doğrudan alıcının üzerindeki bir ısı motoru tarafından kullanılır. Küçük ölçekli bireysel kullanıcı veya çok daha büyük santral amaçlı uygulamaları mevcuttur. Stirling motorlu parabolik çanak sistemi uygulamaları Şekil 8'de görülmektedir.

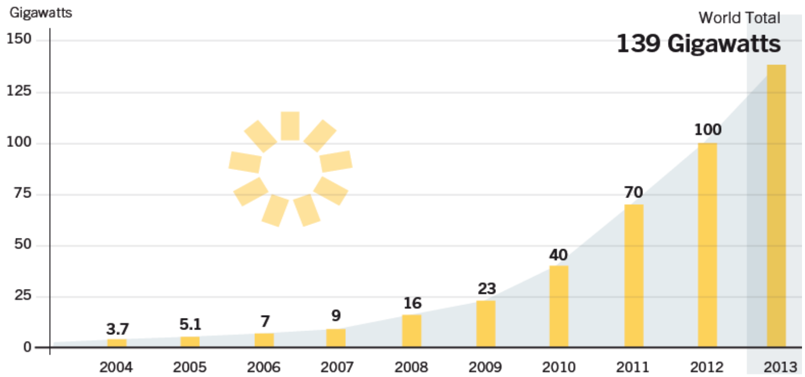
Şekil 8. Stirling motorlu parabolik çanak sistemi uygulamaları

Dünya CSP kurulu gücü 430 MW olup, halihazırda planlama aşamasında 5500 MW kapasiteli 45 adet CSP projesi vardır. Dünyada lider ülkeler ABD ve İspanya'dır (Norm Enerji, 2014:04.04.2015).

3. GÜNEŞ POTANSİYELİ AÇISINDAN TÜRKİYE VE DÜNYA

Ülkemizin güneş enerjisi potansiyeli İspanya ile yaklaşık olarak denk diğer tüm Avrupa ülkeleri güneş potansiyelinden daha fazla olup, ortalama 1000–1450 kWh/m².yıl değerindedir. Dolayısıyla Türkiye'nin güneş enerjisi potansiyeli fosil enerji kaynaklarının 10.000 katından fazladır. Dünya'nın tüm yüzeyine denk gelen güneş enerjisi potansiyeli bilinen kömür rezervlerinin 50 katına, bilinen petrol rezervlerinin 800 katına denktir [9].

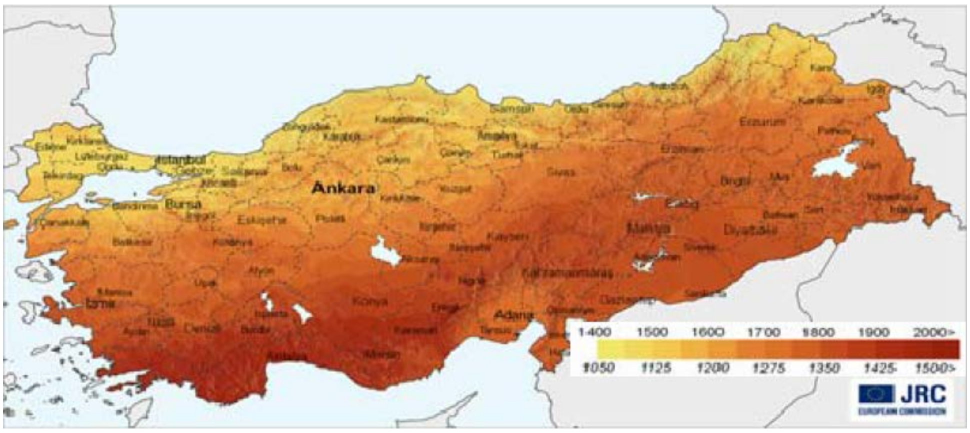
Uluslararası Enerji Ajansı, 2050 yılında küresel elektrik enerjisi üretiminin %11 gibi önemli bir oranının güneş enerjisinden sağlanacağını öngörmektedir (Bilgin, 2006). Dünya'da güneş enerjisinden elektrik enerjisi üretimi miktarı 2013 yıl sonu itibari ile 139 GW seviyesine ulaşmıştır. Günümüzde Almanya, İtalya, Çek Cumhuriyeti ve diğer AB ülkeleri FV pazarlar haline gelmişlerdir (Solar Energy, 2015:03.04.2015). Şekil 9'da Dünya'da güneş enerjisinden elektrik enerjisi üretiminde ülkelerin kapasiteleri görülmektedir. (Turkish Environmental Technologies, 2014:1).



Şekil 9. 2004–2013 arası küresel güneş enerjisi kapasitesi

Devlet Meteoroloji İşleri Genel Müdürlüğünde (DMİ) mevcut bulunan 1966–1982 yıllarında ölçülen güneşlenme süresi ve ışınım şiddetine göre Türkiye'nin ortalama yıllık toplam güneşlenme süresi 2640 saat (günlük toplam 7,2 saat), ortalama toplam ışınım şiddeti 1,311 kWh/m²-yıl (günlük toplam 3,6 kWh/m²) olduğu tespit edilmiştir. Türkiye, yıllık 110 gün güneş enerjisi potansiyeline sahip olup, metrekare başına 1.100 kWh elektrik enerjisi üretilebilecek durumdadır.

Enerji ve Tabii Kaynaklar Bakanlığı – Elektrik İşleri Etüt İdaresi verilerine göre Türkiye’de 56.000 MW termik santral kapasitesine eşdeğer güneş enerji kapasitesi bulunmakta ve yıllık yaklaşık 380 milyar kWh elektrik üretilebilmektedir. Ancak Türkiye’deki faydalanılan toplam güneş pili (FV) kapasitesi 1 MW civarındadır. Elektrik santralleri kurulu gücümüzün 5000 katından fazladır. Şekil 10’da Avrupa Birliği Enerji Komisyonu’nun araştırmalarına göre, Türkiye’nin güneş ışınım yoğunluğu gösterilmiştir (Demircan ve Alakavuk, 2008:1).



Şekil 10. Türkiye’nin şehirlere göre güneş ışınım yoğunluğu

Ülkemiz, coğrafi konumu itibariyle sahip olduğu güneş enerjisi potansiyeli açısından birçok ülkeye göre şanslı durumdadır. Türkiye'nin en fazla güneş enerjisi alan bölgesi Güney Doğu Anadolu Bölgesi olup, bunu Akdeniz Bölgesi izlemektedir. Türkiye ısısal güneş enerjisi üretimi ve kullanımı açısından Çin, ABD ve Japonya’dan sonra dünya dördüncüsü durumundadır.

Türkiye'nin brüt güneş enerjisi potansiyeli, 87,5 milyon ton petrole eşdeğerdir. Bu değerin 26,5 milyon tonu ısı kullanımına, 8,75 milyon tonu ise elektrik üretmeye uygundur. Türkiye, günümüzde bu potansiyelin yalnızca yüz binde 2'sinden faydalanmaktadır (Solar Energy, 2015:03.04.2015).

Türkiyede konsantre güneş enerjisi teknolojisiyle Mersin'de kurulumu tamamlanmış 5 MW'lık güce sahip kule tipi yoğunlaştırılmış güneş enerji tesisi 100 dönüm araziye kurulmuş ve bu arazinin 30 dönümlük bölümü yansıtıcı aynalar tarafından kullanılmaktadır.

Bu tesiste 510 adet heliostat yansıtıcı, güneşi gün içerisinde uygun açılarla takip ederek, güneş ışınlarını 50 metre yükseklikteki bir kule üzerindeki alıcıya yansıtarak yüksek sıcaklık ve basınçta buhar elde edilmektedir. Elde edilen yüksek sıcaklıktaki buhar ile elektrik üretilmektedir.

4. GÜNEŞ ENERJİSİ İÇİN VERİLEN KAMU TEŞVİKLERİ

Dünya enerji piyasasında AB ülkeleri enerji ithalatında birinci, enerji tüketiminde ise ikinci sıradadır. AB, enerji sektöründeki yenilenebilir enerji payını 2020 yılında %20'ye, 2040 yılında ise %50'ye çıkarmayı da hedeflemektedir. Avrupa Birliği ülkeleri, YEK kullanımını arttırmak için çeşitli mali teşvikler, vergi teşvikleri ve üretim teşvikleri vermektedir. 1980 sonrası yenilenebilir enerji üretimiyle ilgili projeler desteklenmiş, yatırım ve vergi teşvikleri yapılmıştır.

Almanya'da çatılara yerleştirilen güneş panelleriyle elektrik üretimi yapılarak ihtiyaç fazlası enerji dağıtım şirketlerine satılmaktadır. 2013 yılı itibariyle, Almanya'da kurulu olan güneş panellerinin %40'ı (1–10 kW) konutlarda, %50'ye yakın bir oranı (10–100 kW) ticari çatı sistemlerinde ve %10'a yakın bir oranı da çok büyük güneş güç santrallerinde kullanılmaktadır.

Günümüzde güneş panelleriyle elektrik üretimine devletler tarafından alım garantisi verilmektedir. Verim düşük olsada bu sayede güneşten elektrik üretimi artmıştır. Almanya'da güneşten üretilen elektriğin fiyatı 40 €c/kWh ve yatırım tutarının %25'i kadar devlet sübvansyonu uygulanmaktadır. Avusturya da toplam enerji tüketiminin %23 YEK'lerden karşılanmaktadır. Belçika'da YEK yatırımlarında %15'e kadar devlet yardımı yapılmakta ve elektrik üreticilerine 0,02449 €/kWh teşvik verilmektedir. Toplam destek miktarı yatırım maliyetinin maksimum % 30'u ile sınırlıdır. Danimarka'da elektrik dağıtım şirketleri YEK'ten üretilen enerji kullandıkları takdirde 1,5 €c/kWh teşvik almaktadırlar. Fransa'da YEK'li santral inşasında kullanılan toplam bedelin vergi tutarının %25'i alınmamaktadır. İngiltere'de YEK'ten üretilen elektriğin kullanımını zorunlu kılan kanunlar yürürlüktedir. İsveç, sermaye bedelinin % 25'ine kadar kurulan her kW başına 332€ destekleme verilmektedir. İtalya, YEK'li üretim yatırımlarına %40 kadar destekleme vermektedir. Güneş enerjisi projelerinde ise, katma değer vergisi %20 yerine %10 olarak alınmaktadır. Yunanistan, Girit Adası'ndaki güneş yatırımlarının %50'sine teşvik ödemektedir (Kaya, 2006:1; Solar Energy, 2015:03.04.2015).

FV sektöründe, güneş panelinden elektrik üretimini ilk zamanlarda kuruluş maliyetlerini karşılamazken günümüzde verimliliğin artmasıyla bu tip sistemler karlılığa geçmiştir. 1998 yılında hiç FV paneli olmayan İspanya, 10 yıl içinde kurduğu güneş santralleri ile güneşten elektrik üretiminde hatırı sayılır bir güce ulaşmıştır. Almanya, ABD, Çin İtalya Japonya izlemektedir. Bu hızlı gelişim tüketicilere verilen teşvikler ile sağlanmaktadır. Dünyada ülkeler tarafından güneş enerjisi için verilen kamu teşvikleri Tablo 1.'de gösterilmiştir.

Tablo 1. Dünya'da ülkeler tarafından güneş enerjisi için verilen kamu teşvikleri

Ülkeler	Sabit fiyat garantisi	Sübvansiyon (indirim)	Yatırım teşvik	Vergi indirimi	Kamu yatırımı	Kamunun enerji alım garantisi
Almanya	x	x	x	x	x	
Avusturya	x	x	x		x	
İngiltere	x	x		x	x	
Danimarka	x	x	x	x	x	x
Finlandiya	x	x		x		x
Fransa	x	x	x	x	x	x
Hollanda		x	x	x		
İrlanda	x	x	x			x
İspanya	x	x	x	x	x	
İsveç		x	x	x	x	
İtalya	x	x	x	x	x	
Lüksemburg	x	x	x	x		
Norveç		x		x	x	
Portekiz	x	x	x	x	x	x
Yunanistan	x	x	x		x	
Türkiye			x			

5. TÜRKİYE'DE İLGİLİ KANUN VE TASARILARDA GÜNEŞTEN ELEKTRİK ÜRETİMİ

Dünyadaki mevcut durum Türkiye açısından değerlendirildiğinde güneş enerjisi açısından potansiyelimizi kullanmadığımız görülmektedir. Bilindiği üzere ülkemiz, güneş enerjisi kuşağında ve güneş enerjisi potansiyeli dünya ortalamasının çok üzerindedir. Avrupa Birliği (AB) ülkeleri arasında neredeyse en fazla güneş enerjisi potansiyeline sahip ülke Türkiye'dir. Ancak güneş enerjisinden elektrik üretimi bir kaç MW kadardır. Henüz istenen düzeylerdeki YEK'li kurulu güce ulaşma hedeflerinden de çok uzaktadır.

Elektrik piyasası yönetmeliği YEK'li elektrik kullanımını arttırmayı amaçlamakta olup, ülkemizde de bazı teşvikler ve düzenlemeler mevcuttur. Ancak Avrupa ülkeleriyle kıyaslandığında teşviklerin çok düşük boyutlu olduğu görülmektedir. Şu anki teşviklerde lisans ücreti muafiyeti ve YEK'ten üretilen elektiriği kullanan üretim tesislerinin santrallerin tamamlanmasından sonraki 8 yıl için lisans ücreti ödenmemesi gibi teşvikler mevcuttur. 2005 tarihinde 25819 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren 5346 sayılı kanunda YEK'ten üretilen elektriğe 10 yıl boyunca kWh başına 5 cent teşvik verilmektedir. Ayrıca 4628 sayılı yasada yapılan değişiklik ile kendi ihtiyaçlarını karşılamak üzere 500 kW'a kadar tesis kuran bireysel kullanıcıların şirket kurma ve lisans zorunluluğundan muafiyetleri sağlanmıştır. Güneş enerjisinden yararlanma potansiyeli, Türkiye'nin tüm bölgeleri için ciddiyetle ele alınmasını gerektiren bir büyüklüktedir. Güneş enerjisinin aktif yöntemle yapı ısıtılmasından, seraların ısıtılmasına, tarımsal ve endüstriyel kurutmaya, endüstriyel ısı uygulamalarına, soğutmaya, metalürjik fırınlara, fotokimyasal ve foto biyolojik işlemlere dek çeşitli kullanım alanlarındaki araştırmaların desteklenmesinin yanı sıra uygulamaların yaygınlaştırılmasına da çalışılmalıdır. Bu çerçevede güneşli soğutma konusu, ülkemiz koşullarında tarımsal ürünlerin ve gıda sanayi ürünlerinin saklanılması açısından üzerinde önemle durulması gereken bir seçenektir.

6. SONUÇLAR

FV panellerin elektrik enerjisi üretiminde maliyet-etkin yani ekonomik olabilmeleri için FV panel sistemlerine ek olarak çeşitli ek entegre sistemleri FV panellerden elektrik enerjisi kazancının arttırılarak panellerin kendini daha kısa sürede amorti etmeleri sağlanabilir. Böylece maliyeti fazla olan FV panellerin daha az maliyete sahip olması gerçekleştirilebilir. FV panellerin elektrik enerjisi kazançlarını arttıracak en önemli sistemler; güneş takip sistemleri ve iklimlendirme sistemleridir. İklimlendirme sistemleri, FV panellerin elektrik enerjisi kazançlarını az oranda arttırsa da kullanılacağı bölge itibariyle duruma göre tercih edilebilir. Ancak güneş takip sistemleri ile FV panelin güneşi gün boyunca takip etmesi sağlanarak güneşten optimum düzeyde yararlanılmalıdır. Yapılan birçok çalışmada güneş takip sistemlerinin sabit sistemlere göre FV panellerin elektrik enerjisi kazançlarını önemli oranda arttırdığı tespit edilmiştir. Bundan dolayı uygulanacak FV panel sistemlerinde güneş takip sistemlerinin kullanımı tavsiye edilmektedir. Bundan daha da önemli olan ise FV panel sistemleri yerine CSP sistemlerin kullanılması gerekliliğidir. Çünkü ülkemiz güneş enerjisi potansiyeli açsından AB ülkeleri arasında ilk sırada olmasına rağmen bu potansiyeli yanlış kullanmakta ve bu potansiyelden yeteri kadar faydalanmamaktadır. Örneğin Almanya FV panelli güneş enerjisi üretimini benimsemişken, Türkiye ile benzer sıcaklık ve iklim koşullarına sahip İspanya ise FV panel sistemine ihtiyaç duyulmayan ısı kaynaklı CSP sistemli güneş üretim yöntemlerini tercih etmektedir. Ülkemiz iklim koşullarına benzerlik gösteren ispanya örneği Türkiye için daha verimli bir üretim yöntemi olabilecekken, gerek kültürel gerekse ekonomik ilişkiler nedeniyle Almanya'nın güneşten faydalanma yöntemi olan güneş ışınımından faydalanarak FV paneller aracılığıyla elektrik üretmeyi tercih etmekteyiz. Oysaki ülkemizde Almanya'nın sıcaklık ve rakım değerlerine uygun olan yerler Doğu Anadolu bölgesinin bir bölümü ve yüksek yerleşim yerleri olup, söz konusu bu yerler tüm güneş potansiyelimizin %20'sine karşılık gelmektedir. Türkiye'nin asıl güneş potansiyeli ısı kaynaklıdır ve tüm güneş potansiyelimizin %80'nine tekabül etmektedir. Dolayısıyla ülkemiz ile benzer iklim koşullarına sahip olan İspanya model olarak seçilebilir. İspanya son 10 yılda ısı kaynaklı CSP güneş potansiyelini kullanarak tüm Dünya'da güneşten elektrik üretimi açısından 4. sıraya yükselmiştir. Ülkemizde güneşten elektrik üretiminde SMGTS gibi bazı CSP sistemli üretim yöntemleri benimsenmelidir. Zira sabit FV panelli sistemlerde sıcaklık dezavantaj olup verimi azaltırken, SMGTS gibi ısı kaynaklı CSP sistemlerinde ise sıcaklık verimi yükselten en önemli parametredir.

Ülkemiz enerjide dışa bağımlı bir ülkedir. Bu nedenle sürdürülebilir bir enerji politikasına sahip olmalıdır. YEK'ten üretilen elektrik için ulusal bazda enerji politikaları oluşturulmalıdır.

Güneş enerjisi açısından zengin üretim potansiyelimiz değerlendirilmelidir. Zira ülkemizin güneş potansiyeli çok yüksek olmasına rağmen birçok AB ülkesine göre güneşten faydalanma oranımız çok düşük düzeylerdedir.

Türkiye 2009 yılında tüm enerji ihtiyacının %52'sini kendi enerji kaynaklarıyla karşılarken 2014 yılında tüm enerji ihtiyacımızın %29'unu karşılayabilmektedir. Buradan anlaşılacağı üzere YEK'lere verilen teşvik ve desteklerin yetersiz olması enerji ithalat açığını arttırmıştır.

Güneş enerjisi ile ilgili uygulamalar, konutlar ve dış aydınlatma için teşvikler özendirilmelidir. Çünkü ülkelerin verdiği teşvikler oranında halkın yaygın bir şekilde güneş enerjisinden elektrik üretimini kullandığı Tablo 1'den görülmektedir. Yani Almanya İspanya ve Fransa gibi ülkeler kendi vatandaşlarına birçok konuda teşvik verdiğinden ve bilinçlendirme çalışmaları yaptıklarından güneşten elektrik üretiminde daha ön sıralarda yer almaktadırlar. Güneş potansiyeli en çok olan Avrupa ülkesi olmasına rağmen, Türkiye bu sıralamada en son sırada yer almaktadır. Çünkü en az bilinçlendirme ve teşvik çalışması yapan ülkedir.

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İKLİM DEĞİŞİKLİĞİ VE TÜRKİYE'DE SÜRDÜRÜLEBİLİR ENERJİ

CLIMATE CHANGE AND SUSTAINABLE ENERGY IN TURKEY

Mehmet Harun TOPAY[*]

ÖZET

Dünya'da fosil yakıtların yaygın olarak kullanılması, ormanların hızlı bir şekilde azalması, yanlış arazi kullanımı, sanayileşme ile birlikte atmosfere gönderilen sera gazlarının atmosferdeki birikimleri, Sanayi İnkılabından bu yana hızla artmaktadır. .Bu durum ise, doğal sera etkisini kuvvetlendirerek ,şehirleşmeyle birlikte dünyanın yüzey sıcaklıklarının artmasına sebep olmaktadır.19. yüzyılın sonlarında başlayan ısınma, 1980'li yıllara daha da belirginleşerek her yıl bir önceki yıla göre küresel sıcaklık bariz şekilde artmıştır. 1998, hem küresel ortalama hem de kuzey ve güney yarımkürelerin ortalamaları açısından, 1860 yılından beri yaşanan en sıcak yıl olmuştur.

Ülkeler için önemli bir sorun haline gelmiş olan küresel ısınma, tüm insanlığı ilgilendirdiği için 20 yılı aşkın bir zamandır konuyla ilgili paydaşlarca çalışmalar sürdürülmektedir.

Bununla ilgili konferanslar, sempozyumlar, toplantılar düzenlenmekte, sivil toplum kuruluşları tarafından ve hükümetler tarafından çalışmalar yürütülmektedir.

Yenilenebilir enerji kaynaklarını, güneş enerjisi, rüzgar enerjisi, biyokütle enerjisi, hidrojen enerjisi ve hidrolik enerji, jeotermal enerji, dalga enerjisinden oluşan su gücü enerjileri ile füzyon enerjisi olmak üzere sınıflandırabiliriz. Yenilenebilir enerji kaynakları, güneşten gelen enerjinin doğrudan yada dolaylı olarak kullanımı sonucu elde edilmektedirler. Yenilebilir enerji kaynakları, miktarlarının sınırlı olmaması, çevreye daha az zarar vermeleri ve güvenli olmaları nedeniyle fosil yakıtlardan daha avantajlıdırlar. En fazla bilinen ve en hızlı büyüme kaydeden, ülkelere sürdürülebilir kalkınmayı sağlamada yardımcı olacak yenilenebilir enerji kaynakları, güneş ve rüzgar enerjisidir. Biyokütle ve su gücü de tükenmeyen enerji kaynaklarıdır.

Anahtar kelimeler: İklim Değişikliği, Sürdürülebilir Enerji, Güneş Enerjisi.

ABSTRACT

The widespread use of fossil fuels in the world, rapid depletion of forests,incorrecct use of land,accumulation in the atmosphere of greenhouse gases to the atmosphere along with industrialization, the industry is growing rapidly since the revolution. In this case, strengthening the natural greenhouse relationship with urbanization has led to an increase in the Earth's surface temperature. Starting in the late 19th century warming,more obvious become clearer global temperatures compared to the previous year has increased every year as compared to 1980. In 1998, the global average in terms of both average of the northern and southern hemisphere, has occured the warmest year since 1860.

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Global warming, which has become a major problem for the country, it is a time for all of humanity more than 20 years working on the issue of interest to stakeholders is ongoing. Conferences about it, symposia, meetings are held, the work is carried out by civil society organizations and governments.

Renewable energy sources, solar energy, wind energy, biomass energy, hydrogen energy and hydraulic energy, geothermal energy, water power energy,which consists of wave energy,can classify including fusion energy.

Renewable energy sources, energy from the sun is obtained directly or indirectly as a result of use. renewable energy sources, the lack of a limited amount of fossil fuels is more advantageous because of less environmentally damaging, and they are safe. The most widely known and recorded the fastest growth, renewable energy sources will help countries to ensure sustainable development, solar and wind energy. biomass and energy are infinite source of the water power.

Key Words: Climate Change, Sustainable Energy, Solar Energy

1.GİRİŞ

İklim sistemi, Yerküre'nin yaklaşık 4.5 milyar yıllık tarihi boyunca milyonlarca yıldan on yıllara kadar tüm zaman ölçeklerinde doğal olarak değişme eğilimi göstermiştir. Etkileri jeomorfolojik ve klimatolojik olarak iyi bilinen en son ve en önemli doğal iklim değişiklikleri, 4. Zaman'daki (Kuvaterner) buzul ve buzularası dönemlerde oluşmuştur. Ancak 19. yüzyılın ortalarından beri, doğal değişebilirliğe ek olarak, ilk kez insan etkinliklerinin de iklimi etkilediği yeni bir döneme girilmiştir. Günümüzde iklim değişikliği, sera gazı birikimlerini arttıran insan etkinlikleri de dikkate alınarak tanımlanabilmektedir.

Ülkeler için önemli bir sorun haline gelmiş olan küresel ısınma, tüm insanlığı ilgilendirdiği için 20 yılı aşkın bir zamandır konuyla ilgili paydaşlarca çalışmalar sürdürülmektedir.

Bununla ilgili konferanslar, sempozyumlar, toplantılar düzenlenmekte, sivil toplum kuruluşları tarafından ve hükümetler tarafından çalışmalar yürütülmektedir.

Enerji, günlük yaşamın her anında ve yapılan her etkinlikte insanın en önemli gereksinimidir. Yeterli düzeyde ve çevresel değerleri tehdit etmeyen enerji sağlama ve kullanma toplumların en önemli sorunudur. Enerji sağlamada fosil yakıtlar ve yenilenebilir kaynaklar olmak üzere başlıca iki kaynak vardır. Örneğin, Amerika Birleşik Devletleri ve diğer sanayileşmiş ülkelerde enerjinin nerdeyse tamamı kömür, doğal gaz gibi fosil yakıtlardan elde edilmektedir. Kullanımı esnasında ise, enerjinin nasıl üretildiği ya da çevreye vereceği zarar pek fazla göz önünde bulundurulmamaktadır. Önemli olan enerjinin hayatımıza ulaşmasıdır. Özellikle gelişmiş ülkelerdeki yaşam tarzını tanımlayan ve onu geleneksel yaşam biçimlerinden farklılaştıran ve üstünlük sağlayan özellik, enerji bolluğudur.

Yenilenebilir enerji kaynaklarının kullanımı tüm insanlığın geleceğini güvence altına almak için yaşamsal bir öneme sahiptir. Karbondioksit gazının atmosferde yoğun olarak birikmesi, küresel ısınmaya yol açmaktadır. Meydana gelen sıcaklık artışı, dünya ikliminin değişmesine, kutuplardaki buzulların erimesine, deniz seviyelerinin yükselmesine ve neticede birçok verimli tarım topraklarının sular altında kalmasına neden olacaktır. Küresel ısı artışını önlemenin ilk koşulu, fosil yakıt kullanımını azaltarak, enerji altyapısını yenilenebilir enerjileri kullanmaya uygun duruma getirmektir.

Yenilenebilir enerji kaynaklarını, güneş enerjisi, rüzgar enerjisi, biokütle enerjisi, hidrojen enerjisi ve hidrolik enerji, jeotermal enerji, dalga enerjisinden oluşan su gücü enerjileri ile füzyon enerjisi olmak üzere sınıflandırabiliriz. Yenilenebilir enerji kaynakları, güneşten gelen enerjinin doğrudan ya da dolaylı olarak kullanımı sonucu elde edilmektedirler. Yenilebilir enerji kaynakları, miktarlarının sınırlı olmaması, çevreye daha az zarar vermeleri ve güvenli olmaları nedeniyle fosil yakıtlardan daha avantajlıdırlar. En fazla bilinen ve en hızlı büyüme kaydeden, ülkelere sürdürülebilir kalkınmayı sağlamada yardımcı olacak yenilenebilir enerji kaynakları, güneş ve rüzgar enerjisidir. Biokütle ve su gücü de tükenmeyen enerji kaynaklarıdır.

Günümüzde teknolojinin gelişmesi, sanayileşme gibi etkenlere bağlı olarak küresel ısınma kavramı ortaya çıkmıştır ve bu kavram tüm insanlığı etkilemeye devam etmektedir. Küresel ısınmanın etkilerini minimum düzeye indirgemek, geleceğe daha temiz bir çevre bırakabilmek ve gençlerim izin Türkiye'de daha temiz çevrede yaşayabilmesi için sürdürülebilir, temiz enerji kaynaklarını tercih etme zarureti bulunmaktadır.

2.İKLİM DEĞİŞİKLİĞİ

Dünya'da fosil yakıtların yaygın olarak kullanılması, ormanların hızlı bir şekilde azalması, yanlış arazi kullanımı, sanayileşme ile birlikte atmosfere gönderilen sera gazlarının atmosferdeki birikimleri, Sanayi İnkılabından bu yana hızla artmaktadır. Bu durum ise, doğal sera etkisini güçlendirerek, şehirleşmeyle birlikte dünyanın yüzey sıcaklıklarının artmasına sebep olmaktadır.

Dünya var olduğu günden bu yana iklim değişiklikleri süregelmektedir. Atmosfer bilimcilerine göre 20. Yüzyılın ortalarına kadar doğal etkenler ve süreçlerle meydana gelen değişimler, 1960'lardan sonra insanların yapmış olduğu faaliyetlerin iklim değişikliklerinde daha etkin olduğu görüşü ağırlık kazanmıştır. Ancak, özellikle sanayileşme sonrasında ve insanın bitip tükenmek bilmeyen ihtirasları ile birlikte küresel ısınma dediğimiz kavram ortaya çıkmıştır.

İklim, en basit tanımıyla herhangi bir alandaki hava şartlarını uzun yıllara ait ortalama durumudur. İnsan müdahalesi olmaksızın iklimde belli aralıklarla değişiklikler gözlenmektedir. Fakat, özellikle 20. Yüzyılın sonlarından itibaren teknolojide meydana gelen gelişmeler, sanayileşmenin hız kazanması gibi çeşitli faktörlere bağlı olarak sera etkisi, küresel ısınma olarak adlandırdığımız ve tüm insanlığı etkileyen kavramlar literatürde yerini almıştır.

İklim olaylarının ortalamasından sapmalar şeklinde karşımıza çıkan iklim deşikliği kavramı ise, 1988 yılının sonunda düzenlenen Hükümetler Arası İklim Değişikliği Paneli (IPCC) ile ilk defa politik (Paterson ve Grubb, 1992: 293–294) ve ekonomik bir sorun olarak karşımıza çıkmıştır. İklim değişikliği kavramı son yirmi yıllık periyotta literatürde farklı şekillerde tanımlanmıştır.

İnsanlar tarafından atmosfere salınan gazların sera etkisi yaratması sonucunda dünya yüzeyinde sıcaklığın artmasına küresel ısınma denir. Bu olay son 50 yıldır iyice saptanabilir duruma gelmiş ve önem kazanmıştır.

İklim sisteminde vazgeçilmez bir yere sahip olan sera gazları, güneş ve yer radyasyonunu tutarak, atmosferin ısınmasında başlıca etkendirler. Sera gazlarının bulunmaması durumunda yeryüzünün sıcaklığının bugüne göre 30 ^{o}C daha soğuk olacağı hesaplanmıştır. Son yıllarda atmosferde çeşitli insan aktivitelerinden kaynaklanan nedenlerle karbondioksit, metan, ozon ve di azot monoksit gibi gazlardan oluşan sera gazları, yeryüzü sıcaklığında belirgin artmalara sebep oluyor. Sera etkisinin artması, troposferin ısınmasında, stratosferin de soğumasında en önemli etken olarak gösteriliyor.

Atmosferde doğal olarak bulunan ve dünyamızın aşırı soğumasını engelleyen sera gazlarının salınımı, özellikle karbon dioksit, metan ve nitrojen oksit sanayi devriminden bu yana insan faaliyetleri sonucu artış göstermiştir. Doğal geri emme süreçleri zorlanmış ve atmosferdeki sera gazı konsantrasyonları sürekli olarak yükselmiş ; sonuç olarak da küresel ısınma dediğimiz dünyamızın yüzeyinde ortalama sıcaklığın giderek artması süreci başlanmıştır. Çeşitli ülkelerden 2500 bilim adamının katkıda bulunduğu Hükümetler arası İklim Değişikliği Paneli'nin (IPCC) araştırmaları sonucu, 1995 yılından bu yana iklim değişikliği ve küresel ısınmanın inkar edilemez gerçekler olduğu kabul edilmiştir.

Bilim adamları artık araştırmalarını oluşturdukları çeşitli iklimsel senaryoların bölgesel ve yöresel etkileri üzerine odaklamışlardır. Genel kanı ılıman ve yağışlı bölgelerin daha fazla yağış alacağı ve ısı yükselmesinin tarım ürünlerinde rekolte artışı gibi yararlarının olabileceği yönündedir. Ancak, taşkınlar ve fırtınalar gibi doğal afetlerdeki artışlar da işin olumsuz yönü olabilecektir. Ülkemizin yer aldığı Akdeniz ve Orta Doğu bölgesinde aksine bir gelişim, yani kuraklık artışı ve tarımsal verimde düşüş öngörülmektedir.

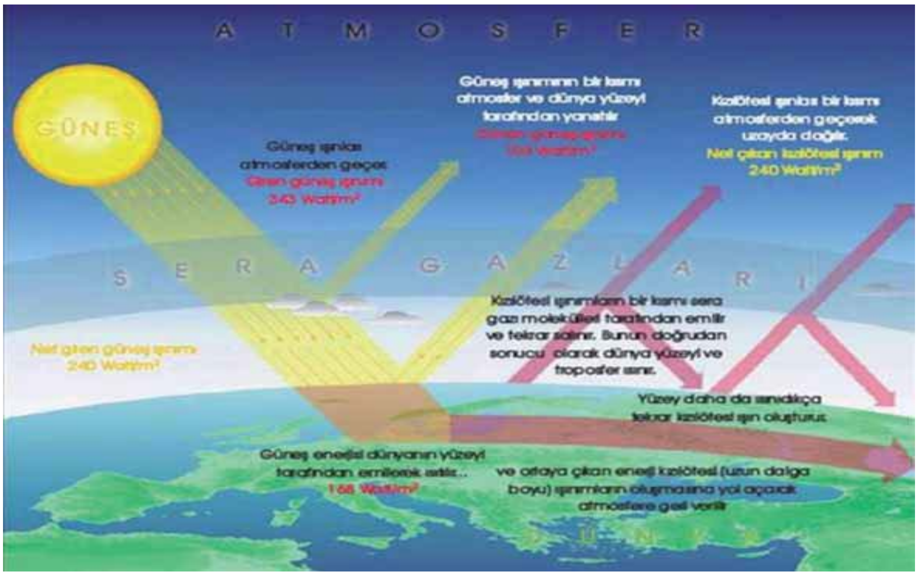
Bu arada, orta vadede, hatta belki de uzun vadede, tek seçeneğimiz değişen iklim koşulları altında yaşamayı, tarım yapmayı, su kullanmayı öğrenmek durumundayız. Bunun yolu da hem toprağı, hem suyu, israf etmeden, kirletmeden, bozmadan, kullanmayı öğrenmekten geçmektedir.

Sıcak ve Soğuk hava dalgalarına karşı en duyarlı ve zayıf bölge İç Anadolu ve Doğu Anadolu bölgesidir. Yazları Basra alçak basınç sisteminin etkisiyle Güneydoğu Anadolu bölgesi üzerinden gelen sıcak ve kuru hava iç bölgelerde çok daha etkili olmaktadır.

2.1. Küresel Isınma (Sera etkisi)

Fosil yakıtların yoğun bir şekilde yakılması ile başta karbondioksit olmak üzere, atmosferde sera gazlarının giderek artması ve buna bağlı olarak dünyamızın ısınması, sera etkisi (küresel ısınma) olarak tanımlanmaktadır.

Sera etkisi yapan gazlar arasında, karbondioksit, metan, karbon monoksit, hidrokarbonlar ve kloroflora karbonları sayılabilir. Küresel ısınmanın en büyük etkisinin, kutuplardaki buzulların erimesine yol açması ve denizlerin yükselerek bir çok ülkenin sular altında kalması olacağı belirtilmiştir. Fosil yakıt tüketiminin aynı hızla sürmesi sonucunda, önümüzdeki 50 yıl içinde dünyamızın sıcaklığının 5 derece artacağını ve bunun da büyük felaketlere yol açacağını göstermektedir. Ayrıca, sera etkisi nedeniyle yeryüzü sıcaklığının artması ile denizlerden göllerden ve nehirlerden daha çok buharlaşma olacak, dolayısıyla daha fazla yağmur ve doğal sel felaketleri olacaktır (Muslu, 2000).



Şekil 1. Sera etkisi (İklime Özen Göstermek, 2006

Türkiye Kyoto Protokolü'ne 2009 yılında taraf oldu.

Türkiye'nin iklim değişikliği ile mücadele konusundaki yol haritası olan Ulusal İklim Değişikliği Strateji Belgesi 2010 yılında kabul edildi.

Ülkemiz Avrupa Birliği Bakanlığı tarafından hazırlanan Avrupa Birliği Sürecinin Çevre Alanına Katkıları konusunda hazırlanan broşürde:

"AB iklim değişikliği politikalarına uyum çalışmaları sayesinde, birçok bölgeyi ve

sektörü (enerji, tarım, taşımacılık, turizm, sağlık vb.) olumsuz etkileyecek sorunlarla mücadele edilecek ve önlemler alınacak.

Sera gazı emisyonlarının izlenmesi ve azaltılması, ozon tabakasının korunması ve iklim değişikliğinin olumsuz etkilerine karşı dayanaklılığın artırılması için güçlü politikalar ortaya konacak."denmektedir.

Biz de önümüzdeki süreçte hem çevreye duyarlı, hem ekonomik hem de sürdürülebilir dediğimiz enerji kaynakları kullanımının artacağı kanaatini taşıyoruz.

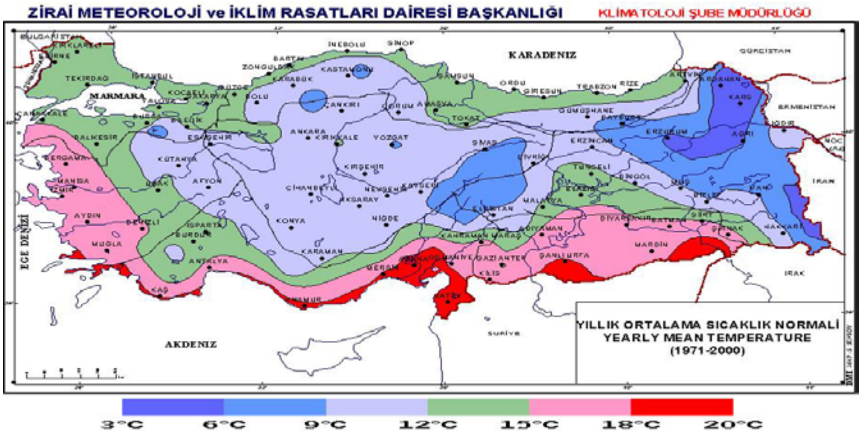
2.2. Asit Yağmurları

Özellikle kömür ve petrol gibi fosil yakıtlardan havaya atılan kükürt dioksit, azot oksitler ve karbon gazları, yağmur damlaları ile birleştirilerek sırayla sülfürik asit, nitrik asit ve karbonik asit oluşturur. Asit yağmurlarının zararı, ormanlarla sınırlı olmayıp, canlı varlıkların yanı sıra, demir yolları, binalar, köprüler ve tarihsel kalıntılar üzerinde de etkili olmaktadır. Fosil yakıtların yanma reaksiyonu sonucunda atmosferik sera etkisine yol açan CO_2 salımı 1990 yılında 0.6 milyar ton/yıl iken, özellikle son 40 yılda büyük bir artış göstererek, 1998 yılında 5.5 milyar ton/yıl'a ulaşmıştır.(Muslu, 2000)

2.3Küresel İklim Değişikliğinin Türkiye'ye etkileri

Sıcak ve Soğuk hava dalgalarına karşı en duyarlı ve zayıf bölge İç Anadolu ve Doğu Anadolu bölgesidir. Yazları Basra alçak basınç sisteminin etkisiyle Güneydoğu Anadolu bölgesi üzerinden gelen sıcak ve kuru hava iç bölgelerde çok daha etkili olmaktadır.

Karadeniz kış aylarında Sibirya'dan gelen soğuk hava dalgasının etkisinin azalmasında önemlidir. Bu sistemin etkisiyle gelen soğuk hava Karadeniz den getirdiği ve Anadolu üzerinde yakaladığı nemli havanın etkisiyle yoğun miktarda kar yağışlarına neden olmaktadır. Sahile yakın kesimlerde denizlerin konumu nedeniyle aşırı karasal iklim etkilerinden korunmaktadır.



Şekil 2. 1971-2000 Yılları arası ortalama sıcaklık dağılımı. Kaynak : S. Sensoy

Türkiye yağış klimatolojisi bakımından düzenli olmayan bir yapıya sahiptir. Türkiye'de yıllık ortalama yağış 654 kg/M2 olmasına karşın yağış rejimi homojen değildir.

Alansal olarak yeterli yağış alamayan sahalar kısımlar yurdun çok büyük bir kısmını oluşturmaktadır, yıllık toplam yağıların büyük kısmı Doğu Karadeniz bölgesinin doğusu (2200 Kg/m2), Batı Karadeniz bölgesi (1400 Kg/m2), Orta ve bat Akdeniz 1000 kg/m2 ve doğu Akdeniz ile Siirt, Bingöl ve Bitlis bölgesi 800 Kg/m2, Orta Anadolu'nun iç kısımları 200 Kg/m2 ve diğer bölgeleri 400 Kg/m2 dir. Bu durum bize göstermektedir ki her yer eşit oranda ve yeterince yağış alamamaktadır.

Yapılan araştırmalar sonucu, 1995 yılından bu yana iklim değişikliği ve küresel ısınmanın inkar edilemez gerçekler olduğu kabul edilmiştir.

Bilim adamları artık araştırmalarını oluşturdukları çeşitli iklimsel senaryoların bölgesel ve yöresel etkileri üzerine odaklamışlardır. Genel kanı ılıman ve yağışlı bölgelerin daha fazla yağış alacağı ve ısı yükselmesinin tarım ürünlerinde rekolte artışı gibi yararlarının olabileceği yönündedir. Ancak, taşkınlar ve fırtınalar gibi doğal afetlerdeki artışlar da işin olumsuz yönü olabilecektir. Ülkemizin yer aldığı Akdeniz ve Orta Doğu bölgesinde aksine bir gelişim, yani kuraklık artışı ve tarımsal verimde düşüş öngörülmektedir.

Bu arada, orta vadede, hatta belki de uzun vadede, tek seçeneğimiz değişen iklim koşulları altında yaşamayı, tarım yapmayı, su kullanmayı öğrenmek durumundayız. Bunun yolu da hem toprağı, hem suyu, israf etmeden, kirletmeden, bozmadan, kullanmayı öğrenmekten geçmektedir. Günümüzde enerji tüketiminin hızla artmasına paralel olarak alışılagelen enerji kaynaklarının yakın bir gelecekte tükeneceği bilimsel bulgularla ispatlanmış bir gerçektir. Ayrıca, artan nüfus ve enerji talebine bağlı olarak dünyanın emisyon değerlerinin günümüzdeki sınırlar içinde tutulması pek mümkün görünmemektedir. Bu kirliliğin devam etmesi durumunda dünya sıcaklığının artacağı ve deniz seviyesinin yükseleceği bilinmektedir. Bunun için şu an tüm dünyada enerji üretiminde yenilenebilir enerji

kaynakları önerilmekte ve kullanılmaktadır. Bu enerji kaynakları temel olarak hidroelektrik enerji, rüzgar enerjisi, güneş enerjisi, jeotermal enerji, biokütle enerji ve hidrojen enerjisi olarak sınıflandırılabilir.

3.SÜRDÜRÜLEBİLİR ENERJİ

Gelecek 100 yıl içinde fosil enerji kaynakları olan kömür, petrol ve doğal gazın tükenme olasılığı yüksektir. Bunun aksine yenilenebilir enerji kaynakları(güneş, rüzgar, hidroelektrik, jeotermal, biyokütle) doğanın kendi evrimi içinde sürekli olarak kendilerini yeniledikleri için tükenmezler. Bu kapsamda, zaman açısında "sürdürülebilir" olan yenilenebilir enerji kaynaklarının daha fazla kullanılması yönünde adımlar atılmaya başlanmıştır.

Yenilenebilir enerji kaynaklarının avantajları, karbondioksit emisyonlarını azaltarak çevrenin korunmasına yardımcı olmaları, yerli kaynaklar oldukları için enerjide dışa bağımlılığın azalmasına katkıda bulunmalarıdır.

AB, yeni ve yenilenebilir enerji kaynaklarının kullanımını teşvik ediyor. Ülkemizde, 8 Ocak 2011 tarihinde yayınlanan 5346 sayılı Yenilenebilir Enerji Kaynaklarının Elektrik Enerjisi Üretimi Amaçlı Kullanımında Değişiklik Yapılmasına Dair 6094 sayılı Kanun ile destekleme mekanizmaları güçlendirildi. Bu kapsamda yenilenebilir kaynaklardan enerji üreten tesislere kaynak(güneş, rüzgar, jeotermal, hidroelektrik, biyokütle) bazında teşvikler getirildi (Avrupa Birliği Bakanlığı).

Türkiye'de kişi başına yıllık elektrik tüketimi 3.060 kWh düzeylerinde olup, bu miktar kalkınmış ve kalkınmakta olan ülkeler ortalamasının çok altındadır. Ülkemizin ekonomik ve sosyal bakımdan kalkınmasının sağlanması için sanayileşme bir hedef olduğuna göre bu endüstrinin ve diğer kullanıcıların ihtiyacı olan enerjinin, yerinde, zamanında ve güvenilir bir şekilde karşılanması büyük önem arz etmektedir. Türkiye'de 1950'lerde yılda sadece 800 GWh enerji üretimi kapasitesi varken, bugün bu oran yaklaşık 388 misli artarak yılda 310.000 GWh düzeylerine ulaşmıştır. 53.235 MW'a ulaşan kurulu güç ile yılda yaklaşık 310.570 GWh enerji üretimi mümkündür. Ancak arızalar, bakım onarım, işletme programı politikası, küresel ekonomik kriz, tüketimde talebin azlığı, kuraklık, randıman vb. sebeplerle ancak 228.431 GWh enerji üretimi olmuştur. Yani kapasite kullanımı %73,6 düzeylerinde gerçekleşmiştir. Termik santrallerde kapasite kullanım oranı ortalama %70,8 düzeylerinde iken hidroelektrik santrallerde bu oran %84,5 düzeylerinde olmuştur. Enerji üretimimizin %25,16'sı yenilenebilir kaynak olarak nitelendirilen hidrolik (%22,8), rüzgar (%2,07) ve jeotermal (%0,29) kaynaklardan, kalan %74,84'ü ise fosil yakıt kaynakları olarak adlandırılan termik (doğal gaz, linyit, kömür, fueloil, motorin, asfaltit, nafta gibi) kaynaklardan üretilmektedir. Son yıllarda rüzgar ve jeotermal kaynakların enerji üretiminde kullanımına ilişkin yoğun çalışmalar yapılmakta olup ayrıca ülkemiz için zaruri hale gelen nükleer enerji kullanımı için de çalışmalar yapılmaktadır (.Devlet Su İşleri, 2015)

Günümüzde enerji üretilebilecek doğal kaynakların hızla tükenmesi sonucunda insanlar alternatif, temiz enerji kaynaklarına yönelmeye başlamışlardır. Bunları biz sürdürülebilir enerji başlığı altında toplayabiliriz.Bunlar hidroelektrik enerji, rüzgar enerjisi, güneş enerjisi, jeotermal enerji, biokütle enerji ve hidrojen enerjisi, biogaz, bioyakıt, bioetanol, olarak ele alınabilir.

3.1.Hidroelektrik Enerjisi

Hidroelektrik santrallar (HES) akan suyun gücünü elektriğe dönüştürürler. Akan su içindeki enerji miktarını suyun akış veya düşüş hızı tayin eder. Büyük bir nehirde akan su büyük miktarda enerji taşımaktadır. Ya da su çok yüksek bir noktadan düşürüldüğünde de yine yüksek miktarda enerji elde edilir. Her iki yolla da kanal yada borular içine alınan su, türbinlere doğru akar, elektrik üretimi için pervane gibi kolları olan türbinlerin dönmesini sağlar. Türbinler jeneratörlere bağlıdır ve mekanik enerjiyi elektrik enerjisine dönüştürler.

Hidroelektrik enerji santraller; Yenilenebilir kaynak olan sudan enerji elde etmeleri, sera gazı emisyonu oluşturmamaları, inşaatın yerli imkanlarla yapılabilmesi, teknik ömrünün uzun olması ve yakıt giderlerinin olmaması, işletme bakım giderlerinin düşük olması, istihdam imkanı oluşturmaları, kırsal kesimlerde ekonomik ve sosyal yapıyı canlandırmaları yönünden en önemli yenilenebilir enerji kaynağıdır.(Elektrik İşleri Etüd İdaresi, 2015)

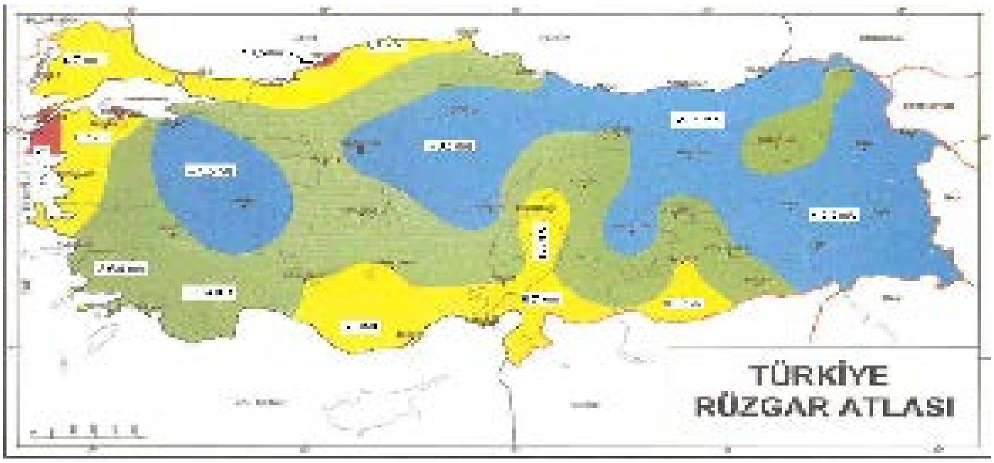
Bir ülkede, ülke sınırlarına veya denizlere kadar bütün tabii akışların %100 verimle değerlendirilebilmesi varsayımına dayanılarak hesaplanan hidroelektrik potansiyel, o ülkenin brüt teorik hidroelektrik potansiyelidir. Ancak mevcut teknolojilerle bu potansiyelin tamamının kullanılması mümkün olmadığından mevcut teknoloji ile değerlendirilebilecek azami potansiyele teknik yapılabilir hidroelektrik potansiyel denir. Öte yandan teknik yapılabilirliği olan her tesis ekonomik yapılabilirliği olan tesis demek değildir. Teknik potansiyelin, mevcut ve beklenen yerel ekonomik şartlar içinde geliştirilebilecek bölümü ekonomik yapılabilir hidroelektrik potansiyel olarak adlandırılmakla beraber gelişen teknoloji ve artan enerji fiyatları teknik ve ekonomik potansiyelimizin teknik potansiyele yaklaşmasını sağlamıştır. Türkiye'nin teknik hidroelektrik potansiyeli dünya teknik potansiyelinin %1,5'ine, Avrupa teknik potansiyelinin ise %17,6'sına tekabül etmektedir.

Türkiye'de teorik hidroelektrik potansiyel 433 milyar kWh, teknik olarak değerlendirilebilir potansiyel ise 216 milyar kWh olarak hesaplanmıştır. Avrupa Birliği'nin yeşil enerji için uyguladığı vergi indirimleri ve destekleme politikaları ekonomik olarak potansiyelin artmasını sağlayacaktır. Türkiye'de işletmede olan 303 adet hidroelektrik santralin toplam kurulu gücü 17.372 MW ve ortalama yıllık üretimi ise 62.000 GWh olup, bu değer toplam teknik potansiyelin %28,7'sine karşılık gelmektedir. ABD teknik hidroelektrik potansiyelinin %86'sını, Japonya %78'ini, Norveç %72'sini, Kanada %56'sını, Türkiye ise %28,7'sini geliştirmiştir. Uluslararası Enerji Ajansı'nca (IEA) 2020'de dünya enerji tüketimi içerisinde hidroelektrik ve diğer yenilenebilir enerji kaynaklarının payının bugüne göre %53 oranında artacağı öngörülmüş olup, bu her güçteki hidroelektrik potansiyelin değerlendirilmesi olarak yorumlanmaktadır. Avrupa Komisyonu Birlik stratejileri kapsamında Avrupa Birliği (AB) içerisinde 2020 yılına kadar iç brüt enerji tüketimindeki yenilenebilir enerji payını %20'ye çıkartmak üzere gerekli yasal düzenlemeleri yürürlüğe koymuştur. Ekonomik durgunluklar dikkate alınmazsa, Türkiye'de elektrik tüketimi her yıl yaklaşık %8 oranında artmaktadır. Bu talebi karşılamak için ülkemiz yeni enerji projeleri için her yıl 5 milyar ABD Doları ayırmak zorundadır. Bütün dünyada olduğu gibi ülkemizde de enerji hayati bir konu olduğundan, kendine yeterli, sürekli, güvenilir ve ekonomik bir elektrik enerjisine sahip olunması yönünde başta dışa bağımlı olmayan ve yerli bir enerji kaynağı olan hidroelektrik enerjisi olmak üzere bütün alternatifler göz önüne alınmalıdır.(Devlet Su İşleri, 2015)

3.2.Rüzgar Enerjisi

1973 dünya petrol krizi, alternatif ve yenilenebilir enerji kaynaklarına gösterilen ilginin artmasına sebep olmuştur. Dünya enerji ihtiyacının önemli bir bölümünü karşılayan fosil yakıtların kısıtlı kullanım sürelerinin olması, enerjinin elde edilmesi sırasında çevreye yapılan tahribat ve gelecek nesillerin de enerji ihtiyacı dikkate alındığında yenilenebilir enerji kaynaklarının önemi daha iyi anlaşılmaktadır. Bu kaynakların yaygın ve geniş ölçekli kullanımı, teknolojik gelişmelere ve potansiyeli belirleyecek ulusal ve uluslar arası bilgi ağının oluşturulmasına bağlıdır. İlk etapta göz önünde bulundurulması gereken yenilenebilir enerji kaynaklarından birisi rüzgâr enerjisidir (Dündar, 2003: 433).

Türkiye rüzgar bakımından zengin yöreleri olan bir ülkedir. 10 m yükseklikteki yıllık ortalama rüzgar hızı ve güç yoğunluğu açısından en yüksek değer 3.29 m/sn ve 51.91 W/ m^2 ile Marmara Bölgesi 'nde saptanmıştır. En düşük değer ise, 2.12 m/sn hız ve 13.19 W/m2 güç yoğunluğu ile Doğu Anadolu Bölgesi 'ndedir. Türkiye 'nin %64.5 'inde rüzgar enerjisi güç yoğunluğu 20 W/ m^2 'yi aşmazken, %16.11 'inde 30-40 W/ m^2 arasında, %5.9 'unda 50 W/ ' m'^{2} nin ve %0.08 'inde de 100 W/m^2 'nin üzerindedir (Tavman ve Önder, 2001:323).



Şekil 4. Türkiye Rüzgar Atlası (EİE Genel Müdürlüğü)

Türkiye 'nin rüzgar potansiyeli tam olarak belirlenememiş olsa da, brüt potansiyelinin yılda 400 milyar kWh, teknik potansiyelinin ise 120 milyar kWh olduğu düşünülmektedir. Söz konusu teknik potansiyel yıllık elektrik üretiminin 1.2 katıdır. Ancak, Türkiye genelinde 10 m yükseklikteki rüzgar yoğunluğunun alansal ve zamansal dağılımı ile teknolojik kısıtlamalar göz önünde tutulduğunda, güvenilir rüzgar enerjisi potansiyeli 12 milyar kWh/yıl olarak hesaplanmaktadır (Tavman ve Önder, 2001:323).

Rüzgar potansiyeli bakımından zengin olan bölgelerimiz Ege, Marmara ve Doğu Akdeniz kıyılarıdır. Elektrik İşleri Etüd idaresi tarafından hazırlanan "Türkiye Rüzgar Atlası" na göre yerleşim alanları dışında 50m yükseklikteki rüzgar hızları, Marmara, Batı Karadeniz, Doğu Akdeniz kıyılarında 6.0 – 7.0 m/sn, iç kesimlerde ise 5.5 – 6.5 m/sn civarında, Batı Akdeniz kıyılarında 5.0 –6.0 m/sn iç kesimlerde 4.5 – 5.5 m/sn, Kuzey – Batı Egede ise kıyılarda 7.0-8.5 m/sn, iç kesimlerinde ise 6.5-7.0 m/sn'dir (Elektrik İşleri Etüd İdaresi). Diğer taraftan ABD' nin uzay çalışmaları ile saptadığı meteorolojik veriler, Türkiye'nin rüzgar enerjisi bakımından zengin olduğunu göstermektedir. Türkiye'nin bulunduğu coğrafi yöreye bağlı olarak komşu ülkelerde ve bölge ülkelerinde yapılmış ölçüm verileri de bu bulguyu desteklemektedir (Devlet Planlama Teşkilatı).

3.4. Güneş Enerjisi

Dünyanın en önemli enerji kaynağı güneştir. Güneşin ışınım enerjisi, yer ve atmosfer sistemindeki fiziksel oluşumları etkileyen başlıca enerji kaynağıdır. Dünyadaki madde ve enerji akışları güneş enerjisi sayesinde mümkün olabilmektedir. Rüzgâr, deniz dalgası, okyanusta sıcaklık farkı ve biyokütle enerjileri, güneş enerjisini değişim geçirmiş biçimleridir. Güneş enerjisi, doğadaki su döngüsünün gerçekleşmesinde de rol oynayarak, akarsu gücünü yaratmaktadır. Fosil yakıtların da, biyokütle niteliğindeki materyallerde birikmiş güneş enerjisi olduğu kabul edilmektedir. Doğal enerji kaynaklarının pek çoğunun kökeni olan güneş enerjisinden, ısıtma ve elektrik elde etme gibi amaçlarla doğrudan yararlanılmaktadır. Güneş enerjisi çevre açısından temiz bir kaynak özelliği taşıdığından da fosil yakıtlara alternatif olmaktadır. Yeryüzüne her sene düşen güneş ışınım enerjisi, yeryüzünde şimdiye kadar belirlenmiş olan fosil yakıt haznelerinin yaklaşık 160 katı kadardır. Ayrıca yeryüzünde fosil, nükleer ve hidroelektrik tesislerinin bir yılda üreteceğinden 15.000 kat kadar daha fazladır(Bayram, 2001)

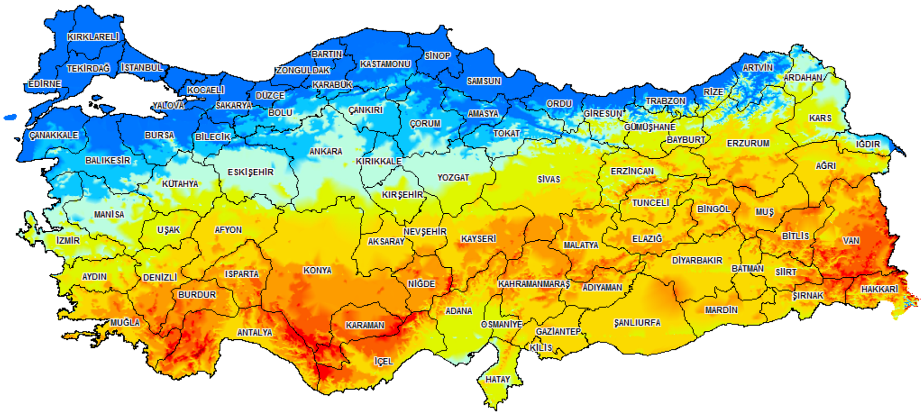
Güneş enerjisi, güneş çekirdeğinde hidrojen gazının helyuma dönüşmesi sırasında oluşan ışıma ile açıklanır. Dünya atmosferinin dışında güneş enerjisinin şiddeti, yaklaşık olarak sabit ve 1370 W/m2 değerindedir, ancak yeryüzünde 0-1100 W/m2 değerleri arasında değişim gösterir. Bu enerjinin dünyaya gelen küçük bir bölümü dahi, insanlığın mevcut enerji tüketiminden kat kat fazladır. Güneş enerjisinden yararlanma konusundaki çalışmalar özellikle 1970'lerden sonra hız kazanmış, güneş enerjisi sistemleri teknolojik olarak ilerleme ve maliyet bakımından düşüş göstermiş, çevresel olarak temiz bir enerji kaynağı olarak kendini kabul ettirmiştir (Kıncay vd., 2009).

Sera etkisine yol açan karbondioksit gazının, atmosfere yayılımının %80'i, enerji üretimi, dağıtımı ve tüketiminden kaynaklanmaktadır. Karbondioksit, günümüz toplumunun en büyük atık ürünüdür. Kömür yerine kullanılacak olan güneş pilleri sayesinde, karbondioksit miktarında önemli azaltımlar sağlanabilmektedir. Güneş enerjisinden, şimdilik çoğunlukla güneş pilleri aracılığıyla faydalanılmaktadır, kısaca güneş enerjisi günümüzde güneş pilleri anlamına gelmektedir. Güneş pilleri teknolojisi elektrik üretim ihtiyacını karşılayabilecek düzeydedir (Uzunoğlu vd. 2001, s.89)

BÖLGE	TOPLAM GÜNEŞ ENERJİSİ (kWh/m^2-yıl)	GÜNEŞLENME SÜRESİ (Saat/yıl)
G.DOĞU ANADOLU	1460	2993
AKDENİZ	1390	2956
DOĞU ANADOLU	1365	2664
İÇ ANADOLU	1314	2628
EGE	1304	2738
MARMARA	1168	2409
KARADENİZ	1120	1971

Tablo 1-Türkiye'nin Yıllık Güneş Enerjisi Potansiyelinin Bölgelere Göre Dağılımı

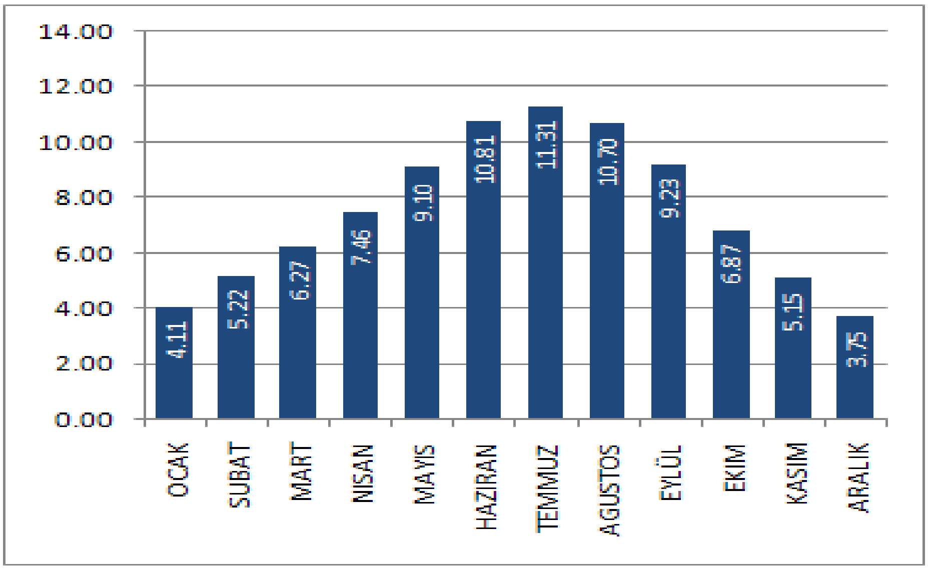
Tablo 1'e bakıldığında Türkiye'nin toplam güneş enerjisi potansiyelinin oldukça yüksek olduğu görülmektedir. Özellikle Güneydoğu Anadolu Bölgesi ve Akdeniz Bölgesi'nde Güneşlenme süresinin ve enerji potansiyelinin iyi değerlendirildiği taktirde sürdürülebilir enerji bağlamında önemli bir yere sahip olduğu söylenebilir. Güneşlenme süresinin en az olduğu Karadeniz Bölgesinde bile Güneş enerjisinden faydalanılabilir .Kısacası Ülkemizde yeterince faydalanmadığımız güneş enerjisinden azami derecede faydalanmak için gerekli adımlar atılmış ve devletimiz güneş enerjisinden elektrik üretimini teşvik etmektedir.



Şekil 5. Güneş Enerjisi Potansiyel Atlası (Yenilenebilir Enerji Genel Müdürlüğü)

Güneş Enerjisi Potansiyeli Atlasına baktığımızda(Şekil 5.) Türkiye'nin büyük bir kesiminin güneş enerjisi potansiyeli bakımından zengin olduğu görülmektedir. Enerji ve Tabii Kaynaklar Bakanlığı'nın yenilenebilir enerji kaynaklarının üretimini ve kullanımını teşvik ettiği düşünülecek olursa temiz, sürdürülebilir bir enerji kaynağı olması açısından Güneş Enerjisinin yaygın olarak kullanılmaya başlanması özellikle çevrenin geleceğinde önemli bir yere sahip olacaktır.

Şekil 6'ya baktığımızda Türkiye'de güneşlenme süresinin özellikle yaz aylarında en yüksek seviyesinde olduğu görülmektedir. Bahar aylarında da azımsanamayacak bir güneşlenme süresi vardır. Ülke olarak var olan güneş potansiyelinin en iyi şekilde değerlendirilmesi gerekmektedir.



Şekil 6. Türkiye Güneşlenme Süreleri (Yenilenebilir Enerji Genel Müdürlüğü)

3.5.Jeotermal Enerjisi

Jeotermal enerji, yerkabuğunun derinliklerindeki ısının yer altı sularını ısıtması sonucunda ısınan suyun yeryüzüne çıkmasıyla oluşan bir enerji türüdür. Bu enerjinin daha çok ısı enerjisi olarak kullanılması önerilmektedir. Bunun yanında sanayi için diğer enerji kaynaklarından çok daha ucuzdur. Jeotermal enerjinin kullanım tarihi oldukça eskiye dayanmaktadır. Jeotermal enerjiyi ilk kullananlar, eski Romalılardır. Doğal sıcak su olarak termal banyolarda ısıtma ve sağlık amacıyla kullanmışlardır. ABD'de konut ısıtma amacıyla ilk kez 1891 yılında kullanılmıştır. 1904 yılında İtalya'da ilk defa jeotermal kuru buhardan elektrik üretilmiştir. 1969 yılında Fransa'da büyük şehirlerin jeotermal enerjiyle ısıtılmasına başlanmıştır. Türkiye'de ısınma amacıyla ilk olarak 1964 yılında Gönen'de (Balıkesir) bir otelde kullanılmıştır. Türkiye'deki konutların %30'unun jeotermal enerji ile ısıtılması mümkündür. 31500 megawattlık enerjinin günümüzde sadece %2' si kullanılmaktadır (Çengel, 2003, s.10). Jeotermal enerjiden konutlarda ısıtma, kaplıcalarda, sera ısıtmacılığı ve elektrik üretiminde faydalanılmaktadır.

Yer kabuğunun çeşitli derinliklerinde birikmiş olan ısının oluşturduğu ve sıcaklıkları atmosferik sıcaklığın üzerinde olan sıcak su, buhar ve gazlar olarak tanımlanan jeotermal enerji genel olarak çevre yönünden temiz bir enerjidir ve doğal kaynaklar kullanıldığı için dışa bağımlılığı azdır.. Ülkemiz jeotermal enerji potansiyeli açısından dünyadaki zengin ülkeler arasında yer almaktadır. Dünyada toplam elektrik kurulu gücü 8274 MW'e iken ülkemizde 20.4 MW'e'dir. Mevcut şartlara göre ülkemizde, 2010 yılı hedefi 500 MW ve 2020 yılı hedefi 1000 MW olarak öngörülmektedir. Türkiye'de toplam 1000 dolayında sıcak ve mineralli su kaynağı ve jeotermal akışkan çıkan kuyu noktası vardır. Bilinen jeotermal alanların %95'i ısıtmaya uygundur. Türkiye'de az sayıda da olsa yüksek entalpili jeotermal alanlar da keşfedilmiştir. Ancak ülkemizde jeotermale dayalı elektrik üretimi yeterli düzeye ulaşamamıştır. Bugün arama yapılmış sahalar içinde, yeni teknolojileride kullanarak 10 kadar jeotermal sahadan elektrik üretmek mümkündür Bunlar Kızıldere (Denizli), Germencik (Aydın), Salavatlı (Aydın), Yılmazköy (Aydın), Tuzla (Çanakkale), Caferbeyli (Manisa), Salihli-Göbekli (Manisa), Simav (Kütahya), Seferihisar

(İzmir), Dikili (İzmir). Halen 20.4 MWe brüt kurulu güce sahip (242 rezervuar sıcaklığı olan) Denizli-Kızıldere santralı zaman zaman 15 MWe üretim kapasitesine çıkmasına rağmen, iç kullanımı hariç net ortalama 12 MWe elektrik üretmektedir. Aydın-Germencik'te (232 rezervuar sıcaklığına sahip) ise aşamalı olarak yaklaşık 100 MWe gücüne ulaşacak taşınabilir üniteler için Yap-İşlet modeline göre santral kurma işlemler sürdürülmektedir. Ülkemizde on yerleşim biriminde toplam 24200 adet konutun jeotermal enerji ile ısıtılması yapılmaktadır. Bu on yerleşim yerindeki kurulu güç kapasitesi 52550 konuttur. Ayrıca birçok irili ufaklı termal turizm tesisi jeotermal enerji ile ısıtılmaktadır (Kumbur vd.).

Jeotermal enerji, sıcaklık içeriğine göre düşük sıcaklıklı sahalar (20-70 °C), orta sıcaklıklı sahalar (70-150 °C), yüksek sıcaklıklı sahalar (150 °C'den yüksek) olmak üzere üç gruba ayrılır. Düşük ve orta sıcaklıklı sahalar bugünkü teknolojik ve ekonomik koşullar altında, başta ısıtma olmak üzere (sera, bina, tarımsal kullanımlar), endüstride (yiyeceklerin kurutulması, kerestecilik, kağıt ve dokuma sanayinde, dericilikte, soğutma tesislerinde), kimyasal madde üretiminde (Lityum, KaCl2, borik asit, amonyum bikarbonat, ağır su, akışkandaki CO2' den kuru buz elde edilmesinde) kullanılmaktadır. Ancak orta sıcaklıklı sahalardaki akışkanlardan da elektrik üretimi için teknolojiler geliştirilmiş ve kullanıma sunulmuştur. Yüksek sıcaklıklı sahalardan elde edilen akışkan ise elektrik üretiminin yanı sıra entegre olarak diğer alanlarda da kullanılabilmektedir (DPT, 2007-2013)

Şekil 7. Türkiye Jeotermal Enerji Kaynakları Haritası

Elimizde jeotermal gibi geniş alanlarda kullanılabilecek olan enerji kaynağına sahip olmamız enerjinin sürdürülebilirliği açısından önemlidir. Dolayısıyla jeotermal enerji kaynaklarından maksimum derecede yararlanmamız gerektiği açıktır.

3.6. Biyokütle Enerjisi

Dünyanın çoğalan nüfusu ve sanayileşmesi ile giderek artan enerji gereksinimini

çevreyi kirletmeden ve sürdürülebilir olarak sayılayabilecek kaynaklardan belki de en önemlisi biyokütle enerjisidir. Bitki yetiştirilmesi, güneş var olduğu süre süreceği için, biyokütle tükenmez bir enerji kaynağıdır. Biyokütle; tükenmez bir kaynak olması, her yerde yetiştirilebilmesi, özellikle kırsal alanlar için sosyo-ekonomik gelişmelere yardımcı olması nedeniyle uygun ve önemli bir enerji kaynağı olarak görülmektedir [3]. Biyokütleye örnek olarak, ağaçları, mısır, buğday gibi özel olarak yetiştirilen bitkileri, otları, yosunları, evlerden atılan meyve ve sebze atığı gibi tüm organik çöpleri, hayvandışkılarını, gübre ve sanayi atıklarını saymak olanaklıdır. Bitkilerin fotosentezi sırasındakimyasal olarak özellikle selüloz şeklinde depo edilen ve daha sonra çeşitli şekillerde kullanılabilen enerjinin kaynağı güneştir. Güneş enerjisinin biyokütle biçimindeki depolanmış enerjiye dönüşümü, insan yaşamı için esastır. Fotosentez yoluyla enerji kaynağı olan organik maddeler sentezleşirken tüm canlıların solunumu için gerekli olan oksijen de atmosfere verilir. Üretilen organik maddelerin yakılması sonucu ortaya çıkan karbondioksit ise, daha önce bu maddelerin olu□ması sırasında atmosferden alınmı□ olduğundan, biyokütleden enerji elde edilmesi sırasında çevre, karbondioksit salınımı açısından korunmuş olacaktır (TÜGİAD, 2004).

Biyokütle ya Türkiye' de olduğu gibi doğrudan yakılmaktadır ya da çeşitli süreçlerde(havasız çürütme, piroliz, fermantasyon, gazlaştırma, hidroliz, biyofotoliz, esterleşmereaksiyonu) biyokütlenin yakıt kalitesi arttırılıp alternatif biyoyakıtlar (biyogaz, çöpgazı, biyodizel, biyoetanol, sentetik yağ) üretilmektedir (Şen,2006.)

Günümüzde biyokütle enerjisini klasik ve modern olarak iki sınıfa ayırmak olanaklıdır. Ağaç kesiminden elde edilen odun ve hayvan atıklarından oluşan tezeğin basit şekilde yakılması klasik biyokütle enerjisi olarak tanımlanırken, enerji bitkileri, enerji ormanları ve ağaç endüstrisi atıklarından elde edilen bio-dizel, etanol gibi çeşitli yakıtlar, modern biyokütle enerjisinin kaynağı olarak tanımlanır (TÜGİAD, 2004).

Şekil 8. Bursa Katı Atık Depolama Alanı

Biyokütle Enerjisi elde etme çalışmaları son zamanlarda hız kazanmış olup, bu konuda Bursa Büyükşehir Belediyesi tarafından yapılan çalışma takdire şayandır.

Katı atık depolama sahasında metan gazından, içme suyu ana hattına kurulan tribünle sudan, güneş enerjisinden ve son olarak inşaatına başlanan çamur yakma tesisinden elektrik üreten Bursa Büyükşehir Belediyesi, JICA iş birliğiyle atıklardan daha fazla enerji üretme çalışmalarına hız veriyor. Japonya'da uzun yıllardır atıktan enerji elde etme teknolojisi konusundaki çalışan Japon Uluslararası İş Birliği Ajansı (JICA), Türkiye'den seçilen 5 pilot ilden biri olan Bursa'da çalışmalara başladı.

Daha yaşanabilir bir Bursa hedefiyle çevre yatırımlarına öncelik veren Büyükşehir Belediyesi özellikle yenilenebilir enerji kaynaklarının geliştirilmesi için uluslararası iş birliklerine gidiyor. Japonya'da uzun yıllardır var olan atıktan enerji teknolojisi konusundaki tecrübelerini Türkiye'ye aktaracak olan JICA, çalışma sahası olarak Sakarya, Kocaeli, Antalya, İzmir ve Bursa'yı pilot il seçti. EX Research Institute Ltd. ve KOKUSAI KOGYO Co. Ltd. iştirakiyle oluşan JICA Araştırma Takımı Bursa'da atıklardan enerji elde edilmesine yönelik araştırma çalışmasına başladı. Ağustos 2015'te tamamlanması planlanan çalışma kapsamında Büyükşehir Belediyesi Çevre Koruma ve Kontrol Dairesi Başkanlığı da atık yönetimi konusunda sahip olduğu bilgileri JICA takımı ile paylaştı. JICA Araştırma Takımı kendi metodolojilerine göre belediye atıklarını; mutfak atıkları, plastik, kağıt, karton, cam, yanabilir. 17 kategoride inceleyerek atık tasnifi yaptı. Proje sayesinde ilgili belediyelerle Japon teknolojisi konusunda bilgi ve deneyim paylaşımı sağlanacak ve Türkiye'de atıktan enerji elde edilmesine katkıda bulunulacak. Bursa, birçok alanda sahip olduğu öncü rolünü atık yönetimi alanında da devam ettirecek (enerjienstitüsü.com).

Nüfusumuzun Suriye'den gelenlerle arttığı düşünüldüğünde ve daha çok tükettiğimiz göz önüne alındığında biyokütle enerji potansiyeli bakımından ülkemizin oldukça zengin olup, bu kaynağın geliştirilmesi bakımından da yeterli imkanlara sahip olduğu açıktır. Ülkemizin enerji bakımından dışa bağımlılığını azaltmak için, enerji ormancılığı ve enerji tarımına geçilmesi, bunlardan ve atıklardan biyoyakıt elde edilmesi, gübreler, atıklar ve çöplerden elde edilecek biyogaza gerekli önemin verilmesi gerekmektedir. Böylece eldeki var olan kaynaklarla ucuz, temiz ve sürdürülebilir enerji elde edilmiş olacaktır.

Çok yakın zaman önce medyada yer alan haberlere göre Kırklareli'de biyokütleye dayalı elekrik üretim santralinde odun ve ayçiçeği sapları yakılarak elektrik üretilecek.

Proje için hazırlanan tanıtım dosyasına göre, tesiste hammadde olarak kullanılması ve yakılarak enerji elde edilmesi planlanan toplam biyokütle miktarı yıllık yaklaşık 100 bin tonu buluyor. Bu kaynağın 91 bin tonluk kısmı orman ürünlerinden, 9 bin tonluk kısmı ise ayçiçek sapından sağlanacak. Tesiste, Kırklareli bölgesi ve çevre illerde orman ürünleri ve tarım ürünlerinin işlenmesinden ortaya çıkan biyokütle yakacak hammaddesi olarak kullanılacak. Atıkların yataklı reaktörde yakılmasıyla elde edilecek buharın, buhar tribününden geçirilmesiyle elektrik enerjisi üretilecek. Elde edilecek elektrik enerjisi, Kırklareli OSB şebekesine verilecek.

Projeyle şimdiye kadar değerlendirilmemiş, biyokütle olarak tanımlanan orman artıkları ve tarımsal nitelikli artıklar, elektrik enerjisine çevrilecek ve enerji piyasasına katma değer sağlanacak.

Bölgedeki orman yoğunluğunun fazla olması, orman ürünlerinin işlenmesinden kaynaklanan biyokütle atıklarının fazlalığı ve mevcut sistemde değerlendirilmemesi bu bölgenin proje alanı olarak belirlenmesinde etkin rol oynadı.

3.7.Hidrolik Enerji

Ülkemizin yenilenebilir enerji potansiyeli içinde en önemli yeri tutan hidrolik kaynaklarımızın teorik hidroelektrik potansiyeli 433 milyar kWh olup teknik olarak değerlendirilebilir potansiyel 216 milyar kWh ve ekonomik hidroelektrik enerji potansiyel 140 milyar kWh/yıl'dır. 2013 yılı sonu itibarıyla ekonomik olduğu belirlenen potansiyelin %41'lik kısmı işletmede, özel teşebbüs tarafından yapımı sürdürülen projeler dahil olmak üzere %27'lik kısmı ise inşa halindedir. Türkiye, enerji sektöründe rekabete dayalı yatırım ortamının geliştirilmesi ve şeffaf bir piyasa yapısının oluşturulması yönünde adımlar atmaya devam etmekte olup özel sektöre açılan elektrik üretim sektöründe özellikle yenilenebilir enerji kaynaklarına yönelik yürürlüğe konulan yasal düzenlemelerin de etkisiyle, hidroelektrik santral (HES) yapmak üzere Ocak 2013 itibariyle 12.515 MW'lık 560 santral lisans almış durumdadır.

2013 yılı sonu itibariyle, işletmede bulunan 467 adet HES ile 22.289 MW'lık kurulu güce ve toplam potansiyelin yaklaşık %34,8'sına karşılık gelmektedir. 2013 yılında elektrik üretimimizin, %24,8'i hidrolikten elde edilmiştir. Son yıllarda yaşanan kuraklıklar hidroelektrik santrallerinden beklenen katkının sağlanamamasına neden olmaktadır. Ancak hidroelektrik üretimi 2013 yılında 2012 yılına göre %2,4 oranında artarak 59.245 MW olarak gerçekleşmiştir. Teknik ve ekonomik olarak değerlendirilebilecek tüm hidroelektrik potansiyelin 2023 yılına kadar elektrik enerjisi üretiminde kullanılması hedeflenmekte olup 2023 yılına kadar; 36.000 MW olan hidroelektrik potansiyelimizin tamamını kullanmayı hedeflemektedir.

Su potansiyeli; bir akarsu havzasında hidroelektrik enerji üretiminin teknolojik üst sınırını göstermektedir.

Uygulanan teknolojiye bağlı olarak düşü, akım ve dönüşümde oluşabilecek kaçınılmaz kayıplar hariç tutulmaktadır.

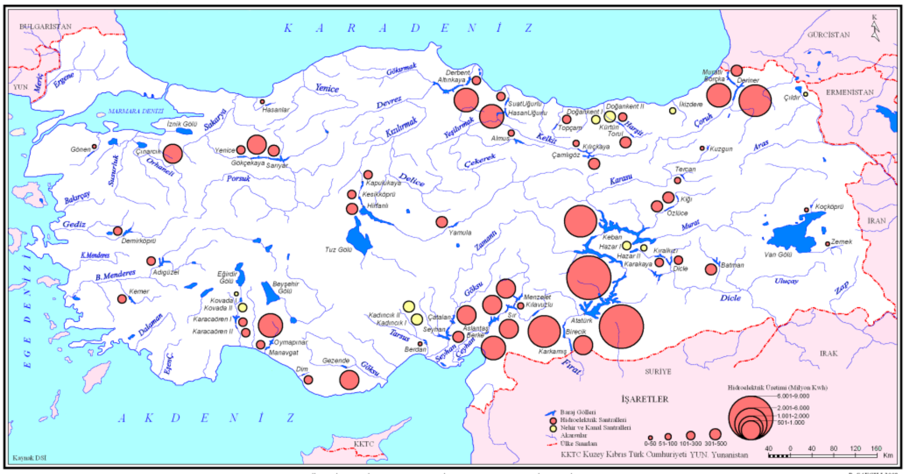
Bölgede planlanan hidroelektrik projelerin teknik açıdan uygulanabilmesi ve gerçekleştirilmesi ile elde edilecek hidroelektrik enerji üretiminin sınırlarını göstermektedir.

Bu niteliğiyle teknik yönden değerlendirilebilir hidroelektrik potansiyel, brüt potansiyelin bir fonksiyonu olmakta ve çoğunlukla onun yüzdesi olarak ifade edilmektedir. Ülkemizin teknik yönden değerlendirilebilir hidroelektrik enerji potansiyeli 216 milyar kWh civarındadır.

Ekonomik olarak yararlanılabilir hidroelektrik potansiyel, bir akarsu havzasının hidroelektrik enerji üretiminin ekonomik optimizasyonunun sınır değerini gösteren, gerek teknik açıdan geliştirilebilmesi mümkün, gerekse ekonomik yönden tutarlı olan tüm hidroelektrik projelerin toplam üretimi olarak tanımlanabilir. Bir başka deyişle, ekonomik olarak yararlanılabilir hidroelektrik potansiyel, beklenen gelirleri giderlerinden fazla olan su kuvveti projelerinin hidroelektrik enerji üretimini göstermektedir.

Türkiye'nin teknik olarak değerlendirilebilir hidrolik enerji potansiyeli 216 milyar kWh ve bunun 126 milyar kWh'ı ekonomik olarak değerlendirilebilir durumda ve halen bu potansiyelin % 35'i değerlendirilmiş bulunuyor. 2020 yılında hidrolik enerji potansiyelinin % 90'dan fazlasının değerlendirilmesi bekleniyor. Türkiye'deki hidrolik enerjinin toplam üretilen enerji içerisindeki yıllara göre payı: 1990: %40, 2004: %31, 2006: %22,4'tür. Bir akarsu havzasının hidroelektrik enerji üretiminin teorik üst sınırını gösteren brüt su kuvveti potansiyeli; mevcut düşü ve ortalama debinin oluşturduğu potansiyeli ifade etmektedir. Topografya ve hidrolojinin bir fonksiyonu olan brüt hidroelektrik enerji potansiyeli, ülkemiz için 433 milyar kWh mertebesindedir.

Hidroelektrik santrallerin ekonomik yapılabilirliğinin hesaplanabilmesi için enterkonnekte sistemde aynı enerjiyi üretecek kaynaklar gözden geçirilmekte, en ucuz enerji kaynağı belirlenerek hidroelektrik santral (HES) projesi bu kaynakla mukayese edilmekte ve ancak daha ekonomik bulunursa önerilmektedir (Bakır, 2005).



TÜRKİYE HİDROELEKTRİK SANTRALLERİ HARİTASI

Şekil 9. Türkiye Hidroelektrik santralleri haritası

Şekil 9'a baktığımızda Türkiye'nin hidroelektrik enerji potansiyeli açısından da zengin bir ülke olduğu görülmektedir. Fizibilite çalışmalarının yapılması, hidroelektrik santrallerinden azami derecede faydalanılabilmesi için gerekli önlemlerin alınması ve santrallerin daha uzun süre kullanımının sağlanması enerji verimliliği için kazanç olacaktır.

3.8.Hidrojen Enerjisi

Güneş ve diğer yıldızların termonükleer tepkimeye vermiş olduğu ısının yakıtı hidrojen olup, evrenin temel enerji kaynağıdır (Enerji Bakanlığı).

Hidrojen bilinen tüm yakıtlar içerisinde birim kütle başına en yüksek enerji içeriğine sahiptir. 1 kg hidrojen 2,1 kg doğal gaz veya 2,8 kg petrolün sahip olduğu enerjiye sahiptir.

Isı ve patlama enerjisi gerektiren her alanda kullanımı temiz ve kolay olan hidrojenin yakıt olarak kullanıldığı enerji sistemlerinde, atmosfere atılan ürün sadece su ve/veya su buharı olmaktadır. Hidrojen petrol yakıtlarına göre ortalama %33 daha verimli bir yakıttır. Hidrojenden enerji elde edilmesi esnasında su buharı dışında çevreyi kirletici ve sera etkisini artırıcı hiçbir gaz ve zararlı kimyasal madde üretimi söz konusu değildir.

Araştırmalar, mevcut koşullarda hidrojenin diğer yakıtlardan yaklaşık üç kat pahalı olduğunu ve yaygın bir enerji kaynağı olarak kullanımının hidrojen üretiminde maliyet düşürücü teknolojik gelişmelere bağlı olacağını göstermektedir.

Bununla birlikte, günlük veya mevsimlik periyotlarda oluşan ihtiyaç fazlası elektrik enerjisinin hidrojen olarak depolanması günümüz için de geçerli bir alternatif olarak değerlendirilebilir. Bu tarzda depolanan enerjinin yaygın olarak kullanılabilmesi örneğin toplu taşıma amaçları için yakıt piline dayalı otomotiv teknolojilerinin geliştirilmesine bağlıdır.

Hidrojen, Güneş ve diğer yıldızların termonükleer tepkimeye vermiş olduğu ısının yakıtıdır. Sıvı hidrojenin hacmi gaz halindeki hacminin sadece 1/700'ü kadardır. Hidrojen, tüm yakıtlar içinde birim kütle basına en yüksek enerji içeriğine sahip gazdır. 1 kg hidrojen 2,1 kg doğalgaz veya 2,8 kg petrolün sahip olduğu enerjiye sahiptir (Turan, 2006). Hidrojen dünyada en basit ve en çok bulunan bir elementtir. Aynı zamanda renksiz, kokusuz, havadan 14,4 kez daha hafif ve zehirsiz bir gazdır. Yerel olarak da üretimi mümkün olan hidrojen enerjisi ayrıca kolay ve güvenli bir şekilde taşınması ile enerji kaybı az olan, her alanda kullanılabilen bir enerji türüdür. Hidrojen doğada bileşikler halinde bulunmaktadır ve en çok bilinen bileşiği sudur. Hidrojenin yakıt olarak kullanılması halinde atmosfere atılan ürün sadece su ve su buharıdır. Bunun dışında çevreyi kirletici veya sera etkisini artırıcı hiçbir zararlı madde üretilmemektedir. Ayrıca hidrojen petrol yakıtlara göre ortalama 1,33 kat daha verimli bir yakıttır. Hidrojen kömür, doğalgaz gibi fosil kaynaklarının yanı sıra sudan, rüzgar, dalga ve biyokütleden de üretilebilmektedir. Hidrojen birincil bir yakıt olmadığından, su, fosil ya da fosil olmayan yakıtlardan üretilmek zorundadır. Hidrojenin enerji kaynağı olarak yaygın kullanımı global iklim değişikliği, enerji verimliliği ve hava kalitesini iyileştirecektir. Piroliz, gazlaştırma ve buhar gazlaştırma gibi termokimyasal dönüşüm prosesleri biyokütleyi daha faydalı enerjiye dönüştürebilir. Buhar gazlaştırma verimi su-ürün oranı artışına paralel olarak arttırılabilir. Pirolizden ve buhar gazlaştırmadan hidrojen eldesi sıcaklıkla artış gösterir. Hidrojen üretimi için kullanılan bazı biyokütle türleri Tablo 2'de verilmiştir. Hidrojen enerjisi ile çalışan yakıt pilleri hidrojen geleceğine imkan verecek önemli teknolojilerdendir ve gazolinin ve diğer fosil yakıtların yanmasına göre daha verimli bir alternatiftir. Hidrojen iki önemli enerji problemini çözme potansiyeline sahiptir: petrole bağımlılığı azaltır ve kirlilik ve sera gazı emisyon seviyelerini düşürür. Hidrojen günümüzde geleneksel enerji kaynaklarından daha pahalıdır. Hidrojeni biyokütleden ekonomik olarak üretmede çeşitli teknolojiler bulunmaktadır. Hidrojen biyokütleden pirolizle üretilebilmektedir. Isı üretmek üzere yakılabilir ya da elektrik üretmek için yakıt piline gönderilebilir. Biyohidrojen teknolojisi gelecekte önemli bir rol oynayacaktır çünkü yenilenebilir enerji kaynaklarından yararlanma olanağı sağlayacaktır (Önal E, Yarbay R.Z., 2010)

Biyokütle Türleri	**Temel Dönüşüm Prosesleri**
Fındık Kabuğu	Buhar gazlaştırma
Zeytin Küspesi	Piroliz
Çay Atığı	Piroliz
Saman Atıkları	Piroliz
Şehirsel Katı Atıklar	Süperkritik su ekstraksiyonu
Tahıl Atıkları	Süperkritik sıvı ekstraksiyonu
Pulp ve Kağıt Atığı	Mikrobiyal fermentasyon
Petrol Esaslı Plastik Atığı	Süperkritik sıvı ekstraksiyonu
Gübre çamuru	Mikrobiyal fermentasyon

Tablo 2. Hidrojen üretiminde kullanılan bazı biyokütle türleri

3.9. Dalga ve Gelgit enerjisi

Deniz kökenli yenilenebilir enerjiler; deniz dalga enerjisi, deniz sıcaklık gradyant enerjisi, deniz akıntısı(boğazlarda) ve gel-git (med- cezir) enerjisidir. Türkiye'de gel-git enerjisi elde etme imkanı yoktur. Çünkü, denizlerimizde gel-git gerçekleşmesi imkansızdır. Dolayısıyla Türkiye açısından gel-git enerjisi uzak bir ihtimaldir. Türkiye için söz konusu enerji grubu içerisinde deniz dalga enerjisi ve boğazlarda deniz akıntıları enerjisinden yararlanma imkanı vardır. Bununla ilgili gerekli girişimlerin yapılması ve faal olarak dalga ve deniz akıntıları enerjisinden yararlanmak gerekmektedir.

Deniz dalgaları, yenilenebilir enerji kaynaklarının son keşfedilen türü olarak biliniyor. Masrafsız ve çevre dostu olan dalga enerjisi, güçlü ve sınırsız, doğal yenilenebilir kaynak olma özelliği taşıyor. Dalganın yüzeyinden ya da yüzey altındaki dalgaların basıncından elde ediliyor. Dalga enerjisi makineleri, rüzgârın su yüzeyinde yaptığı hareketlenme sonucu oluşan basıncı kullanarak elektrik üretiyor. Deniz ve okyanus dalgalarında çok büyük enerji bulunuyor. Yeryüzünün % 70'ten fazlası suyla kaplı. Buna bağlı olarak dalgaların oluşturduğu bu enerji, yılda 80 bin TWh'ye kadar üretim potansiyeline sahip. Bu da dünya çapındaki enerji talebinin beşte birini karşılamak için yeterli ancak dalga enerjisi günümüzde yaygın değil. Bunun sebebi, şiddetli fırtınalarda türbinlerinin çok zarar görmesi ve dalga oranının çok yüksek olduğu yerlerin kısıtlı olmasından kaynaklanıyor.

Konuyla ilgili olarak Ege Üniversitesi Mühendislik Fakültesi Makine Mühendisliği Enerji Ana Bilim Dalı Başkan Yardımcısı Prof. Dr. Aydoğan Özdamar, "Dalgalar, rüzgâr tarafından hareketlendirilen deniz yüzeyinin bozulan dengesinin tekrar dengeye gelme isteğiyle oluşurlar. Dalga gücünü, dalganın yüksekliği ve dalga boyu belirler. Dalga enerjisi rüzgâr, hidrolik, biyomas, güneş, gelgit enerjileri gibi yenilenebilir enerjilerdir. Yani tükenmeyen ve çevre dostu enerjilerdir. Dalga enerjisinden elektrik enerjisi üretilebileceği gibi su pompalama gibi mekanik güç gereken yerlerde de yararlanılabilir." dedi.Yrd. Doç. Dr. Utku Şentürk ise, "Türkiye'de dalga enerjisi gücü, kıyılarda 30-50 kw/m'dir. Ulusal Araştırma Enstitüsü ve Türkiye Elektromekanik Sanayi A.Ş., 2008 yılında dalga türbini üretimi projesine başladılar ve 2009 yılında 5 kw gücünde dalga türbini ürettiler. Sakarya Karasu'da prototip tesis kurulmuştur. Bunun dışında Türkiye'de uygulama yoktur ancak akademik çalışmalar sürmektedir. Dünyada dalga enerji tesisleri vardır. Özellikle İngiltere, Portekiz, Norveç ve Danimarka öncü ülkelerdendir." diye konuştu (enerjienstitüsü.com).

3.10. Nükleer Enerji

Nükleer enerji üretimi diğer kömür, doğal gaz veya petrol kullanarak elektrik üreten teknolojilere göre çok daha az miktarda karbondioksit salınımına neden olur. Yani nükleer santrallerin sera gazı emisyonları daha az olduğundan küresel ısınmayı hızlandırıcı etkileri daha düşüktür. Aynı zamanda kullanılacak yakıtı depolamak göreceli olarak kolay ve ekonomik olduğundan, nükleer santraller enerji arz güvenliğinin sağlanması hususunda devletlerin elini kolaylaştırır. Hammadde hacmine göre çok yüksek miktarda enerji sağlar. 1 kg kömürden 3 kWh, 1 kg petrolden 4 kWh elektrik enerjisi üretilmekteyken 1 kg uranyumdan ise 50.000 kWh elektrik enerjisi üretilebilmektedir. Bu gibi avantajların yanı sıra nükleer enerjinin yararlarının karşısında daha ciddi nitelikli potansiyel zararları da vardır. Özellikle alternatif enerjilerin maliyetleri düşmekteyken ve geli- şen teknolojilerle alternatif enerjilerin verimlilikleri de yükselmişken nükleerin zararlarını kabullenmek rasyonel bir seçim olmayabilir. Nükleer santrallerin olası patlama ihtimalleri elimine edilse dahi nükleer atıkların ne yapılması gerektiği henüz netleştirilememiştir ve doğaya hali hazırda zarar vermektedir. Yüksek güvenlik standartlarına rağmen nükleer enerji halen çok riskli bir teknolojidir. Japonya'da olduğu gibi kazalar halen olabilmektedir. %100 güvenli bir nükleer santral bulunmamaktadır. Nükleer santrallerde meydana gelen kazaların ise sonuçları hem doğa hem de insanoğlu için çok yıkıcı olmaktadır (Muradov, 2012).

Türkiye'de Mersin Akkuyu ve Sinop'ta Nükleer Enerji santralleri kurulacaktır. Santrallerle ilgili gerekli çalışmalara başlanmış olup yakın zamanda faaliyete geçmeleri beklenmektedir. Özellikle çevreci kuruluşlar Çernobil ve Fukuşima kazalarını örnek göstererek, ülkemiz açısından telafisi mümkün olmayan zararlarla karşı karşıya olunacağı için nükleer santrallere karşı çıkmakta ve eylemler yapmaktadırlar. Ayrıca nükleer atık sorunu da nükleer enerjinin en önemli problemi olarak karşımızda durmaktadır.

Bazı çevreci gruplar tarafından kuvvetli bir şekilde, yenilenebilir enerjide artış olduğu savunulmaktadır. Ancak, enerji aritmetiği böyle bir önerinin güçlüğünü açıklamaktadır. Gelecekteki enerji talebindeki artışlar düşünüldüğünde, yenilenebilir enerjinin, azalan fosil yakıt kaynakları ile yer değiştirmesinin kolay olmadığı görülmektedir.

Gelecekte, ancak, nükleer enerji ve yenilenebilir enerji birlikte olursa, hem emre amadelik sağlanabilecek ve hem de temiz enerjiye sahip olunabilecektir. Bu husus, sürdürülebilir kalkınma bağlamında da önem arz etmektedir (Tuğrul,2004).

İlk örneği 1996'da Japonya'da hizmete giren ve halen geliştirme süreci devam eden - Mersin Akkuyu'da Rus şirketi tarafında bir örneği inşa edilecek olan - 3. nesil nükleer santrallerde kısmen de olsa pasif güvenlik unsurları tesis edilmiştir. Bu santraller, aynı zamanda 2. nesil santrallere göre daha yüksek yakıt verimliliğine ve daha az atık üretme özelliğine sahiptir. Ancak, nükleer enerji teknolojisinin ana hedeflerinden birisi olan tam pasif güvenlikli santrallerin 4. nesil olarak adlandırılan ve geliştirilmeleri 2030'lı yılları bulacağı tahmin edilen bir süreç sonunda ortaya çıkmaları beklenmektedir.

Akkuyu Nükleer Santralinin ardından Japonlar tarafından yapılacak olan Sinop Nükleer Santrali için de etüd çalışmalarına başlanılmış olup 2023 yılında faaliyete geçmesi planlanmaktadır.

Türkiye'nin enerjiye ihtiyacı olduğu ve yenilenebilir enerji kaynaklarından enerji elde edilmesi tekniklerinin yeterince gelişmemiş olduğu dikkate alındığında gerekli önlemlerin alınması kaydıyla nükleer enerjiden faydalanılmasının zorunluluk olduğu açıktır.

SONUÇ VE ÖNERİLER

Enerji kalkınmanın ana unsuru olmasının yanında çevresel riskleri ve sorunları da beraberinde getirmektedir. Enerjiye yönelik olarak yapılan bütün faaliyetler, araştırılma aşamasından başlanılarak tüketimine kadar her aşamada, gerekli tedbirlerin alınmaması durumunda, çevre üzerinde, olumsuz etkiler ortaya çıkarmakta ve yerel, bölgesel, küresel ölçekte çevre sorunlarına yol açabilmektedir. Bundan dolayı enerji ile çevre arasındaki etkileşim üzerinde hassasiyetle durulması gereken bir konudur.

Günümüzdeki mevcut enerji anlayış modelinin neden olduğu hızlı iklim değişikliği sorunu tüm dünya ülkelerini etkileyen bir ekolojik sorun halini almıştır. Hızlı iklim değişikliği nedeniyle dünyadaki türlerin yok oluş hızları atmış ve ekolojik denge bozulmuştur. Günümüzdeki geleneksel enerji üretim tekniklerinin kullanımına devam edilmesi halinde önümüzdeki 100 yıl içinde 5ºC'lik bir artış öngörülmektedir ki, bu ölçekteki bir artış ekolojik sistem üzerinde geri dönüşü olmayan hasarların oluşmasına yol açabilecektir.

Netice itibariyle, dünya ekosistemi küresel bir sorunla karşı karşıya kalmış durumdadır. Bu sebeple küresel bir problemin çözümü için küresel bir eylem planının uygulanması zarureti doğmuştur.Hızlı iklim değişikliği probleminin kaynağında CO2 salınımları bulunmakta ve söz konusu emisyonların %44'lük bölümü enerji üretimi sırasında oluşmaktadır. Bundan dolayı söz konusu eylem planın başlangıç noktasının enerji üretimindeki tercihlerin değiştirilerek konvansiyonel enerji teknolojilerinden yenilenebilir enerji teknolojilerine geçilmesi oluşturmaktadır. Enerji anlayış modelindeki değişim ile istenilen sonucun elde edilebilmesi için küresel enerji yoğunluğunun da enerji verimliliğindeki AR-GE çalışmalarıyla en aza indirgenmesi gerekmektedir.

Elektrik üretiminde kullanılan kaynakların çeşitlendirilmesi ileride çıkabilecek kaynak teminindeki problemler ve fiyat artma risklerine bağlı olarak ülkelerin zor durumda kalmalarını en aza indirmede oldukça önemlidir. Bu kapsamda ülkeler mevcut hidrolik kaynaklarının yanında, rüzgar, güneş, jeotermal vb. gibi yerli, dışa bağımlı olmayan, doğal ve tükenmeyen, çevreye zarar vermeyen, temiz enerji kaynaklarını elektrik üretimi içinde belirli oranlara çıkarmak için hedeflerini koymalı, gerekli yasal düzenlemeleri yapmalı ve bu konuda somut adımlar atmalıdırlar. Türkiye Avrupa' da en yüksek rüzgar potansiyeline sahip olmasına rağmen, kurulu rüzgar gücü bakımından gerekli gelişmeyi gösterememiştir .Ancak Enerji ve Tabii Kaynaklar Bakanlığı'nın son yıllarda yenilenebilir Enerji Kaynaklarıyla İlgili çıkarmış olduğu kanun ve yönetmelikler, yenilenebilir enerji kaynaklarını kullanmayı teşvik etmeyi amaçlamaktadır. Biz de, Bakanlığın yapmış olduğu çalışmaları destekliyor ve yenilenebilir enerji kaynakları kullanımının yaygınlaşacağını ümit ediyoruz.

Günümüzde enerji ile ilgili mevcut sorunlar ve geleceğe yönelik oluşturulan felaket senaryoları göz önüne alındığında yenilenebilir enerji kaynaklarının önemi açıkça ortaya çıkmaktadır. Ülkemiz yürüttüğü iklim değişikliği ve son zamanların popüler terimi olan "Karbon Ekonomisi" çalışmalarında yenilenebilir enerji kaynaklarının payını arttırmalı ve enerji verimliliği konusuna dikkat etmelidir. Yenilenebilir enerji teşvikleri biraz daha iyileştirilmeli ve yatırımcı için cazip fiyatlara çekilmelidir. Rüzgar enerjisi alanında her yıl gelişim gösteren eğilim devam ettirilmelidir. Lisans konusunda yatırımcıların yaşadığı sorunlar asgariye indirilmeli, lisans verilen projelerin bir an önce işletmeye geçmelerinin sağlanması için lisans almadan tesis tamamlanmasına kadar olan süreçte yatırımcıların karşılaştıkları güçlükler ve karşılaşılan sorunlar çözülmeli ve yatırımcı teşvik edilmelidir. Yeni teknolojilerin entegrasyonu sağlanmalı ve rüzgar haritası sıkça güncellenmelidir. Türbin imalatı sürecinde kullanılan malzemelerin yerli üretimi konusunda devlet teşvikleri arttırılmalı ve yatırımcıya kolaylık sağlanmalıdır. Özellikle yurtdışından ithal edilen ara malzemelerin üretimi üzerine yoğunlaşılmalıdır.,

Üretim konusunda teşvikler verilmeli, yarışmalar düzenlenmeli en azından bazı malzemeler açısından dışa bağımlılıktan kurtulmalıdır..

Jeotermal enerjisi alanında mevcut potansiyel teknolojinin el verdiği ölçüde maksimum düzey ve fayda ile kullanılmalı, bu alanda var olan yüksek potansiyel boşa harcanmamalıdır. Teknik personel ve uzman kişi açığını kapatma konusunda en büyük görev üniversitelerimize düşmektedir. Üniversitelerimizin ilgili bölümlerde bu konunun üzerine düşerek öğrencileri yönlendirmesi ve teşvik etmesi gerekmektedir. Mevcut yeryüzüne çıkarılmış kaynakların yanında yer altında keşfedilmemiş jeotermal kaynaklar için jeofizik araştırmalara önem verilmeli ve disiplinler arası çalışmalar yapılmalıdır

Enerji konusunda dışa bağımlı bir ülke olduğumuz düşünülürse, dışa bağımlılıktan kurtulmak için alternatif, yenilenebilir, temiz, sürdürülebilir enerji kaynaklarına yönelmemizin ülkemizin yüksek menfaatleri bakımından çok önemli olduğu ortadadır.

Bunların dışında yenilenebilir enerji kaynaklarıyla ilgili ara eleman ihtiyacını temin etmek üzere Milli Eğitim Bakanlığı tarafından Mesleki ve Teknik Anadolu Liseleri bünyesinde konuyla ilgili alanlarda eğitim verilmelidir. Mevcut alanlar ve dallar revize edilmelidir.

Ders kitaplarında yenilenebilir enerji kaynakları konusuna geniş yer verilmelidir.

Yine Meslek Yüksekokullarında Yenilenebilir Enerji Kaynaklarıyla ilgili bölümler açılmalı, sahada çalışacak teknikerler yetiştirilmelidir.

Yenilenebilir Enerji Kaynaklarından elektrik üretiminin çevreye ve ekonomiye katkıları konusunda halkı bilinçlendirici çalışmalar yapılmalıdır.

Özellikle nükleer enerji konusundaki insanlardaki negatif algının değiştirilmesi için çalışmalar yapılması, nükleer konusundaki tereddütlerin giderilmesi, enerji ihtiyacımızı karşılayacak alternatif enerjiler içinde nükleer enerjinin de günümüz şartlarında gerekliliği konusunda ikna edici politikalar izlenmesi gerekmektedir.

Bütün vatandaşlar enerji tasarrufu konusunda bilinçlendirilmeli, enerji tasarrufu konusunda kağıt üzerindeki ve ütopik projelerden çok, halkın sahipleneceği gerçekçi projelere ağırlık verilmelidir.

Şu anda enerji konusunda dışa bağımlı olduğumuz, daha çok fosil yakıt kullandığımız, çevreye zarar verdiğimiz, küresel iklim değişikliğine katkıda bulunduğumuz hususunda farkındalık oluşturulmalıdır.

Yapılacak olan seminer, konferans, sempozyum, bilgilendirme toplantılarıyla, hazırlanan broşürlerle, dergi ve gazetelerle, kitaplarla halka ulaşılmalı, ülke içinde yaşayan herkese temiz, yenilenebilir, sürdürülebilir enerji kullanma sorumluluğu kazandırılmalıdır ki, gelecekte enerji sorunu yaşamayalım.

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TÜRKİYE'DE KARBONDİOKSİT EMİSYONU, ENERJİ TÜKETİMİ VE EĞİTİM İLİŞKİSİ: BOOTSTRAP NEDENSELLİK ANALİZİ

RELATIONSHIP BETWEEN CO_2 EMISSIONS, ENERGY CONSUMPTION AND EDUCATION IN TURKEY: BOOTSTRAP CAUSALITY ANALYSIS

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ÖZET

Bu çalışmanın amacı Türkiye'de karbondioksit emisyonu, enerji tüketimive eğitim düzeyi değişkenleri arasındaki nedensellik ilişkisinin araştırılmasıdır. Bu amaçla Türkiye'ye ait veriler 1971-2010 yıllarını kapsayacak şekilde analiz edilmiştir. Önceki çalışmalardan farklı olarak uygulamada ilk, orta ve yükseköğrenim düzeyleri ile karbondioksit emisyonu arasındaki nedensellik ilişkisi ayrı ayrı araştırılmaktadır. Ek olarak nedensellik analizinde bootstrap dağılımından elde edilen kritik değerler kullanılmıştır. Elde edilen bulgulara göre ilköğretim ve ortaöğretim okullaşma düzeyleri ile karbondioksit emisyonu ve enerji tüketimi arasında nedensellik ilişkisine rastlanmazken yükseköğretim okullaşma düzeyinden karbondioksit emisyonu ve enerji tüketimine doğru bir nedensellik ilişkisi olduğunu ortaya koymaktadır. Bu anlamda çevre ve enerji politikalarını yürüten otoriteler için yükseköğrenim okullaşma düzeyi etkili bir araç olarak sunulmaktadır.

Anahtar Kelimeler: Karbondioksit emisyonu, Enerji tüketimi, Eğitim, Bootstrap nedensellik analizi.

ABSTRACT

The aim of this study is to investigate the causality relationship between energy consumption, education level and CO2emissions. In this frame,Turkey' data are contributed to the analysis for the period of 1971-2010. Apart from previous studies causality relationship between primary, secondary, tertiary education level and CO2is investigated separately. In this analysis critical value was used which obtain from bootstrap distribution as well.Findings indicate that there is not any causality between primary, secondary schoolenrolment and CO2emissions,butcausality relationship found which from tertiary school enrollment towards to energy consumption and CO2 emissions. In this sense high education can be effective instrument for politicians which conduct policy about environment and energy.

Key words: CO2emissions, Energy consumption, Bootstrap causality analysis

1. GİRİŞ

Ülkelerin büyüme sürecinde temel hedefleri olan üretim artırma arzusu, çevreye verilen zararların görmezden gelinmesine sebebiyet vermiş, 1990'lı yıllar ile birlikte çevresel sorunlar küresel boyutlara ulaşmıştır. Söz konusu çevre sorunları içerisinde en öne

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çıkanlar, doğal kaynakların ve yeşil alanların bilinçsizce tüketilerek yok edilmesi ve küresel ısınmadır. Bu sorunlar içerisinde küresel ısınmanın etkilerinin hızlı ve büyük ölçekte görülmesi bu sorunu öncelikli çözülmesi gereken sorunlar listesinde üst sıralara taşımıştır.

Küresel ısınmanın altında yatan en büyük etkenin sera gazları olduğu bilinmektedir. Sera gazlarının %60'ını CO_2 gazı teşkil ederken, CO_2 salınımı büyük ölçüde insani faaliyetler sonrasında gerçekleşmektedir (IEA, 2013). Özellikle birincil enerji kaynağı olan fosil yakıt kullanımı bu salınımın temel kaynağıdır. Fosil yakıtın çabuk ulaşılabilir ve diğer enerji kaynaklarına göre daha ucuz olması sebebiyle söz konusu sorunun önümüzdeki yıllarda artacağı yönünde görüşler bulunmaktadır (Kandpal ve Garg, 1999). Son çeyrek yüzyılda CO_2 salınımındaki artış yaklaşık olarak % 16 artmıştır (WDI,2014). Dünya üzerinde yaşayan toplam nüfusun yarısı bu gazın etkisini büyük oranda hissetmektedir (Lau vd., 2009).

Küresel ısınma etkisinin oluşumunda rol alan gazların azaltılması için birçok düzenleme getirilmesine rağmen, bu düzenlemelere dünya genelinde toplu bir katılımın olmaması toplamda gazların salınımını azaltmamaktadır. Özellikle Kyoto protokolü sonrasında antlaşmaya dahil ülkelerin yapmış olduğu düzenlemeler salınımı azaltsa da, sıkı düzenlemelerle karşılaşan firmalar üretim tesislerini düzenlemelerin daha az sıkı olduğu yerlere taşımaktadır. Bu sebeple özellikle gelişmekte olan ülkelerin bu antlaşmaya dahil olması dünyanın çevresel kalitesi için önem arz etmektedir (Romuland,2011:66). Aksi takdirde üretim tesislerinin taşındığı Çin ve Hindistan gibi ülkeler birer kirlilik sığınağı haline dönüşmektedir (Taylor, 2005). Bu koşullar altında alınan önlemler kirliliğin azalmasını sağlamamakta sadece kurumsal düzenlemelerin olmadığı ülkelere çevresel bozulma konusunda öncelik verilmektedir (Akın, 2014:466). Çevresel bozulmanın getirdiği olumsuz sonuçların sadece kirliliğin görüldüğü yerleri değil, uzun dönemde bu konuda önlem almış ülkeleri de etkilemesi söz konusudur. Bu sebeple özellikle sera gazlarının içerisinde önemli bir payı bulunan CO_2'nin azaltılmasına yönelik alınacak önlemlere küresel katılım şarttır.

CO_2 salınımının artışının sebeplerini sorgulayan çalışmalarda temel belirleyiciler ekonomik büyüme, enerji ihtiyacı, yabancı sermaye yatırımları ve dış ticaret olarak görülmektedir (Ahmedvd., 2012; Ru vd., 2012; Islam vd., 2012). Son dönemlerde ise eğitim ile çevresel bozulma arasındaki ilişki sorgulanmaya başlanmıştır. Yukarıda sayılan çevresel bozulmanın belirleyicileri ile eğitim arasında yakın ilişki bulunmaktadır. Bu sebeple çevresel bozulmanın önlenmesi için üretilecek politikaların temel araçlarından biri de eğitim olması gerekmektedir. Eğitim ile çevresel bozulma arasındaki ilişkiyi ortaya koyan ampirik çalışmaların sayısı az olsa da her geçen gün artmaktadır. Bu sayıların niteliğinin ve niceliğinin artması çevresel bozulma ile mücadelede, eğitim konusuna verilen önemi artıracaktır. Diğer taraftan eğitim seviyesinin farklılaşmasının çevresel bozulma üzerine olan etkilerinde değişim görülebilmektedir (Aytun,2014).Mevcut literatür incelendiğinde eğitim ve çevresel bozulma nedensellik ilişkisinin Türkiye için henüzaraştırılmadığı görülmektedir.

Bu sebeple çalışmanın temel amacı, Türkiye için eğitim ile çevresel bozulma arasındaki ilişkiyi farklı eğitim düzeylerini dikkate alarak sorgulamaktır. Önceki çalışmalardan farklı olarak uygulamada ilk, orta ve yükseköğrenim düzeyleri ile karbondioksit emisyonu arasındaki nedensellik ilişkisi ayrı ayrı araştırılmaktadır. Gerçekleştirilen testToda-Yamamoto (1995) tipi nedensellik testinin Hacker ve Hatemi-J (2006; 2012) tarafından geliştirilmiş bir versiyonudur. Nedensellik analizinde kurulan VAR modeli için kullanılacak gecikme sayısı Hatemi-J (2003) tarafından önerilen enformasyon kriteri ile tespit edilmiştir. Nedensellik sınaması için elde edilen MWALD istatistikleri kaldıraçlı bootstrap dağılımından elde edilen kritik değerlerle karşılaştırılmıştır (Efron, 1997; Hacker ve Jatemi-J, 2006; 2012). Bulgulara göre, Türkiye için ilköğretim ve ortaöğretimokullaşma düzeyleri ile karbondioksit emisyonu ve enerji tüketimi arasında nedensellik ilişkisine rastlanmamaktadır. Diğer taraftan, bulgular yükseköğretim okullaşma düzeyinden karbondioksit emisyonu ve enerji tüketimine doğru bir nedensellik ilişkisi olduğunu ortaya koymaktadır.

Çalışmanın ikinci bölümünde çevresel bozulma ve eğitim arasındaki ilişkiye yönelik teorik çerçevede ortaya konularak konu ile yapılmış ampirik literatür sunulmuştur. Üçüncü bölümde yapılacak ekonometrik analiz hakkında bilgi verilerek kullanılacak verilere ilişkin açıklamalarda bulunulmuştur. Dördüncü bölümdeeğitim ile karbondioksit emisyonu, enerji tüketimi ve gelir düzeyi değişkenleri arasındaki nedensellik test edilip bulgular ortaya konulmuştur. Beşinci bölümde elde edilen bulgular tartışılarak çalışma sonlandırılmıştır.

2. LİTERATÜR

1992 yılında imzalanan Rio sözleşmesi ile eğitim, çevresel bozulma ve sürdürülebilir kalkınma için önemli araçlarından biri olarak tanımlanmıştır. Bu tarih sonrasında gerçekleştirilen çalışmalarda eğitimin çevresel bozulma üzerine olan etkileri ampirik olarak sorgulanmaya başlanmış fakat elde edilen bulgular üzerine tam bir uzlaşı sağlanamamıştır (Romuland, 2011:77). Bunun sebebi farklı eğitim düzeylerinin çevresel kalite üzerine olan etkilerinin farklılaşması olabilir. Ayrıca söz konusu etkinin yönü uzun dönemde değişmektedir (Aytun, 2014). Kısa dönemde artan eğitimle birlikte gelir de artmakta, artan gelir tüketim harcamalarını uyarmaktadır. Artan tüketim talebinin karşılanması için gerçekleştirilen üretim doğal kaynakların daha hızlı ve bilinçsizce tüketilmesine sebep olmaktadır (Princen, 2001). Eğitimin düzeyinin artması uzun dönemde çevresel bozulmayı azaltmaktadır. Yüksek eğitim çevre dostu teknolojilerin oluşumuna da imkân vermektedir. Bu durum çevresel bozulmayı azaltmaktadır. Ayrıca okuryazarlık oranının artması bireyin bilgi kaynaklarına ulaşımını kolaylaştırmaktadır (Managenergy, 2004). Özellikle çevresel bozulmayı önleme konusunda yapılan kamuoyu oluşturma çabalarına eğitimli insanların katılımı daha kolay olmaktadır (Nelson ve Phelps, 1966). Öğrencilerin eğitim süreçlerinde almış oldukları eğitim uzun dönemde çarpan etkisi yaratarak mevcut etkiyi daha da güçlendirmektedir (Uddin, 2014:61). Bu sebeple eğitim ile çevresel bozulma arasındaki ilişki sorgulanırken uzun bir zaman periyodu içerisinde eğitim düzeyleri ayrı ayrı sorgulanmalıdır.

Diğer taraftan eğitimin çevresel bozulmaya neden olduğu yönündeki görüşler temel eğitim düzeyi için geçerlidir. Eğitim ekonomik büyümenin itici güçlerindendir. Bireyler ekonomik büyümeyle birlikte daha yüksek gelir seviyesine ulaşmakta ve daha mutlu olmak için daha fazla tüketmek istemektedir (Jorgenson,2003). Özellikle düşük gelir gurubuna dahil olan ülkelerde ilk okullaşma, düşük gelirli hane halkının gelirinde oransal olarak yüksek artışlar sağlamaktadır. Bu durum tüketim alışkanlıklarının değişmesine ve aşırı tüketime yol açmaktadır. Çevre konusunda yeterince bilinçlenmemiş tüketici 'daha fazla tüketim daha fazla mutluluktur' mantığı ile tüketimi artırarak çevreye zarar vermektedir (Princen, 2001).

Romuland (2011) eğitim ile çevresel bozulma ilişkisini sorguladığı çalışmasında eğitimin çevresel bozulmayı pozitif yönde etkilediği sonucuna ulaşmıştır. Romuland bu eğitim artışının tüketimi uyardığını ve bu pozitif yönlü ilişkinin, eğitimin gelir artışı sağlaması sebebiyle oluştuğunu ifade etmiştir. Grossman ve Krueger (1993) gelir seviyesi belirli bir eşik seviyesine ulaştığında söz konusu pozitif etkinin tersine döndüğünü ifade etmektedir. Bu etki Çevresel Kuznets Eğrisi (ÇKE) ile benzerlik göstermektedir. Ters U şeklindeki Çevresel Kuznets Eğrisinin oluşumunda gelirin artması belirli bir eşik düzeyine kadar çevresel bozulmayı artırmaktadır. Bu süreçte üç etkileşim mekanizması bulunmaktadır; Ölçek etkisi, kompozisyon etkisi ve teknoloji etkisi (Brock ve Taylor, 2004). İlk olarak ölçek etkisi, artan üretim miktarı ile birlikte üretim faktörü talebinin artması nedeniyle çevresel bozulmayı pozitif yönde etkilemektedir. Kompozisyon etkisi ise üretilen ürünün kompozisyonunun çevreye uyumu ile farklılaşabilmektedir. Ürünlere olan talep ürünün kompozisyonunu belirlemektedir. Artan gelirle birlikte tüketicinin ürün kompozisyonu tercihi çevresel bozulmanın belirleyicisidir. Kompozisyonun çevreye duyarlılığının fazla olması durumunda üretici bu durumu dikkate almakta ve çevreye daha düşük oranda zarar veren ürünler üretmektedir. Bireyin fayda fonksiyonunda çevre unsurunun yer almadığı durumlarda, kompozisyon oluşturulurken çevre dikkate alınmamakta ve çevresel bozulma artmaktadır. Yüksek gelirin sağladığı teknolojik ilerleme ile çevresel bozulmayla olan ilişkisinin yönü mutlak negatiftir. Teknolojik ilerlemelerin amacı daha az kaynak kullanmaktır (Kumbaroglu vd., 2008). Bu sebeple yeni teknolojilerin çevre dostu olduğu düşünülmektedir (Bimonte, 2002).

Eğitim düzeyinin başlangıç evresi ölçek etkisi ile ilişkilendirilebilir. Eğitimin ilk okullaşma düzeyinde yaratmış olduğu etki, gelir etkisi ile ortaya çıkmaktadır. Birey artan geliri ile daha fazla çeşit ve miktarda ürünü tüketmek istemektedir. Orta okullaşma ile birlikte çevre bilinci oluşmaya başlamaktadır. Oluşan çevre bilinci ürün taleplerine yansıdığında üreticiler ürün kompozisyonlarında bu duruma dikkat etmektedir. Boopen ve Vinesh (2011) Maritus için gerçekleştirmiş oldukları zaman serisi analizinde orta okullaşma ile çevresel bozulma arasında negatif yönlü ilişki bulmuştur.

Aytun (2015) ÇKE hipotezini test eden çalışmasında önceki çalışmadan farklı olarak, eğitimin (ilköğretim, ortaöğretim ve yükseköğretim) çevre kirliliği üzerine olan etkisini gelişen ülkeler için sorgulamıştır. Gelişen ülkelerin, gelir artış sürecinin ilk aşamasında bulundukları için çevre kirliliğinin olumsuz etkilerine daha çok maruz kaldıkları bilinen bir gerçektir. Bu nedenle uygulamada Türkiye de dahil olmak üzere 10 gelişen ülkenin verileri kullanılmıştır. Panel Fully Modified OLS yöntemi ile elde edilen tahmin sonuçlarına ters U şeklindeki çevresel Kuznets eğrisinin varlığına işaret etmektedir. Ayrıca karbondioksit salınımı ile ortaöğretim okullaşma oranı arasında pozitif yönde ilişki bulunurken yükseköğretim okullaşma oranı arasında negatif yönde ilişki bulunmaktadır. Gelişen ülkelerde eğitim düzeyine ilişkin bulgular ÇKE hipotezini destekler niteliktedir. Aytun'a (2014:357) göre gelişmenin ilk aşamalarında büyümenin ölçek etkisi çevresel bozulmaya yol açmaktadır. Bu aşamada ekonominin sahip olduğu sektörel kompozisyon ve teknik seviye kirlilik yaratan basit ve düşük beşeri sermaye gerektiren teknolojilerden meydana gelmektedir. Gelişmenin ilerleyen aşamalarında ise hem sektörel kompozisyon hem de üretim tekniğinde meydana gelen ilerlemeler ile kirlilik azalacaktır. Şüphesiz ki böylesi gelişmeler yükseköğrenim görmüş bir nüfus sayesinde gerçekleştirilebilecektir. Ek olarak gerçekleştirilen nedensellik analizi sonuçları göre seriler arasında kısa dönemli nedensellik ilişkisinin bulunmadığını göstermektedir. Uzun dönemli nedensellik analizi sonuçlarına göre ise ekonomik büyüme, enerji kullanımı ve okullaşma oranlarından karbondioksit salınımına doğru uzun dönemli bir hata düzeltme ve nedensellik mekanizmasının bulunduğunu göstermektedir. Bu nedenle çalışmadagelişen ülkelerdeki çevre kirliliğini azaltmak için yükseköğretim düzeyinin arttırılmasının etkili bir araç olacağınıortaya koymaktadır (Aytun, 2014:360). Bu anlamda lise ve yüksek eğitim çevresel bozulmayı mutlak olarak azaltmaktadır. Çevresel kalitenin iyileşmesinin altında yatan temel etken artan eğitim düzeyi sayesinde sağlanan çevre bilinci ve üretilen çevre dostu teknolojilerdir. Ayrıca bu çevre dostu teknolojilerin içselleştirilmesi de yüksek eğitimle birlikte daha kolay olmaktadır (Nelson ve Phelps,1966). Günümüzde teknolojik gelişmeler AR-GE çalışmaları ve teknoloji transferi yoluyla sağlanmaktadır(Ma ve Stern, 2007). Üretimde yeni teknolojilerin kullanılmasında teknoloji transferinin etkisi daha büyük olmaktadır (Keller 2004). Yüksek eğitim seviyesi teknoloji transferinin gerçekleşmesini kolaylaştırmaktadır (Eaton ve Kortum, 1999). Ayrıca eğitim düzeyinin artması ile bireylerin beceri düzeyleri de artmaktadır. Bu beceri artışı bilgi teknolojilerinin kullanımı alanında gerçekleştiğinde bireylerin bilgiye ulaşımı hızlanmakta ve eğitim seviyesinde ki artış süreklilik kazanmaktadır. Eğitim düzeyinin çevresel bozulmayı azaltıcı etkisi katlanarak artmaktadır (Farzin ve Bond, 2006).

Üst düzey eğitimli birey için çevre lüks bir mal olarak nitelendirilmektedir. Tüketici yüksek eğitimi sayesinde belirli bir gelir seviyesine ulaşınca, çevresel kaliteye olan talebi artmaktadır. Bu durumda birey, politik seçimlerini daha duyarlı yapmakta çevresel bozulma konusunda duyarlı politikacıları tercih etmektedir. Ayrıca eğitimli tüketiciler bir araya gelerek oluşturdukları sivil toplum örgütleri aracılığıyla politik bir güç olabilmektedir (Farzin ve Bond 2006). Bu durum dış ticaret, yabancı sermaye yatırımları gibi çevresel bozulma ile yakın ilişkisi olan konularda karar alınırken kontrol mekanizması oluşturmaktadır (Dasgupta ve Wheeler, 1997). Wheeler vd. de (1993) devletin çevresel düzenlemeler konusunda yeterince duyarlı olmaması durumunda, yüksek eğitimli grupların politika yapıcılar üzerinde bir baskı unsuru oluşturduğunu ifade etmişlerdir. Baiocch vd.(2010) panel veri analizi yöntemiyle gerçekleştirdiği analiz sonuçları da Wheeler ve arkadaşlarını desteklemektedir. İngiltere için gerçekleştirilen analizde yüksek eğitimli kesimin ülkedeki CO_2 emisyonunu azaltıcı bir etkisi olduğu sonucuna ulaşmıştır. Bu durum 'yeşil tüketicilik' olarak adlandırılan akımı kuvvetlendirmektedir. Petit ve Sheppard (1992) eğitimli toplulukların bir araya gelerek çevresel bozulmayı azaltabileceğini ifade etmiştir.

Eğitimin kaynak kullanımını azaltarak çevresel bozulmayı azaltma mekanizmalarından biride nüfus artış hızını düşürmesi kanalıyla gerçekleşmektedir. Eğitim düzeyi artan ülkelerde doğum oranında azalma meydana geldiği çeşitli çalışmalarla ortaya konmuştur. Nüfus artışının azalması kullanılan kaynak miktarını da azaltmaktadır (Livi-Baci, 1997). Birey daha az sayıda çocuk sahibi olarak onlara daha kaliteli bir gelecek sunmayı amaçlamaktadır. Ayrıca eğitimli birey yüksek ücret kazanmakta bu da çocuk sahibi olmanın fırsat maliyetini artırmaktadır.

3. VERİ VE YÖNTEM

Uygulamada kullanılan veriler Dünya Bankası'nın Dünya Kalkınma Göstergeleri veri tabanından elde edilmiştir. Türkiye için elde edilen yılık veriler 1971-2010 dönemini kapsayacak şekilde bir araya getirilmiştir. Söz konusu örneklemin seçilme nedeni bütün seriler için ortak olarak bu dönem zarfında eksiksiz bulunabilmesidir. Kullanılan serilere ilişkin ayrıntılı tanımlamalar Tablo 1'de sunulmaktadır.

Tablo 1. Veri Tanımlamaları ve Kaynakları

Kod	İsim	Kaynak
C	Kişi başına CO2 emisyonu (metrik ton)	WDI[a]
E	Kişi başına enerji kullanımı (kg olarak petrole eşdeğer)	WDI[a]
Y	Kişi başına Gayrisafi Yurtiçi Hasıla (2005 yılı sabit fiyatları - USD)	WDI[a]
P	Okullaşma oranı, ilköğretim (% brüt)	WDI[a]
S	Okullaşma oranı, ortaöğretim (% brüt)	WDI[a]
T	Okullaşma oranı, yükseköğretim (% brüt)	WDI[a]

[a] Dünya Bankası Veri Tabanı (World Development Indicators) http://databank.worldbank.org/data/views/variable Selection/selectvariables.aspx?source=world-development-indicators (Erişim: 20.03.2015)

Uygulamaya konu olan serilere ilişkin tanımlayıcı istatistikler (Tablo 4) ve serilerin 1971-2010 yılları içerisinde izlediği gelişim (Şekil 1) EK'te sunulmaktadır. Analize başlamadan bütün serilerin logaritması alınmıştır.

Bu çalışmada Türkiye'de karbondioksit emisyonu, enerji tüketimi, gayrisafi yurtiçi hasıla ve okullaşma oranı göstergeleri arasındaki nedensellik ilişkisi araştırılmaktadır. Granger'a (1969) göre bir bağımlı değişkeni en iyi bir şekilde açıklayan kendi gecikmeli değerleridir (Denklem 1 ve 2). Aşağıdaki gibi (Denklem 1) oluşturulan iki değişkenli basit bir modelde X'in gecikmeli değerleri, Y'nin kendi gecikmeli değerleri ile beraber Y'nin bugünkü değerini açıklayabiliyorsa X'ten Y değişkenine doğru Granger (1969) anlamında nedensellik ilişkisi bulunduğu kabul edilir.

$$Y_t = \alpha_0 + \sum_{i=1}^{k} \beta_i Y_{t-i} + \sum_{i=1}^{k} \theta_i X_{t-i} + e_t \qquad 1)$$

$$X_t = \delta_0 + \sum_{i=1}^{k} \vartheta_i X_{t-i} + \sum_{i=1}^{k} \mu_i Y_{t-i} + \varepsilon_t \qquad 2)$$

Denklem 1 ele alındığında*X*'ten*Y*'ye doğru bir nedenselliğin söz konusu olması için *X*'e ait gecikme katsayılarının beraberce sıfıra eşit olduğu hipotezi ($H_0 : X \nrightarrow Y, \quad \theta_1 = \theta_2 = \cdots = \theta_k = 0$) reddedilmelidir. Bu birleşik hipotezin testinde standart WALD testi kullanılmaktadır. Böylece WALD testi ile H_0 hipotezi reddedilerek X'ten Y serisine doğru bir nedensellik bulunduğu ortaya konulabilmektedir. Gerçekleştirilen WALD testi ki-kare dağılımına uymaktadır. Ancak temelde serilerin seviye değerlerinin kullanıldığı VAR modeline dayalı bu metot, birim kök içeren ya da eşbütünleşik seriler için asimptotik test istatistikleri geçersiz olduğundan uygulanamazlar (Park ve Phillips, 1989; Sims vd., 1990). Toda ve Yamamato (1995) tarafından geliştirilen modifiye edilmiş WALD testi Granger tipi nedensellik testinin karşılaştığı bu sorunun üstesinden gelebilmektedir. Toda-Yamamato nedensellik testinde serilerin bütünleşme dereceleri veya aralarındaki olası eş bütünleşme ilişkisi, nedensellik sınamasının geçerliliğini etkilememektedir. Toda-Yamamoto nedensellik testi de VAR yöntemine dayanmaktadır. VAR analizinde sistem içinde yer alan her bir içsel değişken, sistemdeki tüm içsel değişkenlerin gecikmeli değerlerinin bir fonksiyonu olarak varsayılmaktadır. Toda-Yamamoto yaklaşımında ilk olarak serilerin düzeyleri kullanılarak standart vektör otoregresif model (VAR) oluşturulur. Analiz VAR modelinin en uygun gecikme uzunluğunun (k) saptanması ile başlar. Sonrasında, birim kök testleri ile modeldeki değişkenler için maksimum bütünleşme derecesi (dmax) saptanır. Daha sonra VAR modeli için belirlenen uygun gecikme uzunluğuna (k), maksimum bütünleşme derecesi (dmax) ilave edilir. Sonraki aşamada ise VAR modeli (Denklem3 ve 4) k+dmax gecikme düzeyinde SUR ya da OLS tahmincileri ile tahmin edilir.

$$Y_t = \alpha_0 + \sum_{i=1}^{k+dmax} \beta_i Y_{t-i} + \sum_{i=1}^{k+dmax} \theta_i X_{t-i} + e_t \qquad 3)$$

$$X_t = \delta_0 + \sum_{i=1}^{k+dmax} \vartheta_i X_{t-i} + \sum_{i=1}^{k+dmax} \mu_i Y_{t-i} + \varepsilon_t \qquad 4)$$

Son olarak VAR modelindeki her bir denklemde açıklayıcı değişkenlerin k düzeyinde gecikmesinin beraberce sıfıra eşit olduğuna ilişkin MWALD testi uygulanır. Açıklayıcı değişkenlerin beraberce sıfıra eşit olduğuna yönelik sıfır hipotezinin reddedilememesi açıklayıcı değişkenden bağımlı değişkene doğru Toda-Yamamoto tipi nedensellik bulunduğu anlamına gelmektedir.

İlerleyen dönemde Hacker ve Hatemi-J (2006:1494) özellikle küçük örneklem, normal dağılıma uymama ve hata teriminde koşullu değişen varyans (ARCH) olması durumları için simülasyon deneyleri gerçekleştirmiştir. Elde ettikleri sonuçlar MWALD yaklaşımından elde edilen test istatistiğinin sıfır hipotezini reddetme yönünde sapmalı olduğunu ortaya koymaktadır. Hacker ve Hatemi-J (2006) söz konusu durumlarda ortaya çıkacak olan sapmayı önlemek için Efron (1997) tarafından geliştirilen kaldıraçlı (leveraged) bootstrap yöntemini önermektedirler. Çalışmada bootstrap dağılımından elde edilen kritik değerler kullanıldığında test performansının arttığı ortaya konulmaktadır (Hacker ve Hatemi-J, 2006:1499).

Bir diğer sorun VAR modeli için gecikme sayısının belirlenmesinde ortaya çıkan farklı metotların yarattığı belirsizliktir. VAR modeli için gecikme sayısı yaygın olarak SBC (Schwarz Bayesian Information Criterion), HQC (Hannan and Quinn Criterion) aracılığı ile belirlenebilmektedir. Ancak Hatemi-J (2003:137) bu iki enformasyon kriterinin, VAR modelinin farklı istikrar koşullarında aynı başarıyı sergilemediğini ortaya koymaktadır. Ayrıca yapılan simülasyonlar aynı VAR modeli için Schwarz (1978) ve Hannan ve Quinn (1979) enformasyon kriterlerinin farklı gecikme sayıları önerebildiğini göstermektedir.Bu durum ise kararsızlığa yol açmaktadır.Özellikle ekonomik ve finansal serilerin büyük ölçüde durağan olmadıkları düşünüldüğünde bu sorun daha da önem taşımaktadır (Hatemi-J:136).Bu sorunu gidermek üzereHatemi-J (2003) tarafından Schwarz (1978) ve Hannan-Quinn (1979) enformasyon kriterlerinin bir kombinasyonu olan Hatemi-J (2003) enformasyon kriterinin (HJC) kullanılmasını önermektedir.Bu sayede optimal gecikme sayısının seçilme olasılığı arttırılmaktadır. HJC (Denklem 5) için $\hat{\Omega}_j$, j gecikme sayısında, T örneklemi için, varyans-kovaryans matrisinin(Ω) en yüksek olabilirlik yöntemiyle yapılmış tahminidir (Hatemi-J, 2003:136).Yapılan simülasyonların %85'inden fazlasında bu yeni kriter kullanılarak yapılan gecikme düzeyi seçimlerinin istikrar koşullarından bağımsız olarak doğru olduğu ortaya konulmaktadır (Hatemi-J, 2003:137).

$$HJC = \ln\left(det\hat{\Omega}_j\right) + j\left(\frac{n^2 lnT + 2n^2 \ln(lnT)}{2T}\right) \qquad j = 0, \ldots, K \qquad 5)$$

Bu çalışmada söz konusu iki sorunu gidermek üzere geliştiren yaklaşımların bir bileşimi kullanılmıştır. Yine Hacker ve Hatemi-J (2012) tarafından geliştirilen bu yaklaşımla optimal gecikme sayısı Hatemi-J enformasyon kriteri ile bootstrap nedensellik analizinin içerisinde doğrudan hesaplanarak kullanılmaktadır (Hacker ve Hatemi-J, 2012)

4. BULGULAR

Uygulamanın ilk aşamasında, değişkenlerin durağan olup olmadıkları, yani birim kök içerip içermediklerini anlamak için birim kök sınamaları yapılmıştır. Böylece değişkenlerin maksimum bütünleşme derecesi ve dolayısıyla da Toda ve Yamamoto (1995) nedensellik sınamasında VAR modeline eklenecek gecikme sayısı (dmax) belirlenebilmektedir. Bunun için, ADF (Dickey ve Fuller, 1979; 1981; MacKinnon, 1996) ve PP (Phillips ve Perron, 2001) birim kök sınamalarından yararlanılmıştır. Tablo 2'de sunulan birim kök sınama sonuçlarına göreC, E, Y, P ve Sbirinci farkları alındığında durağan iken Tikinci farkında durağan bulunmuştur. Serilerimizden beşi I(1), bir tanesi I(2) olduğu için maksimum entegrasyon mertebesi dmax=2 olarak belirlenmiştir.

Tablo 2. ADF ve PP Birim Kök Test Sonuçları

		Seviye		Birinci Fark		İkinci Fark	
Seriler	Test	S	S + T	S	S + T	S	S + T
C	*ADF*	-1,315	-3,024	-6.107**	-6.966**	-	-
	PP	-1,338	-3,024	-6.251**	-6.134**	-	-
E	*ADF*	-1,214	-3,559	-6.229**	-6.358**	-	-
	PP	-1,214	-3.648*	-6.269**	-6.130**	-	-
Y	*ADF*	-0,346	-2,744	-6.290**	-6.540**	-	-
	PP	-0,327	-2,83	-6.290**	-6.197**	-	-
P	*ADF*	-2,107	-2,109	-5.631**	-10.427**	-	-
	PP	-2,29	-2,34	-5.629**	-5.567**	-	-
S	*ADF*	-1,636	-1,983	-5.185**	-5.705**	-	-
	PP	-1,577	-1,203	-5.149**	-5.183**	-	-
T	*ADF*	-0,269	-3.376*	-3.242*	-5.858**	-5.858**	-5.773**
	PP	0,331	-2,151	-3.394*	-3,393	-5.902**	-5.804**

Not: H_0: Seri birim kök içermektedir. ** ve * H_0 hipotezinin sırasıyla yüzde %1 ve %5 anlam düzeyinde reddedildiğini göstermektedir. ADF için MacKinnon (1996) kritik değerleri kullanılmış olup uygun gecikme sayısının belirlenmesinde Schwarz (1978) bilgi kriteri kullanılmıştır. Phillips-Perron için bant genişliği Newey-West ile seçilmiştir. Spektral tahmin metodu olarak Bartlett kerneli kullanılmıştır. S sabit, S+T sabit ve trend içeren modeli temsil etmektedir.

Birim kök sınamalarından sonra gerçekleştirilen bootstrap nedensellik testi sonuçları Tablo 3'te özetlenmektedir*. Test sonuçlarına göre ilköğretim okullaşma oranı (P) ve ortaöğretim okullaşma oranından (S), Kişi başına CO2 emisyonu (C), Kişi başına enerji kullanımı (E) ve Kişi başına Gayrisafi Yurtiçi Hasıla (Y) değişkenlerine doğru bir nedensellik ilişkisi bulunmamaktadır. Her ne kadar ilk ve orta öğretim düzeylerinde meydana gelen ilerlemelerin çevresel bozulmaya yol açacağına yönelik bir beklenti bulunsa dabu durumun 1971-2010 yılı örnekleminde Türkiye için geçerli olmadığı görülmektedir(Jorgenson, 2003; Princen, 2001; Romuland, 2011). Bu durum Grossman ve Krueger'in (1993) gelir seviyesi belirli bir eşik seviyesine ulaştıktan sonra eğitimin kirlilik yaratıcı etkilerinin tersine döneceğine ilişkin görüşünü desteklemektedir. Türkiye'nin 1970'ler sonrasında bu eşik seviyesini geçmiş olma olasılığını akla getirmektedir.

Yükseköğretim okullaşma oranından (T) ise Kişi başına CO2 emisyonuna (C) doğru tek yönlü bir nedensellik ilişkisi bulunmaktadır. Bu durum Aytun'un (2014:360) gelişen ülkelerdeki çevre kirliliğini azaltmak için yükseköğretim düzeyinin arttırılmasının etkili bir araç olacağınıyönündeki önerisini destekler niteliktedir. Yükseköğretim ile teknoloji transferleri daha kolay olabilmekte, yüksek bilgi ve beceri düzeyindeki insanlar çevreyi lüks bir mal olarak nitelendirmektedirler. Ayrıca eğitimli tüketiciler bir araya gelerek oluşturdukları sivil toplum örgütleri aracılığıyla politik ve denetleyici bir güç olabilmektedir (Eaton ve Kortum, 1999; Farzin ve Bond, 2006; Dasgupta ve Wheeler, 1997; Wheeler vd., 1993). Ek olarak Türkiye için yükseköğretim okullaşma oranından (T) kişi başına enerji kullanımı (E) ve kişi başına gayrisafi yurtiçi hasıla (Y) değişkenlerine doğru tek yönde bulunan nedensellik ilişkisi mevcut literatürdeki beklentilerle örtüşmektedir. Ek bir bulgu ise Türkiye için karbondioksit salınımından enerji tüketimine doğru tek yönlü bir nedenselliğin bulunmasıdır.

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* Ayrıntılı sonuçlar ekte raporlanmaktadır (Tablo 5-10).

5. SONUÇ

Çevresel bozulma, enerji tüketimi ve gelir düzeyi ilişkisi iktisatçılarca yaygın incelenen konulardan birisidir. Farklı ülke ve dönemler için pek çok defa test edilen Çevresel Kuznets eğrisi hipotezine göre ülkeler gelişmenin ilk aşamalarında yüksek kirlilik düzeylerine yol açacak, ilerleyen aşamalarda olumlu şekilde işleyen kompozisyon ve teknik etki kanalları ile kirlilik azalmaya başlayacaktır. Karbondioksit emisyonuna olan etkiyi ölçmek üzere önceki çalışmalardan farklı olarak ilköğretim, ortaöğretim ve yükseköğretim okullaşma oranları da analize dahil edilmiştir. Söz konusu nedensellik ilişkisi Türkiye için 1971-2010 dönemi yıllık verileri ile araştırılmıştır. Analiz metodu olarak standart Granger ve Toda-Yamamoto tipi nedensellik analizinin eksikliklerini gidermek üzere iki yeni yaklaşım uygulanmıştır. İlk olarak VAR modeli için kullanılacak gecikme sayısı Hatemi-J enformasyon kriteri ile tespit edilmiştir. İkinci olarak nedensellik sınaması için elde edilen MWALD istatistikleri kaldıraçlı bootstrap dağılımından elde edilen kritik değerlerle

Tablo 3. Bootstrap Nedensellik Testi Sonuçları

Bağımlı Değişkenler	Açıklayıcı Değişkenler					
	C	E	Y	P	S	T
C	-	0.671	0.098	1.482	0.001	3.586 *
E	5.253**	-	0.400	2.994	0.108	6.991 **
Y	1.761	0.210	-	1.718	0.537	7.727 **
P	0.193	1.461	1.779	-	0.001	0.144
S	0.030	0.027	0.000	1.414	-	1.511
T	0.000	0.303	0.797	2.099	0.385	-

Not: Kritik değerler 100000 tekrarlı bootstrap dağılımından elde edilmiştir. ***, ** ve * bootstrap kritik değerleri kullanılarak, H_0 hipotezinin sırasıyla %1, %5 ve %10 anlam düzeyinde reddedildiğini göstermektedir. VAR modeli için optimal gecikme sayısı HJC (Hatemi-J, 2003) ile k=1 olarak belirlenmiştir. ADF ve PP birim kök testi sonuçlarına göre dmax=2 olarak belirlenmiştir.

karşılaştırılmıştır. Bulgulara göre, Türkiye için ilköğretim ve ortaöğretim okullaşma düzeyleri ile karbondioksit emisyonu ve enerji tüketimi arasında nedensellik ilişkisine rastlanmamaktadır. Diğer taraftan, bulgular yükseköğretim okullaşma düzeyinden karbondioksit emisyonu ve enerji tüketimine doğru bir nedensellik ilişkisi olduğunu ortaya koymaktadır. Bulgular neticesinde yükseköğretim düzeyini iyileştirmeye yönelik girişimler, Türkiye'de çevre kirliliğini azaltmayı amaçlayan politika yapıcılara etkili bir araç olarak sunulmaktadır.

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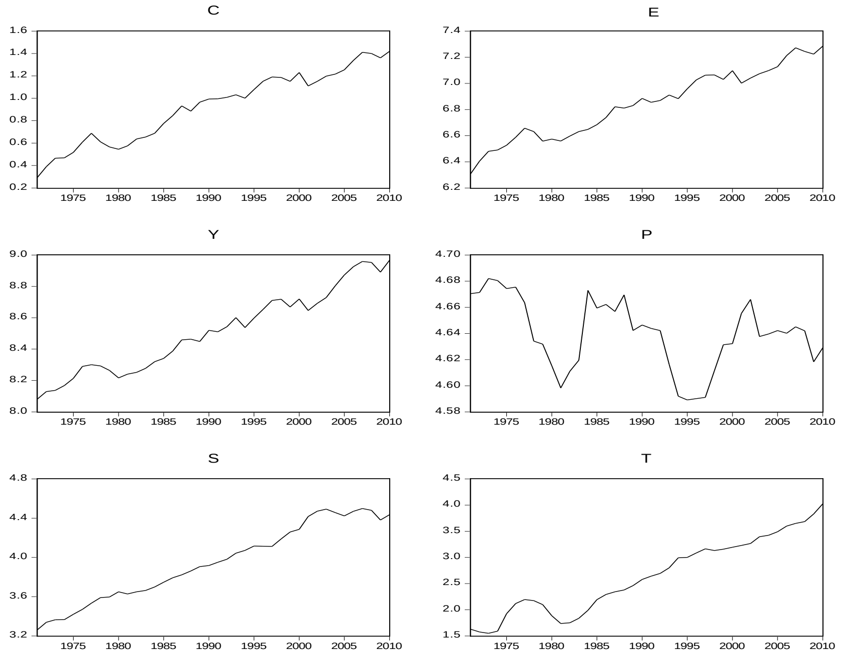
EK

Tablo 4.Tanımlayıcı İstatistikler

	C	E	Y	P	S	T
Ortalama	0.924	6.843	8.512	4.639	3.948	2.643
Medyan	0.994	6.861	8.514	4.642	3.934	2.609
Maksimum	1.418	7.284	8.966	4.681	4.498	4.023
Minimum	0.293	6.307	8.081	4.589	3.262	1.548
St. Hata	0.319	0.264	0.261	0.026	0.388	0.721

Şekil 1. Analize Konu Serilerin Zaman İçindeki Seyri



Tablo 5.Nedensellik Analizi Sonuçları (1)

$C = f(E, Y, P, S, T)$ modeli						
H_0	MWALD	Asimp. p-değeri	Bootstrap Kritik Değerleri			SONUÇ
			1%	5%	10%	
$E \nrightarrow C$	0,671	0,413	8,623	4,557	3,134	Kabul
$Y \nrightarrow C$	0,098	0,754	8,962	4,782	3,246	Kabul
$P \nrightarrow C$	1,482	0,223	8,898	4,751	3,231	Kabul
$S \nrightarrow C$	0,001	0,974	8,809	4,698	3,180	Kabul
$T \nrightarrow C$	3,586	0,058	8,93	4,704	3,203	**Red**

Tablo 6.Nedensellik Analizi Sonuçları (2)

$E = f(C, Y, P, S, T)$ modeli						
H_0	MWALD	Asimp. p-değeri	Bootstrap Kritik Değerleri			SONUÇ
			1%	5%	10%	
$C \nrightarrow E$	5.253	0.022	8.576	4.599	3.155	**Red**
$Y \nrightarrow E$	0.400	0.527	9.005	4.746	3.244	Kabul
$P \nrightarrow E$	2.994	0.084	8.872	4.769	3.226	Kabul
$S \nrightarrow E$	0.108	0.742	8.833	4.685	3.190	Kabul
$T \nrightarrow E$	6.991	0.008	8.677	4.627	3.192	**Red**

Tablo 7.Nedensellik Analizi Sonuçları (3)

$Y = f(C, E, P, S, T)$ modeli						
H_0	MWALD	Asimp. p-değeri	Bootstrap Kritik Değerleri			SONUÇ
			1%	5%	10%	
$C \nrightarrow Y$	1.761	0.184	8.722	4.676	3.202	Kabul
$E \nrightarrow Y$	0.210	0.647	8.650	4.586	3.150	Kabul
$P \nrightarrow Y$	1.718	0.190	8.991	4.856	3.312	Kabul
$S \nrightarrow Y$	0.537	0.464	9.030	4.782	3.227	Kabul
$T \nrightarrow Y$	7.727	0.005	9.023	4.756	3.225	**Red**

Tablo 8.Nedensellik Analizi Sonuçları (4)

$P = f(C, E, Y, S, T)$ modeli						
H_0	MWALD	Asimp. p-değeri	Bootstrap Kritik Değerleri			SONUÇ
			1%	5%	10%	
$C \nrightarrow P$	0.193	0.661	8.973	4.745	3.213	Kabul
$E \nrightarrow P$	1.461	0.227	8.812	4.663	3.190	Kabul
$Y \nrightarrow P$	1.779	0.182	8.965	4.784	3.268	Kabul
$S \nrightarrow P$	0.001	0.977	8.793	4.657	3.154	Kabul
$T \nrightarrow P$	0.144	0.704	9.012	4.727	3.203	Kabul

Tablo 9.Nedensellik Analizi Sonuçları (5)

$S = f(C, E, Y, P, T)$ modeli						
H_0	MWALD	Asimp. p-değeri	Bootstrap Kritik Değerleri			SONUÇ
			1%	5%	10%	
$C \nrightarrow S$	0.030	0.862	8.792	4.710	3.182	Kabul
$E \nrightarrow S$	0.027	0.869	8.746	4.628	3.141	Kabul
$Y \nrightarrow S$	0.000	0.992	8.960	4.714	3.210	Kabul
$P \nrightarrow S$	1.414	0.234	8.770	4.744	3.218	Kabul
$T \nrightarrow S$	1.511	0.219	8.768	4.650	3.197	Kabul

Tablo 10.Nedensellik Analizi Sonuçları (6)

$T = f(C, E, Y, P, S)$ modeli						
H_0	MWALD	Asimp. p-değeri	Bootstrap Kritik Değerleri			SONUÇ
			1%	5%	10%	
$C \nrightarrow T$	0.000	0.989	8.808	4.708	3.209	Kabul
$E \nrightarrow T$	0.303	0.582	8.800	4.660	3.184	Kabul
$Y \nrightarrow T$	0.797	0.372	9.002	4.746	3.212	Kabul
$P \nrightarrow T$	2.099	0.147	9.090	4.810	3.282	Kabul
$S \nrightarrow T$	0.385	0.535	8.816	4.669	3.183	Kabul

JEOTERMAL ENERJİNİN SÜRDÜRÜLEBİLİR AKUAKÜLTÜR SİSTEMLERİNDE KULLANIMI

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ÖZET

Akuakültür mevcut doğal kaynakların kullanımı ve sürdürülebilirlik açısından son derece önemli bir sektör konumundadır. Dünya nüfusunun protein ihtiyacının karşılanmasında önemli bir paya sahip olan akuakültüre talep gün geçtikçe artmaktadır. Akuakültürde, birim alanda en yüksek verimi elde etmek, ortam koşullarındaki stabiliteyi sağlamak amacıyla kapalı devre sistemlerin kullanımı yaygınlaşmaktadır. Kapalı devre sistemlerin su sıcaklığı ısıtma ve soğutma sistemleriyle kontrol edilmektedir. Bu sistemlerde suyu ısıtmak amacıyla jeotermal su kullanımı enerji açısından önem arz etmektedir. Bu çalışmada, jeotermal enerjinin, sürdürülebilir su ürünleri yetiştiriciliğinde değerlendirilmesi irdelenmiştir.

Anahtar Kelimeler: Jeotermal enerji, akuakültür, sürdürülebilirlik

ABSTRACT

Aquaculture is an extremely important sector in terms of the use of available natural resources and sustainability. To meet the protein needs of the world population is increasing demand for aquaculture which has a significant share. In aquaculture, to achieve the highest yield per unit, the use of recirculating aquaculture system (RAS) in order to ensure the stability conditions are widespread. The RAS system is controlled by water temperature heating and cooling systems. Geothermal water to heat water for use in these systems, it is important in terms of energy. In this study, geothermal energy, were examined to evaluate the cultivation of sustainable aquaculture.

Keywords: Geothermal energy, aquaculture, sustainability

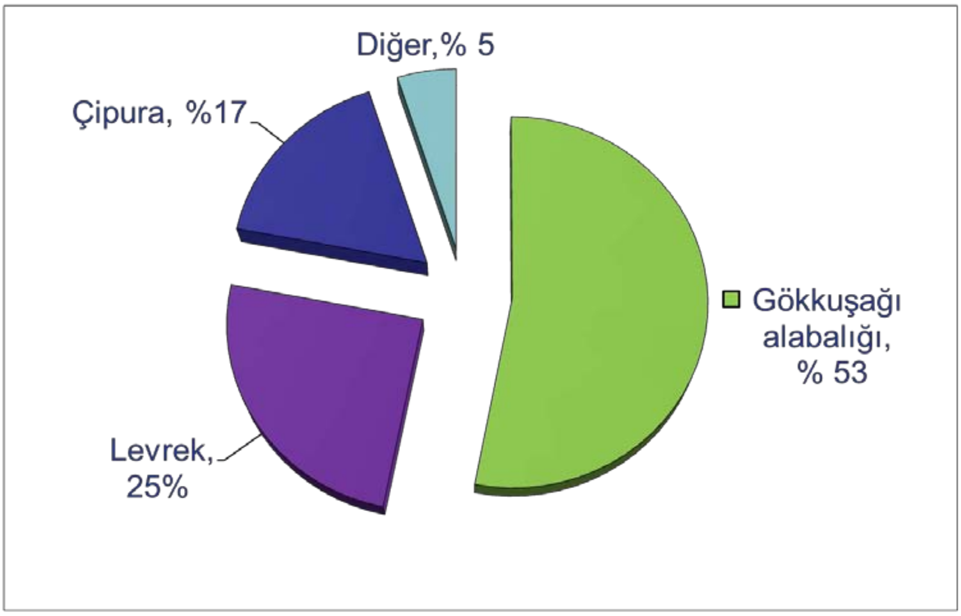
GİRİŞ

Gelişmişliğe bağlı olarak sağlıklı ve dengeli beslenme bilinci de önemini korumaya devam etmektedir. Bu olguyla birlikte hayvansal proteinlere duyulan ihtiyaç toplumların gündeminden eksik olmamaktadır. Artan nüfusla birlikte taze balığa olan talep de artış göstermektedir. İnsan popülasyonundaki artış karşısında yaşanan protein sıkıntısını gidermek için kültür balıkçılığı çözüm oluşturmaktadır. Hayvansal protein ihtiyacının giderilmesinde denizlerin ve iç suların önemi her geçen gün artmakta ve su ürünleri yetiştiriciliği geleceğin sektörü olarak görülmektedir. Günümüzde dünyanın protein ihtiyacının önemli bir kısmı su ürünleri yetiştiriciliği ile karşılanmaktadır. Özellikle gelişmiş ülkelerde kişiler, beslenmelerine çok dikkat etmekte ve beslenme alışkanlıklarında sağlık açısından uygun gıdaları seçmeye itina göstermektedirler. Bu gıdalar içerisinde de çoklu doymamış yağ asitleri yönünden zengin olan balık ve diğer su ürünleri ilk sıralarda yer almaktadır. Balık eti besleyici değeri oldukça yüksek, insan beslenmesi için mükemmel bir gıda kaynağıdır. Zengin protein içeriği ve yapısında bulunan çoklu doymamış yağ asitleri ile vücudun temel besin maddeleri ihtiyacını karşılayan balık eti, insan fizyolojisi ve metabolik fonksiyonları üzerinde olumlu etki yaparak hastalıklardan korunmada ve sağlıklı bir yaşam sürdürmede rol alan önemli bir besin maddesidir (Kaya vd., 2004). Sağlıklı beslenmedeki öneminden dolayı su ürünlerine olan ilgi dünyada ve ülkemizde gittikçe artmaktadır. Türkiye'nin deniz ve iç su kaynaklarının kullanılabilir toplam yüzey alanı 25 milyon hektar olup bu durum akuakültür açısından sahip olunan potansiyelimizin büyüklüğünü açıkça göstermekte, bu kaynakların etkin ve sürdürülebilir şekilde kullanmanın gerekliliğini ortaya koymaktadır. Bu potansiyel, su kaynaklarının rasyonel kullanımını, kaynakların devamlılığını ve sürdürülebilir su ürünleri yetiştiriciliği için yönetim ve planlama stratejilerini zorunlu hale getirmektedir. Hayvansal veya bitkisel ürün yetiştiriciliğinde amaç, birim alandan en yüksek düzeyde verim elde edilmesidir. Bunun için yetiştirilecek türün ihtiyaç duyduğu uygun koşulların sağlanması ve bunun devam ettirilmesi gerekmektedir. Su ürünleri yetiştiriciliğinde yetiştirilecek türe bağlı olarak suyun ısıtılması ve/vaya soğutulması kaçınılmazdır. Suyun ısıtılması veya soğutulması maliyet gerektiren bir durumdur. Özellikle suyun ısıtılmasının gerektiği durumlarda jeotermal suların kullanılması çok önemli bir çıkış noktası ve aynı zamanda yeraltı zenginliklerinin ülke ekonomimize kazandırılması noktasında faydalı bir yaklaşımdır.

1. SU ÜRÜNLERİ YETİŞTİRİCİLİĞİ

Akuakültür mevcut doğal kaynakların kullanımı ve sürdürülebilirlik açısından son derece önemli bir sektör konumundadır. Su ürünleri yetiştiriciliği olarak ta adlandırılan akuakültür, insan faktörü dahilinde kontrollü ve/veya yarı kontrollü olarak gıda, doğal stokların iyileştirilmesi, süs, hobi ve bilimsel araştırmalar için hayvansal ve bitkisel su canlılarının yetiştirilmesi olarak tanımlanabilir (Çelikkale vd.,1999). Su ürünleri yetiştiriciliği, FAO tarafından dünyada en hızlı büyüyen gıda üretim sektörü olarak gösterilmekte ve tüm dünyada yaygınlaşmaktadır (Subasinghe vd,. 2009). Dünya su ürünleri üretimi 158 milyon ton olup, bunun 91 milyon tonu avcılık yoluyla, 67 milyon tonu ise yetiştiricilikten elde edilmiştir (FAO, 2012). Dünyada su ürünlerinde ortalama yılda yüzde 10'dan fazla bir büyüme söz konusudur. Bununla birlikte, 2030 yılına kadar dünyada yetiştiricilikten elde edilen miktarın daha da artarak 80 milyon tonu aşacağı tahmin edilmektedir (Davenport vd., 2003).

Şekil 1. Türkiye'deki Yetiştiricilik Üretiminin Dağılımı (TÜİK, 2013)



Türkiye'deki su ürünleri yetiştiriciliği üretimi 2001 yılından 2013 yılına kadar %282 artarak 67.244 tondan 233.394 tona ulaşmıştır. Ülkemizde yıllık su ürünleri üretimi yaklaşık 600-700 bin ton arasında gerçekleşmiştir. 2013 yılında 128,059 ton alabalık, 35,701 ton çipura, 67,913 ton levrek üretilmiştir (TUİK, 2014).

Stratejik konumu, iç-dış pazarlardaki büyüme potansiyeli, Türkiye'yi global akuakültür pazarında büyük bir güç haline getirmektedir. 2013 yılı itibariyle ülkemiz, dünyanın en büyük çipura-levrek üreticisi unvanına sahip olmuştur. Özellikle; alabalık, çipura ve levrek üretimindeki hızlı büyüme trendinin devam edeceği öngörülmektedir. Akuakültür sektörü bugün Türkiye ekonomisinin de yükselen yıldızı olarak nitelendirilmektedir. Ülkemiz Avrupa'da çipura, levrek ve alabalık pazarında ilk sıralarda yer almaktadır. Avrupa'da tüketilen her dört levrek veya çipuradan biri Türkiye'de üretilmektedir.

Dünya genelinde aşırı avcılık nedeniyle içsu ve denizlerdeki stoklarda bariz bir azalma görülmüştür. Bu azalışa paralel olarak su ürünleri yetiştiriciliği yaygınlaşarak artmıştır. Türkiye, kültür balığı üretimini Çin ve Hindistan'dan sonra en hızlı arttıran üçüncü ülke konumundadır.

1.2. Kapalı Devre Sistemler

Yetiştiriciliği yapılan su ürünlerinden birim alanda daha fazla verim elde etmek amacıyla çeşitli teknolojiler geliştirilmiştir. Bu amaçla kuluçkahanelerden yıl boyunca verim elde etmek için kapalı devre sistemler kullanılmaya başlanmıştır. Kapalı devre olarak kurulan bu sistemler tam kapalı, yarı kapalı ve açık devre sistem olarak kullanılabilmektedir. Akuakültürde kullanılan tam kapalı devre sistemlerde günlük olarak %5-10 civarında taze su girişi yapılarak aynı su çeşitli filtrasyon yöntemleriyle defalarca kullanılmaktadır. İhtiyaç halinde bu tesisler kapalı veya açık sistemlere dönüştürülebilmektedir.

Kapalı devre sistemlerde su kalitesinin sağlanması önemli bir konudur. Kullanılan suyun sıcaklığı bu yetiştirme teknolojilerinde ısıtma ve soğutma sistemleriyle kontrol edilmektedir. Elektrik enerjisiyle çalışan ısıtma ve soğutma sistemleri maliyeti arttırmaktadır. Diğer yetiştiricilik sistemlerine göre arazi ve su ihtiyacının az olması, su parametrelerinin kontrolünün yapılabilmesi ve yıl boyu üretim imkanının olması bu sistemi avantajlı hale getirmektedir (Masser vd., 1999).

Şekil 2. Kapalı Devre Akuakültür Sistemi

Kapalı devre sistemler mekanik filtrasyon ünitesi, biyolojik filtrasyon ünitesi, organik partiküllerin parçalanması için ozonlama ünitesi, ultraviyole ünitesi, havalandırma ve karbondioksit uzaklaştırma ünitesi, oksijenlendirme sistemi, ve balıkların bulunduğu tanklardan oluşur. Kapalı devre sistem; dışkı ve yem artıkları uzaklaştırıldıktan ve balıklar için toksik özellikteki amonyak, biyolojik arıtma ile zararsız hale dönüştürüldükten sonra suyun tekrar kullanımı esasına dayanan bir akuakültür sistemidir. Ayrıca su, yetiştiricilik tanklarına dönmeden önce kalite ve kimyasal yapı bakımından oksijence zenginleştirme, karbondioksitin uçurulması, ozonla veya UV ile muamele gibi bazı işlemlere de tabi tutulur (Losordo vd., 1999).

Şekil 3. Genel Şekliyle Kapalı Devre Sistem

Kapalı devre sistemler, yoğun balık yetiştiriciliğinin yapıldığı sistemler olup özellikle su kaynaklarının yetersiz veya uygun olmadığı şartlarda kullanılır.

Yetiştiricilikte su sıcaklığı türün ihtiyaç duyduğu değerlerin altına düştüğünde balıkların vücut metabolizmaları olumsuz yönde etkilenir ve balıklar yem almayı durdururlar. Optimum sıcaklıkların korunması kara hayvanlarına nazaran sucul hayvanlar için daha fazla önemlidir. Su ürünleri yetiştiriciliğinde sıcaklıkların optimum değerlerde tutulmasıyla %50-%100'e varan oranlarda verim elde edilebilmektedir. Jeotermal su ile sabit bir sıcaklık değerinin sağlanması, yıl boyu üretim planlamasının yapabilmesi ve sürdürülebilir su ürünleri üretimi açısından önemlidir.

Ülkemizde balık üretim tesisleri olarak bir değerlendirme yapıldığında, miktar ve kapasite yönünden yaklaşık %41'lik oranla ilk sırada Muğla gelmekte, bunu %13 ile İzmir, her birisi %3-4 oranıyla Bilecik, Kayseri, Çanakkale, Antalya ve Aydın illeri, %1,5–2 oranla da Trabzon, Rize, Ordu, Denizli, Samsun, Kahramanmaraş, Isparta ve Burdur illeri izlemektedir.

Tablo 1.Türkiye'de Üretim Yapan Tesisler

Su Ürünleri Yetiştiricilik Tesisleri (2013)

Faaliyet Alanı	Adet	Proje Kapasitesi (ton/yıl)
İçsu İşletmeleri	1.935	245.166
Deniz İşletmeleri	418	217.494
TOPLAM	2.353	462.660

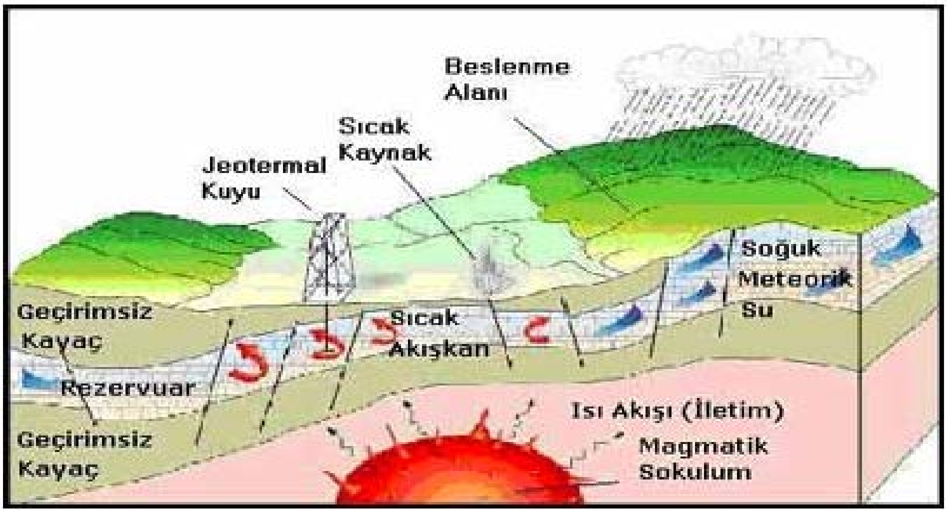
Kaynak:BSGM

Ülkemizde ruhsatlı 2353 adet işletme mevcut olup, proje kapasitesi toplam 463 bin tondur. Bunun yanı sıra 18 adet deniz balığı kuluçkahanesi bulunmaktadır. Bu tesisler uygun sıcaklık değerlerini sağlamak için elektrik enerjisi kullanmaktadırlar. Bu durum da maliyetleri arttırmaktadır. Kuluçkahaneler ısıtmada jeotermal su kullandıklarında büyük oranda kar elde etmiş olacaklardır.

2. JEOTERMAL ENERJİ

Jeotermal enerji, yerkabuğunun çeşitli derinliklerinde birikmiş ısının oluşturduğu, sıcaklıkları atmosferik sıcaklığın üzerinde olan ve çevresindeki normal yeraltı ve yerüstü sularına göre daha fazla erimiş mineral, tuzlar ve gazlar içerebilen sıcak su, buhar ve gazlardan oluşan akışkandan elden edilen enerji olarak tanımlanabilir. Jeotermal enerji yeraltından çıkan ve yeraltına geri verilen, yenilenebilir ve sürdürülebilir bir enerji kaynağıdır. Uygun koşullarda işletilirse sonsuz ömre sahiptirler. Akuakültürde sadece güneşten ve elektrikten sağlanan ısı enerjisine karşın jeotermal enerjinin kullanılması ile kısa bir süre içerisinde daha fazla üretim sağlandığı görülmektedir. Jeotermal kaynak bakımından Türkiye dünyada yedinci sırada jeotermal ısı kullanımında ise beşinci sırada yer almaktadır. Dünya nüfusunun hızla artmasına paralel olarak sanayileşme de hızla artmıştır. Tüm bunların sonucunda çevre kirliliği geleceğimizi tehdit eder hâle gelmiştir. Sanayileşmiş ülkeler, artan enerji ihtiyaçlarını gidermek için, çevreyi kirletmeyen, temiz, ucuz ve yenilenebilir kaynak arayışına girmiştir. Gelişmişliğin ölçütlerinden biri de enerji tüketimidir. Ülkemiz gelişmişlik sınırında yer almakla birlikte her geçen gün artan enerji tüketimi yönünden de gelişme göstermektedir. Bu anlamda Türkiye, enerji kaynaklarını en verimli şekilde değerlendirmek ve alternatif enerji kaynaklarını kullanmak zorundadır. Gerek öz kaynaklarımızın, gerekse ülke dışından sağlanan enerji kaynaklarının gelecekte tükeneceği düşünüldüğünde bunun çözümü için alternatif enerji kaynaklarını da kullanmak, onları geliştirerek ekonominin hizmetine sunmak zorunlu hale gelmektedir.

Şekil 4. Jeotermal Kaynak



Jeotermal kaynaklar kullanıldıktan sonra çevreye atılmamalı, Rezervuarı beslemesi bakımından, işlevi tamamlandıktan sonra tekrar yeraltına gönderilmelidir (reenjeksiyon). Reenjeksiyon birçok ülkede yasalarla zorunlu hale getirilmiştir.

Dünyadaki jeotermal kaynaklar başlıca şu alanlarda kullanılır;

Elektrik enerjisi üretimi

Merkezi ısıtma, soğutma, sera ısıtması vb. alanlarda

Endüstriyel amaçlı kullanım, proses ısısı temini, kurutma vb. alanlarda

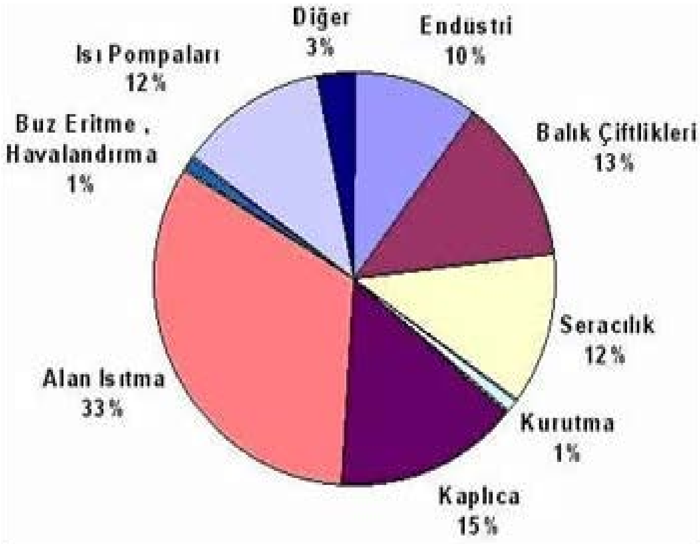
Kimyasal madde ve mineral üretimi, karbondioksit, gübre, lityum, ağır su, hidrojen üretimi

Kaplıca amaçlı kullanım (Termal Turizm)

Düşük sıcaklıklarda (30 derece) kültür balıkçılığında

Mineralli su olarak

Şekil 5. Dünyada Jeotermal Enerjinin Doğrudan Kullanımı (Lund vd., 2010)



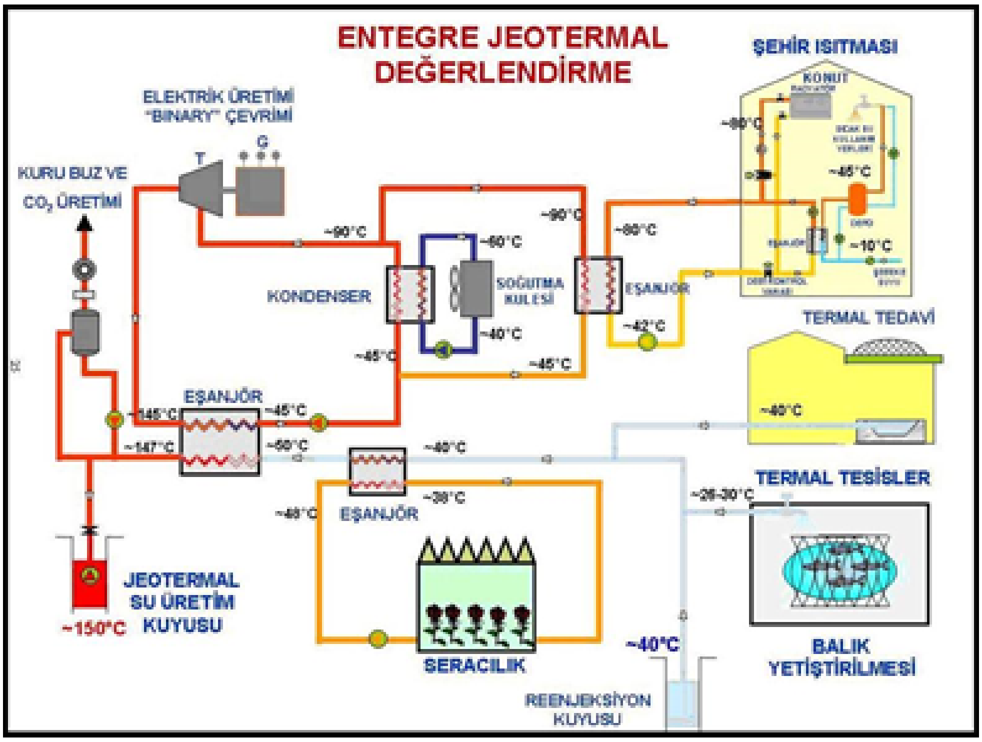
Alternatif enerji kaynaklarından olan jeotermal enerji; tükenebilen enerji kaynakları ile yarışacak düzeyde potansiyele sahip olmamakla birlikte yenilenebilir olması, uygun teknolojilerin kullanılması halinde kirletici etkisi olmayan, sürdürülebilen, yerli ve çevre dostu özellikleri ile öne çıkan bir enerji türüdür. Ancak jeotermal enerji, reenjeksiyon yapılmadığı takdirde tükenebilir ve çevre dostu olmaktan çıkan bir enerji türüne dönüşebilir.

Çizelge 1. Dünyada Jeotermal Enerjinin Sıcaklığa Göre Kullanım Alanları (Ludvik,1996)

Sıcakl	**Kullanım Alanları**
	Yüksek konsantrasyonlu solüsyonların buharlaştırılması, elektrik
	Diatomitlerin kurutulması, ağır su ve hidrojen sülfit eldesi
	Kereste kurutmacılığı, balık kurutmacılığı
	Bayer's metodu ile alüminyum eldesi
	Konservecilik, çiftlik ürünlerinin çabuk kurutulması
	Şeker endüstrisi, tuz endüstrisi
	Distilasyonla temiz su elde edilmesi
	Çimento kurutmacılığı
	Organik maddeleri kurutma, yün yıkama ve kurutma
	Balık kurutma (stok balık)
	Yer ve sera ısıtmacılığı
	Soğutma (Alt Sıcaklık Limiti)
	Sera ahır ve kümes ısıtmacılığı
	Mantar yetiştirme, balneolojik hamamlar
	Toprak ısıtma
	Yüzme havuzları, fermantasyonlar, damıtma
	Balık çiftlikleri

Jeotermal enerji birçok alanda kullanılabilmekle beraber entegre bir sistem olarak ta kullanılabilir. Alan ısıtmada ve termal turizmde kullanılan jeotermal su daha sonra daha düşük sıcaklıkla akuakültür faaliyetlerinde de kullanılabilir

Şekil 6. Jeotermal Enerjinin Entegre Kullanımı (TJD,2005)



3. Dünyada Jeotermal akuakültür örnekleri

Yetiştiriciliği yapılan su ürünlerinden bazılarının tropik iklimlerde yetişmesi yaygın olarak yetiştiriciliğini sınırlandırmaktadır. Bu skala jeotermal enerji kullanılarak genişletilebilir. Dünyada jeotermalin doğrudan kullanım uygulamaların %16'sı akuakültür faaliyetlerindedir. 2010 yılında toplam 22 ülkenin akuakültürde jeotermal enerji kullandığı bilinmektedir. Bu ülkelerin başında Çin, Amerika, İtalya, İzlanda ve İsrail gelmektedir. 2005 ile 2010 yılları arasında dünyada akuakültür çalışmalarında jeotermal enrejinin kullanımında artış görülmüştür. Jeotermal suların enerjisinden faydalanarak yapılan yetiştiriciliğin asıl amacı türlerin ihtiyaç duyduğu sıcaklığı uygun seviyede ve stabil tutmaktır.

Çizelge 2. Dünya Su Ürünleri Sektöründe Jeotermal Enerjinin Kullanım (Lund vd., 2010)

	1995	**2000**	**2005**	**2010**
Kurulu güç kapasitesi (MWt)	1,097	605	616	653
Enerji kullanımı(TJ/yıl)	13,493	11,733	10,976	11,521
Kapasite faktörü	0.39	0.61	0.57	0.56

Dünya genelinde jeotermal kaynak ile tilapia, salmon ve alabalık yetiştiriciliği yaygın olarak yapılan türler olmakla birlikte tropikal balıklar, ıstakoz karides ve timsah yetiştiriciliği de yapılmaktadır. Bazı ülkeler jeotermal suyu deniz balığı yetiştiriciliğinde de kullanmaktadırlar.

Çizelge 3. Bazı Su Canlılarına Ait Sıcaklık Gereksinimleri ve Büyüme Evreleri (Rafferty,2008)

Tür	**Sıcaklık sınır değerleri (°C)**	**En uygun yetiştirme sıcaklığı (°C)**	**Büyüme evresi(gün)**
İstiridye	0-36	24-26	730
Istakoz	0-31	22-24	730
Karides (kuruma)	4-?	25-31	182-243
Karides (pembe)	14-40	22-29	182-243
Somon	4-25	15-19	182-365
Büyük boy karides	24-32	27-30	182-365
Yayın balığı	17-35	27-29	182
Yılan balığı	0-36	23-30	365-730
Tilapya	8-41	22-30	-
Çiklit balıkları	15-35	22-29	180-210
Sazan	4-38	20-32	-
Alabalık	0-32	15	182-243
Tatlı su levreği	0-30	22-28	304
Çizgili levrek	?-30	16-19	182-243

Amerika'da 58 su ürünleri üretim tesisinde jeotermal kaynak uygulaması yapılmaktadır. Bu kaynakların yıllık enerji tüketimi 3000 TJ'dur. Amerika'da Balık yetiştirciliğinde havuzların üzeri örtülmeden jeotermal enerji kullanarak 0.242 TJ/yıl/ton levrek ve tilapia üretimi gerçekleşmektedir. İzlanda'da tatlı su türlerini yetiştirme amaçlı suyu 5°C'den 12°C'ye çıkarmak için 20-50°C sıcaklığında jeotermal su kullanılmaktadır. İzlanda'da 2013 yılında 70 adet balık üretim çiftliği mevcut olup bunların 20 tanesi jeotermal enerji kullanarak üretimlerini gerçekleştirmektedirler. Başta salmon olmak üzere 7000 ton balık üretilmiş bunun 2000 tonunu dil balığı teşkil etmektedir (Ragnarsson, 2014). İzlanda'da 2013 yılında dil balığı üretimi için kurulan 22,500 m^2'lik tesiste 35°C'lik suyun sıcaklığını 21°C'ye düşürmek için deniz suyu kullanmaktadır. 1.2 milyon yavru dil balığını 400 gr olan satış boyuna getirerek 500 ton ürün elde edilmiştir. Bu tesis yıllık üretimini 2000 tona 60 işçi ile çıkarmayı planlamaktadır.

Kanal yayın balığı Amerika'da kültüre alınan önemli bir türdür. Yaygın olarak kullanılan yöntem havuzlarda balıkların yumurtlatılarak üretimidir. Sıcaklıklar 24-30ºC'ye yükseldiğinde yayın balıkları yumurtlamaya başlarlar. Bu sıcaklık değerleri jeotermal su kullanılarak sağlanmakta ve anaçların yumurtlatılması gerçekleşmektedir. Kontrol vanalarıyla sıcak suyun anaç tanklarına girişi sağlanır ve aeratörler yardımıyla suyun oksijenlendirilmesi gerçekleşir. Bu tesiste yine jeotermal su kullanılarak yavruların yetiştirilmesi gerçekleşir (Hall vd., 2002).

Ayrıca Amerika'da yine beton havuzlardaki yayın balığı üretimi için 32°C sıcaklıkta jeotermal su derelerden gelen su ile 27-29°C'ye kadar soğutularak kullanılmaktadır (Lund, 2006). Gökkuşağı alabalığı ve mersin balığı yetiştiriciliğinde jeotermal ısıdan faydalanılır. Bu balıklar işlenerek pazara sunulduğunda ortaya çıkan atık ürünlerle de timsah yetiştiriciliği yapılmaktadır. Timsahların et ve derilerinden faydalanarak ekonomiye katkı sağlanmış olmaktadır.

Oregon'da alan ısıtmasında kullanılan jeotermal su karides yetiştiriciliğinde de kullanılmaktadır. Kampüste bulunan laboratuvar ve sınıfların ısıtılmasında kullanılan 97°C'lik jeotermal su kullanıldıktan sonra 27°C'ye düşürülerek karides havuzlarına verilmektedir.

İtalya'da Apulia Kıyılarında 1500m^3 /saat'lik 25°C'lik tuzluluğa sahip sığ kuyulardan elde edilen su kullanılarak 500 ton'luk çipura, levrek ve yılan balığı üretimi gerçekleşmektedir. Yine İtalya'da 250 m derinlikteki kuyulardan çıkan 5000 m^3 /saat'lik 19°C'lik tuzlu su ile önemli miktarlarda çipura ve levrek üretimi gerçekleşmektedir (Carella and Sommaruga, 1999).

Jeotermal akuakültür Çin'de hızla büyüyen bir sektör durumundadır. Önceleri düşük sıcaklılardaki jeotermal su Afrika yayın balığı, yılan balığı, tilapia, karides ve kaplumbağa üretmek için kullanılırken günümüzde bunlara ilaveten zehirli yılan, değerli su kabukluları üretmek için de kullanılmaya devam etmektedir. Çin'de 72 bölgede 17 jeotermal kaynak akuakültür için değerlendirilmektedir. Jeotermal ısı kullanılarak üretilen yılan balıklarının tümü yurt dışında pazar bulmaktadır.

Yunanistan'da Vistonis Lagününde insan eliyle oluşturulmuş kanala açık denizden ilkbaharla birlikte balıklar göç etmeye başlarlar. Havaların ısınmasıyla birlikte bu lagüner bölgede balıklar için bol miktarda besin oluşur. Havaların soğumasıyla büyümüş balıklar tekrar derin sulara geri dönmeye çalışırlar. Bu göç esnasında oluşturulmuş tuzaklara yakalanırlar ve geri dönemezler, oluşturulmuş kanallarda kışlarlar. Kışın soğuktan buz tutan su yüzeyi birçok balığın özellikle de değerli bir balık olan çipuraların ölümüne neden olmuştur. Bunu önlemek amacıyla 400m ve 420m derinliğinde iki kuyu kazılmış. 80 m^3

/saat debiye sahip olan bu kuyuların sıcaklığı 34 ◦C'dir. Buradaki jeotermal kaynak bu kanalda bulunan balıklar için kurtarıcı olmuştur (Gelegenis vd., 2006).

Şekil 7. Porto Lagos Balık Kışlatma Kanalı

Salton Denizinin batısında çıkan jeotermal suyun sıcaklığı yüksek olup (30-60 ^{o}F) bu bölgede çöl iklimi hakimdir. Kullanılan jeotermal suyun sıcaklığı soğutma kuleleriyle düşürüldükten sonra kullanılmaktadır. Kaliforniya da bu tarz havuzlarda tilapia üretimi yapılmaktadır.

Şekil 8. Tilapia Balığı İçin Kuluçka Alanı **Şekil 9**. Soğutma Kuleleri, Pacific Aquafarms

Kızıldeniz kıyılarında Umm Huweitat'ta kapalı devre üretim yapan bir kuluçkahanede jeotermal su kullanılarak kedibalığı üretimi gerçekleştirilmektedir. 70 ◦C sıcaklığında ve 0.12 L/s debi ile gelen jeotermal su direkt yetiştirme tankına gelmeyip tanka gelen suyu ısıtma amaçlı kullanılmaktadır (Farghally vd.,2014).

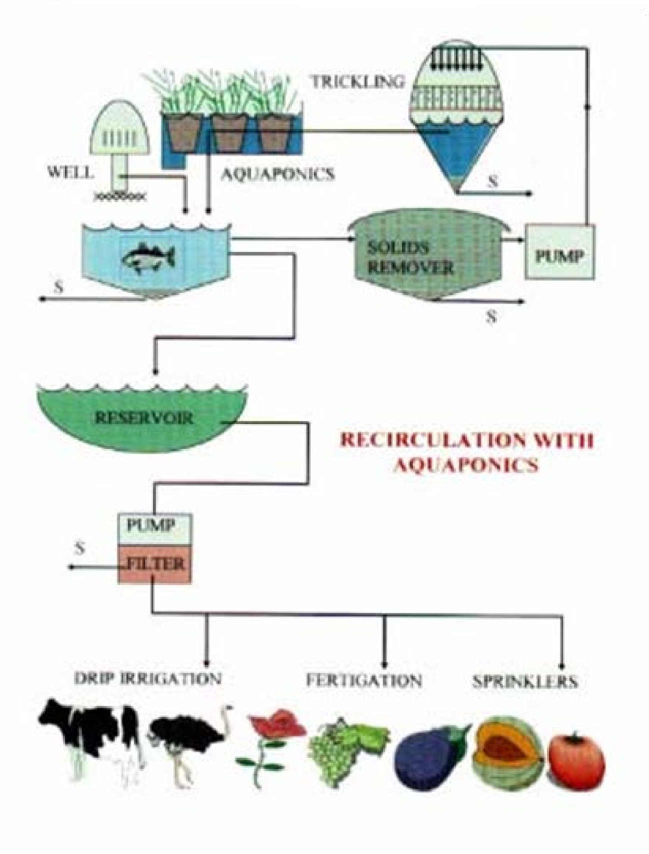
Kaliforniya'daki Scientific Hatcheries-Huntington Beach isimli işletme kapalı devre üretim yapan bir sistemdir. Burada genellikle bilimsel çalışmalar yapılmakla beraber akvaryumculuk için balık yetiştirilmektedir. Kapalı sistem çalışan bu tesiste yıllık olarak 2 milyon adet balık üretimi gerçekleşmektedir.

İsviçre firması olan Tropenhaus, 2005'den beri Alplerdeki Frutigen kasabasındaki merkezinde jeotermal enerjiyi kullanarak egzotik meyve, mersinbalığı ve 'siyah altın' da denilen havyar üretimi yapmaktadır. 2700 m^3'lük havuzun içi Alplerden gelen doğal sıcak su kaynakları ile doldurulmaktadır. Havuzda yaklaşık 35000 adet siyah mersinbalığı bulunmakta ve yılda 800 kilo havyar üretilmektedir. Havyar, üretimin az olması ve talebin çok olması nedeniyle en pahalı su ürünlerinden biridir. Havyarın kilosu 7-8 bin dolardan alıcı bulmaktadır.

Şekil 10. Mersin Balığı

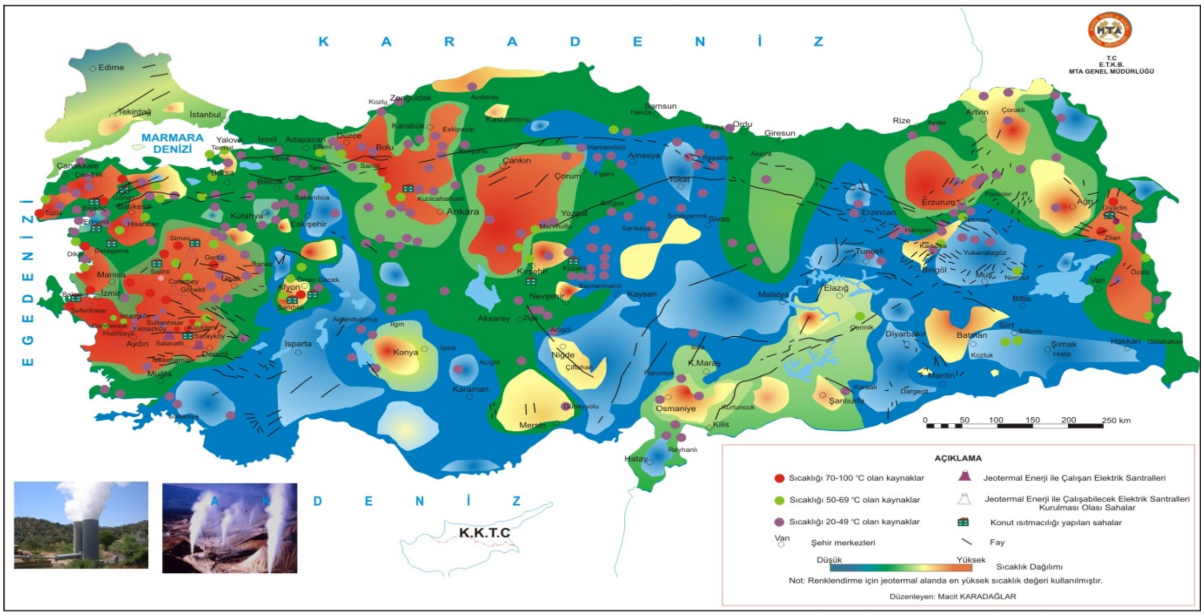
İsaril'de kurak bölgede kurulan akuaponik sistem hem ekonomik hem de ekolojik nedenlerden dolayı oluşturulmuştur. Suyun kısıtlı olmasından dolayı kapalı devre sistemle yetiştiricilik yapılmaktadır. Kışın su sıcaklığını optimum değerlerde tutmak için jeotermal su kullanılmaktadır. İsrail'de ‰8-12 tuzluluğa sahip olan jeotermal sular mevcuttur. Balık tanklarından çıkan bu tuzlu su bazı tarım ürünleri için oldukça faydalıdır. Özellikle kavun ve domates başarılı bir şekilde üretilmektedir. İsrail'de yüksek tuzlulukta agri-akuakültür sistemde zeytin ve palmiye yetiştiriciliği de yapılmaktadır.

Şekil 11. Agri-Akuakültür



Şekil 12. Türkiye'deki Jeotermal Kaynaklar ve Uygulama Alanları

Jeotermal Kaynaklar ve Uygulama Haritası



4. Türkiye'de Jeotermal Akuakültür Potansiyeli

Türkiye jeotermal bakımından oldukça önemli bir konumdadır. Ülkemizde jeotermal alanların % 95 i çoğunlukla doğrudan kullanım uygulamaları olan düşük ve orta entalpili alanlardır. Ülkemizin sahip olduğu jeotermal enerji ile konutların %30'u ısıtılabilir. Sahip olduğumuz toplam jeotermal potansiyelin ancak %6'sı değerlendirilebilmektedir. Finansal destek sağlanması halinde 99 MW olan kurulu güç 300 MW , 2084 MW olan kurulu ısı kapasitesi ise 4000 MW'a çıkarılabilir. Ülkemizde sıcaklığı 20-242 ºC arasında değişen 1500 dolayında sıcak ve mineralli su kaynağı ile ekonomik ölçekte kullanılabilecek 195 jeotermal alan bulunmaktadır. Türkiyen'in jeotermal ısı kapasitesi yaklaşık 31500 MW olarak hesaplanmıştır.

Dünyadaki potansiyel jeotermal enerjinin sekizde birine sahip olan Türkiye genel sıralamada yedinci olarak yer almaktadır. Türkiye'nin enerji ihtiyacı her yıl en az %6 artış göstermektedir. Türkiye 2030 yılına kadar yenilenebilir kaynak payını %30 arttırmayı hedeflemektedir.

Türkiye, termal su ile denizin buluştuğu nadir ülkelerdendir. Ülkemizde termal turizm ile denizin entegre kullanılabileceği yerler olarak; Çeşme, Kuşadası, Seferihisar, Bodrum, Edremit, Kestanbol, Dikili, Aliağa örnek verilebilir. Ayrıca seracılıkta kullanılan jeotermal suda balık üretimi de yapılabilir. Seracılık yapılan alanalar göz önünde bulundurulduğunda nerelerde balık üreticiliğinin yapılabileceği de görülebilmektedir.

Türkiye'de başlıca jeotermal seracılık yapılan yerler:

Izmir-Dikili,Bergama : 1.200.000 m2

Manisa-Salihli,Urganlı : 600.000 m2

Kütahya-Simav : 300.000 m2

Denizli-Kızıldere-Tosunlar : 200.000m2

Şanlıurfa-Karaali : 230.000 m2

İzmir-Balçova : 200.000 m2
Diğerleri : 270.000 m2

İzmir'in Bergama İlçesinde jeotermal enerji ile seracılık yapan Agrobay Firması yer altından 100 ºC olarak çıkan sıcak suyla seraları ısıttıktan sonra, derecesi düşen suyu yer altına geri göndermektedir. Sera projesine başlarken jeotermal suyu üç yatırım alanında kullanmayı planladıklarını söyleyen firma, seraları ısıttıktan sonra 45-50 ºC'ye düşen suyu bölgede kuracakları termal otel ve sağlık merkezinde değerlendirmeyi, buradan da 28 ºC'ye düşen suyu yılan balığı yetiştirme çiftliğine yönlendirmeyi planlamıştır. Yıllık 3000 ton balık üretmeyi hedefleyen firma Avrupa'da bunun için bağlantılarının hazır olduğunu belirtmiştir. Jeotermal kaynaklarından sonuna kadar yararlanmayı düşünen firmanın projesi hazırlanmış fakat uygulamaya başlanamamıştır.

Yine Bergama İlçesinde bulunan, akvaryum balığı üreten Ordas dünyanın tropik akvaryum balığı üretimi yapan önemli firmaları arasında yer almaktadır. Bölgede bulunan jeotermal suyu ısıtma amaçlı kullanan firma önemli miktarda enerji tasarrufu sağlamaktadır.

SONUÇ VE ÖNERİLER

Dünyada ve ülkemizde deniz, göl ve akarsulardaki aşırı avcılık nedeniyle doğal stoklarda su ürünlerinde önemli miktarlarda azalma görülmektedir. Stokların azalmasıyla su ürünlerine olan talebi karşılamak için yetiştiricilik yoluna gidilmektedir. Gerek doğal stokların zenginleştirilmesi için gerekse besin ihtiyacını karşılamak amacıyla tüm dünyada yetiştiricilik faaliyetlerinde artış görülmektedir. Birçok ülkede jeotermal akuakültür uygulaması yapılmasına rağmen ülkemizde yok denecek kadar az çalışma mevcuttur.

Türkiye'deki deniz balıkları kuluçkahanelerinin birçoğu jeotermal alanlara yakın durumdadır. Kapalı sistem olarak ta çalışan bu kuluçkahaneler optimum şartları sağlamak amacıyla yüksek miktarlarda elektrik enerjisi kullanmaktadırlar. Kışın ısıtma amaçlı elektrik enerjisi kullanmak yerine jeotermal su ile kazançlarını 2-3 kat arttırabilirler.

Ülkemizde kültür balıkçılığında kullanılabilecek çok sayıda jeotermal kaynak mevcuttur. Düşük sıcaklıklı jeotermal kaynaklarımızı bu şekilde ekonomiye kazandırarak dünya pazarında önemli bir yer elde etmemiz mümkün olacaktır. Kış mevsimi sert geçmekle beraber ülkemizin doğusu düşük sıcaklıklı jeotermal kaynaklara sahiptir. Bu bölgelerde yapılacak jeotermal kültür balıkçılığı Türkiye ekonomisine önemli katkı sağlayacaktır.

Ülkemizde bol miktarda jeotermal enerji turizm ve seracılık alanında kullanılmaktadır. Kurulacak entegre sistemlerle yeraltı enerji kaynaklarımız daha etkin bir şekilde değerlendirilmiş olacaktır. Dünyada birçok ülkede tilapia, yayın ve yılan balığı oldukça rağbet görmektedir. Gerek turizm amaçlı gerekse seracılık faaliyetlerinde kullanılan atık jeotermal sularda rağbet gören bu türlerin yetiştirilmesiyle su ürünleri sektöründe ekonomik canlanma artmış olacaktır. Ayrıca turizm amaçlı kullanılan atık jeotermal sularda tilapia ve akvaryum balıkları yetiştirilerek bölgenin cazibesi de artırılabilir.

Jeotermal kaynaklarla açık alanlarda yapılan üretimlerde havuz yüzeyinden kaybolan ısı, rüzgar hızı ve havuz ile çevre arasındaki sıcaklık farkından oldukça etkilenir. Bu havuzların yüzeyleri örtüldüğünde daha az ısı kaybı yaşanır ve optimal değerlerde daha az dalgalanma sağlanır. Üretim sistemleri kapalı devre olarak dizayn edildiğinde daha az enerji harcandığı gibi yeraltı kaynaklarımız daha tasarruflu kullanılmış olur. Ülke ekonomisine artı değer katacak diğer bir sistem ise akuaponik sistemlerdir. Yine jeotermal su ile balık yetiştiriciliğinde kapalı veya açık sistem üretimden çıkan su ile topraksız tarım yapılarak önemli miktarlarda hem balık hem de sebze ve meyve üretimi gerçekleştirilebilir.

Uygun sıcaklıklardaki jeotermal su ile ülkemizde üretimi yapılmayan ve pek bilinmeyen fakat diğer ülkelerde pazar payı olan pangasyus balığı yetiştiriciliği de yapılabilir. Bu yetiştiricilik şekli entegre sistemlerle gerçekeştirildiğinde çok daha verimli olacaktır.

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RÜZGÂR ENERJİSİ VE SOSYAL KABUL: ÇANAKKALE-ERENKÖY ÖRNEĞİ

WIND POWER AND SOCIAL ACCEPTANCE: THE CASE OF ÇANAKKALE-ERENKOY

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Mustafa KARA[†]

ÖZET

Yenilenebilir enerji kaynaklarından rüzgâr enerjisi kullanımı son yıllarda hızlı artış göstermektedir. Bununla birlikte geleceğin enerji talebini karşılamada çevreye duyarlı, yenilenebilir, temiz ya da alternatif enerji kaynağı olarak rüzgâr enerjisine yönelik kamuoyunda olumlu kanaatin ve desteğin varlığı da genelde kabul edilmektedir. Çalışmanın amacı, her türlü politika ve uygulamanın olmazsa olmazı olan halk desteğine rüzgâr enerjisi ve sosyal kabul bağlamında sosyal bilimcilerin dikkatini çekmek; bu konudaki uluslararası yazını inceleyerek konunun kavramsal içeriği ve boyutlarını ortaya koymak; ülkemiz bağlamında Çanakkale-Erenköy örneğinde konunun önemine vurgu yapmaktır. Araştırmada temel olarak açıklayıcı yöntem kullanılmış bu kapsamda ikincil verilerden yararlanarak Dünya'da ve Türkiye'de rüzgâr enerjisi konusu ile rüzgâr enerjisi ve sosyal kabul konusu kavramsal olarak incelenmiştir. Çalışmada yenilenebilir enerji kaynağı olarak rüzgâr enerjisine dikkatler çekilmiş; rüzgar enerjisine yönelik yüksek düzeydeki halk desteği vurgulanmış; buna rağmen mevcut rüzgar enerji santrallerine yönelik halkın kabulünün istenen düzeyde olmayışının nedenleri irdelenmiştir.

Anahtar kelimeler: Rüzgâr enerjisi, Sosyal Kabul, Çanakkale, Erenköy.

ABSTRACT

Utilization of wind power among renewable energy sources has been increasing dramatically. In addition, it is accepted that there is a general positive public opinion about wind power is environment friendly, renewable, clean and an alternative energy source. Aim of this research is, to attract social scientists attention to public support, which is essential for every policy and application, in context of wind power and social acceptance, to detect the subject's concepts and aspects by searching international literature; to emphasize importance of the subject by examining Çanakkale-Erenköy practice. In this research, explanatory method has been applied mainly and by benefitting from secondary data wind power and, wind power and social acceptance subjects have been inspected conceptually in the World and Turkey. Fieldwork, which is done in Çanakkale-Erenköy, has been used as primary data. As a result of the research; wind power has been stressed as a renewable energy source; high public support towards wind power has been emphasized; despite this, reasons of insufficient public acceptance towards existing wind tribunes has been investigated.

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Key words: Wind Energy, Social Acceptance, Çanakkale-Erenköy

GİRİŞ

Sürdürülebilir kalkınmanın ekonomik, sosyal ve çevresel yönleriyle enerji konuları arasında yakın ilişki bulunmaktadır. Bu çerçevede kömür, petrol, doğal gaz vb. fosil yakıtlar ya da yenilenemeyen enerji kaynakları ile yenilenebilir ya da temiz enerji olarak da adlandırılan çevreye sıfır ya da çok az etkisi olan, dünya var oldukça tükenmeyecek olan hidrolik, rüzgâr, güneş, jeotermal, biokütle, gel-git gibi kaynaklar karşılaştırılmaktadır. Çok uzun dönemdir enerji kaynağı olarak kullanılan fosil yakıtların çevreye ve topluma yönelik olumsuz maliyeti, bir anlamda, temiz enerji kaynaklarının, yenilenebilir enerjinin geliştirilerek kullanılmasını kaçınılmaz kılmaktadır.

Yenilenebilir enerji kaynaklarından rüzgâr enerjisi kullanımı son yıllarda hızlı artış göstermektedir. Bununla birlikte geleceğin enerji talebini karşılamada çevreye duyarlı, yenilenebilir, temiz ya da alternatif enerji kaynağı olarak rüzgâr enerjisine yönelik kamuoyunda olumlu kanaatin ve desteğin varlığı da genelde kabul edilmektedir (Carneiro vd., 2013: 30-36).

Her türlü politikada başarının sırrı, halkın onu benimseyerek makul düzeyde desteklemesinde yatmaktadır. Toplumların giderek artan enerji talebinin karşılanmasından sorumlu siyasal karar alıcıların enerji kaynaklarının kullanımıyla ilgili alacakları siyasi-yönetsel kararların başarısı ya da başarısızlığında önemli belirleyicilerden biri de sosyal kabul konusudur. Enerji ve sosyal kabul konularının özellikle sosyal bilimciler tarafından incelenerek sürdürülebilir enerji planlaması çerçevesinde getirecekleri önerilerin yetkililerce dikkate alınması, enerji politikaların başarısı kadar demokratik çoğulculuk için de önemlidir. Bu kapsamda rüzgâr enerjisine yönelik yüksek düzeyde olumlu düşüncelerin varlığına rağmen somut yerel proje uygulamalarında halkın kabulünün gözardı edildiği anlaşılmaktadır (Wüstenhagenvd., 2007: 2683-2691). Bu çalışmanın amacı, her türlü politika ve uygulamanın olmazsa olmazı olan halk desteğine rüzgâr enerjisi ve sosyal kabul bağlamında sosyal bilimcilerin dikkatini çekmek; bu konudaki uluslararası yazını inceleyerek konunun kavramsal içeriği ve boyutlarını ortaya koymak; ülkemiz bağlamında Çanakkale-Erenköy örneğinde konunun önemine vurgu yapmaktır.

Enerji ve sosyal kabul konularında dikkat çeken başlıca olgu: NIMBY*(Not-In-My-Back-Yard Arka bahçemde olmasın)* sendromu olarak adlandırılan yöre halkının, kendilerine yakın bir alanda, belli yatırımlar için verilmiş arazi kullanım kararlarına yönelik karşı çıkma yönündeki davranışlarıdır. Kavramın konusu, içeriği, temel özellikleri ile hangi yatırımlar için ne tür karşı çıkış davranışların ortaya çıktığının incelenmesi oldukça karmaşık olsa da bu bununla mücadele için sorumlu aktörlerin yapmaları gerekenlerin belirlenerek yeni uygulamaların geliştirilmesi giderek önem kazanmaktadır (Palabıyık vd., 2010: 134-137). NIMBY, kısaca, bir yörede yapılmak istenen yatırımlara yönelik o yörede yaşayanların bu yatırıma duydukları güvensizlik nedeniyle karşı çıkışlarını anlatan bir kısaltmadır. NIMBY davranışı, yöre halkının kendilerine yakın yerlerde inşa edilmek istenen hapishane, akıl hastanesi, düşük gelirliler için konut, atık bertaraf tesisi, atık yakma tesisleri, karayolları, enerji santrali, nükleer santral vb. yatırımlara yönelik yoğun, bazen duygusal, çoğunlukla sert ve katı karşı çıkışlarıdır (The American Heritage Dictionary of the English Language, 2000; Sellers, 1993: 460; Kraft vd., 1991: 300). Yöre halkının bu tür yatırımlara karşı çıkışlarının bilgi eksikliği, güvensizlik, ideolojik düşünce tabanlı farklı nedenleri olsa da genelde sağlık ve güvenlik konularında algılanan riskin yüksek olması; kullanılacak teknoloji konusundaki bilgisizlik; sorumlu idarelere ve kuruluşa yönelik güvensizlik; çeşitli olası çevresel olumsuzluklar; sözkonusu yatırımların kötü işletilmesinden kaynaklanabilecek olumsuzluklar; yöredeki gayrimenkul değerlerindeki düşüş; kamu külfetleri karşısında eşit olmayan yükümlülükler vb. nedenler dikkat çekmektedir. Benzer yatırımlar için birbirinden farklı türde karşı çıkışlar görülmekle birlikte karşı çıkanların bu konudaki temel argümanları arasında: Yapılacak yatırımın gereksiz olduğu; bu konuda devlete ya da işletici kuruluşa duyulan güvensizlik; işletme yöntemlerindeki yetersizlikler; yatırımın sağlık ve güvenlik konularında ciddi olumsuzluklar yaratacağı ve özellikle telafisi güç sağlık risklerinin varlığı ağırlık kazanmaktadır (Sellers, 1993: 460; Schively, 2007: 225).

Enerji politikaları içinde yenilenebilir enerji kaynaklarına verilen önem artarken, özellikle rüzgâr enerjisi alanında sosyal kabulle ilgili yaşanabilecek zorlukların enerji temininde yenilenebilir enerjiye yönelik olumu gelişmeleri bir ölçüde sınırlandırabileceği tartışılmaktadır (Wüstenhagenvd., 2007: 2683).Enerji ve sosyal kabul konusunda rüzgâr enerjisi yatırımlarıyla ilgili kamuoyunun genelde olumlu görüşünün olduğu kabul edilmektedir. Bununla birlikte rüzgâr enerjisine yönelik yerel halkın olumlu görüşleriyle birlikte, gerçekleştirilen somut projelere ait bilimsel çalışmalarda rüzgâr santrallerinin özellikle görsel etkilerinden kaynaklanan zorluklarada dikkat çekilmektedir (Jobertvd., 2007: 2751; Wüstenhagenvd., 2007: 2683).

Pek çok kamuoyu yoklamasında halkın yenilenebilir enerji kaynaklarına desteği vurgulanırken (McGowanve Sauter, 2005), yerel halkın somut projelere ilişkin NIMBY davranışının da proje uygulamalarını geciktirdiği ya da iptal ettirdiği bilinmektedir(Toke, 2005). Özellikle rüzgâr enerjisine yönelik halkın genelde Kanada'da %79, Birleşik Krallıkta %80, Danimarka'da %82 gibi yüksek oranlarda desteklerine rağmen, yerelde somut uygulamalara karşı çıkış arasındaki bu farklılık, Avrupa'da, özellikle de Birleşik Krallıkta, yenilenebilir enerjinin gelişimini etkileyebilecek kritik bir konu olarak değerlendirilmektedir (Toynbee, 2007: 31; Wright-Devine, 2005: 125-127). Yine Birleşik Krallık, Hollanda ve Fransa gibi ülkelerde enerji kaynakları içinde yenilenebilir enerji kaynağı olarak rüzgâr enerjisi hedeflerine ulaşmada sosyal kabul konularının önemli kısıtlar oluşturabileceği değerlendirilmektedir (Agterboschvd., 2009: 394). Yapılan çalışmalardan rüzgâr enerjisine yönelik halkın yüksek düzeyde destek ve kabulünün varlığına rağmen, somut projelere yönelik halkın yine de NIMBY davranışında bulunmasında, tesisin yer seçimi ve kuruluş aşamalarında kurumsal faktörlerin de etkili olduğu anlaşılmaktadır. Bu durumda açık toplumlarda, daha açık ve şeffaf süreçlerde sürdürülebilir alansal planlamaların geliştirilerek uygulanması vurgulanmaktadır(Woolsink, 2000).Rüzgâr enerjisi yatırımlarıyla ilgili halkın karşı çıkışında NIMBY sendromunun varlığı kadar bu olguyu reddeden çalışmalar da bulunmaktadır (Agterboschvd., 2009: 394).

Sonuçta enerji ve sosyal kabul yazını ve halk katılımının nihai amacı, mevcut yatırıma yönelik halkın desteğinin sağlanarak başarılı proje uygulamalarının önünü açmaktır. Günümüzde NIMBY karşıtı olarak ise yöresinde bazı teknolojik ve sosyal yatırımları destek anlamında YIMBY *(Yes-In-My-Back-Yard Arka bahçemde olsun),* BIMBY *(Built-It-In-My-Back-Yard Arka bahçemde yapılsın)* (Burninghamvd., 2006: 5), özellikle rüzgâr türbinlerinin bir gelir kaynağı olarak görülmesiyle birliktePIMBY *(Please-In-My Backyard Lütfen arka bahçemde olsun)* davranışı da görülebilmektedir (Jobertvd., 2007: 2752). Vatandaşların kendilerine yakın yörede gerçekleştirilecek yatırımlarla ilgili düşünceleri bu kapsamda araştırmacılar için geniş bir çalışma alanı; yönetici ve karar alıcılar için de hukuki ve kurumsal düzenlemelerle kamu politikası bağlamında daha etkin ve katılımcı süreçlerin oluşturulmasında fırsat oluşturmaktadır. Bu özelliği ile sosyal kabul konusunda yapılan girişimler, demokrasinin doğal bir sonucu olarak da görülmektedir (Miller, 2000).

Bu çalışmada, önce çalışmanın amacı ve konusuyla ilgili girişten sonra Dünyada ve ülkemizde rüzgâr enerjisi özetlenmiş; ardından rüzgâr enerjisi ve sosyal kabul yazını incelenmiştir. Yöre halkının rüzgâr enerjisi, rüzgâr türbinleri ve santrallerine yönelik düşünce ve kanaatlerini öğrenmeyi amaçlayan Çanakkale-Erenköy örneğinde gerçekleştirilen çalışmanın sonuçları hakkında da kısa bilgi verilmiştir. Çalışma sonucunda her türlü politikada olduğu gibi enerji politikalarında da başarının anahtarı niteliğindeki yöre halkının kabulü konusunun rüzgâr enerjisi alanında da bilimsel önceliklerle araştırılması gerektiğine dikkat çekilmiş; proje uygulayıcılarına, karar vericilere ve sonraki çalışmalar için bilim insanlarına yönelik öncelikli konular öne çıkarılmaya çalışılmıştır.

1. DÜNYA'DA VE TÜRKİYE'DE RÜZGÂR ENERJİSİ

Dünya'da yenilenebilir enerji gün geçtikçe önem kazanmaktadır. Bunda devlet desteklerinin, giderek düşen yatırım maliyetlerinin, bölgesel karbondioksit fiyatlandırmalarının ve uzun dönemde fosil yakıt fiyatlarındaki artışın etkili olduğu değerlendirilmektedir. 2010-2035 döneminde toplam elektrik üretimi içinde yenilenebilir enerji kaynaklarının payının üçe katlayarak %31'e ulaşacağı; bunun da yarısının hidrolik, dörtte birinin de rüzgâr enerjisi kaynaklı olması beklenmektedir. 2012-2035 döneminde yenilenebilir enerjiye yapılacak yatırım maliyetleri toplamının 6,4 trilyondolar olduğu; bununda en azından 2,1 trilyonunun rüzgâr santrallerine harcanması gerektiği belirtilmektedir (IEA, 2012).

Toplam enerji arzı içinde rüzgâr, güneş, hidro, jeotermal ve biyokütle gibi yenilenebilir kaynakların payı da giderek artmaktadır. Dünya'da 2008 yılında toplam elektrik tüketiminin %1,3'ü rüzgârdan sağlanırken bu oran 2012 yılsonunda %2,5 olarak gerçekleşmiş; Avrupa'da bu oran %4'ten %6'ya yükselmiştir. 2012 yılsonu itibariyle Danimarka'da elektriğin %33,7'si, İrlanda'da %14,5'i, Portekiz'de %20'si, İspanya'da %17,8'i, Almanya'da %7,7'si, Birleşik Krallıkta %6'sı, İtalya'da %4'ü, ABD'de %3,5'i, Hindistan'da %2,7'si, Çin'de %2'si rüzgârdan elde edilmektedir. Dünya elektrik üretimi içinde rüzgâr enerjisi payının 2020-2025 yıllarına kadar %18'e ulaşacağı tahmin edilmektedir.Bu dönemde rüzgâr enerjisi üretiminde Çin'in, OECD ülkelerini geride bırakarak liderliği sürdürmesi, ABD'nin de üçüncü sırada yer alması tahmin edilmektedir(IEA, 2013).

Dünya'da 2010 yılında 4.950 GW olan gayri safi elektrik üretim kapasitesinin %26'sına denk gelen 1.313 GW'ı yenilenebilir kaynaklardan oluşmaktadır. Dünya yenilenebilir enerji kapasitesi içinde hidrolik enerji %76,5 ile en büyük paya sahip olurken bunu %15 ile rüzgâr, %4,5 ile biyokütle, %3 ile güneş, %0,8 ile jeotermal izlemektedir. Bu kapasitenin de %32,9'u Avrupa'da, %31,9'u Asya'da, %19,1'i Kuzey Amerika'da, %13'ü Latin Amerika'da, %2,8'i Afrika'da kuruludur. 2010 yılında dünyada kurulu rüzgâr türbinleri kapasitesi yıllık %27'lik artışla 198 GW olarak gerçekleşmiştir. Bu kapasitenin de %74'ü Çin, ABD, Almanya, İspanya ve Hindistan'da bulunmaktadır (Alturki vd., 2013: 149).2012'de Dünya'da Kurulu rüzgâr enerjisi üretim kapasitesi bir önceki yıla göre %15,7 artışla 282.482 MW olarak gerçekleşmiştir. Dünya rüzgâr enerjisi kapasitesinin %38,6'sı (109.237 MW) Avrupa'da, %34,6'sı (97.810 MW) Asya'da, %23,9'u 67.576 MW) Kuzey Amerika'da, %1,2'si (3.505 MW) Latin Amerika ve Karayiplerde, %1,1'i (3.219 MW) Pasifik Bölgesinde, %0,4'ü (1.135 MW) Afrika'da kuruludur. Dünyanın kurulu rüzgâr enerjisi kapasitesine sahip ilk beş ülkesi Çin (%26,8), ABD (%21,2), Almanya (%11,1), İspanya (%8,1) ve Hindistan'dır (%6,5)(GWEC, 2013).2012 yılında Dünya'da rüzgâr enerjisine yapılan yıllık yatırımın 78 milyar dolar olduğu ifade edilmektedir(IEA, 2013: 10).

Çeşitli devletlerin yenilenebilir enerji teşvikleriyle ilgili önemli adımlar attığı da bilinmektedir. Avrupa Birliği (AB) Konseyi'nin birlik üyesi ülkeler için 2007 yılındaki koyduğu hedef, 2020 yılına kadar enerji kaynaklarının %20'sinin yenilenebilir kaynaklardan oluşmasıyla ilgili bağlayıcı kararıdır (Council of the European Union, 2007). Bu hedefin tutturulmasında ise rüzgâr enerjisinin önemli yeri olacağı beklenmektedir. Bugün yenilenebilir enerji konusundaki liderliği açık olan AB'de elektrik enerjisinin yaklaşık %20'si yenilenebilir kaynaklardan sağlanırken bunun da %5,3'ü rüzgârdan elde edilmektedir. 2020 yılına gelindiğinde ise AB'de elektriğin %34'ünün yenilenebilir kaynaklardan elde edilirken rüzgâr enerjisinin payının da %14 olması beklenmektedir. 2050'de sera gazlarının %80-95 oranında azaltılması üzerinde anlaşan AB liderlerinin bu hedefin gerçekleştirilmesi için, nihayetinde %50'si rüzgâr enerjisinden elde edilecek olan elektrik tüketiminin tamamının, %100'ünün, yenilenebilir kaynaklardan sağlanması hedefinin şimdiden konması gerektiği de dile getirilmektedir(EWEA, 2014).

Türkiye'de genel kullanım amaçlı ilk yerel rüzgâr türbini, 1986'da Çeşme-Altınyunus tesislerinde kurulmuş; uluslararası nitelikte üç türbinden oluşan ilk rüzgâr santrali ise yine Çeşme-Germiyan Köyü'nde 21 Şubat 1998'de işletmeye açılmıştır. Ülkemizde Yap-İşlet-Devret Modeli ile işletmeye açılan ilk rüzgâr santrali toplam on iki türbinden oluşan Alaçatı'daki santraldir (Özdamar, 2000: 135-136).Türkiye'de özellikle 2006 ve sonrasında rüzgâr enerjisi üretim kapasitesinde dramatik gelişmeler kaydedilmiştir. 1998 yılı sonunda sadece 9 MW olan rüzgâr enerjisi üretim kapasitesi, 2012 yılsonunda 2.312 MW olarak gerçekleşmiştir (Tablo 1).

Tablo 1: Türkiye'de Rüzgâr Enerjisi Üretim Kapasitesi ve Artış Oranları

Yıllar (Yılsonu)	Üretim Kapasitesi (MW)	Değişim (%)
1998	9	-
1999	9	-
2000	19	+111,2
2001	19	-
2002	19	-
2003	21	+10,6
2004	21	-
2005	20	-4,7
2006	65	+225
2007	207	+218
2008	333	+60,9
2009	801	+140,6
2010	1.329	+66
2011	1.799	+35,4
2012	2.312	+28,6

Kaynak: The WindPower Wind Turbines and Wind Farms Database, Wind Energy Data for Turkey, http://www.thewindpower.net/country_en_34_turkey.php, 19.01.2014.

Son yıllarda gösterdiği gelişme ile ülkemiz, rüzgâr enerjisi alanında Avrupa'da önemli yer edindiği anlaşılmaktadır (Tablo 2).

Ülkeler	Kapasite MW(Yılsonu)
Almanya	31.332
İspanya	22.796
Birleşik Krallık	8.445
İtalya	8.144
Fransa	7.196
Portekiz	4.525
Danimarka	4.162
İsveç	3.745
Polonya	2.497
Hollanda	2.391
Türkiye	**2.312**
Romanya	1.905
Yunanistan	1.749
İrlanda	1.738
Avusturya	4.922
Diğer Avrupa Ülkeleri*	4.922
TOPLAM	**109.237**

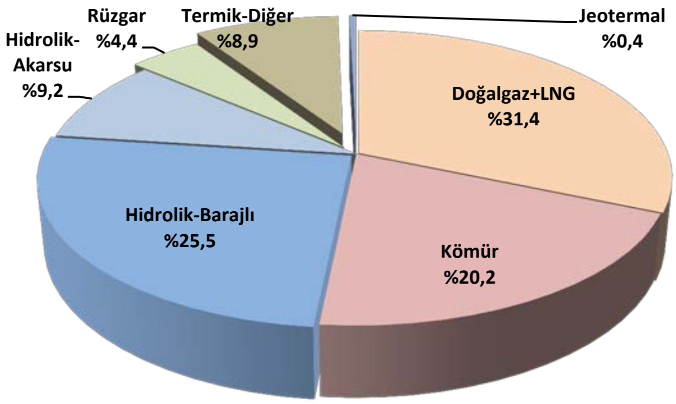
Tablo 2: Avrupa'da 2012 Yılı Kurulu Rüzgâr Enerjisi Kapasitesi (MW)

*Bulgaristan, Hırvatistan, Kıbrıs, Çek Cumhuriyeti, Estonya, Finlandiya, Faroe Adaları, Makedonya, Macaristan, İzlanda, Letonya, Lihtenştayn, Lüksemburg, Malta, Norveç, Romanya, Rusya, İsviçre, Slovakya, Slovenya, Ukrayna.

Kaynak:GWEC Global Wind Energy Council (2013), Global Wind Statistics 2012, http://www.gwec.net/wp-content/uploads/2013/02/GWEC-PRstats-2012_english.pdf, 11.02.2013.

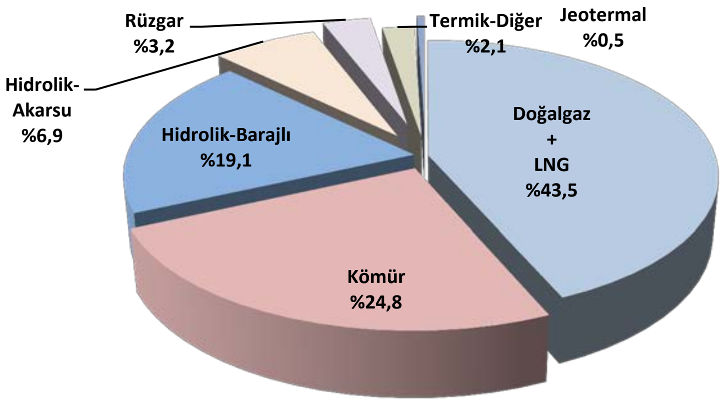
Bu gelişmelerle 2013 yılı içinde Türkiye'de, mevcut 61.422 MW'lık elektrik enerjisi kurulu gücünün %4,4'ünü rüzgâr enerji santralleri oluşturmaktadır (Grafik 1). Yine 2013 yılı kesinleşmemiş rakamlarına göre üretilen 179,5 milyar kWh elektriğin de %3,2'si rüzgârdan elde edilmiştir (Grafik 2).

Grafik 1: Türkiye'de Elektrik Enerjisi Kurulu Gücü (30.09.2013)



Kaynak: TMMOB Elektrik Mühendisleri Odası, www.emo.org.tr, 20.01.2014

Grafik 2: Türkiye'de Elektrik Üretimi (Ocak-Eylül 2013 Kesinleşmemiş)



Kaynak: TMMOB Elektrik Mühendisleri Odası, www.emo.org.tr, Erişim 20.01.2014

Ülkemizde Temmuz 2013 itibariyle işletmede olan rüzgâr enerji santrallerinin toplam gücü 2.616 MW olduğu bildirilmektedir. Rüzgâr santrallerinin güç bakımından bölgelerimize göre yüzdesel dağılımı incelendiğinde %40,68 ile Ege Bölgesinin öne çıktığı görülmekte olup onu %37,19 ile Marmara, %16,32 ile Akdeniz, %3,05 ile Karadeniz, %2,75 ile Karadeniz bölgeleri izlemektedir. İllere göre yüzdesel dağılımlara bakıldığında %25,45 ile Balıkesir, %19,09 ile İzmir, %13,21 ile Manisa, %7,96 ile Hatay, %5,15 ile Osmaniye, %5,10 ile Çanakkale, %3,44 ile İstanbul öne çıkmaktadır. Halen 30 farklı yatırımcı tarafından yürütülen projelerle toplam 970,40 MW'lık rüzgâr enerji santrali inşa halindedir (TUREB, 2013).

20 ülkede 24 binden fazla tüketiciyle yenilenebilir enerji tercihleriyle ilgili gerçekleştirilen ve Dünya'da en geniş tüketici anketi olarak bilinen 2012 Yılı Küresel Tüketici Rüzgâr Araştırmasına (VESTAS, 2012) göre tüketicilerin %85'i yenilenebilir enerjiden daha fazla faydalanılmasını istemektedir. Ankete katılanların %74'ü rüzgâr enerjisi kullanan markaları tercih edeceğini; %49'u yenilenebilir enerji ile üretilmiş ürünler için daha fazla ödemeyi kabul edeceğini belirtmektedir. Aynı çalışmanın Türkiye verilerine göre ülkemizde de tüketiciler yenilenebilir enerjiye olumlu bakmaktadırlar. Ankete katılanların %90'ı, kullandıkları elektriğin yenilenebilir enerjiden tedarik edilmesi taraftarıdır. Tüketicilerin %75'i rüzgâr enerjisi kullanan markaları satın almayı tercih ettiklerini açıklamışlardır. Ankete katılanların %93'ü önümüzdeki beş yıl içinde Türkiye'de yenilenebilir enerji kaynaklarının kullanımının artacağını beklemektedir. Türkiye'de gelecekte en fazla hangi yenilenebilir enerji kaynağının kullanılacağına ilişkin soruya tüketicilerin %35'i rüzgâr, %32'si güneş, %12'si hidrolik enerji, %11'i jeotermal, %3'ü biyokütle şeklinde yanıt vermişlerdir. Türkiye'de tüketicilerin %47'si ev, işyeri gibi günlük hayatlarının geçtiği yerlere yakın noktalarda rüzgâr santrallerinin kurulmasını kesinlikle desteklemektedir. Rüzgâr enerji santrallerinin kendisine yakın yerlerde kurulmasına kesinlikle karşı olanların oranı ise sadece %2'dir (TUREB, 2013).

2. RÜZGÂR ENERJİSİ VE SOSYAL KABUL: İLGİLİ YAZINA BİR BAKIŞ

Fosil kökenli yakıtların giderek tükenmesi ve çevreye olumsuz etkileri, ülkeleri, temiz ve sınırsız kullanılabilirlik avantajlarıyla çevre dostu, temiz, yenilenebilir kaynaklara yöneltmiştir. Doğa'da serbestçe ve sınırsızca bulunan, kolayca enerjiye dönüştürülebilir özelliğiyle rüzgâr enerjisi, yenilenebilir kaynaklar arasında önemli yere sahiptir.Hiçbir doğrudan emisyona sebep olmayan rüzgâr türbinlerinin bununla birlikte toprak kullanımına etkisi, elektromanyetik etkisi, gürültü ve diğer etkiler olmak üzere bazı olumsuzlukları da bulunmaktadır. Örneğin rüzgâr santrallerinin inşasında türbinlerin görsel etkileri dâhil, arazi kullanım uygunluğu fiziki planlamalara konu edilmektedir. Geniş alan gerektiren büyük ve orta ölçekli santraller yerleşim yerleri dışında, uzak ve açık alanlarda kurulmaktadır. Buralarda türbinlerin kurulu olduğu alan, toplam proje alanının %2'sini kapsadığı için tarımsal faaliyetleri de etkilememektedir. Ortaya çıkabilecek elektromanyetik etkilerle radyo dalgalarında oluşabilecek parazitler de tasarım yenilikleriyle azaltılabilmektedir. Bunlarla birlikte türbinlerin göçmen kuşların ölümüne yol açtığı, gölgesinin ve gürültüsünün bazı psikolojik rahatsızlıklara neden olduğu da bildirilmektedir(Fıçıcı, 2008: 49-55).

Enerji ve sosyal kabulü konu edinen çalışmalarda ileri sürülen 'güven-kabul edilebilirlik' *(trust-acceptability)* tabanlı modellerde, öncelikle fosil yakıtlarla ilgili olarak, halkın sosyal kabulünün fayda ve risk algılamaları ile düzenleyici kurumlara olan güven duygularından etkilendiği anlatılmaktadır(Bronfamvd., 2012: 247). Bunun aksine, yenilenebilir enerji kaynaklarıyla ilgili olarak ise, halkın kabulü ile algılanan fayda-risk ve kurumlara duyulan güven arasında istatiksel bir ilişkiye rastlanılmadığı vurgulanmaktadır. Bilim insanları bu farklılığı, özellikle halkın yenilenebilir enerji kaynakları hakkındaki olumlu düşüncelerini, olası fayda ve risk değerlendirmelerine ya da diğer kurumlara duyulan güvene bağlı kalmadan yenilenebilir kaynaklara yönelik kişisel, sosyal ve çevresel düzeyde sahip oldukları yüksek seviyedeki olumlu kanaatlerle açıklamaktadırlar(Bronfamvd., 2012: 247). Yenilenebilir enerji kaynaklarından elde edilen ve ulaşım, aydınlatma, ısıtma, soğutma gibi son kullanım alanlarında kullanılan elektrik enerjisine yönelik içlerinde akademisyen, sanayici, bilim insanı, karar vericiler ve diğer kullanıcılar bulunan 300 kişiye yapılan ankette de %97,9 oranında yenilenebilir enerji üzerinde görüş birliği olduğu belirlenmiştir (Iniyanvd., 2001: 657).

Kamuoyunun rüzgâr enerjisiyle ilgili, genelde olumlu görüş sahibi olduğu kabul edilmektedir. Buna bağlı olarak özellikle 1980'li yıllar ve sonrasında enerji ve sosyal kabul konularında dikkat çeken bilimsel çalışmalara rağmen, halkın yenilenebilir enerjiye dolayısıyla rüzgâr enerjisi yatırımlarına yönelik olumlu düşüncelerine rağmen, rüzgâr enerjisi ve sosyal kabul konusu yeterince incelenmediği anlaşılmaktadır. Rüzgâr enerjisi ve sosyal kabul konularında 1980'li yıllardaki ilk çalışmalarda yenilenebilir enerji ve rüzgâr enerjisine yönelik halkın yüksek düzeydeki olumlu kanaatlerine bağlı olarak, bu konulardaki olası sorunlar 'teknoloji dışı' olarak nitelenmiştir. Rüzgâr enerjisi ve sosyal kabul konusunu, basitçe, kamuoyunun salt olumlu düşüncesinin de ötesinde ele alan ilk çalışma, Carlman'a ait, İsveç'te rüzgâr enerji santralleri inşasıyla ilgili olarak siyasetçilerin ve karar vericilerin görüşlerine yer verdiği 1984 tarihli çalışmadır. O ve sonrasında yapılan akademik çalışmalarda planlama ve uygulamaya yönelik bazı kısıtlılıklarla birlikte rüzgâr santralleriyle ilgili çalışmalarda özellikle görsel özelliklerin öne çıktığı görülmektedir (Wüstenhagen, 2007: 2683).

Rüzgâr enerjisi ve sosyal kabul yazınında halkın salt reddetme davranışı, NIMBY ile yani bencil ve bilgisizce hareket ederek rüzgâr santralleri inşasına karşı çıktığını açıklayan alan çalışmalarına sık rastlanmamaktadır (Pepermansve Loots, 2013: 321). Örneğin Wolsink(1994: ; 2000: 55; 2006:) rüzgâr santrallerine yönelik halkın olumsuz düşüncelerinin açıklanmasında NIMBY kavramının oldukça yetersiz kaldığı düşüncesindedir. Kendisi Hollanda'da rüzgâr santrallerinin inşasından önce ve sonra yaptığı bir alan çalışmasında halkın sadece %25'inin rüzgâr santralleriyle ilgili düşüncelerinde kişisel fayda maliyet düşünceleriyle hareket ettiğini; oysa halkın yarıdan fazlasının kamusal faydalar gözettiğini belirlemiştir. O'na göre rüzgâr santralleri inşasında başarılı olmanın anahtarı, zaten varolan halkın kabulünden daha çok, fiziksel planlama çerçevesinde yer alan kurumsal düzenlemelerle ilgilidir (Wolsink, 2000: 55-63).

Bununla birlikte rüzgâr santrallerinin inşasına yönelik yöre halkının itirazlarının genelde rüzgâr türbinlerinin görsel etkileriyle ilgili olduğunu vurgulayan çalışmalar çoğunluktadır(Ellis vd., 2006; Johansson ve Laike, 2007). 80'li ve 90'lı yılarda rüzgâr türbinlerinin görsel etkileri ile büyüklüklerine odaklanan çalışmalarda sosyal kabul konusundaki eksikliklerin yetersiz bilgilenme, estetik, teknolojiye olan güvensizlik, mülkiyet, yatırımcının yerel toplulukla ilişkileri ile planlama sürecinde halk katılımının olmayışından kaynaklandığı belirtilmektedir. Bulgular, eğitim düzeyi görece düşük yaşlı vatandaşların diğerlerine göre rüzgâr santralleri lehine düşündüklerini göstermektedir (Corscaddenvd., 2012: 393). Son dönemde rüzgâr enerjisi ve sosyal kabul konularına olan akademik ilgisizlik devam etse de gerçekleştirilen çalışmalarda sosyal kabulün pek çok değişkenle incelenebileceği anlaşılmaktadır.

Almanya örneğinde, rüzgâr santrallerinin görsel olumsuzlukları yanında rüzgâr türbinlerine yakın yerlerde yaşayan halkın gayrimenkul değerlerindeki azalış yanında özellikle yakınlarda oturanlar için bir stres ve rahatsızlık kaynağı olarak gürültü ve uçak uyarı ışıklarını öne sürerek şikâyetçi oldukları gözlemlenmektedir (Pohlvd., 2012: 592-593). Danimarka'da, kıyılarda yer alan rüzgâr türbinlerinin yoğunluğu ile halkın kabulü arasındaki ilişkiyi konu edinen bir çalışmaya göre daha fazla sayıda rüzgâr türbininin, yerel halkın, daha fazla olumsuz düşünce sahibi olmasını etkilediğini göstermektedir.Yine ikamet ettiği meskenin görüş alanında çok sayıda rüzgâr türbini olan vatandaşların sosyal kabullerinin bundan etkilendiği de istatistiksel olarak belirlenmiştir(Ladenburgvd., 2013).

Rüzgâr türbinlerinin inşasına yönelik karşı çıkışları açıklamayı amaçlayan diğer çalışmalarda yöre halkının psikososyal özellikleriyle birlikte vatandaş katılımı, planlama, mülkiyet ve diğer kurumsal faktörlere dikkat çekilmektedir (Pepermans ve Loots, 2013: 321). Bu kapsamda rüzgâr enerjisi ve sosyal kabul yazınının amacı:Çoğunlukla görsel olumsuzluklarla bağlantılı olarak halkın fiziksel ve psikolojik tabanlı karşı çıkışlarıyla, temiz ve güvenli enerji kaynağı algısıyla hareket edenler arasındaki anlaşmazlıklarınsomut proje uygulamalarıyla giderilmesidir. Mekânsal planlama ve somut proje uygulamalarında gerçekleştirilecek etkin vatandaş katılımının, sosyal kabule olası olumlu katkıları ile toplumsal uzlaşıya hizmet etmesi beklenmektedir. Rüzgar enerjisi ve sosyal kabul literatüründe öne çıkan temel argüman, önceden karar verilmiş programlara halkın bir şekilde razı edilmesinden ziyade, ilgili tarafların kabul edilebilir çözümler üzerinde görüş birliğine varmaları gerektiğidir (Pepermans ve Loots, 2013: 321).

Özellikle yerel somut proje uygulamalarında rüzgâr santrallerinin görsel etkileriyle ilgili zorluklara dikkat çekilmekle birlikte; İsveç, Hollanda ve ABD'de gerçekleştirilen çalışmalarda öne çıkan özellik: Az sayıda ancak görece daha büyük rüzgâr türbinlerinden oluşan rüzgâr santrallerinin; daha fazla sayıda ancak görece daha küçük rüzgâr türbinlerinden oluşan santrallere göre daha kabul edilebilir olduğudur (Jobertvd., 2007: 2751-2752; Thayer ve Freeman, 1987). Yine çalışır durumdaki rüzgâr türbinlerine yönelik halkın kabulünün, beklenen yararları teyit etmesi bakımından, daha fazla olduğu anlaşılmaktadır (Jobertvd., 2007: 2752). Rüzgâr santrallerinin planlaması ya da inşası sırasında ortaya çıkabilecek karşı çıkışların, proje tamamlanıp işletmeye açılmasıyla dramatik biçimde destek şekline de dönüşmektedir. Rüzgâr santrallerine yönelik yerel desteğin, türbinlerin çalışmaya başlamasıyla daha da arttığı belirtilmektedir. Bu süreçte halkın planlama ve uygulama aşamalarında sürece katkı vermeleri ve işletmeye ortak olmalarının hızlandırıcı etkide bulunduğu belirlenmiştir (Sovacoolve Ratan, 2012: 5270).

Öte yandan rüzgâr santralleri konusunda halkın kabulünü etkileyen unsurların başında yöre halkının projelere ortak olması; halkın rüzgâr santrallerinin sahibi olması ya da proje uygulama alanının mülkiyetine sahip olması gibi finansal konular da gelmektedir (Jobertvd., 2007: 2752). Özellikle yabancı yatırımcılar ile yerel halk arasında finansal faydalar konularında yaşanan sıkıntıların santrallerin mülkiyetiyle de ilgili olabileceği; halka sağlanacak çeşitli finansal faydaların ve halkın planlama sürecine katılımının yerelde rüzgâr santrallerine yönelik desteği arttırdığı belirtilmektedir (Agterbosch, 2009: 394). Bununla birlikte rüzgâr enerjisi ve arazi kullanımı hakkında yöre halkının iyi düzeyde bilgilendirilmesi; başarılı ve etkin halkla ilişkilerin varlığı; planlama süreçlerinde halk katılımının sağlanması inşa ve işletme aşamalarında sosyal kabulü olumlu etkilemektedir (Jobertvd., 2007: 2752). Rüzgâr enerjisi ve sosyal kabul yazınında halk katılımının, genelde sosyal kabulü olumlu etkilediği; halk katılımının nitelik ve nicelik anlamında geliştirilerek halkın karşı çıkışını azaltması yanında, geniş anlamda demokratik yönetişime de olanak sağlayacağı vurgulanmaktadır (Wright, 2012).

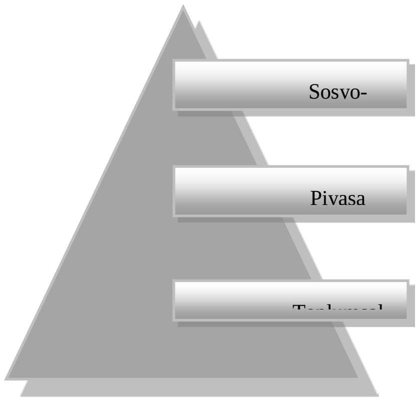
Burada dikkat çeken özellik; rüzgâr enerjisi projelerinin planlama, uygulama ve işletme aşamalarında yatırımcıların, ihtiyaç duydukları yerel halkın kabulünü sağlamaya yönelik süreçleri uygun yönetebilmeleridir. Fransa ve Almanya'da rüzgâr enerjisi yatırımlarına yönelik yerel halkın sosyal kabulünün sağlanması amacıyla gerçekleştirilen alan çalışmalarında iki önemli konu dikkat çekmektedir. Buna göre yerel halkın rüzgâr enerjisi yatırımlarıyla ilgili olumlu görüşü, ilk olarak ekonomik içerikteki bazı teşvikleri kapsayankurumsal düzenlemelerden ikinci olarak ise somut proje ile ilgili özellikler ve aktörler olmak üzere özgün proje süreçlerinden etkilenmektedir (Jobertvd., 2007: 2751). Rüzgâr santrallerine yönelik sosyal kabulün en önemli unsuru, alan seçimi olarak gözükmektedir. Yine Wolsink(2007)rüzgâr santralleriyle ilgili planlama süreçlerinin en temel unsuru olarak halka danışmayı görmektedir.

3. SOSYAL KABUL: BOYUTLARI-ŞARTLARI VE ÇANAKKALE-ERENKÖY ÖRNEĞİ

Gerek yatırımcılar gerekse kullanıcılar bakımından yenilenebilir enerjiye yönelik sosyal kabulü araştıran çalışmalarda konunun sosyo-politik, piyasa ve toplumsal olmak üzere temelde üç düzlemde incelendiği görülmektedir. Wustenhagen ve arkadaşlarının yenilenebilir enerjiye yönelik sosyal kabulün sözkonusu boyutlarını açıkladıkları çalışmalarında en genel ve geniş düzlem olarak sosyo-politik alanı işaret etmektedirler. Bu alanda özellikle halkın, düzenleyici kurumların, politika yapıcıların temel aktörler olarak kullanılan teknolojiyle ilgili kabullerinin daha alt düzeylerde gerçekleşen kabulleri de etkilediği vurgulanmaktadır. Sosyal kabul konusunda en özgün ve temel alan en alttaki toplumsal düzlemdir. Yerel halk, yerel aktörler ölçeğinde fayda ve maliyetlerin paylaşılması, planlama ve uygulamanın hayata geçirilmesi ve yerel halkın güven unsuru en altta yerelde gerçekleşmektedir. Ulusal politikalarla yerel topluluk arasında yer alan orta düzeyde ise sözkonusu teknoloji yatırımcıları ve tüketicilerin kabulü yer almaktadır(Wüstenhagenvd., 2007).

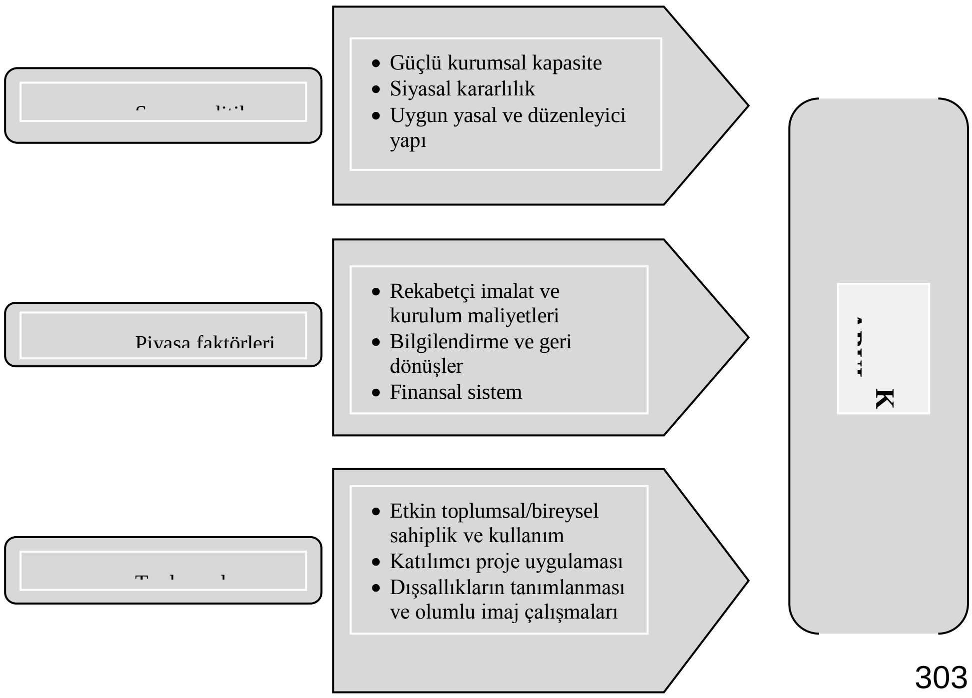
Aşağıda (Şekil 1) yer aldığı biçimde yenilenebilir enerjiye yönelik sosyal kabulün diğerlerinden bağımsız salt kendi düzlemlerinde gerçekleşme şansı çok zordur. Kısaca, yerel çıkarları dikkate alan, yatırımcıları ve kullanıcıları bu konuda teşvik eden sosyal ve siyasi düzenlemelere sahip ortamlarda sosyal kabulün gelişeceği anlatılmaktadır. Her türlü başarılı rüzgâr enerjisi yatırımıyla ilgili olarak sosyo-politik ve toplumsal kabulün önceden başarılmış olması olmasa olmaz özelliktedir (Wustenhagen vd. 2007: 2684).

Şekil 1: Yenilenebilir Enerjiye Yönelik Kabulün Üç Boyutu



Danimarka ve Hindistan'da rüzgâr santrallerine yönelik sosyal kabul konusunu inceleyen diğer çalışmada Sovacool ve arkadaşları, Wustenhagen'in sosyal kabul boyutlarından hareketle sosyal kabulün şu dokuz faktörün varlığına bağlı olduğuna dikkat çekmektedir (Sovacoolve Ratan, 2012: 5269). Bunlar (Şekil 2): (1)Güçlü kurumsal kapasite; (2)Siyasal kararlılık; (3)Uygun yasal ve düzenleyici yapı; (4)Rekabetçi imalat ve kurulum maliyetleri; (5)Bilgilendirme ve geri dönüşler; (6)Finansal sistem; (7)Etkin toplumsal/bireysel sahiplik ve kullanım; (8)Katılımcı proje uygulaması ve (9)Dışsallıkların tanımlanması ve olumlu imaj çalışmalarıdır.

Şekil 2: Sosyo-politik; Piyasa ve Toplumsal Kabulün Boyutları ve Şartları



Bell ve diğerleri (2005)ise ‘sosyal boşluk’*(social gap)* olarak adlandırdıkları rüzgâr enerjisine yönelik kamuoyunun yüksek düzeydeki desteğine rağmen, yerelde rüzgâr santralleri projelerinin uygulanmasında yaşanan görece daha düşük orandaki başarının açıklamasını üç farklı biçimde yapmaktadırlar. Bunlardan ilki, özetle bahsedildiği şekliyle, NIMBY sendromunun varlığı iledir. İkinci açıklama ise küçük de olsa bazı grupların özellikle planlama aşamasında dikkate alınmamasından kaynaklanan demokratik pratiklerdeki eksikliklere dikkat çekmektedir. Son olarak rüzgâr santrallerinin inşasıyla ilgili yerelde yaşanan karşı çıkışlar ya da beklenen desteğin daha düşük düzeydeki gerçekleşmesi, yöre halkının, sözkonusu yatırımların özellikle görüntü-peyzaj gibi etkilerini, çevreye, insanlara, canlılara olası etkileri gibi belli kriterleri temel alarak verdikleri şartlı desteklerle açıklanmaktadır.

Sonuçta rüzgâr enerjisi ve sosyal kabul yazınında rüzgâr enerjisine yönelik halkın yüksek düzeyde olumlu kanaatine rağmen yerelde rüzgâr santrali inşasına görece daha az destek vermesi NIMBY davranışının ötesinde bir yaklaşımı gerektirmektedir. Bu açıdan sözü geçen ‘sosyal boşluğun’ açıklanmasında çok farklı faktörleri ele alan bilimsel çalışmalara gereksinim duyulduğu açıktır.

Son olarak rüzgâr enerjisi ve halkın kabulü konusunu ulusal yazında Çanakkale-Erenköy örneğinde inceleyen çalışma(Güzel, 2013)sonuçları özetlenecek olursa:

- *Anemon Rüzgâr Enerji Santrali:* 2007 yılı Şubat ayında Çanakkale-Erenköy’de 30,4 MW kurulu gücündeki 800 kW’lık 38 adet Enercon türbin ile yılda yaklaşık 86 milyon kWh elektrik üretilmektedir. Ortalama 43 bin ton karbondioksitin atmosfere verilmeden üretilen bu elektrikle yaklaşık 38 bin konutun elektriği karşılanabilmektedir.

- *Anket çalışması:* 2012 tarihli Adrese Dayalı Nüfus Kayıt Sistemi verilerine göre Erenköy’ün nüfusu 1.651 kişidir. Çalışma bütününde geliştirilen sorulardan oluşan anket formu, 15 Mart-15 Nisan 2013 tarihleri arasında, tespit edilen örneklem özellikleri dikkate alınarak toplam 312 kişiye uygulanmıştır. Katılımcıların %58,7’si 19-45 yaş arasında olup bunların da yarıdan fazlası doğma büyüme Erenköylüdür. Katılımcıların dörtte biri (%24,7) 60 yaş ve üstüdür. Ankete cevap verenlerin dörtte üçü (%76) evlidir. Katılımcıların yaklaşık yarısı (%45,8) ise kendi işinde çalışmaktadır. Erenköy’de yaşayan katılımcıların %45,2’si ilköğretim, %35’i lise, %17,6’sı ise üniversite mezunudur. Katılımcıların ortalama yarısının (%54,2) geliri 900 lira ve altındadır.

- *Çanakkale-Erenköy’de halk rüzgâr türbinlerini desteklemektedir:* Bölge halkı %91,6 oranında Erenköy’de rüzgâr enerji türbinlerinin kurulmasını desteklemektedir .Cinsiyet olarak kadınların erkeklere göre; eğitim olarak lisansüstü ve/veya üniversite mezunlarının lise ve ilköğretim mezunlarına göre rüzgâr türbinlerin kurulmasını daha fazla desteklediği anlaşılmaktadır.

- *Rüzgâr türbinlerinin Erenköy’e ekonomik katkısı:* Rüzgâr enerji santralinin yöre halkına yeni iş imkânları sağlama (%53,8); işletmenin bölgeye ekonomik katkısı (%49,3); arazi sahiplerine gelir kaynağı olup olmadığı (%59,6) konularında ankete katılanlargenelde olumsuz düşüncelere sahiptir.

- *Devlet rüzgâr enerjisinin zorunlu hale getirmeli; Rüzgâr enerjisi, enerjide dışa bağımlılığımızı azaltacaktır:* Her iki konuda da halkın dörtte üçü (%75) olumlu düşünceye sahiptir.

- *Rüzgâr enerjisini desteklemek amacıyla daha fazla ödeme yapamam:* Ancak, Erenköylüler, rüzgâr enerjisini desteklemek amacıyla bir miktar daha fazla fatura ödeme konusunda (%83,1) isteksizdirler.
- *Rüzgâr türbinlerinin olası olumsuzlukları arasında kuş ölümleri öne çıkmaktadır:* Katılımcılardan %31,4'ü türbinlerin kuş ölümlerine neden olduğu düşüncesinde olup %45,2'sinin bu konuda bir fikri bulunmamaktadır.
- *Çanakkale-Erenköy'de halkın çok önemli bir çoğunluğu (%89,4) ülkemizde elektriğin yenilenebilir kaynaklardan sağlanması gerektiği düşüncesindedir:* Katılımcıların yaklaşık yarısı, %45,8'i, Türkiye'de elektriğin rüzgâr enerjisinden elde edilmesi gerektiğini düşünürken bunu %22,4 ile güneş, %21,2 ile hidro enerji izlemektedir.

SONUÇ VE DEĞERLENDİRME

Günlük yaşamın, değişen ve dönüşen modern dünyanın motor gücü enerjidir. Kalkınmanın ve yaşam kalitesinin vazgeçilmez unsuru olan enerji, özelde elektrik enerjisi, her toplum için stratejik öneme sahiptir. Hayatın her alanında insan ve toplum için hayati öneme sahip enerjinin ekonomik, teknik ve sosyal içeriğiyle ekonomiklik, etkenlik ve etkililik anlamlarında sürdürülebilir nitelikte elde edilmesi, bilimin her zaman öncelikli konuları arasında olmuştur.

Artan nüfus, kentleşme ve ekonomik gelişmelerle birlikte toplumların kalkınma hedeflerini yerine getirme, toplumsal refahı artırma ve uluslararası rekabette ayakta kalma çabaları beraberinde daha fazla enerji talebini gerektirirken, enerji temininde de yeni teknolojik gelişmeler birbirini izlemektedir. Günümüzde ülkelerin gelişmişlik düzeylerini belirleyen bu yeni teknolojilerin temel amacı; işletim ve üretim maliyetleri düşük, çevreyle uyumlu, sosyal değerlere duyarlı, güvenilir, zamanında, etkin biçimde elektrik enerjisinin elde edilmesidir.

Enerji kaynakları arasında yenilenemeyen-fosil yakıtlara bağımlılık sürmektedir. Her ülkenin diğer ülkeler gibi ülkemiz için de doğru ve yeterli verilerden hareket edilerek yerli ve daha fazla yenilenebilir kaynaklara önem veren, uygun maliyette, ekonomik, sosyal, teknolojik ve çevresel boyutlarıyla enerji arz-talep dengesini sağlayacak 'sürdürülebilir ve güvenilir' ulusal enerji politikaları içinde yenilenebilir enerji kaynaklarının, özelde rüzgâr enerjisinin de yer alması kaçınılmazdır. Konunun bu anlamda teknik uzmanlar kadar sosyal bilimciler tarafından da incelenmesi önemlidir.

Toplumların giderek artan enerji talebinin karşılanmasından sorumlu karar alıcıların, enerji kaynaklarının kullanımıyla ilgili alacakları siyasi-yönetsel kararların başarısı ya da başarısızlığında önemli belirleyicilerden biri de sosyal kabul konusudur. Bu arada rüzgâr enerjisi ve sosyal kabul konularının özellikle sosyal bilimciler tarafında incelenerek sürdürülebilir enerji planlaması çerçevesinde getirecekleri önerilerin sorumlularca dikkate alınması, gerek demokratik çoğulculuk gerekse politikaların başarısı için önemli olduğu bilinmektedir.

Bu aşamada rüzgâr enerjisi ve sosyal kabul konularının ülkemizde sosyal bilim insanlarınca yeteri kadar çalışılmadığı da bir gerçektir. Elde olan yazın dikkate alındığında:

Rüzgâr santrallerine karşı çıkışlarda yapılan çalışmalar NIMBY sendromunun varlığını yalanlamaktadır.

Rüzgâr enerjisi ve sosyal kabul çalışmalarında daha çok yerel halkın rasyonel olmayan davranışlarını anlatmakta kullanılan NIMBY sendromundan ziyade, rüzgâr enerjisine yönelik halkın yüksek düzeydeki açık desteğine rağmen, yerelde az da olsa rüzgâr santralleri inşasına karşı çıkışını anlatmak için 'sosyal boşluk' kavramı kullanılmaktadır. Burada insanlar türbinlerin insanlar, doğa ve görselliğe olan etkilerini dikkate alarak kurulan santrallere 'nitelikli destek' vermektedirler. Sosyal kabulün sağlamasında karşıtların bir şekilde razı edilmesinden çok, süreçlere bu nitelikli desteği arttıracak 'demokratik yönetişimin' hâkim olması amaçlanmalıdır.

Rüzgâr santralleriyle ilgili karşı çıkışın asıl nedeni olarak görsel olumsuzluklar dikkat çekmektedir. Yine proje planlaması aşamasında halkın katılımı sosyal kabulün başarılmasında önemli bir etken olarak kabul edilmektedir.

Başarılı somut proje uygulamalarında dikkat edilmesi gereken unsurlar olarak: Öncelikle yer seçimi dikkatlice yapılmalıdır. Santralin insan, doğa ve çevresine olabilecek olumsuz etkileri önceden değerlendirilmeli; görsel etkileri göz ardı edilmemelidir. Mülkiyet, fayda ve maliyetler, teşvikler, tasarım ve imaj çalışmaları bu kapsamda önem kazanmaktadır. Sonrasında yerel uygulamalarla ulusal ve küresel önceliklerin uyumlulaştırılması gerekmektedir. Elektrik üretiminde yenilenebilir enerji vurgusu, seragazı azatlımı ulusal ve uluslararası politikalara katkısı bu kapsamdadır. Bu uyumun sağlanmasında yatırımcının yerel ile ilişkilerinde de olumlu uygulamalar geliştirilmesi önemlidir. Yine süreç yönetiminde pazarlıktan ziyade ortak uzlaşının sağlanmasına yönelik eylemler düşünülmelidir. Katılım bu anlamda anahtar rol üstlenmektedir.

Sonuç olarak rüzgâr enerjisine yönelik halkın yüksek düzeydeki olumlu tutum ve düşüncelerin, bilimsel veriler ışığında düşünülmüş proje süreçleriyle yerelde somut proje uygulamaları için de sağlanması kaçınılmazdır. Rüzgâr enerjisi, yerel halk, yerli ya da yabancı yatırımcı, yerel, ulusal ve küresel alanda yer alan diğer unsurlar bu anlamda daha detaylı bilimsel çalışmalara konu edilebilir. Ancak bunlarla bir politika ya da projenin başarılı olabileceği unutulmamalıdır.

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EGE VE AKDENİZ KIYILARINDAKİ TERMİK SANTRALLERİN EKOLOJİYE ETKİLERİ

THE ECOLOGICAL EFFECTS OF THERMAL POWER PLANTS STATED IN THE AEGEAN AND MEDITERRANEAN COASTS

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ÖZET

Gelişmiş ülkeler, kirletici üretimlerle karşılanan gereksinimlerini ve yatırımlarını sanayileşmesini tamamlamamış ve ekonomik olarak geri kalmış ülkelerde gerçekleştirmektedirler. Sanayi tesisleri nedeniyle, İzmir'in Aliağa İlçesi kirliliğin yoğun yaşandığı ve sınır değerlerin fazlasıyla aşıldığı bir bölge halini almıştır. Demir Çelik Fabrikaları, Gemi Söküm Tesisleri ve diğer tesislerin yarattıkları kirlenme nedeniyle, Aliağa yöresi çevre sağlığı ve canlı yaşamının çok büyük risk altında olduğu bölge durumuna gelmiştir. Bugün itibariyle mevcut kirlilik, Aliağa ile birlikte tüm bölgenin doğal bitki örtüsünü, balıkçılığı, tarım alanlarını olumsuz etkilemekte, çevre sağlığı ve canlı yaşamı için risk oluşturmaktadır.

Akdeniz foku, Dünya'da nesli ileri derecede tehlike altına girmiş, korunma önceliği en üst seviyede olan bir deniz memelisi olup Karabiga (Çanakkale) ve civarında belgelenmiştir. Termik santrallerin bu bölgede kurulmaya başlamasıyla bu çok önemli deniz memelisinin artık buralara gelip barınması da söz konusu olmamaktadır. Manisa'nın Soma ilçesinde (Yırca), termik santralinin yapımı nedeniyle bölgede bulunan yaklaşık 6 bin zeytin ağacı söküldü. Bu tür uygulamaların, teknik ve bilimsel çalışmalarla, ağaçların sökülmeleri yerine başka uygun yerlere nakledilmeleri daha gerçekçi bir yaklaşım olacaktır. Enerji üreten termik santraller enerji ve toplum refahı, gelişme için gerekli olmakla birlikte yanı sıra doğaya vereceği zarar göz ardı edilmemelidir. Bizim doğaya ihtiyacımız var, tersine doğanın bize ihtiyacı yok. İnsanoğlu Doğa ve gelişmişlik sürecinin uyumlu olabilmesi için insanoğlunun çevre ile kalkınma arasında mutlaka dengeli bir çözüm yolu bulması gerekir.. Henüz uygun seviyelerde kullanılmayan güneş ve rüzgar enerjilerinin de enerji üretim sistemlerine dâhil edilmesi kaçınılmazdır.

Anahtar Kelimeler: Ekoloji, Termik Santraller, Kirlilik

ABSTRACT

Over the past few decades, industrialization has created pollutionproducing facilities that for economic and environmental reasons have largely been moved to underdeveloped countries. the Pollution in the Aliaga area has been concerning for many years due to the wastes from steel mills and ship dismantling operations. The risks to the environment and surrounding population are becoming greater as facilities and operations

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expand. Today, pollutants are damaging natural vegetation in the entire region as well as negatively effecting fisheries and farms

Mediterranean monk seals are on the brink of extinction their special ecosystem in the Karabiga (Dardanelles) region necessitates the highest level of protection for these rare marine mammals . The establishment of thermal power plants in the region will eventually lead to the an environment in which these marine mammals can no longer live.

In the Soma district of Manisa (Yirca), approximately 6,000 olive trees have been removed in order to make room for a thermal power plant. Other sites for thermal power plants should be considered that will not involve harming the environment for the monk seals nor require the destruction of valuable olive trees.

Thermal power plants that produce energy are important for the welfare of our society, and for the continuing development of our communities. We need an unspoiled environment also. We need an unharmed nature, nature does not need us. A balance should be sought that will enable society to progress while maintaining a clean environment that does not harm our area's natural flora and fauna. It should also be added that solar energy and wind energy are not yet at a level to be suitably implemented. It should also be added that solar energy and wind energy are not yet at a level to be suitably implemented.

Key Words: Ecology, Thermal Power Plants, Pollution

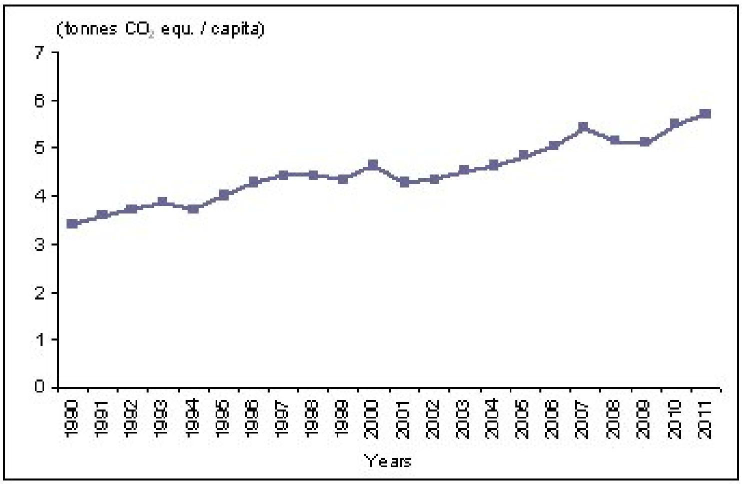
GİRİŞ

Dünya'da değişik ülkelerin çok farklı gelişmişlik düzeyleri ile orantılı olarak karbon dioksit (CO_2) emisyonları da farklılıklar göstermektedir (Tablo.1). CO_2 emisyon envanteri incelendiğinde termik santrallerin, çimento fabrikalarının, demir çelik endüstrisinin ve rafinerilerin yüksek miktarlarda ve merkezileşmiş alanlarda CO_2 salınımı yapan en temel kaynaklar olduğu görülmüştür (Tablo 2). Ulaşım ve evsel kullanımdan doğan emisyonlar dağınık kaynaklar olup etkinlik ölçümleri ile azaltılabilecekleri düşünülmektedir.

Ülkeler	CO_2 emisyonlar (kt)	Emisyon kişi başı (t)
DÜNYA	35,270,000	-
Çin	10,330,000	7.4
ABD	5,300,000	16.6
Hindistan	2,070,000	1.7
Rusya	1,800,000	12.6
Japanya	1,360,000	10.7
Uluslararası Taşımacılık	1,070,000	-
Almanya	840,000	10.2
Güney Kore	630,000	12.7
Kanada	550,000	15.7
Endonezya	510,000	2.6
Suudi Arabistan	490,000	16.6
Brezilya	480,000	2.0
İngiltere	480,000	7.5
Meksika	470,000	3.9
İran	410,000	5.3
Avusturya	390,000	16.9
İtalya	390,000	6.4
Fransa	370,000	5.7
Güney Afrika	330,000	6.2
Polonya	320,000	8.5

Tablo 1. EDGAR (Avrupa komisyonu ve Hollanda Çevre Değerlendirme Ajansı tarafından oluşturulan 2013 yılı değerleri)

Türkiye'deki emisyon envanteri yıllık emisyon artışının yüksek olduğunu göstermektedir. Enerji verimliliğinin ve yenilenebilir enerji kaynaklarının kullanımının arttırılması amaçlansa da fosil yakıtlara olan bağımlılığın tüm ülkelerde devam edeceği öngörülmektedir. Bu durumda, alınması gereken diğer bir önlem, kömür yakıtlı termik güç santrallerinden CO_2 emisyonunu azaltacak teknolojileri destelemek olacaktır. Tüm yanma işlemlerinde CO_2 ürün olarak çıktığından CO_2'in tamamen bertaraf edilmesi yine de mümkün olamamaktadır. Bu nedenle, CO_2 emisyonlarının azaltılması için önlemler alınmalıdır. CO_2 emisyonlarının azaltılması, CO_2'in jeolojik yapılarda yeraltı depolanması ile mümkün olmaktadır. Dünya genelinde 7887 endüstri bölgesinden açığa çıkan CO_2 emisyonlarının 13,5 Gt/yıl (IEA 2008) olarak belirlendiği düşünüldüğünde, bilinen petrol ve gaz rezervuarları dışındaki jeolojik alanların da değerlendirilmesi gerekmektedir.



Tablo 2. Sera gazı emisyonu, kişi başı, 1990-2011

1. ENERJİ ÜRETİM SANTRALLERİ

1.1. Termik Santraller

Katı fosil yakıtların kimyasal enerjisinin kazanlarda buhar elde etmek için kullanıldığı ve Rankine su-buhar çevrimine uygun Buhar türbinleri kullanılarak elektrik enerjisine dönüştürüldüğü elektrik santralleridir. Günümüzde elektrik büyük oranda bu yöntemle üretilmektedir.

- Afşin-Elbistan A Termik Santrali, 1.355 MW
- Afşin-Elbistan B Termik Santrali, 1.440 MW
- Sugözü Termik Santrali, 1.320 MW
- Çayırhan Termik Santrali, 640 MW
- Çatalağzı Termik Santrali, 300 MW
- Çolakoğlu Termik Santrali, 180 MW
- Çatalağzı Eren Enerji Termik Santrali, 1.360 MW
- İçdaş Değirmencik Termik Santrali, 405 MW
- İçdaş Bekirli Termik Santrali, 1.200 MW
- Eren Enerji Çatalağzı Termik Santrali, 1.375 MW
- 18 Mart Çan Termik Santrali, 320 MW
- Kangal Termik Santrali, 457 MW
- Kemerköy Termik Santrali, 630 MW
- Yeniköy Termik Santrali, 420 MW
- Yatağan Termik Santrali, 630 MW
- Seyit Ömer Termik Santrali, 600 MW
- Yatağan Termik Santrali, 630 MW
- Tunçbilek Termik Santrali, 365 MW
- Orhaneli Termik Santrali, 210 MW
- Soma Termik Santrali A-B (2 Adet), 1.034 MW

- Çumra Termik Santrali, 37 MW
- Silopi Termik Santrali, 135 MW

Şekil 1. Termik santral

1.2. Hidroelektrik Santraller

Yüksek seviyedeki su birikintisinin potansiyel enerjisinin su türbinlerini tahrik etmek için kullanıldığı santrallerdir. Ülkemizde bulunan hidroelektrik santraller:

- Atatürk Barajı Hidroelektrik santrali, 2405 MW
- Karakaya Barajı Hidroelektrik santrali, 1800 MW
- Keban Barajı Hidroelektrik santrali, 1330 MW
- Oymapınar Barajı Hidroelektrik santrali 540 MW
- Ermenek Barajı Hidroelektrik santrali 308 MW
- Özlüce Barajı Hidroelektrik santrali, 200 MW
- Gökçekaya Barajı Hidroelektrik santrali, 278 MW
- Obruk Barajı Hidroelektrik santrali, 203 MW
- GÜNDER BARAJI Arık enerji Hidroelektrik santrali, 28,2 MW
- Aksa Enerji Çorum, İncesu Hidroelektrik santrali, 15 MW

Şekil 2. Hidroelektrik santral

1.3. Rüzgâr Enerjisi Santralleri

Rüzgâr türbinleri vasıtasıyla elektrik üretimi yapan santrallerdir. Genellikle yüksek tepelere kurulması uygun olduğundan kuruluş maliyeti yüksektir. Sayıları her geçen gün artan rüzgar santralleri en çevre dostu enerji üretim yöntemlerindendir.

Şekil 4. Rüzgar türbünleri

- Zorlu Enerji (Rotor) Gökçedağ Rüzgâr Enerjisi Santrali, 135 MW
- Aksa Enerji Çanakkele Ayres Rüzgâr Enerjisi Santrali, 5 MW
- Aksa Enerji Balıkesir Şamlı Rüzgâr Enerjisi Santrali, 114 MW
- Aksa Enerji Hatay Sebenoba Rüzgâr Enerjisi Santrali, 30 MW
- Aksa Enerji Manisa Karakurt Rüzgâr Enerjisi Santrali, 10,8 MW
- Çanakkale Rüzgâr Enerjisi Santrali
- Bozcaada Rüzgâr Enerjisi Santrali, 30 MW
- Bandırma Rüzgâr Enerjisi Santrali, 50 MW
- Çeşme Rüzgâr Enerjisi Santrali
- Sanko Enerji Çatalca Rüzgâr Enerjisi Santrali 60 MW (3 MW x 20)

1.4. Nükleer Santraller

Nükleer santral, bir veya daha fazla sayıda nükleer reaktörün yakıt olarak radyoaktif maddeleri kullanarak elektrik enerjisinin üretildiği tesistir. Radyoaktif maddeler kullanılmasından dolayı diğer santrallerden farklı ve daha sıkı güvenlik önlemlerini, teknolojileri içerisinde barındırır.

Şekil 5. Nükleer santral

Nükleer enerji günümüz elektrik ihtiyacının yaklaşık %17′sini karşılamaktadır. Bazı ülkeler enerjilerinin büyük bir kısmını nükleer santrallerden üretmektedir. Örneğin Fransa Uluslararası Atom Enerjisi Ajansı verilerine göre elektrik enerjisinin %75′ini nükleer enerjiden sağlamaktadır. Amerika ise enerjisinin %15′ini buradan karşılamakta fakat bazı bölgelerinde santraller daha yoğun biçimde enerji üretimi yapmaktadır. Dünya çapında 400′den fazla nükleer santral bulunmakta ve bunların 100′den fazlası sadece Amerika’da yer almaktadır.

	Nükleer enerji üretimi		İşletmedeki santraller		İnşa hâlindekiler		Plânlananlar	
Ülkeler	TWh	%	Adet	MWe	Adet	MWe	Adet	MW
ABD	796	20,2	104	100.683	1	1.165	9	11.8
Almanya	128	28,6	17	20.490	0	0	0	
Brezilya	13	2,9	2	1.884	1	1.245	0	
Bulgaristan	15	35,9	2	1.906	2	1.906	0	
Çek Cum.	26	33,8	6	3.678	0	0	2	2.4
Çin	70	1,9	12	9.438	23	23.620	33	36.9
Fransa	390	75,2	58	63.130	1	1.600	1	1.6
Hindistan	15	2,2	19	4.189	4	2.506	20	16.7
İngiltere	63	17,9	19	10.137	0	0	4	6.6
İspanya	51	17,5	8	7516	0	0	0	
Japonya	263	29,2	54	46.823	2	2.650	12	16.5
Güney Kore	141	34,8	20	17.705	6	6.520	6	8.1
Romanya	11	20,6	2	1.300	0	0	2	1.3
Rusya	153	17,8	32	22.693	11	9.153	14	16.0
Ukrayna	78	48,6	15	13.107	2	1.900	2	1.9
Toplam	**2523**	**21,04**	**439**	**373.038**	**61**	**59.154**	**135**	**149.6**

Tablo 3. Uluslar arası atom ajansı 2011 verileri

İnsan nüfusunun artmasına bağlı olarak, teknolojinin ilerlemesi ve sanayileşme ve enerjiye olan talep gün geçtikçe artmaktadır. Hangi yatırım olursa olsun muhakkak çevre etkileşimi ve çevreye verebileceği zararlar önceden düşünülmelidir. İnsan çevre ile uyumlu ve çevreye zarar vermeden yaşamak zorundadır. Ülkemizde özellikle Ege ve Akdeniz bölgemiz için önemli bir ağaç olan zeytin ağaçları, meyvesi nedeniyle insan gıdası olarak çok büyük yarar ve ekonomik getiri sağlar. Önceden iyi düşünülmeden yapılan yatırımlar bazen geri dönülmez veya geri dönmesi uzun sürecek zararlara neden olabilmektedir. Örneğin; Manisa ili Soma ilçesi Yırca beldesinde Termik Santral kurmak için 6.666 zeytin ağacı kesen özel bir şirket, gelen tepkiler üzerine, termik santral kuracağı yeri değiştirerek, 3 km yakınında tarımsal faaliyet olmayan yeni bir yer bulmak zorunda kalmıştır.

2. DENİZ MEMELİLERİ VE TERMİK SANTRALLER

Son yapılan deniz canlıları araştırmaları sonucunda Marmara Denizi'nde de nesli tükenmekte olan Akdeniz foklarına rastlanmıştır. Çanakkale'nin Karabiga kıyılarına yapılması planlanan 7 termik santralın, bu fokların hayatını tehdit ettiği belirtilmiştir.

Nesli tükenmekte olan Akdeniz foklarının uzun yıllar sonra Marmara Denizi'nde de yaşadığı ispatlanmıştır. Ancak bu fokları büyük bir tehlike beklemektedir. Yapılması planlanan 7 termik santral fokların yaşam alanlarının içinde yer almaktadır.

Sualtı Araştırma Derneği - Akdeniz Foku Araştırma Grubu'nun (SAD-AFAG) yaptığı araştırmalarda Çanakkale'nin Karabiga kıyılarında 5 Akdeniz foku kameralarla görüntülenmiştir. Bilim insanları Akdeniz foklarının birey sayısının dünyada yaklaşık 700, Türkiye'de ise 100 olduğunu belirtmişlerdir. Dünyada nesli ileri derecede tehlike altında olan Akdeniz foklarının korunma önceliğinin en üst seviyede gerçekleşmesi için Türkiye'nin de uluslararası anlaşmalara imza attığı bilinmektedir. Türkiye, bu canlının yaşam alanlarıyla birlikte korunmasını Bern, Barselona ve Biyolojik Çeşitlilik Sözleşmeleri ile ilgili ulusal mevzuatımızla kabul ve taahhüt etmiştir. Doğa Koruma ve Milli Parklar Dairesi'nce onaylanmış olan Akdeniz Foku Ulusal Eylem Planı'nda bu nadir deniz memelisinin Marmara'da yaşadığı alanlar açıkça belirtilmiştir.

Şekil 3. Akdeniz foku (*Monachus monachus,* Hermann, 1779)

Karabiga ile Aksaz Köyü arasında kalan 15 kilometrelik kıyı ve deniz alanının sadece Akdeniz foku bakımından değil ayrıca yunuslar, bakir kıyılardaki Tepeli Karabataklar, konaklayan göçmen kuşlar, mağaralardaki yarasalar, kara memelileri bakımından da önemli yaşam alanları olduğu yine bu çalışmalar sonucunda kaydedilmiştir.

SONUÇ VE ÖNERİLER

Enerji ihtiyacı tüm canlılar için tartışılamayacak kadar çok önemli bir gereksinimdir. Aynı şekilde ülkeler de gelişmeleri ve yaşamlarını sürdürebilmeleri, güçlü olmaları için enerji kaynaklarını geliştirmek ve mümkünse dışa en az bağımlı hale gelmek durumundadır. En çok enerji kaynaklarına sahip ülkeler ise en gelişmiş ülkelerdir. İşte bu nedenle bazı gelişmiş ülkeler diğer bölgelerdeki enerji kaynaklarını bir şekilde ele geçirmek ve işletmek için durumlarını daha da güçlendirmek istemektedirler.

Hem enerji güvenliği ve hem de iklim değişikliği öngörüleri tüm ülkeler gibi Türkiye, Azerbaycan ve Orta Asya ülkelerini de hem enerji verimliliğini yükseltme ve hem de mümkün olduğunca yenilenebilir kaynak kullanmaya zorlamaktadır. Doğal gaz ve petrol ihraç potansiyeline sahip üretici ülkeler, özellikle elektrik üretiminde kullanılan doğalgaz ve fuel oil yerine diğer alternatifleri (öncelikle yenilenebilir; ikinci planda ise nükleer) kullanarak, ürettiği doğal gaz ve petrol ihraç kapasitelerini maksimumda tutmak isterler ve bu da, ülkelerin ekonomileri için daha doğru bir tercihtir. Bu yaklaşım doğalgaz ve petrol ihraç edilecek ülkelerin enerji güvenliklerine katkıda bulunacak ve iklim değişikliği çerçevesindeki çabalara da olumlu etki yapacaktır.. 2001 yılından bu yana Türkiye, rekabetçi, liberal ve şeffaf bir enerji sektörü için reform niteliğinde düzenlemelerle bir yeniden yapılanma sürecinden geçmektedir. Piyasalara ilişkin yasalar çıkartılmış, ilgili ikincil mevzuat düzenlemeleri büyük ölçüde tamamlanmıştır. Böylece, hedeflenen rekabetçi ve şeffaf bir enerji piyasası için atılabilecek adımların çok önemli bir bölümü atılmış, hedeflenen piyasa önemli ölçüde gerçekleşmiş bulunulmaktadır. Enerji verimliliği ve hem de yenilenebilir enerji kaynaklarının (özellikle elektrik üretiminde) kullanımlarının artırılmasında olduğu kadar rekabetçi liberal ve şeffaf bir enerji piyasasının oluşturulması yönünde Türkiye'nin Orta Asya ülkeleri ve Azerbaycan'la paylaşabileceği tecrübeleri ve birikimleri vardır; bu alanlar önemli işbirlikleri fırsatları sunmaktadır.

Termik santrallar, kömür, akaryakıt veya gaz gibi fosil yakıtların yakılması yoluyla elektrik üretir. Bu santrallerde, ocağın kazan bölümünde dolanan su, çok sıcak buhar haline dönüşür ve bu buhar, elektrik akımı üreten alternatörlere bağlı türbinleri çalıştırır. İlk büyük petrol krizi sanayileşmiş batılı ülkelerde bu tip termik santrallerin yapımını yavaşlatmıştır. Ancak yine de bu tip santrallar, birçok ülkede enerji açığını kapatmakta görev üstlenmeye devam etmektedir.

Termik santrallerin ürettiği ısının bir bölümü çevreye atılır. Soğutma suyunun sağlandığı kıyı ve ırmak suları birkaç derece ısınır. Kömürün yanmasıyla oluşan küllerin bir bölümü bacaların elektrostatik filtrelerinden dışarı sızar. Bütün fosil yakıtlar azot ve kükürt içerir ve bu maddeler yanma sonrasında oksitler halinde atmosfere karışır. Bu tür gaz atıklar, özellikle ormanlar için son derece zararlı olan asit yağmurlarının en önemli nedenidir.

Yenilenebilir ve bacasız enerji kaynaklarının (hidrojen, güneş, rüzgar, vs) en modern teknoloji ile kullanılmasının yanı sıra, tüm gelişmiş ülkelerin sahip olduğu "Nükleer Santral" kurulumlarının özellikle diğer gelişmekte olan ülkelerce yapılmaması yönünde "Protesto Grupları'' nın yine bu enerji teknolojilerini başarıyla tamamlamış ülkelerce desteklendiği gerçeği unutulmamalıdır.

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HES'LERİN YOL AÇTIĞI ÇEVRE SORUNLARI VE YARGISAL KORUNMA

THE PROBLEMS CAUSED BY HYDROELECTRIC POWER PLANTS AND JUDICIAL PROTECTION

Figen TAŞKIN**
Yakup GÖNEN*

ÖZET

Ekonomilerin gelişmesi beraberinde elektrik enerjisine olan ihtiyacın da artmasına neden olmaktadır. Artan enerji ihtiyacının karşılanmasında doğalgaz ve taşkömürü gibi büyük oranda ithalata dayalı enerji kaynaklarının yanında yerel kaynaklardan da maksimum düzeyde yararlanma ülkenin temel politikaları arasında yer almaktadır.

Yenilenebilir enerji kaynaklarından biri olarak kabul edilen hidroelektrik enerji üretim potansiyelinin üretime geçirilmesi için başta Doğu Karadeniz Bölgesinde olmak üzere birçok HES kurulmuş veya kurulma süreci devam etmektedir.

HES kurulma sürecinde ve sonrasında yargısal içtihatlara konu olan birçok çevresel sorun ortaya çıkmıştır. Bu sorunların temelinde, yasal mevzuatın yetersizliğinin yanında, uygulama aşamasında gerekli özenin ve duyarlılığın gösterilmemiş olması yatmaktadır.

HES ile ilgili yasal mevzuatta nehirlerin can suyunun belirlenmesinde bilimsel ilkelere uyulmamanın yan sıra nehirlerin kendi özellikleri ve mevsimsel değişkenlikler çerçevesinde can suyu miktarı belirlenmemesi ve can suyu bırakımının kontrol etme mekanizmasının işletilememesi önemli yasal eksikliklerdir.

HES yapan firmaların yeterli çevre bilinci ile hareket etmedikleri ve ÇED raporları kimi zaman inşaat sahasına dahi gidilmeden bilimsellikten uzak bir şekilde ve masa üzerinde hazırlanabilmekte ve bu durum mahkeme içtihatlarına yansımaktadır.

2577 Sayılı İdari Yargılama Usulü Kanunu'na (İYUK) Haziran 2014 tarihinde yapılan değişikliklerle "ivedi yargılama usulü" getirilmiştir. ÇED raporlarından kaynaklanan uyuşmazlıkların ivedi yargılama usulü kapsamına alınması, bu davalarda bireyler açısından yargısal korunmanın etkin olarak sağlanıp sağlanamayacağı sorununu da beraberinde getirmiştir.

Çalışmada yasal mevzuattan ve uygulamadan kaynaklanan eksikliklerin yanı sıra İYUK'ta yapılan değişikliklerin, idari yargı denetiminin verimliliği üzerine etkisi incelenecektir.

Anahtar Kelimeler: HES (Hidroelektrik Santrali), Can Suyu, ÇED (Çevresel Etki Değerlendirme), İvedi Yargılama Usulü, Yargısal Korunma

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ABSTRACT

With the development of economies, need of electric energy increased. The general policy of the government is to benefit from national sources mostly rather than importees such as natural gas and coal.

To benefit from hydroelectric power, as one of the renewable energy source, lots of hydroelectric power plants (HEPP) established or in process in Blacksea Region of Turkey.

Both while constructing HEPPs and in the ongoing process, lots of environmental problems occured in dispute. The main reason underlies these problems are unsatisfactoriness of the national law regulations, and negligence and insenstivity in construction period.

There are some deficiencies of legal regulations such as determination of lifeblood of stream beds is not based on scientific norms, these amount of lifeblood is not adopting the seasonal changes and there is no control mechanism for releasing lifeblood from dams.

On the other hand, most of construction firms are lack of environmental consciousness and sometimes environmental impact assessment (EIA) reports are prepared without going the land and unscientifically.

With the changes in Turkish Administrative Procedural Code in June 2014 “quick proceeding method” is regulated. With these amendments EIA reports are took into the scope of quick proceeding method. With this amendment effective protection of individuals is started to discuss.

In this study, the effects of 2014 amendments on Administrative Procedural Code on effectiveness of judicial control additional to deficiencies of regulations and practice.

Keywords: Hydroelectric power plants (HEPP), Lifeblood, EIA (Environmental Impact Assessment), Blacksea Region, Quick Proceeding Method

GİRİŞ

Son on yıl içerisinde, dünyada doğal gaz ve elektrik talebinin Çin’den sonra en fazla arttığı ikinci ülke konumunda bulunan Türkiye’nin önümüzdeki dönemde de ekonomik ve sosyal gelişme hedefleri ile tutarlı olarak, enerji talebi artışı bakımından dünyanın en dinamik enerji ekonomilerinden biri olmaya devam etmesi beklenmektedir. Enerji talebinin artması, petrol ve doğalgaz rezervleri olmayan ve dışarıya bağımlı olan Türkiye’yi yenilenebilir enerji kaynağını kullanma politikasına da hız vermeye zorlamıştır.

Türkiye’nin 10. Kalkınma Planı’nda, ülkenin enerji kaynaklarını ithal etmesinin getirdiği sorunlara değinilmiştir. Plan’da, 2011 ve 2012 yıllarında dış ticaret açığının sırasıyla yüzde 45 ve yüzde 62’sinin net enerji ithalatından kaynaklandığını ve hızla büyümekte olan enerji talebinin karşılanabilmesi için de petrol, doğal gaz ve taşkömürü ithalatının sürekli arttığını belirtmektedir. Bu durum enerjide yüksek oranlı dışa bağımlılığın sürmesine yol açmakta, cari işlemler dengesi ve enerji arz güvenliği üzerinde baskı oluşturmaktadır.

Gene aynı plana göre Türkiye ekonomisinin yüksek ve istikrarlı büyüyebilmesi için mümkün olan bütün yerli kaynakların enerji üretimi amacıyla değerlendirilmesi öncelikli bir husus olduğu görülmektedir. Özellikle yenilenebilir enerji kaynaklarının hem birincil enerji arzı hem de elektrik üretimi amacıyla değerlendirilmesi sürdürülebilir kalkınmanın temini açısından önem taşımaktadır. Bu programla yerli kaynakların enerji üretimindeki payının artırılması suretiyle enerjide dışa bağımlılığın azaltılması amaçlanmaktadır. Program hedeflerinden biri de "Plan döneminde 10.000 MW'lık ilave hidrolik kapasitenin devreye alınması"dır. Performans göstergesi de yenilenebilir kaynaklardan sağlanan elektrik üretimi miktarı olacaktır.

Enerjide yerel kaynaklara dayalı üretimi arttırmak ithalata dayalı enerji oranını azaltmak için yenilenebilir enerjiye ağırlık verilmiştir. Kalkınma Planı'nda öngörülen hedeflere ulaşma yolunda, Hidroelektrik Santralleri (HES) yatırımlarının son yıllarda arttığı görülmektedir. Türkiye'de 2014 yılı itibarıyla 461 HES projesi tamamlanarak faaliyete başlamıştır. Bunun yanı sıra 162 HES inşaatı devam etmekte ve planlanmış olarak ta 823 proje bulunmaktadır (Enerji Günlüğü, 2014b).Türkiye'nin enerji politikasında ülkenin kaynaklarının nasıl kullanılacağı belirtilmiştir.

Sayıları hızla artan HES'lerin gerek yapım gerekse işletim aşamalarında çevreye ciddi zararlar verebildikleri ortaya çıkmıştır. HES'lerin yol açtığı çevresel zararlar ve sosyokültürel yapı üzerindeki olumsuz etkiler yöre halkının şikâyetlerine sebebiyet vermektedir. Sivil toplumun ve meslek kuruluşları bu konudaki tepkilerini bazen protesto gösterisi olarak bazen de yargısal yola başvurmak suretiyle ortaya koymaya başlamıştır. Türkiye'nin gündeminde önemli yer tutmaya başlayan bu santrallerin iptali yönünde birçok dava açılmış ve hala açılmaya devam etmektedir.

Çalışmamızda, Türkiye'nin akarsuları üzerinde yer alan mini HES projelerinde ortaya çıkan ve yöre halkının şikâyetlerine yol açan sorunların kaynağına inilmeye çalışılmıştır. Bu sorunların ortaya çıkmaması için "çevre politikalarına katılım hakkı" kapsamında uygulanabilecek usul kurallarına etkinlik kazandırmanın önemine değinilmiştir.

Çalışmamızda, İdari Yargılama Usul Kanunu'nda 2014 yılında yapılan değişikliklerin, Çevresel Etki Değerlendirme (ÇED) sürecinde ortaya çıkan hukuki uyuşmazlıklar için öngörülen yargısal korunma yolları üzerindeki etkisi incelenmiştir. Bu bağlamda, ÇED uyuşmazlıklarının tabi olduğu ve yeni bir düzenleme olarak eklenen "ivedi yargılama" usulünün özellikleri ve hukukiliği sorunu ele alınmıştır.

Çalışmanın sonunda etkin bir yargısal korunma ile sadece iptal davalarının değil tam yargı davalarının da, dolaylı bir şekilde, çevresel zararları önleyici unsur olarak kullanılabilirliğine dikkat çekilmiştir.

1.HİDROELEKTRİK SANTRALLER ve ÇEVRESEL ETKİ DEĞERLENDİRME

1.1. Hidrolik Enerji ve Hidroelektrik Enerjisi Hidroelektrik Santral Çeşitleri

Hidroelektrik santraller (HES) akan suyun gücünü elektriğe dönüştürürler. Akan su içindeki enerji miktarını suyun akış veya düşüş hızı tayin eder. Büyük bir nehirde akan su büyük miktarda enerji taşımaktadır. Ya da su çok yüksek bir noktadan düşürüldüğünde de yine yüksek miktarda enerji elde edilir. Her iki yolla da kanal ya da borular içine alınan su, türbinlere doğru akar, elektrik üretimi için pervane gibi kolları olan türbinlerin dönmesini sağlar. Türbinler jeneratörlere bağlıdır ve mekanik enerjiyi elektrik enerjisine dönüştürürler (ETKB, 2012). Bu dönüşümün yapıldığı tesislere genel ismiyle hidroelektrik santral denir.

Akarsulardan elektrik üretiminde, yüksekten düşen ya da düşürülen suyun kinetik enerjisinden yararlanılır. Bu amaçla kurulan hidroelektrik santrallerini baraj tipi (depolamalı) ve nehir tipi (depolamasız) santraller olmak üzere ikiye ayırmak mümkündür.

Depolamalı santrallerde elektrik üretimi, akarsuyun akım özellikleriyle olduğu kadar barajın su tutma kapasitesi ile de yakından ilişkilidir. Buna karşın depolamasız santrallerdeki üretim, büyük ölçüde akarsuyun doğal akım özelliklerine bağlıdır.

Bu konudaki diğer bir sınıflandırma da santrallerin kurulu güç durumlarına göre yapılmaktadır (Akpınar, 2005: 2). Bu sınıflandırmada santraller; mikro (1 KW-200 KW), mini (200 KW-1 MW), küçük (1 MW-10 MW), orta (10 MW- 50 MW) ve büyük (50 MW ve üzeri) olmak üzere beş grupta toplanır.

Tüm hidroelektrik enerji kaynakları arasında küçük hidroelektrik santrallerin gelişmiş ve gelişmekte olan ülkelerdeki toplam elektrik enerjisi üretimindeki payı %5 ile %10 arasında olmaktadır. Küçük hidroelektrik santraller toplam kurulu gücü 10 MW'a kadar olan santrallerdir. Bunlar da kendi aralarında mikro, mini ve küçük olarak isimlendirilirler. Dünyada özellikle ABD, Çin, Japonya, Fransa'da pek çok uygulamaları mevcuttur. Küçük hidroelektrik santrallerin avantajları bulunmaktadır. En önemli avantajı gerçekleştirilmesi büyük santrallere kıyasla daha kısa olmasıdır. Küçük hidroelektrik santrallerin makine aksamı her ülkenin şartları ile yapılabilecek durumdadır. Dolayısıyla her ülke için ithal enerji bağımlılığını azaltmaktadır. Küçük hidroelektrik santrallerde standardizasyona gitmek mümkün olduğu için maliyeti azaltır. Üretilen elektrik enerjisi bölgesel kullanımlar için daha uygundur. Dezavantajları ise birim tesis maliyeti ve birim enerji maliyeti yüksek güçlü hidroelektrik santrallere nazaran daha yüksektir.

1.2. Hidroelektrik Santrallerin Zararları

Doğu Karadeniz bölgesindeki mikro hidroelektrik enerji santrallerin yapımı son yıllarda artmıştır. Santrallerin yararı olduğu kadar ekolojik yapıya, su kaynakları ve bitki örtüsü üzerinde olumsuz etkileri olmaktadır. Derelerin Kardeşliği Platformunun ortaya koyduğu bulgulara göre öncelikle verilen zarar bölgede yüzbinlerce ağaç kesilmesinden kaynaklanan bölgenin iklim yapısının değişmesidir. İklim değişmesi, söz konusu bölgenin bitki ve hayvan çeşitliliğinin değişmesini beraberinde getirmektedir. HES'in yapıldığı akarsuyun sıcaklığı değiştiği için akarsuda bulunan canlılar da tamamen değişiyor ve önemli oranda yok oluyor. Su tutumu nedeniyle aşağı bırakılan su miktarındaki azalma, nehrin aşağı bölgesinde yer alan tüm ekosistemleri de bozuyor. O bölgenin toprak yapısı, bitki örtüsü, hayvan varlıkları, bakteri sistemleri de dahil olmak üzere her şeyi olumsuz etkiliyor. Ayrıca nehrin denize ulaştığı yerdeki deltalar eriyor. Topraklarda tuzlanma gerçekleşiyor. Yer altı su kaynakları bozuluyor. Tüm suların kimyasal özellikleri olumsuz yönde değişiyor.

HES'lerin olumsuz etkileri, T.C. Çevre ve Orman Bakanlığı'nın hazırladığı Çevresel Etki Değerlendirmesi Sektörel Rehberleri, ÇED Rehberi– Barajlar ve Hidroelektrik Santrallar adlı kitabında (Çevre ve Orman Bakanlığı, 2009) inşaat aşaması ve su tutulması ve işletme aşamalarında olası etkiler olmak üzere iki ayrı aşamada görüldüğü şeklinde ele alınmıştır. İnşaat aşamasındaki olası etkiler, ise fiziksel çevre ve biyoloji çevre üzerine etkiler olarak ikiye ayrılmaktadır. Fiziksel çevre üzerine etkilerden en önemlisi su kalitesini olumsuz etkilemesidir. Temel kazılması, çevre yollarının inşaatı, agregaların işlenmesi ve beton işleri gibi inşaat faaliyetleri akarsuyun akış aşağısında bulanıklığa, sediman artışına ve suyun alkaliliğini değişmesine neden olacaktır. Toprak kalitesine etkileri, erozyon ve zemin emniyeti, inşaat faaliyetleri, özellikle kazı ve dolgu çalışmaları, üst toprağın sıyrılması ve kayaç kazısı arazinin erozyon ve heyelan etkilerine hassasiyetini arttırır. Benzer şekilde çıplak ya da bozulmuş arazilerdeki inşaat trafiği erozyonu ve sediman taşınımını hızlandırmaktadır. İnşaat işleri ve özellikle kazı dolgu alanlarında, yüksek şev eğimleriyle çalışılan alanlarda ve patlatma kullanılan durumlarda zemin eğimi ve inşa edilen ünitelerde yapılardaki duraylılık mevcut jeolojik özellikler risk sınıfları ve proje tasarım ve inşaat kriterlerinin uygunluğu açısından incelenmelidir. İnşaat aşamasında meydana gelen gaz ve toz emisyonları (kırma-eleme ve beton santralı dahil olmak üzere) ÇED kapsamında değerlendirilmelidir(Çevre ve Orman Bakanlığı. 2009). İnşaat trafiği ve faaliyetleri gürültüye neden olacak faaliyetler (patlatma ve iş makineleri gürültüsü vb.) çevredeki yerleşimleri rahatsız edebilir.

Biyolojik çevre üzerine etki olarak söylenebilecek husus, inşaat alanlarında üst toprak tabakasının sıyrılmasından, kazı ve dolgu faaliyetlerinden ve inşaat trafiğinden dolayı bitki örtüsü ve habitat kaybolmasıdır. Ayrıca, emisyonlar ve su kirliliği gibi nedenlerle çevredeki vahşi yaşam ortamları olumsuz etkilenebilir.

HES'lerin su tutulması ve işletme aşamalarında karşılaşılabilen etkilerden biri, sosyoekonomik çevre üzerinedir. Proje bölgesindeki yerleşim alanlarının demografik yapısı, projenin gerçekleştirilmesi ile ortaya çıkabilecek göç hareketlerinden etkilenebilir. Proje çalışanları için inşaat şantiyelerinin kurulması inşaat aşamasından başlayarak bölgenin demografisinin değişmesine neden olabilir. Projenin boyutuna bağlı olarak bu değişikliğin önemi artacaktır. Proje ile yöredeki ekonomik faaliyet artacak. Yöre halkının bir önemli yararı ancak proje inşaatı süresiyle kısıtlı iş imkânı bulabilmesidir.

Fiziksel çevre üzerine etkiler olarak proje alanının depremselliği, deprem riski de dahil olmak üzere baraj güvenlik riskleri ve baraj inşaatından dolayı deprem riskindeki artıştır.

ÇED Rehberi– Barajlar ve Hidroelektrik Santrallar adlı kitapta olası etkilerin ÇED sürecinde ele alınması gerektiği belirtilmektedir. HES yapım sürecinde yaratılan çevre tahribatı, ÇED raporlarının hazırlanma sürecinde bu olası etkilerin olup olmayacağının yeterince değerlendirilmediğini düşündürmektedir. Alternatif ve yenilenebilir diye tanımlanan derelerin üzerine kurulan HES'lerin, beraberinde çok daha büyük bir yıkım getirdiğini 10 yıldır HES'lere karşı büyük bir mücadele yürüten ve Derelerin Kardeşliği Platformunun kurucusu olan Avukat Remzi Kazmaz, yaşanılan deneyimden yola çıkarak anlatıyor. HES'lerin çevresel zararları "…HES yapılan bölgede yüz binlerce ağaç kesildiğinden iklim değişmekte bitki ve hayvan çeşitliliği değişmeye başlamaktadır. Karasal iklimde yaşayabilen bitkiler ya da hayvanlar yeni iklime ayak uydurmaya çalışıyorlar ya da tümden yok oluyorlar. HES'in yapıldığı akarsunun içinde bulunan canlılar tamamen değişiyor ve önemli oranda da yok oluyor. Suyun sıcaklığı değişiyor. Nehrin sahip olduğu ekosistem tamamen bozuluyor. Su tutumu nedeniyle aşağı bırakılan su miktarındaki azalma, nehrin aşağı bölgesinde yer alan tüm ekosistemleri bozuyor. O bölgenin toprak yapısı, bitki örtüsü, hayvan varlıkları, bakteri sistemleri dahil her şey bozuluyor. Ayrıca nehrin denize ulaştığı deltalar eriyor. Topraklarda tuzlanma gerçekleşiyor. Yeraltı su kaynakları bozuluyor. Tüm suların kimyasal özellikleri olumsuz yönde değişiyor." (Sarıyer Times, 2015)

HES tartışmalarında önemli bir konu ise doğal hayatın devamlılığının sağlanması için dere yatağına bırakılması öngörülen su miktarı veya çok kullanılan tabirle "can suyu"nun miktarıdır. Ekonomik açıdan değeri olan (balıkçılık faaliyeti) akarsularda ekosistem su ihtiyacının belirlenmesi ile ilgili çalışmalar yapılmış ve bu nedenle balıkların yaşamları için gerekli olan su miktarı tüm nehir ekosisteminin ihtiyacı olarak tanımlanmıştır. Ancak son yıllarda diğer canlı gruplarını ekosistemin yapısını (su kanalının formu, bitki örtüsü ve taşkın alanları), nütrient dinamiğini ve birincil üretimi de dikkate alan yeni metotlar geliştirilmiştir (TMMOB, 2011b: 66).

Türkiye'deki uygulamalara bakıldığında ilk önceleri suların hiçbir özelliği dikkate alınmadan hiçbir ayrım yapılmaksızın can suyu için 50 litre/sn gibi bir değer belirlenmiştir. Bu değer, hiçbir bilimsel veriye dayanmamaktadır. (TMMOB, 2011a: 27). Su Kullanım Hakkına Dair Yönetmelik gereğince, hidroelektrik üretim tesisi kuran şirketler, doğal hayatın idamesini sağlayacak miktarda suyu dere yatağına bırakmakla yükümlüdür. Yönetmelikte, dere yatağına bırakılacak can suyu miktarı, HES projesine esas alınan son on yıllık ortalama akımın en az yüzde 10'u olarak saptanmıştır. Ama uluslararası sözleşmelerde can suyu oranı yüzde 30'dur. Amerika Tennah yöntemine göre bu oran yüzde 40'lara çıkmıştır.

Can suyu için öngörülen, bu %10'luk oran uygulamasının hiçbir anlamı ve değeri yoktur. HES'lerde suyun bir noktadan alınarak havza içinde ya da dışında başka bir noktaya aktarılması gerekebileceğinden ara kesimlerde kalan canlı yaşamının devamı için can suyu hesaplarının bilimsel yöntemlerle yapılması gerekmektedir. Uygulamalarda can suyunun her havza için ayrı belirlenmesi gerekirken tek değerle geçiştirilmeye çalışılmaktadır (TMMOB, 2011a: 27).

Su kaynaklarını besleyen parametrelerin değişimi suyun nehirlerdeki özelliklerini doğrudan etkilediğinden bazı mevsimlerde yüksek olurken diğer mevsimlerde de akarsu tamamen kurumaktadır. Yaz mevsiminde ekosistemde kritik durum yaşanmaması için transfer edilecek miktar bu mevsim için ayrı hesaplanmalıdır.

HES'lerde can suyunun bırakılıp bırakılmadığına ilişkin kontrol sisteminin çalışmaması da en önemli sıkıntılardan biridir (TMMOB, 2011a: 27). Kontrol sistemi eksikliği ekosistemi olumsuz etkilediği gibi bu nehirlerden faydalanacak halkı da olumsuz etkileyecek sorunların ortaya çıkışını sağlayacaktır.

HES'lerdeki can suyunun az bırakılması nedeniyle suyun akış hızı, akış miktarı, nehrin derinliği ve taban yapısı önemli ölçüde değişir. Bunlar nehir ekosistemlerinin sağlığı için kritik unsurlardır. HES'lerden nehirlere az oranda su bırakılması sucul canlıların yok olmasına, beslenme, üreme ve göç davranışlarında kısıtlamalara neden olur. Ülkemizde bir nehir kolu üzerinde birden çok HES projesi takip eder şekilde planlanmaktadır. Böylece, farklı HES'ler tarafından borular, kanallar veya tünellerle dere yatağından alınan su, bazen kilometreler boyunca dere yatağına kavuşamaz. Bu durum, ekosistem bütünlüğünü ciddi derecede tehdit eder (Sarıyer Times, (2015).

Bir nehrin akış hızı azaldığında, suyun havalanması ve sudaki çözünmüş oksijen miktarı azalır. Oksijenin belli bir konsantrasyonun altına düşmesi, toplu balık ölümlerine neden olmaktadır. HES işletimi aynı zamanda suyun sıcaklığını değiştirir. Bu durum, sudaki sıcaklığa hassas türlerin yaşamını olumsuz etkiler (Sarıyer Times, 2015).

HES işletimi nedeniyle yer altı suyu miktarı düşer. Bu durumdan nehir civarındaki bitki örtüsü ve yaşamı buna bağlı olan diğer sucul ve yarı sucul canlılar etkilenmektedir. Nehir civarındaki bitki örtüsünün bir başka işlevi, sel kontrolüdür. HES işletimleri dolaylı olarak sel baskını riskini arttırır.

Birçok balık ve omurgasız canlı türü normal davranışı gereği, hayatlarının belirli dönemlerinde nehir boyunca uzun ya da kısa mesafeli göçler gerçekleştirir. Nehirlerdeki göçlerin en yaşamsal olanı, balıkların yumurtlama göçüdür. HES'lerin bir bileşeni olan regülatörler (su toplama yapıları), sucul canlıların nehir boyunca hareketini kesintiye uğratırlar. Üreme tamamen aksarsa, bu durum balık türünün o nehir habitatından tamamen kaybolmasıyla sonuçlanabilir.

Nehirler taşıdıkları sedimentlerle, deniz kıyılarında verimli tarım arazileri ve biyolojik çeşitlilik açısından zengin delta yapılarını oluşturur. Deltalardaki tarımsal verim ve buraya uyum göstermiş biyolojik çeşitliliğin devamı, nehirlerin taşıdığı sediment miktarına bağlıdır. Nehirler aynı zamanda denizlere besin taşır. Bu, denizel türlerin sürekliliği için önemlidir. HES işletimi, nehirlerden denizlere taşınan sediment miktarını kesintiye uğratır. Alt havzalardaki habitat ve biyolojik çeşitlilik buna bağlı olarak etkilenir, delta yapılarına yeterince sediment gelmemesinden dolayı kıyı erozyonu riski artar.

1.3. Türkiye'de HES ile ilgili Yasal Mevzuat

HES'in beslendiği kaynak olan suyun mülkiyetinin ve korunmasının üzerine düzenlenen kurallar manzumesi yıllar boyunca değiştirilmiştir. Hukuk kuralların hiyerarşisinde en üst kural olan Türkiye Anayasalarına bakıldığında değişimin yönü daha net anlaşılmaktadır. 1961 Anayasası'nda "Tabii servetler ve kaynakları, Devletin hüküm ve tasarrufu altındadır. Bunların aranması ve işletilmesi hakkı Devlete aittir. Arama ve işletmenin Devletin özel teşebbüsle birleşmesi suretiyle veya doğrudan doğruya özel teşebbüs eliyle yapılması, kanunun açık iznine bağlıdır" hükmü varken 1982 Anayasası ile özel şirketler eliyle doğal kaynakların aranması ve işletilmesi kolaylığı sağlanmıştır.

Türkiye'de ise suyun kullanımı, suyun zararlarından korunmak, suyun niteliğini korunması ve idari yapı ile ilgili yapılan hukuksal düzenlemeler de bulunmaktadır. 1924 yılından bu yana su ile ilgili çeşitli konularda yapılan düzenlemeler 26 kanun ve 2 kanun hükmünde kararname olmak üzere toplam 28 adettir. Bütün bu düzenlemeler, suyun kullanımı, suyun zararlarından korunmak, suyun niteliğini korumak ve idari yapı ile ilgili yapılan hukuksal düzenlemeler suyun niteliğinin korunması ve kirletilmemesi amacıyla yapılmıştır. Bununla beraber son yıllarda yapılan düzenlemeler, burada saydığımız suyun korunmasını sağlayan düzenlemeleri kaldıracak şekildedir.

Türkiye'de yenilenebilir enerji kaynakları arasında önemli yere sahip olan suyun HES'lerde kullanımı ve enerjiye dönüştürülmesi üzerine tartışma yürütülmektedir. Bu tartışmalar daha çok ırmaklarda kurulan HES'lerin nasıl kurulduğuyla alakalıdır. Bu tartışmanın hukuki zeminde araştırılmasına girişildiğinde de yasal mevzuatın çok geniş olduğu görülmektedir.

Bunun yanı sıra Türkiye, yenilenebilir enerji kaynaklarının geliştirilmesine verdiği önemin bir ifadesi olarak, 26 Ocak 2009 tarihinde Bonn'da düzenlenen konferans sonunda imzalanan anlaşmayla, Uluslararası Yenilenebilir Enerji Ajansı'nın (IRENA) kurucu üyeleri arasında yer almıştır (Dışişleri Bakanlığı, 2014).

1.4. Çevresel Etki Değerlendirme (ÇED) Süreci

HES'lerle ilgili tartışmalarda en çok üzerinde durulan konu da HES projesine ÇED raporu verilmesi sürecidir. Nitekim Anayasa Mahkemesi, ÇED raporlarını çevrenin korunması yükümlülüğünün bir gereği olarak nitelendirmiştir (Resmi Gazete, 2009).

1983 tarihinde Çevre Kanunu (m. 1) "…bütün canlıların ortak varlığı olan çevrenin, sürdürülebilir çevre ve sürdürülebilir kalkınma ilkeleri doğrultusunda korunmasını sağlamak" amaç ve hedefiyle yürürlüğe girmiştir. Kanun'da (m.3/e) İdareye, ile bireyler, meslek odaları ve sivil toplum kuruluşlarının "çevre hakkının kullanılmasına katılım" için ortamını hazırlamak yükümlüğü getirilmiştir (TC Çevre ve Şehircilik Bakanlığı, 2015).

Çevre Kanunu (m. 10) ile çevreye etkileri olabilecek faaliyetlerle ilgili projelerde ÇED raporları hazırlanması öngörülmüş ancak konunun usul ve esaslarının düzenlenmesini Yönetmeliğe bırakılmıştır. ÇED yönetmeliği ilk kez 07.02.1993 tarih ve 21489 sayılı Resmi Gazete'de yayınlanmış ve 2014 yılına gelinceye kadar on beş kez tamamen ya da bir maddeye bir fıkra eklenmesi şeklinde değiştirilmiştir.

Her ÇED yönetmeliği daha mükemmel olması amacıyla çıkarılmış, ancak bir öncekine göre uygulamada daha çok soruna neden olan ve çevre açısından olumsuzluklar taşıyan hükümleri de içeren düzenlemeler olarak yürürlüğe girmiştir; birçok davaya konu olmuştur (Alıca, 2011: 100). 2014 yılında çıkarılan son ÇED yönetmeliği ile HES projelerine açılan iptal davaları üzerine HES projelerini ÇED sürecine sokmayan muafiyet getirilmiştir.

Çevre Kanununa göre (m.2) ÇED: "Gerçekleştirilmesi planlanan projelerin çevreye olabilecek olumlu ve olumsuz etkilerinin belirlenmesinde, olumsuz yöndeki etkilerin önlenmesi ya da çevreye zarar vermeyecek ölçüde en aza indirilmesi için alınacak önlemlerin, seçilen yer ile teknoloji alternatiflerinin belirlenerek değerlendirilmesinde ve projelerin uygulanmasının izlenmesi ve kontrolünde sürdürülecek çalışmaları" (Resmî Gazete, 2013) içeren bir süreç olarak tanımlanmıştır. Bu tanım ÇED yönetmeliklerinde aynen tekrarlanmıştır.

Aynı yönetmeliğe bakıldığında Çevre ve Şehircilik Bakanlığının projeler hakkında ÇED raporu gereklidir veya değildir gibi karar verebildiğini ve dolayısıyla zaten bütün projelerin ÇED sürecine tabi tutulmadığını görüyoruz.

2013 yılında çıkarılan yönetmeliğin Ek 1 listesinde "Kurulu gücü 10 MWm ve üzeri olan" hidroelektrik santrallerinin Çevresel Etki Değerlendirmesine tabi tutulacağı belirtilmektedir.[*] Ek 1'de yer alan HES projeleri mutlaka ÇED sürecine dahil edilecektir.

Aynı Yönetmeliğin Ek 2 listesine göre ise "Kurulu gücü 1-10 MWm arasında olan hidroelektrik enerji santraller" Eleme Kriterleri Uygulanacak Projeler arasında kabul edilmektedir. Bu listede yer alan HES projelerinin ÇED sürecine girip girmeyeceğinin kararı Çevre ve Şehircilik Bakanlığına aittir. Bu yönetmelik, küçük HES'leri değerlendirme dışı tutabilmenin yolunu açmaktaydı.

"Seçme– Eleme Kontrol Listesi'nde yer alan sorulara verilen cevapların, "Proje için ÇED gereklidir", ya da "ÇED gerekli değildir" kararının verilmesinin nasıl belirlendiğine ilişkin kullanılabilecek genel bir kural yoktur. Teoride bir "evet" cevabının olması bile, ÇED gereklidir, kararına yol açabilir. Diğer taraftan, genel olarak "evet" cevapları çoğaldıkça etkilerin önemi daha fazla olmaktadır; "bilinmiyor" cevapları fazlalaştıkça, projenin etkileri hakkındaki belirsizlik de artmaktadır. Bu gibi sonuçlar, ÇED'in gerekliliğine işaret etmektedir(Dervişoğlu, 2010: 123).

Çevre ve Şehircilik Bakanlığı, Seçme Eleme Kriterleri uygulanacak projeler için Yönetmeliğin 17. maddesi gereği Proje Tanıtım Dosyalarını EK-4'te yer alan kriterler çerçevesinde 15 gün içinde inceler ve değerlendirir. Proje hakkında "ÇED Gereklidir" veya "ÇED Gerekli Değildir" kararını beş iş günü içinde verir, kararı Valiliğe, proje sahibine ve Bakanlıkça yetkilendirilmiş kurum ve kuruluşlara bildirir. Valilik bu kararı uygun araçlarla halka duyurur. "ÇED Gerekli Değildir" kararı verilen proje için beş yıl içinde mücbir bir neden bulunmaksızın yatırıma başlanmaması durumunda "ÇED Gerekli Değildir" kararı geçersiz sayılır. Mikro HES'ler için ÇED raporuna gerek olup olmadığı kararını 15 gün içinde verebilmesi uygulamada sorunlara yol açmaktadır. Bazen binlerce sayfa tutan bu raporların, bürokrasinin ağır işleyen çarkları göz önüne alındığında, bu kısa süre zarfında sağlıklı olarak incelenebilirliği şüphelidir.

1993 yılında Çevre Kanunu'na geçici 3'üncü madde olarak konulan ve çok sayıda büyük projeye ÇED muafiyeti getiren değişiklik Anayasa Mahkemesi tarafından iptal

[*] ÇED konusunda en temel tartışma ise "HES yatırımları ve lisans verme süreçlerinde havza bazında bir planlama yapılmadığı için ÇED'lerde her bir proje için noktasal bazda ve tekil olarak gerçekleştirilmektedir. Oysa ki, bir akarsu havzası içerisinde aynı dere üzerinde veya havzayı oluşturan farklı akarsu kollarında planlanan projelerin kümülatif etkilerinin ortaya konması gerekmektedir. Bu kapsamda, öncelikle havzada yer alan su ile ilişkili sektörler tanımlanmalı, havzanın doğal kaynak, habitat ve biyolojik çeşitliliği saptanmalı, daha sonra havzadaki nehir ekosisteminin hizmet ve sağlığını tehdit etmeyecek şekilde bir elektrik üretim planlaması yapılarak ÇED raporları bu kapsamda değerlendirmeye alınmalıdır. Maalesef bu yapılmamaktadır.

edilmiştir. Kamuoyundan büyük tepki alan geçici madde şuydu: "23 Haziran 1997 tarihinden önce yatırım programına alınmış olup bu maddenin yürürlüğü girdiği tarih itibarıyla planlama aşaması geçmiş olan veya ihalesi yapılmış olan veya üretim veya işletmeye başlamış olan projeler ile bunların gerçekleştirilmesi için zorunlu olan yapı ve tesisler ÇED kapsamı dışındadır."

Anayasa Mahkemesinin iptal kararına rağmen aynı doğrultuda bir düzenleme[*], 21/5/2013 tarih ve 6486 sayılı torba kanun ile (m. 12), Çevre Kanununa Geçici Madde 3 olarak eklenmiştir. Bu düzenleme ye karşı Anayasa Mahkemesinde yeniden iptal davası açılmış, 2014 yılında yapılan bu yasal düzenlemede yer alan ÇED muafiyetleri Anayasa Mahkemesi tarafından iptal edilmiş (Hürriyet, 2014); ancak iptal kararı henüz Resmi Gazete'de yayımlanmamıştır.

Aynı durum idari yargı içinde söz konusudur. Bu muafiyet hükmü, ısrarla ÇED yönetmeliğine yerleştirilmeye devam edilmiş; en son, Çevre Mühendisleri Odası'nın açtığı dava ile 1 Nisan 2014'te Danıştay'ca verilen iptal kararına rağmen 5 Nisan 2014'te 9. defa 2014 Yönetmeliğine konulmuştur.[†]

Çevre gibi hassas bir konuda yargı kararlarına karşı gösterilen bu direnci hukuk devleti ilkesi ile bağdaştırmak mümkün değildir ve ayrıca düşündürücüdür.

2.HES'LERİN NEDEN OLDUĞU ZARARLARA KARŞI KORUNMA YOLLARI

HES'lerin neden olduğu zararların önlenmesinde iki temel yol vardır. ÇED politikalarına bireylerin, meslek kuruluşlarının ve sivil toplum örgütlerinin etkin katılımının sağlanması önemlidir. Diğer bir yol ise etkin bir yargısal denetim mekanizmasının işletilmesidir.

2.1. Çevre Politikalarına Katılım Hakkı

1982 Anayasası'nın 56. maddesinde herkesin, "sağlıklı ve dengeli bir çevrede yaşama hakkı"na sahip olduğu ifade edildikten sonra devlete ve vatandaşlara "çevreyi geliştirme, çevre sağlığını koruma ve çevre kirlenmesini önleme" ödevi yüklenmiştir. Nitekim bu doğrultuda 2872 sayılı Çevre Kanunu'nun 1. maddesinde, "Bu Kanunun amacı, bütün canlıların ortak varlığı olan çevrenin, sürdürülebilir çevre ve sürdürülebilir kalkınma ilkeleri doğrultusunda korunmasını sağlamaktır" denilmiştir.

1983 tarihinde yürürlüğe giren Çevre Kanunu "Çevresel Etki Değerlendirmesi (ÇED)" kavramını ilk kez mevzuatımıza kazandırılmış; ancak bu Kanun'da öngörülen ÇED usul ve esaslarını düzenleyen Yönetmelik 10 yıl sonra 7 Şubat 1993 tarihinde çıkarılabilmiştir (Alıca, 2011: 99).

Anayasa Mahkemesinin konuyla ilgili bir kararında (Resmi Gazete, 2009) ÇED'ler "kalkınma ve ekonomik gelişme için yapılacak yatırım ve faaliyetlerin, doğayı tahrip etmeden ve çevreyi kirletmeden gerçekleştirilmesinde kullanılan yöntemlerden birisi" olarak nitelendirilmiştir. Çevrenin zarar gördükten sonra onarımının pahalı veya imkânsız

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[*] Çevre Kanunu, Geçici Madde 3: "23/6/1997 tarihinden önce kamu yatırım programına alınmış olup, bu maddenin yürürlüğe girdiği tarih itibarıyla planlama aşaması geçmiş ve ihale süreci başlamış olan veya üretim veya işletmeye başlamış olan projeler ile bunların gerçekleştirilmesi için zorunlu olan yapı ve tesisler Çevresel Etki Değerlendirmesi kapsamı dışındadır."

[†] ÇED Yönetmeliği Geçici Madde 2: "Çevresel Etki Değerlendirmesi Yönetmeliğinin ilk yayım tarihi olan 7/2/1993 tarihinden önce üretime ve/veya işletmeye başladığı belgelenen projeler Çevresel Etki Değerlendirmesi kapsamı dışındadır."

olabileceğine vurgu yapan Yüksek Mahkeme, ÇED'lerin, Anayasa'nın 56. maddesi ile Devlete verilen çevrenin korunması yükümlülüğünün gereği olduğunu ve doğacak olumsuz etkileri baştan önlemenin yöntemlerinden biri olduğunu belirtmiştir.

Çevre Kanunu'nda (m.3/e) "çevre politikalarının oluşmasında katılım hakkı" düzenlenmiş ve ilgili idareye "meslek odaları, birlikler, sivil toplum kuruluşları ve vatandaşların çevre hakkını kullanacakları katılım ortamını yaratmak" yükümlüğü getirilmiştir.

Anayasa'da yer alan bu hakların güvence altına alınabilmesi için etkin bir kamuoyu denetiminin ve yargısal korunmanın sağlanmış olması gerekir. Hukuk devletinde demokrasinin işlemesi için bireylerin idarenin karar alma sürecine katılımını sağlamak zorunludur(Akyılmaz- Sezginer- Kaya, 2014). Projelerin sadece teknik, ekonomik ve çevresel yönden değil sosyal yönden de ortaya koyacağı etkileşimlerin kamuoyu önünde ve şeffaf bir şekilde ele alınması aynı zamanda iyi yönetişim ilkesinin bir gereğidir. Demokratik bir toplumda esas olan idari karar alma sürecine, o karardan etkilenecek kişilerin katılımını sağlayacak usullerin ortaya konulmasıdır. Bilgi edinme hakkı ve açıklık ilkeleri çerçevesinde tarafların argümanlarını tartışarak aldığı kararlar ortaya çıkan sonucun hukuka uygunluğunun sağlanması yanında tarafların memnuniyetine de katkı sağlayacaktır (Akyılmaz-Sezginer-Kaya, (2014).

ÇED Kanunu halkın katılımını sağlayıcı tedbirler almayı idareye görev olarak yüklemiş olmasına rağmen alt normlarda yapılan değişikliklerle bu katılım işlevsiz hale dönüştürülmüştür. Mülki amirlerce yerel ilan panolarında asılan küçük kâğıtlarla yapılan duyurular ile etkin bir kamuoyu oluşturmak mümkün değildir (Çevre Mühendisleri Odası, 2014). Halkın yapılacak projenin hayatına ve çevreye olan zararını idrak etmesi için ÇED sürecine dair verilen kararlara zamanında ulaşması ve içeriği hakkında yeterince bilgilendirilmiş olması gerekmektedir.

Halkın yaşadığı çevreyle ilgili kararlarda katılımının sağlanmamasının yanında sonradan fark ettikleri hukuksuzlukları hukuki yollardan dahi dile getirememeleri, haklarını arayamamaları tepkisel eylemlerin artmasına neden olmaktadır. Halkın katılımı sağlanmadan yürütülen süreçler, projeleri hızlandırmamakta, aksine sonradan ortaya çıkan toplumsal tepkilerle idare geri adım atmak durumunda kalmakta veya idari yargının iptal kararlarıyla yatırımcı mağduriyetler yaşayabilmektedir. Halkın ÇED sürecine etkin katılımının sağlanması, alınan kararların hukuka uygun olmasına katkı sağlayacak ve yargısal uyuşmazlıkların önüne geçecektir.

2.2.Yargısal Korunma

İdari Yargılama Usulü Kanunu'nda 2014 yılında yapılan değişiklikler ÇED'lerin tabi olduğu yargısal süreç için önemli değişikliklere yol açmıştır.

2.2. 1. ÇED'lerin Tabi Olduğu Yargılama Usulü

Toplum için önem kazanmış ortak ve genel bir ihtiyacın tatminine yönelik olarak bizzat kamu tüzel kişileri veya onların denetimi altında özel kişilerce yürütülen faaliyetler kamu hizmeti olarak adlandırılmaktadır (Gülan, 1988. 148). Toplumun bu ihtiyaçlarının giderilmesi için idarece yürütülen faaliyetlerin temel konusunu ise kamu hizmetleri oluşturur (Akyılmaz- Sezginer- Kaya, 2014: 550).

Anayasa'nın 125. maddesinde yer alan düzenlemeye göre idarenin her türlü eylem ve işlemine karşı yargı yolunun açık olduğu ifade edilmiştir. Kamusal kaynaklardan yararlanılarak elektrik enerjisi üretilmesi faaliyetinin düzenlenme ve denetimi de bir çeşit kamu hizmetidir (Gönen, 2010: 369). Kamu hizmetlerinin yürütülmesi ile ilgili hukuki uyuşmazlıklar ise, genelde, idari yargının görev alanı içerisine girmektedir.

İdari yargıda uygulanacak yargılama usulleri 2577 sayılı İdari Yargılama Usulü Kanunu (İYUK) ile düzenlenmektedir. 08 Haziran 2014 tarih ve 6545 sayılı Kanunla (m.18) İYUK'a eklenen madde 20/A ile "ivedi yargılama usulü" getirilmiştir. Kanun, ivedi yargılama usulüne tabi uyuşmazlıkları liste olarak sıralamıştır. Kanuna göre, idari yaptırım kararları hariç çevresel etki değerlendirmesi sonucu alınan kararlara karşı açılacak davalar ivedi yargılama usulüne tabidir. Çevre Kanunu kapsamında, çevrenin korunmasının sağlanması için çevresel etki değerlendirmesi sonucunda birtakım kararların alınması gerekmektedir. İşte bu tedbir kararlarından idari yaptırım niteliğinde olmayanlar aleyhine açılacak davalar ivedi yargılama usulü ile görülecektir (Çağlayan, 2014: 362). Yani "ÇED gerekli değil" veya "ÇED olumlu" kararlarının iptali için açılan davalar ivedi yargılama usulüne tabi tutulacaktır.

Türk İdari Yargısında yeni bir yöntem olarak kabul edilen ivedi yargılama usulü ile yargılamanın hızlandırılması hedeflenmiştir (Çağlayan, 2014: 370).

İvedi yargılama usulünde normal yargılamadan temel farklılıklar şunlardır:

a) İvedi yargılamada dava açma süresi otuz gündür. Normal davalarda ise dava açmak için öngörülen genel süre (vergi mahkemesi hariç) altmış gündür.

b) İvedi yargılamada İYUK'un 11. maddesi hükümleri uygulanmaz, yani ilgiler tarafından idari dava açılmadan önce, idari işlemin kaldırılması, geri alınması, değiştirilmesi veya yeni bir işlem yapılması için hiyerarşik üst makama, üst makam yoksa işlemi yapan makamın kendisine başvurularak dava açma süresinin durdurulması müessesinin işletilmesi mümkün olmayacaktır. Oysa normal yargılama usulünde İYUK 11. madde kapsamında yapılan idari başvurular davacı lehine olarak dava açma süresini durdurmaktadır.

c) İvedi yargılamada savunma süresi dava dilekçesinin tebliğinden itibaren on beş gün olup, savunmanın verilmesi veya savunma verme süresinin geçmesiyle dosya tekemmül etmiş sayılır. Yani idarenin savunmasına ikinci bir dilekçeyle cevap verilememektedir. Oysa normal yargılamada savunmaya cevap ve ikinci savunma söz konusudur.

d) İvedi yargılamada yürütmenin durdurulması talebine ilişkin olarak verilecek kararlara itiraz edilemez.

e) İvedi yargılamada davalar dosyanın tekemmülünden itibaren en geç bir ay içinde karara bağlanır. Normal yargılama usulünde süre sınırlaması söz konusu değildir.

f) Verilen nihai kararlara karşı tebliğ tarihinden itibaren on beş gün içinde temyiz yoluna başvurulabilir. Normal yargılama usulünde ise bu süre 30 gündür.

g) Temyiz başvurusu üzerine Danıştay, iki ay içerisinde karar vermek zorundadır. Danıştay evrak üzerinde yaptığı inceleme sonunda, maddi vakıalar hakkında edinilen bilgiyi yeterli görürse veya temyiz sadece hukuki noktalara ilişkin ise yahut temyiz olunan karardaki maddi yanlışlıkların düzeltilmesi mümkün ise işin esası hakkında karar verir. Aksi hâlde gerekli inceleme ve tahkikatı kendisi yaparak esas hakkında yeniden karar verir. Ancak, ilk inceleme üzerine verilen kararlara karşı yapılan temyizi haklı bulduğu hâllerde kararı bozmakla birlikte dosyayı geri gönderir. Yani Danıştay idare mahkemesinin esastan inceleme yaparak verdiği kararları uygun bulmadığı takdirde idare mahkemesinin yerine geçerek kendisi karara bağlayacaktır. Oysa olağan yargılama usulünde Danıştay, temyiz başvurusunu kabul eder ve idare mahkemesinin verdiği kararı bozarsa dosyayı idare mahkemesine tekrar görüşülmesi ve yeni bir karar alınması için geri gönderir.

2.2. 2. Temel Hakların Korunma Yolu Olarak İvedi Yargılama Usulü

İdari yargının temel amacı, idarenin işlem ve eylemlerinin hukuka uygunluğunu sağlamak suretiyle idare karşısında bireye yargısal bir korunma sunmaktır (Kalabalık, 2011: 19). İdari yargının sahip olduğu bu amaç, idari yargılama sisteminde yapılan her değişikliğin bireyin hak ve özgürlüklerini korunması hususunda, daha ileri bir noktaya ulaşılması biçiminde haklı bir beklentiye neden olmaktadır. "Hukuk devletinin hukuku" olan idare hukuku da esas itibariyle bu felsefi temeller üzerine oturmaktadır.

2014 yılında yapılan kanun değişikliği ile Türk İdari Yargılama Hukuku sisteminde ilk defa yer bulan ivedi yargılama usulünün örnekleri Fransız ve Alman Hukukunda bulunmaktadır (Sancakdar, 2014: 112). Özellikle Türk İdare ve İdari Yargılama Hukukunun esin kaynağını oluşturan Fransız Hukukunda yer alan ivedi yargılama usulü ile Türk hukuk sistemine getirilen ivedi yargılama usulü arasında önemli farklılıkların olduğu gözlemlenmektedir.

Fransız hukukunda ivedi yargılama usulünün benimsenmesi en kapsamlı haliyle 2000'li yılların başında gerçekleşmiştir. Avrupa İnsan Hakları Mahkemesinin, yaşam hakkı ve işkence gibi konularda ağır özgürlük ihlallerine ilişkin Fransa'yla ilgili konularda vermiş olduğu kararlar, Fransa'da ivedi yargılama usulünün kabul edilmesinde etkili olmuştur (Sancakdar, 2014: 112).

Fransız idari yargılama sisteminde ivedi yargılama usulünün uygulanması için öncelikle dosyanın acil[*] bir niteliğinin olması aranmaktadır. Daha sonra ise üç unsurun bir arada bulunması gerekmektedir. Bunlar;

1) İhlalin ciddi olması

2) Kararın açıkça hukuka aykırı olması

3) Sıradan bir hakla karıştırılmaması gereken bir temel hak ve özgürlüğün sınırlandırılmasıdır (Akbaba, 2014: 441).

İvedi yargılama yetkisine sahip hâkimin, temel bir hak ve özgürlüğü korumak amacıyla idarenin ciddi ve hukuka aykırı ağır bir ihlaline ilişkin faaliyetleriyle ilgili gerekli tüm tedbirleri alma yetkisi bulunmaktadır. Bu durumda hâkimin kural olarak 48 saat içerisinde karar vermesi gerekmektedir (Sancakdar, 2014: 122).

Görüldüğü üzere Fransız hukukunda yer alan ivedi yargılama usulünün temelinde temel hak ve özgürlüklerin korunma altına alınması, açık ve bariz bir biçimde hukuka aykırı kararlarla hem vatandaşların hem de yabancıların mağduriyetlerinin önüne geçilmesi hedefi bulunmaktadır.

Fransız İdari Yargılama Kanunu'nun L 511-2 maddesinde yer alan düzenlemeye göre ivedi yargılama usulünü uygulayacak hâkimler için kıdem şartı aranmaktadır. Bu hâkimler yokluk ve engel hali hariç olmak üzere en az iki yıllık kıdeme ve en az birinci danışman seviyesine ulaşmış hâkimler olmalıdırlar. Yine aynı Kanunda, ivedi yargılama

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[*] Paris idare mahkemeleri bünyesinde acil işler ofisi diye bir bölüm bulunmakta ve bu bölüm yılda yaklaşık 5000 acil dosyaya bakmaktadır. Bu ofiste özellikle yabancıların Fransa'dan uzaklaştırılması ile ilgili idari işlemlere karşı açılan davalara bakılmaktadır. İnsan hakları ihlallerine neden olması mümkün olan bu uyuşmazlıklara özel bir önem atfettiği görülen Fransız idari yargı sisteminin, gecikmesinde sakınca bulunan bu uyuşmazlıkların çözümünü de hızlı bir sisteme bağlayarak söz konusu olumsuzlukları aşmaya çalışmıştır (Akbaba, 2014: 438).

hâkiminin verdiği kararların, itiraz üzerine istinaf mahkemelerinde incelenmesi sırasında da, bu incelemeyi yapacak hâkimin istinaf mahkemesi başkanı veya onun görevlendireceği bir hâkim olması aranmaktadır (Akbaba, 2014: 442). Hâkimler için aranan bu özel şartlar, Fransız yasa koyucunun ivedi yargılama usulüne gösterdiği titizliği ortaya koyması bakımından önemlidir.

Bazı davalar için yargısal sürecin hızlandırılması elbette önemli ve gereklidir. Ancak bu sürecin hızlandırılmasının, hukuk devleti ilkesine ve idare hukukunun ruhuna uygun olarak bireyin temel hak özgürlüklerinin korunması yönünde geçekleşmelidir. Demokratik bir ülkede, ivedi yargılama usulünün, idareyi koruma eğiliminden çok, idari işlemlerin sebep olduğu hukuk ihlallerinin daha hızlı giderilmesi ve idareyi hukuki sınırlar içinde kalmaya zorlaması amacına hizmet etmesi gerekir.

2.2.3. Türk İdari Yargısına Getirilen İvedi Yargılamanın Hak Arama Hürriyeti Üzerine Etkisi

6545 sayılı Kanunla mevzuatımıza eklenen ivedi yargılama usulü özellikle çalışmamızın konusunu ilgilendiren HES projelerinde görüldüğü gibi, devletin enerji politikalarının yargılama süreci engellerine takılmadan bir an evvel hayata geçirilmesi fikrine hizmet etmektedir. Bu durumun bireyi koruyan idare hukuku anlayışından oldukça uzak olduğu ortadır. Buna karşın ivedi yargılama usulüne ilişkin kanun tasarısında genel gerekçe olarak, *"Adil yargılanma hakkının korunması ve bu kapsamda makul süre içinde yargılamanın sonuçlandırılabilmesi…"* hedefleri ileri sürülmüştür. İvedi yargılama usulü hakkında ise "…gecikerek karar verilmesinde hem idare hem de davacılar tarafından katlanılması zor ya da imkânsız sonuçlar doğuracak (davaların)… daha ivedi bir şekilde sonuçlandırılması gerekmektedir." denilmiştir. Ancak getirilen düzenleme bakımından bireyden ziyade idarelerin ve idarenin yetki verdiği işletmelerin çıkarlarının ön plana alındığı gözlemlenmektedir. Özellikle idarenin savunmasında ortaya koyduğu olgulara davacının cevap vermesinin mümkün olmaması, adil yargılanma şansını ortadan kaldırmaktadır. Bunun yanı sıra dava açma süresinin kısıtlanması da oldukça sakıncalı bir düzenlemedir. Nitekim uygulamada yargısal süreçlerin uzun sürmesi çoğunlukla gerek yerel mahkemelerin gerekse temyiz mahkemesinin ağır iş yükünden kaynaklanmaktadır. Normal yargılama usulünde mevcut haliyle dahi yeterince uzun olmayan sürelerin, özellikle karmaşık idari işlemler karşısında yeterli bilgi ve birikim sahibi olmayan ilgililer bakımından anlaşılıp yargısal aşamaya taşınması daha da zorlaşacaktır. Bu ise hak arama hürriyetinin sekteye uğraması anlamına gelmektedir. Yargı önüne gelen uyuşmazlıkların çözümünü hızlandırmak elbette gereklidir ama bunu sağlamak için hak arama hürriyetini sınırlandırmak doğru değildir (Sezginer, 2014: 217).

Yapılan düzenlemeler ilk bakışta yargının hızlı kararlar alabilmesi açısından olumlu izlenimler uyandırmakla beraber, açılan davaların niteliği göz önünde bulundurulduğunda bu aceleciliğin etkin bir yargılama ve adil kararlar verilmesi konusunda şüpheleri desteklediği görülmektedir. Nitekim "ÇED gerekli değildir" ve "ÇED olumlu" kararlarının iptali için açılan birçok dava süre aşımı nedeniyle reddedilmiştir.

ÇED raporları birçok uzmanın katılımı ile hazırlanan bazen binlerce sayfayı bulan geniş kapsamlı raporlardır. Çoğunlukla hâkimlerin uzmanlık alanı dışında kalan ve farklı birçok soruna temas eden bu davaların mahkeme tarafından ivedilikle incelenmesi meslek örgütleri tarafından da oldukça endişe verici bulunmuştur (Çevre Mühendisleri Odası, 2014).

Soruna yapısal olarak yaklaşıldığında kaosun, Türk İdare Hukuku mevzuatında bir idari usul kanunun bulunmamasından kaynaklandığı görülmektedir. İdari işlemlerin yapım usulü konusunda kanuna dayalı belirleyici bir sistem olmadığı gibi hukuk devletine yaraşır bir şeffaflık da ne yazık ki söz konusu değildir. Öyle ki özellikle ÇED raporları hususunda menfaati ihlal edilenlerin çoğu zaman mevcut rapor ve eklerine ulaşmaları dahi ancak yorucu ve bürokratik bir mücadele sonucu mümkün olabilmektedir. Böyle bir durumda dava süresinin kısaltılması neticesinde yargılama faaliyetlerinin hızlandırması bir tarafa bilakis hak arama hürriyetini kullanarak bireylerin idarenin eylem ve işlemlerine karşı yargı yoluna başvurma ihtimalini zayıflatmaktadır.

Hak arama hürriyeti ve adil yargılanma hakkı, hem Anayasamızda hem de temel hak ve hürriyetler ile ilgili evrensel bir belge niteliği taşıyan Avrupa İnsan Hakları Sözleşmesi'nde* düzenlenmiştir. Getirilen düzenlemenin somut koşulları dikkate alındığında yargılama süreçlerini kısaltarak bireylerin adil yargılanma hakkını gerçekleştirmesi bir yana, onların hak arama hürriyetlerini sınırladığı su götürmez bir gerçektir. İdarenin eylem ve işlemlerine karşı yargı yolunun kapatılamayacağına dair anayasal hükmün (md.125) yasal düzenlemelerle tırpanlanması çağdaş hukuk devletlerinde mümkün olmamalıdır. Nitekim AİHS'nin 13. maddesinde yer alan düzenlemede şöyle denilmektedir:

"Bu Sözleşme'de tanınmış olan hak ve özgürlükleri ihlal edilen herkes, söz konusu ihlal resmi bir hizmetin ifası için davranan kişiler tarafından gerçekleştirilmiş olsa dahi, ulusal bir merci önünde etkili bir yola başvurma hakkına sahiptir."

Görüldüğü üzere burada başvuru yollarının etkili olmasının altı önemle çizilmekte ve sözleşmeci devletlere bu konuda yükümlülükler yüklenmektedir. Şüphesiz ki yargısal başvuru yollarını kullanılamaz hale getiren düzenlemeler Sözleşme'nin bu hükmüne aykırı düşmektedir. Temel hak ve hürriyetler konusunda AİHS'nin standartları altına düşen devletlerin uluslararası platformda pek de parlak olmayan bir imaja sahip olmaları kaçınılmazdır.

Temel hak ve hürriyetler elbette ki sınırlanabilir. Ancak yapılan sınırlamaların Anayasa'nın 13. maddesinde belirtilen ilkelere uygun olması gerekmektedir. Getirilen sınırlama hakkın özüne dokunmaksızın yalnızca Anayasanın ilgili maddelerinde belirtilen nedenlere bağlı olarak ve ancak kanunla yapılmalıdır. Bu sınırlamalar, Anayasanın sözüne ve ruhuna, demokratik toplum düzeninin ve lâik Cumhuriyetin gereklerine ve ölçülülük ilkesine aykırı olamaz.

2.2.4. Tam Yargı Davaları Yoluyla Korunma

İdarenin yargısal denetiminde "iptal davaları" HES'lerin yol açtığı zararı önlemede genelde önleyici etkiye sahiptir. Her ne kadar idari bir dava türü olan "tam yargı davaları" daha çok zarar ortaya çıktıktan sonra devreye girse de, tam yargı davalarının da önleyici etki doğurabileceği göz ardı edilmemelidir.

Elektrik piyasası faaliyetlerinde düzenleme ve denetim işlevinin de bir tür kamu hizmeti olduğu yukarıda ifade edilmişti. Kamu hizmeti olarak nitelendirilen bir faaliyet beraberinde idarenin mali sorumluluğunu da gündeme getirecektir. Kamu hizmetlerinin yürütülmesi esnasında ortaya çıkan zararlarda, hizmet, idare tarafından bizzat yürütülmüyor olsa dahi, idare doğan zarardan sorumludur.

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* Avrupa İnsan Hakları Sözleşmesi'nin, Adil Yargılanma Hakkı başlıklı 6. maddesinin 1. fıkrası: "Herkes davasının, medeni hak ve yükümlülükleriyle ilgili uyuşmazlıklar ya da cezai alanda kendisine yöneltilen suçlamaların esası konusunda karar verecek olan, yasayla kurulmuş, bağımsız ve tarafsız bir mahkeme tarafından, kamuya açık olarak ve makul bir süre içinde görülmesini isteme hakkına sahiptir."

Anayasa'ya göre (m.125/son) idare kendi eylem ve işlemlerinden doğan zararı ödemekle yükümlüdür. Bu bağlamda, idarenin vermiş olduğu lisansla veya lisans harici bir izinle akarsular üzerinde kurulan HES'lerin yol açtığı zararlardan sadece özel hukuk kişisi olan işletmelerin değil idarenin de mali sorumluluğu söz konusudur. İdarenin tutum ve davranışı ile ortaya çıkan zarar arasında bir neden- sonuç ilişkisinin varlığı idareyi doğan zarardan sorumlu tutabilmek için yeterlidir (Özay, 1999: 144).

Tam yargı davaları Türkiye'de zararın önlenmesinde etkin bir araç olarak kullanılamamaktadır. Bunun temel nedeni yargının ödenecek tazminatın hesaplanmasında ortaya koyduğu yaklaşımdır. Şöyle ki Türk yargısında zarar hesaplanırken daha çok ortaya çıkan somut zarar ve davacının kişisel durumu göz önünde bulundurulmaktadır. Ancak çevreye zarar veren faaliyetler, genelde, rastlantısal olarak ve düşük oranlarda tespit imkânına sahip olduğu için bu zararı doğuran kişi ve kuruluşlar zararı önleyici tedbirler almak yerine doğan zararın tazminatını ödemeyi daha ekonomik bulabilmektedir.

Yargının tazminat hesaplamasında sadece davacıya veya çevreye olan oranda değil, zarara yol açan idare veya kuruluşun ekonomik gücü ile orantılı "caydırıcı nitelikte" bir tazminata hükmetmesi müstakbel zararları önlemede çok etkili olacaktır.

Çevresel zararlardan doğan tam yargı davalarında caydırıcı etkiye yol açacak önemli bir nokta ise rücu mekanizmasının etkin olarak işletilmesidir. Zararın ortaya çıkmasında ilgili kamu görevlilerinin kasıt veya ağır kusur gibi etkileri bulunduğu takdirde bu zararın, kamu görevlilerine, kusuru oranında, rücu edilmesi hukuken bir zorunluluktur. Maalesef idare bu konuda ajanını koruyucu bir tutum içerisine girmekte ve bu konuda kurum içi denetim mekanizmaları yeterince işlememektedir. Rücu mekanizmasının işlememesi sorununun, Sayıştay denetimi gibi, dış denetim yollarıyla kısmen aşılması mümkündür.

SONUÇ VE ÖNERİLER

Türkiye'nin ekonomik gelişiminin devam etmesi için elbette elektrik enerjisinin mümkün olan en ekonomik yollardan elde edilmesi önemli ve gereklidir. Ancak bu enerji temin edilirken ortaya çıkan çevresel zararların giderilmesinin ülke ekonomisine çok daha fazla yük getirebileceği hatta kimi durumlarda bunun da imkânsız olabileceği gerçeği akıldan çıkarılmamalıdır.

En temiz enerji kaynaklarından biri olarak kabul edilen hidroelektrik enerji üretiminde dahi birçok çevresel sorun ortaya çıktığı gözlemlenmekte ve bunlar yargısal içtihatlara konu olmaktadır.

İdare, genelde, "rant" güdüsüyle hareket etmekte gerek planlama gerekse uygulama aşamasında çevre için gerekli özeni ve duyarlılığı göstermekten kaçınmaktadır. HES ile ilgili yasal mevzuatın can suyunun belirlenmesinde bilimsel ilkelere uyulmamasına bir de can suyu bırakımının etkin olarak kontrol etmemesi sonucunda önemli çevre zararları oluşmaktadır.

Maalesef Anayasada (m. 56.) temel bir hak olarak düzenlenen "sağlıklı ve dengeli bir çevrede yaşama hakkı"nı koruyucu etkin mekanizmalar ortaya konamamıştır.

Çevre Kanunu'nda (m.3/e) düzenlenen "çevre politikalarının oluşmasında katılım hakkı" yeterince işletilmemektedir. Demokratik yönetişim anlayışının yeterince gelişmemiş olması nedeniyle "toplumsal katılım", atlatılması gereken bir idari prosedür olarak görülmekte; yapılacak HES'in çevreye etkisi konusunda kamuoyu yeterince bilgilendirilememekte ve görüşleri dikkate alınmamaktadır. Oysa Çevre Mühendisleri

Odasının da ifade ettiği gibi "*ÇED, (sadece) bir rapor veya bir belge değildir. Bir süreçtir. Bir planlama sürecidir*" (Çevre Mühendisleri Odası, 2014). ÇED Raporları hazırlanırken bireylerin ve ilgili sivil toplum kuruluşlarının etkin katılımının sağlanması görünüşte bir gecikmeye yol açsa da sonuç itibariyle ortaya çıkan işlemin hukuka uygun olmasına ve tarafların kısmen de olsa tatmin olmasına imkân tanıyacağı için yargısal denetime olan ihtiyacı azaltacak ve toplamda daha öngörülebilir bir süreç yaşanacaktır.

Türkiye her ne kadar bir idari usul yasasına sahip olmasa ve idari işlemlerin yapılmasında halkın katılımı mecbur tutulmasa da hiç olmazsa HES'lerin yapımına dair kararlarda ve ÇED raporlarının hazırlanmasında, bu projelerden etkilenecek bireylerin, referandumu da içerecek şekilde, etkin ve aktif katılımını zorunlu kılan prosedürler getirilmelidir.

HES'lere ilişkin mevzuattan ve denetim sorunlarından kaynaklanan eksikliklerin yanında bir de son dönemde, hak arama hürriyetini ve etkin bir yargılamayı kısıtlayıcı hususlar içeren "ivedi yargılama usulü"nün getirilmesi çözümü iyice zorlaştırmıştır. ÇED sürecinde oraya çıkacak gecikmeyi önlemenin yolu, bir başka anayasal hak olan "hak arama hürriyetini" ortadan kaldırırcasına, etkin yargılama yapılması önlemek olmamalıdır.

İdarenin hukuka uygun kararlar almasında ve HES'lerin yol açtığı zararların önlenmesinde yargısal denetim önemli bir husustur. Bu davaların hızlı işlemesi, kararların gecikmemesi elbette çok önemlidir. Ancak ondan daha önemli olan kararların isabetli olması ve bireylerin etkin yargısal korunma imkânına sahip olmasıdır.

Dava açma sürelerinin çok önemli ölçüde sınırlandırılması; hâkimlerin karar sürelerinin binlerce sayfadan oluşan ÇED raporlarını değerlendirmeyi imkânsız kılması gidişat açısından çok da iyiye yorulacak nitelikte değildir.

İdareyi hukuka uygun davranmaya zorlamak için iptal davalarının yanında tam yargı davalarının da etkin olarak kullanılması gerekir. Mahkemelerin tazminata hükmederken belirledikleri miktarı sadece davacının ve doğan zararın değil davalının ekonomik durumunu da hesaba katarak ve "tazmin edici" değil "caydırıcı" bir oran esası ile belirlemeleri ileride doğacak zararları önlemede etkili olacaktır.

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GÜRCİSTAN HİDROENERJİ KAYNAKLARI VE EKOLOJİK SORUNLAR

Anzor M. TAVARTKILADZE*

Güçlü hidroenerji kaynaklarına sahip ve enerji transit ülkesi olan Gürcistan, ekoloji bakımından temiz enerjinin çok önemli üretici ve ihracatçı ülkelerinden biri olma ve yine iklim değişikliğinden kaynaklanan zararlı etkilerden çevreyi koruyabilme imkanına sahiptir.

1.SERA GAZLARI

Ülkenin sera gazları/etkileri küresel emisyonundaki payı çok az (%0.1'e kadar) olmasına rağmen, sorunun aktüel olması nedeniyle, "Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi"nin tarafı olan Gürcistan, bölgesindeki sera gazları emisyonunu azaltma ile ilgili her türlü proje ve programın gerçekleştirilmesine aktif bir şekilde destek olup katılmaktadır.

Tablo 1 **(1).** SG Emisyon Dinamikleri 1990 - 2010 Yılları.

Sektör	1990	1994	1998	2002	2006	2010
Enerji	36,6	7,4	5,1	5,0	6,5	7,7
İmalat	5,4	0,5	0,7	1,0	1,9	3,1
Diğer Sektörler	6,0	3,9	4,0	4,4	4,8	3,5
Toplam	48,0	11,8	9,8	10,4	13,2	14,3

Görüldüğü gibi (tablo 1.), Gürcistan'da emisyonlar, Sovyet döneminin son yılı olan 1990'da 48 milyon ton karbon dioksit (CO_2) ile yaklaşık dünya emisyonunun %0.16'sıydı. Son yıllarda durum önemli ölçüde değişti. 2006 yılında, 1990 yılına göre, dünya emisyonuna Gürcistan'dan sera gazlarının/etkilerinin emisyon payı yaklaşık 5 kat azaldı. Bu durum zikredilen yıllarda elektrik üretiminin azalmasından ve enerji sektöründe hidroenerji payının artmasından kaynaklanmıştır, buna 1990-2014 yıllarında Gürcistan elektrik üretim dinamiği işaret etmektedir (çizim 2.).

2. İKLİM DEĞİŞİKLİĞİ VE ENERJİ SORUNLARI

Ekonomi sektörleri arasında enerji sera gazlarının en büyük emitörüdür. Atmosferde sera gazların emisyonunun büyük payı (% 65) ondan gelmektedir. Sera gazlarının emisyonunda ise en büyük pay (% 76.3) karbondioksitten (CO_2) gelmektedir.

Gürcistan, bağımsızlığın ilk yıllarında çok şiddetli enerji krizi yaşıyordu, bunun temel nedeni Sovyetler Birliği'nin ortak tek enerji sisteminden çıkılmasıydı. Buna ek olarak Gürcistan'da ortaya çıkan olumsuz gelişmeler (iç karışıklıklar, silahlı çatışmalar), doğal kaynakların kontrolsüz kullanımına yol açtı. Verilerden de görüldüğü gibi, bugüne kadar

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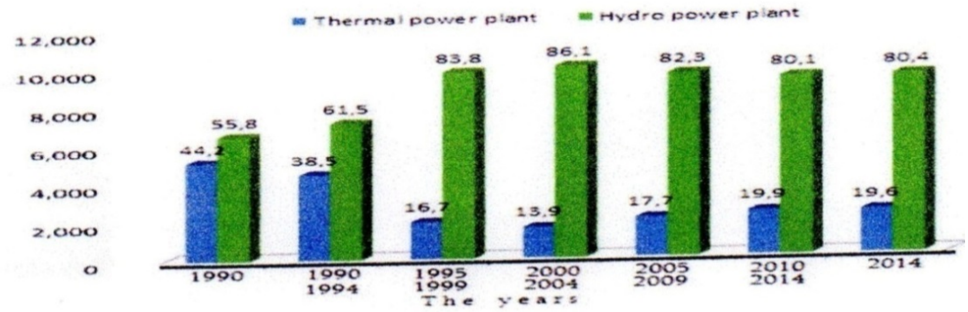
ülkede yerel elektrik üretimiyle 1990 yılın seviyesine ulaşılamadı, fakat son yıllarda durum radikal olarak değişti. Gürcistan'da elektrik üretimi 2006 yılındaki 7.6 milyar kilovat-saaten, 2014'te 10.369.6 milyar kilovatsaate kadar çıktı. Yıllık ortalama artış hızı % 3.34 oldu.

1990 yılına nazaran Gürcistan'ın sera gazı emisyonu, elektrik üretimi ve enerji sektörünün azaltılması, artan hidroelektrik payı nedeniyle, 2014 yılında eskisine göre neredeyse 5 kat düştü.

2.1.İklim Değişikliği ve Enerji Sorunları

Bilindiği gibi, ekonominin sektörlerinden en büyük oranda sera gazı salınımını enerji sektörü (% 65) ile vermektedir. Bu sera gazları içinde karbondioksit (CO_2) payı olarak (% 76.3) düşmektedir. Gürcistan, bağımsızlığın ilk yıllarında ciddi bir enerji krizi yaşadı, bunun en büyük sebebi ise özellikle Sovyetler Birliğinin, Birleşik Enerji Sistemi idi. Görüldüğü gibi, ülkede üretilen elektrik 1990 seviyesine hala ulaşmış değil. Ama son yıllarda durum ciddi biçimde değişmektedir. Gürcistan elektrik üretimi (2006) yılında 7,6 milyar kilovat-saat iken, (2014) yılında 10.369.6 milyar kilovata çıkmış, yıllık büyüme oranı ortalama % 3.34 olmuştur.

Milliar d kW hours



Son 25 yıl (1990 – 2014) boyunca, hidroelektrik santrallerinin (HES) ürettikleri elektrik enerjisinin Gürcistan enerji üretimindeki oranı %70,87'den 80.4'e çıktı, yani %9.53, bunun neticesinde ise bu sektörden kaynaklanan karbon dioksit (CO_2) emisyonları 650,000 ton (%21) azaldı.

Gürcistan'da enerji güvenliği ve istikrarı amacıyla çok şey yapılmasına rağmen, bu sorun bugüne kadar tam olarak çözülemedi. Ülke hala ithal enerji kaynaklarına yüksek oranda bağlıdır. 2010-2014 döneminde ülkedeki elektrik enerjisini yıllık ortalama tüketimi 14 milyar kilovat saati, üretimi ise 10.370 milyar kilovat saati idi.

3. HİDROENERJİ

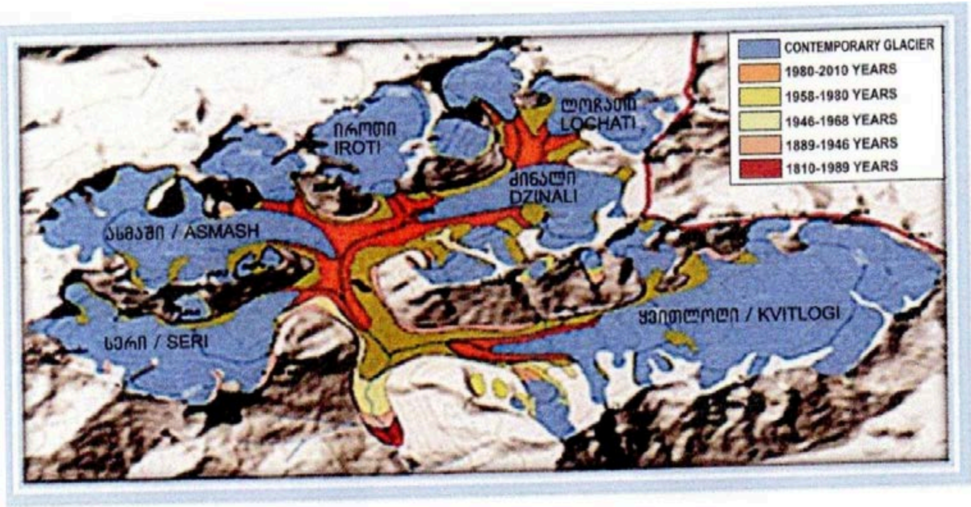
Mevcut verilere göre, son 25 yıl boyunca iklim değişikliği neticesinde Gürcistan'da yıllık ortalama sıcaklık 3.0-3.50 C civarında arttı. Meteoroloji bilgilerine göre 2007-2010 yıllarında yıllık ortalama derecesi muhtemelen 4-5 0C kapsamında arttı, dolayısıyla Gürcistan'da su kaynaklarının azalması beklenmektedir.

3. 1 HES'lerin Esas Besleyici Kaynakları ve Akım Dinamiği.

Hidroenerji kaynakları bakımından çok spesifik ve ilginç bölgeler olan Enguri ve Ajaristskali havzaları, iklim değişikliği ortamında su kaynakları dinamiği açısından incelenmeye değerdir.

3.2.1 Engur Havzası – Engur Havzasının iklimi, açık görünen dikey zonlamayla nitelendirilmektedir.

Dikey zonlamayla/bölgelemeyle Karadenizin nemli – yumuşak kış ve sıcak yaz bölgesi ile başlıyor ve devamlı kar ve buzullar bölgesiyle bitiyor, orada ise, Gürcistan sınırları dahilinde olan Kafkasya Sıradağları'nın en yüksek bölgesi olan Shkhara var (5.203m). Mestia'daki meteorolojik santralinin verilerine göre, son 25 yıl boyunca Enguri havzasında yıllık ortalama sıcaklığının artış hızı 0.50 C'dır, yağışların mevsimsel artış toplamı ise, %10'dur.



Resim 1. **(3)** Tviberi Buzulunun Geri Çekilimi 1810-2010 Yıllarında.

3.2.1.1. Buzullar- Küresel ısınma bakımından, su kaynaklarının azalma eğilimi ve mevsimsel su akım değişikliği, zikredilen bölgede genelde Engur havzasının buzullarına bağlıdır.

19. yüzyılın 90'lı yıllarından 20. yüzyılın ikinci yarısına kadar bu havzada buzullar önemli değişiklikler gördü, örneğin: 1890 yılındaki topografik haritada Tviber Buzulu bir bütün sistemiyle gösterilmiştir. 1959-1960 yılların hava resimleri ve topografik harita analizi gösterdi ki, zikredilen buzul büyük değişiklik görmüş. 1890-1960 yıllarında buzulun uzunluğu 2.14 km, alanı/yüzölçümü ise, 3.0 km2 ile azaldı. Buzulun şeridinin yükseliğinde değişik oldu ve Tiber buzulu 1889-2010 döneminde 200 metre yukarıya doğru çekildi. Aynı durum Tchalaati buzulunda da sözkonusu olup, Gürcistan Coğrafya Enstitüsü tarafından yapılan araştırmaların sonuçlarıyla ortaya kondu. Dolayısıyla, 1890–1965 döneminde yıllık ortalama sıcaklığın artması (0,30 C) neticesinde Engur Havzasının toplam alanı %13 azalmıştır Mevcut verilere dayanarak düşünülebilir ki, Engur Nehrinin havzasında bu asrın sonunda buz örtüsü neredeyse kalmayacaktır. Bu durumda da geçen asrın 50'li yıllarına kıyasla 2050 yılında Engur Nehrinin akan tüm miktarı, genelde buzuldan akması sebebiyle, %10 azalacaktır.

3.2.2. Ajaristskalı Havzası– Ajaristskali havzası da, Engur Havzası gibi, açık belirgin dikey bölgelemeyle nitelendirilmektedir: Karadeniz'den itibaren nemli–astropikal hava–yumuşak kış-sıcak yaz, aynı zamanda, nemli iklim, aşırı sert olmayan kış ve kısa süren yaz. Hem Acara'nın sahil kısmı hem Acara'nın dağ bölgesinde 1990–2014 yıllarında, önceki ilgili döneme kıyasen, yıllık ortalama sıcaklık artmış bulunmaktadır.

Mevcut verilere göre yapılan hesaplamayla, Gürcistan'ın batısında asrın sonunda, önceki döneme (1990 – 2014) kıyasen yıllık ortalama sıcaklık 3.50 C artacak, yağışların miktarı ise, % 6 azalacaktır.

Ajaristskali havzasının en başta gelen nehirlerinden biri olan Ajaristskali Nehri, büyük hidroenerji kaynaklarına sahip olup genelde yağmur, toprak sularıyla ve özellikle de kar sularıyla oluşmaktadır/beslenmektedir. Bununla birlikte bu nehrin çok belirgin biçimde mevsimsel değişen özelliği var. Ajaristskali'de (Keda İlçesi'nde) 1937 yılından itibaren orta güçte (16 megavat) bir hidroelektrik santrali olan "ATSHES" ve 4 küçük hidroelektrik santrali faaliyet görmektedir. Halihazırda 272 megavat gücündeki 4 hidroelektrik santralinin inşaatı yapılmaktadır.

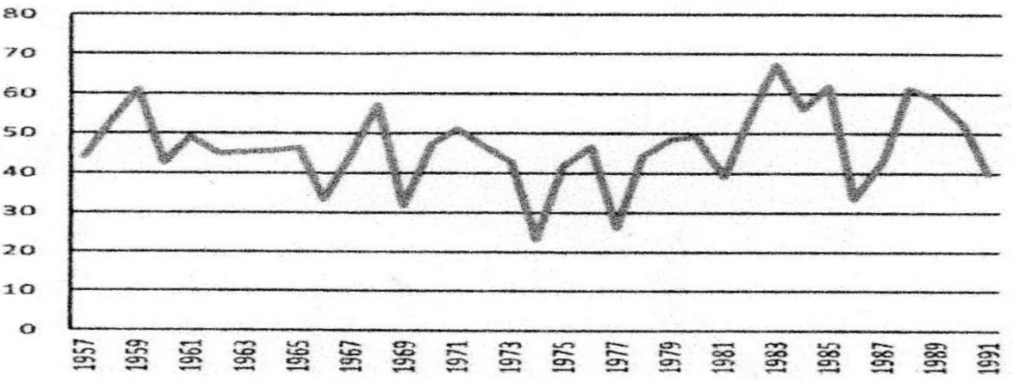
Mevcut verilere (Keda Meteoroloji Santrali) göre, 1978-1991 yıllarında, 1965–1978 döneminde, Ajaristskali'nin yıllık ortalama akım miktarı %2,0 azaldı. Son yıllardaki iklim değişiklik verilerinin analizine göre, 2100 yılında Ajaristskali'nin toplam akım miktarı, 1988–2001 yılların yıllık ortalama akım miktarına göre, %10-11 azalacağı düşünülebilir.

3.2.3. Ormanlar. İklim değişikliğinin devam ettiği mevcut durumda, su kaynaklarının sabitliği ve onun mevsimsel değişiklik yoğunluğu, dağdaki ormanların durumuna büyük ölçüde bağlıdır. Son yıllarda bu bölgede, özellikle HES'lerin hidro kaynaklarıyla esas "besleyici rezervuarlarından" biri olan subalpine bölgesinde ekolojik durumlar zorlaştı. Bölgenin biyoekolojik ortamı değişmektedir, su miktarı azalmaktadır veya dağdan akan dere ve nehirler tamamen kurumaktadır. Bu durum iklim değişikliklerinin devam ettiği süreçte, en çok orman ve arazilerin yoğun ve düzgün olmayan/yanlış kullanımıyla ilgilidir. Bunun açık bir örneği, aynı doğa-iklim şartlarında yaşayan Türkiye ve Gürcistan'ın subalpin orman ve otlaklarının (Arsiani ile Şavşat sıra dağlarının bazı bölgelerinin) durumudur. Gürcistan'a kıyasen subalpin orman ve arazilerin daha az yoğunlukla kullanıldığı Türkiye tarafında, ormanın üst şeridinin değişikliği (aşağıya doğru eksilmesi), Gürcistan tarafına göre daha az görünmektedir.

4. HİDROENERJİ KAYNAKLARI

Değerlendirmeye göre, Gürcistan'ın hidroenerji kaynaklarının potansiyeli 80 TWh olup, bunun 27 TWh kadarı ulaşılabilecek potansiyel olarak sayılmaktadır. Halihazırda mevcut potansiyelin yaklaşık %11.1'i kullanılmaktadır. Son 20-25 yıl boyunca, hidroelektrik enerjinin Gürcistan'ın toplam elektrik üretimindeki payı %40 artmıştır.

Saniyede Küp metre

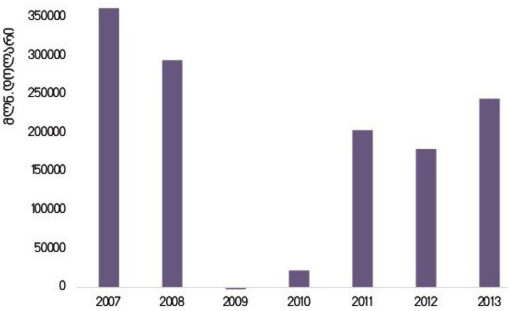


Çizim 2. **(4)** Ajaristskali Nehrinin yıllık ortalama akım dinamiği 1957-1991 yıllarında**.**

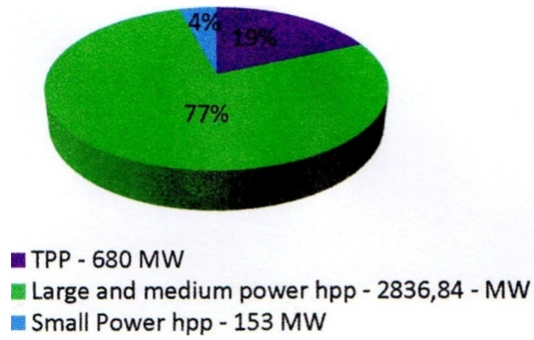
Halihazırda Gürcistan'da mevcut hidroelektrik santrallerinin kurulu toplam gücü, yaklaşık 3500 megavattır, yani ülkede oluşan elektrik enerjisinin %85'tir. Bugün Gürcistan'da yaklaşık 47 küçük ve orta, 6 ise büyük hidroelektrik santrali vardır. Bunlar arasında 20 HES 10 megavat'tan fazla güce sahiptir. HESlerin toplam gücü 2,752 megavattır, en büyüğü 1,300 megavat gücündeki ENGURHES'tir (Engur Hidroelektrik Santrali). Rehabilitasyon çalışmalarının yapılması, bazı durumlarda modernizasyonlar neticesinde 2010 yılında ülkede 9,375 milyar kv/st elektrik enerjisi üretildi.

Tablo 2. **(5)**

HES	Faaliyete Geçişi	Yıllık üretim Mll.kv.s	HES	Faaliyete Geçişi	Yıllık üretim Mll.kv.s
Zagesi	1927	160	Vardnilhesi I–IV	1971	1.023
Dzevruli	1956	88	Satskhenhesi	1952	50
Rioni	1933	325	Vartsikhhesi I- IV	1976	1,000
Munleik	1956	2	Ortachalhesi	1954	80
Ats Hes	1937	85	Engurhesi	1978	3,800
Bzhuzhahesi	1957	50	Shahorshesi	1955	114
Khrami -1	1947	184	Jinvalshesi	1985	350
Lajanurhes	1960	438	Gumatihesi	1956	376
Chitakhevhesi	1949	110	Tetrikhevhesi	1952	60
Khrami 2	1963	184	Khadorihesi	2004	100



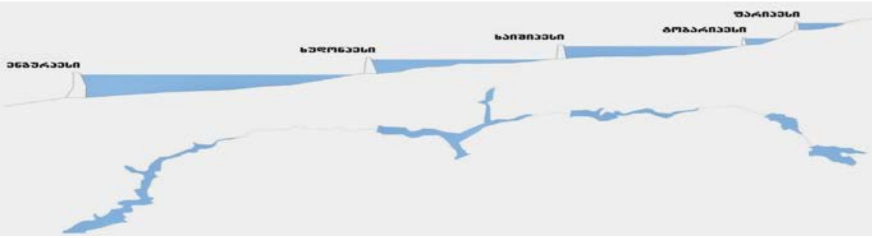
Çizim 3. **(6)** 2007-2013 Yılları Arasındaki Elektrik Enerjisi



Çizim 5. (**7)** Gürcistan’da Doğrudan ve Yabancı Yatırım Kurulu Elektrik Enerjisi 2014

4.1 Perspektifi olan Projeler

Son 20-25 yıl boyunca Gürcistan’da yalnız bir orta büyüklükte HESin, 24 megavat kurulu gücündeki KHADORIHES’in inşa edilmiş olması dikkat çekici bir notadır. Bu yıllarda kurulu elektrik enerjisi üretiminin artması, genelde mevcut güçlerin rehabilitasyonundan kaynaklanmaktadır. Günümüzde bu durum değişmektedir. 2050 yılına kadar ülkede 70 ve daha fazla orta ve büyük güçte HES’in projelendirilmesi ve inşaatı planlanmış bulunmaktadır. Yatırımcılar, Gürcistan’ın hidroenerjisi ile ilgili olarak, Engur Nehri (Khudoni, Cheri, Jorkvali, Dizi, Lakhamura, Lukha, Khaishi, Tobari, Parihesi), Rioni Nehri (Tvishi, Namakhvani, Joneti, Alpana), Tskhenistskali Nehri (Tsageri, Lakhashuri), Kura (Mtkvari) Nehri (Minadze, İdumala, Aspindza, Khertvisi) gibi, toplam kurulu gücü 3000 megavata kadar olan persperktifli HES’lere büyük ilgi göstermektedirler.



Resim 2. **(8)** Engur Nehrinde planlanan HESler.

Resim 3. (9) Engur Hidroelektrik santralı inşaat şeması barajı

Resim 4. (10) Khudon hidroelektrik barajı şeması

Enguri Nehrinin hidroelektrik potansiyeli yaklaşık 3540 megavat olarak değerlendirilmiştir. O, 10 milyar kilovat/saate kadar elektrik enerjisini üretebilir. Halihazırda ENGURHES (Engur hidro elektrik santrali) ve VARDNILHES ile nehrin potansiyelinin yalnız yarısı kullanılmaktadır.

KHUDONHES (Khudon hidroelektrik santral) inşaatı 1979 yılında başladı, çok kapsamlı çalışmalar yapıldı, hidroelektrik santralının inşaatı nedeniyle bölge sakinlerin hukuksal sorunlarına çözüm getirilemediğinden onlarca yıldır inşaat durdurulmuş vaziyettedir. Bugünkü hükümet, zikredilen inşaatın en kısa sürede yeniden başayacağı sözünü vermiştir. Bu proje, ENGURHES'den sonra ülkenin güç bakımından ikinci sıradaki elektrik santrali olacak ve yıllık 1.4 milyar kilovat elektrik enerjisi üretecektir. Ön hesaplamalara göre, KHUDONHES (Khudon hidroelektrik santrali) inşaatı yapıldıktan sonra Gürcistan'da elektrik güç üretiminin %20 artacağı düşünülmektedir.

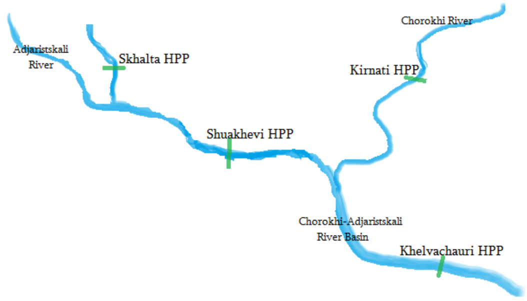
Yukarıda da zikredildiği gibi Gürcistan'ın hem küçük hem büyük güçteki hisroelektrik yapıların inşaatı konusunda tecrübesi vardı. Engur Nehrinde 1.300 megavat gücündeki "ENGURHES" 1978 yılında işletmeye alındı. Bu projenin inşaası o zaman için çok zor rölyef şartlarında, konstrüksiyon özellikleri ve güç bakımından Kafkasya'da harika bir hidro kompleks olarak tamamlandı. Faaliyete girmesinden günümüze yaklaşık kırk yıldır bir kere bile ciddi bir sorun yaşanmamıştır.

Bu açıdan bakıldığında son yıllarda komşumuz ve dostumuz Türkiye Cumhuriyeti'nin bu konudaki katettiği gelişmeler takdire şayandır. Oldukça zor rölyef şartlarında, zor konstrüksiyon ve büyük kapsamlı hidro yapı projeleri gerçekleştirdi. Tabii ki, bu gibi güçlü hidro yapıların inşaatı ve işletilmesinin, hem biyoekolojik hem beklenmedik olumsuz jeolojik vakaları harekete geçirme bakımından ciddi riskleri vardır, bu ise, sadece Türkiye değil, komşu ülkeleri de ilgilendirmektedir. Mevcu veriler şimdiye kadar endişe etme sebebi göstermemektedir. Türk uzmanların görüşlerine göre, az çok değişen biyo ekolojik ortam kısa sürede adaptasyona girmektedir, bazı uzmanların görüşlerinde, çökeltiyle (nehrin doğal olarak getirdiği malzemeyle) deniz sahili besleyicilerinden olan Çoruh Nehrinde, çökelti kütlesinin azalma eğiliminin Karadeniz'in aşındırıcı vakalarının meydana gelmesiyle ilgisi olduğuna işaret edilmektedir. Bu olumsuz durumun yoğunlaşma sebebi bugüne kadar araştırma sonuçlarıyla sonuna kadar tespit edilmemiştir.

4.1.1. İnşaatı Yapılan Hidroelektrik Santrallar:

Tablo **3 (11)** İnşaatı Yapılan Hidroelektrik Santralları

Enerji santralleri	Giriş tarihine Operasyonu	Kurulu kapasite (MW)	Enerji santralleri	Giriş tarihine Operasyonu	Kurulu kapasite (MW)
Paravani	30.08.2015	85	Arakali	31.07.2015	8,9
Kirnati	30.08.2015	36,44	Abuli	31.07.2015	22,2
Khelvachari 1	28.02..2017	47,48	Shuakhevi	10.06.2015	178
Lukhuni	28.02..2017	12	Skhalta	10.06.2020	9,8
Aragvi	15.02.2015	8			



Resim 5.**(12)**Ajaristskali ve Çoruh Havzaları İnşaatı

Resim 6. **(13)** ATSHESS – 1937 Binaları Bağlayan Hidro tünelleri

Gürcistan'da 2012 yılında 407.82 megavat kurulu gücündeki 9 hidroelektrik santralının inşaatı başlamış ve bunlar 2015-2020 döneminde faaliyete girecektir. Özellikle dağ bölgelerinde aynı zamanda küçük hidroelektrik santrallarının geniş çaplı proje ve inşaat çalışmaları devam etmektedir. Mevcut hesaplamalara göre, 2020 yılında ülkede kurulu elektrik enerjisinin toplam gücü, yalnız orta ve küçük hidroelektrik santralların çoğalmasına bağlı olarak, %15-20 ile artacaktır. Ülkenin bu konuda iyi bir tecrübesi vardır. Geçen asrın 50-60'lı yllarda genelde dağ bölgelerinde yüzlerce küçük hidroelektrik santrali yapıldı ve yarım asır boyunca başarıyla faaliyet gösterdiler. 1980'li yıllarda Gürcistan da, diğer Sovyet cumhuriyetleri gibi ortak tek enerji sistemine bağlı olduğundan hükümet yerel küçük hidroelektrik santrallarından vazgeçti. Bugün bu hidroelektrik santralların yalnız %5-7'lik kısmı faaliyettedir.

6. GÜRCISTAN'DA ELEKTRIK ENERJISI TÜKETIMI

1985-1990 yıllarında Gürcistan'da yıllık ortalama elektrik tüketimi 18 milyar kilovatsaat civarındaydı. Kişi başına tüketim 3,4 bin kilovatsaatti. 2005-2010 döneminde bu veriler, 8.3 ve 1,5 idi, 2014 yılında ise, 14.5 ve 2,9 idi. Ülke nüfusunun yıllık ortalama % 0.5'li artması halinde 2100 yılında Gürcistan nüfusu 7,5 milyon olacağı, kişi başına 4.500 kilovatsaat yıllık tüketim olması halinde de ülkenin elektrik ihtiyacının 34 milyar kilovat saat olacağı düşünülmektedir.

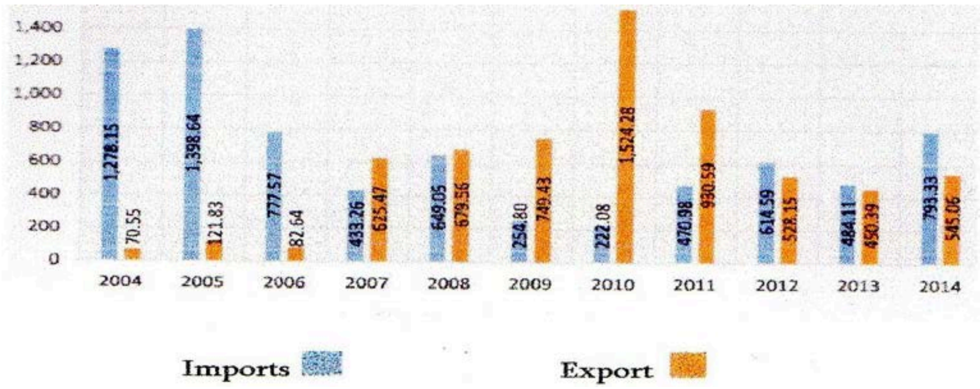
Tablo 3. (14)Gürcistan Enerji Sisteminin Bazı Göstergeleri

Dönem	Milyar KW / h	Enerji oluşturulan %		Tüketim	
		Termal	Hidro	Toplam (milyar)	Kişi başına (bin)
1985–1990	18,0	44.2	55.8	18.0	3.4
2005–2010	8.31	15.9	84.1	8.32	1.5
2010–2014	10.4	19.9	80.1	14.0	2.8
2014	10.4	19.6	80.4	14.5	2.9

7. ELEKTRIK ENERJISININ IHRACATI VE ITHALATI

Güçlü hidroelektrik kaynaklarına sahip ve enerji transit ülkesi olan Gürcistan, ekolojik bakımından temiz enerjinin önemli bir üreticisi ve ihracatçı ülke olma imkanına sahiptir. Bunun için Gürcistan'da son yıllarda çok sayda, çok önemli, ülke için bugüne kadar görülmemiş denebilir projeler gerçekleştirilmektedir. Yine,"Karadeniz Elektrik Aktarma Şebekesi" projesine Gürcistan'ın katılması önemlidir. Proje, Türkiye ile birlikte tek enerji sisteminin oluşturulmasını ve Türkiye üzerinden Avrupa ülkelerine elekrik enerjisi ihracat imkanının artmasını sağlamaktadır. Ayrıca bu proje, Gürcistan'ın enerji altyapısının geliştirilmesi, ülkenin enerji sisteminin çalışma istikrarına katkı sağlamaktadır.

Milyar kW saat



Çizim 6. **(15)** Gürcistan Elektrik İthalatı ve İhracatı 2004-1914 y.

Son 10 yıl boyunca Gürcistan'dan elektrik ihracat payı yaklaşık 8 kat arttı, ithalat ise, 1.6 kat azaldı. Muhtemel hesaplamalara göre, 2050 yılında ihracat hacmi temiz enerjiye dayanarak 40-50 milyar kilovatsaate kadar artacaktır. Bunun sonucunda ithalatçı alıcı ülkelerde ısı gaz emisyonları muhtemelen 60-65 milyon tona kadar azalacaktır.

SONUÇ

1. Çevreye negatif etki yapabilcek hidroelektrik santrallei konusunda çevre etki değerlendirme sistemini bölgesel ve sınır ötesi olarak oluşturmak gerekmektedir.

2. Antropojenik etkiden zaten ağırlaşan, rölyef ve jeolojik olarak çok hassas dağ bölgelerinin durumu, doğada gerçekleşen karmaşık afetler, hatta gergin küresel siyaset durumu enerji projeleri konusunu hassas ve endişeler oluşturan bir mesele yapmıştır. Bu nedenler dikkate alındığında:

- Zikredilen bölgelerde tam güvenli olması bakımından orta ve düşük güçte hidroelektrik santralların inşaatı alternative olabilir. Hidroenerji projelerinin geliştirilmesi hırslı menfaatlere göre planlanmamalı ve buna ülkenin ekosistemi kurban edilmemelidir.

- Bütün büyük barajlarının inşaatı, çevre ve inşanlar için geri dönüşümsüz değişiklikler ve riskleri meydana getirebileceği için, Uluslararası Finans kurumları bu gibi projelerin finanse etme konusunda, devletler ve halkların anlaşması konusuna öncelik vermeil ve gerekirse ertelemelerde tereddüt etmemelidir.

3. Enerji güvenliği bakımından, özellikle düşündürücü bir husus, iklim değişikliği sonucunda su kaynaklarının azalmasıyla ilgili sorundur. Bu sorun Gürcistan'ın da aralarında olduğu hidrokaynaklara dayanan ünkelerin enerji durumunu çok kritik duruma düşürebilir. Şu an için, hem Gürcistan hem benzeri fiziki ve coğrafi ve iklim şartları olan pek çok ülkenin bu sorunu yoktur, fakat mevcut bilgilere göre zamanla meydana gelebilir. Bundan dolayı, hidroenerji sektöründe politikaların iklim değiştirici özellikleri olup-olmadığı incelenerek yapılması lazımdır.

4. Gürcistan'ın enerji sistemi sert bir şekilde kendini gösteren mevsimsel dengesizilik özelliğindedir. Sovyetler Birliği dağıldıktan ve Gürcistan enerji sisteminden ayrıldıktan sonra bazı güçler yazın kullanılmamaktadır. Bundan dolayı enerji güvenliğinin sağlanması için elektrik enerjisi ünitelerinin geliştirilmesinin yeni stratejisi, sezonik enerji dengesizliği dikkate almalıdır.

5., Özellikle dağ bölgelerinde, hidro kaynaklarının esas temin edici/besleyici bölgeleri olarak ormanların rasyonel kullanımı ve muhafaza edilmesi, bu bakımdan Gürcistan'da ve diğer ülkelerde kanıtlanmış mekanizmaların uygulanması gerekmektedir. Orman konusunda onun doğal yenilenmesine dikkat edilmelidir. Bunun büyük etkililiği Acara'nın subalpin bölgesi (1900-2000mt) örneğiyle, yıllarca yapılan deneylerden tespit edilmiştir.

Konuşmamın sonunda, samimi misafirperverlik için ve iyi çalışma ortamı yarattığınız için üniversite yönetimine ve onun tüm personeline teşekkür ediyorum. Ayrıca destekçi kuruluşlara ve sempozyumun tüm katılımcılarına özel olarak teşekkürlerimi sunmak istiyorum. İleride sizleri Gürcistan'da da ağırlamaktan mutluluk duyacağız.

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AKILLI SAYAÇLARIN ŞEBEKE ENTEGRASYONU VE TÜRKİYE UYGULAMASI

SMART METER NETWORK INTEGRATION AND ITS APPLICATION IN TURKEY

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ÖZET

Akıllı sayaçlar geleneksel enerji sayaçlarına göre sistem yöneticilerine ve tüketicilere çok daha fazla bilgi sağlayan, müdahale imkanı sunan gelişmiş elektrik enerji ölçüm cihazlarıdır. Bir akıllı sayaç tasarımı elektrik dağıtım şirketi ve müşteri gereksinimlerine bağlıdır. Bu çalışmada akıllı sayaçlar ile entegre olabilecek çeşitli özellikler ve teknolojiler anlatılmaktadır. Akıllı sayaçlara dair tasarım dahil karşılaşılabilecek çeşitli sorunlar, zorluklar, dağıtım süreci, kullanım ve akıllı sayaç altyapısı hakkında özet bilgilere yer verilmiştir. Buna ek olarak, ülkemiz için gelecekte akıllı sayaçlara dair karşılaşılabilecek çeşitli uygulamalar ve avantajlara değinilmiştir. Dünya'da birçok ülkede akıllı sayaçlara yapılan yatırımlar ve teşvikler hakkında bilgi verilmiştir. Ayrıca, ülkemiz gibi gelişmekte olan ülkelerde akıllı sayaçların tanıtılması açısından da akademik ve elektrik piyasası sektörüne katkı sağlaması hedeflenmiştir.

Anahtar Kelimeler: Akıllı sayaç, Akıllı şebeke, Dağıtım şebekesi

ABSTRACT

Smart meters are developed measurement devices that provide much more information to the consumers and that provide the intervention opportunity compared to the conventional energy meters. A smart meter design is dependent on the requirements of the electricity distribution company and the customers. In this study, various features and technologies that can be integrated with the smart meters are explained. Summary information on various problems that can be encountered including design of smart meters, difficulties, distribution process, use and infrastructure of smart meters was given. In addition, various applications and advantages about smart meters that can be encountered in the future in our country were mentioned. Information about promotions and investments made in smart meters in many countries in the world was given. Furthermore, the study aims to contribute to the academic and electricity market sector in term of the introduction of smart meters in developing countries such as our country.

Keywords: Smart meter, Smart grid, Distribution network

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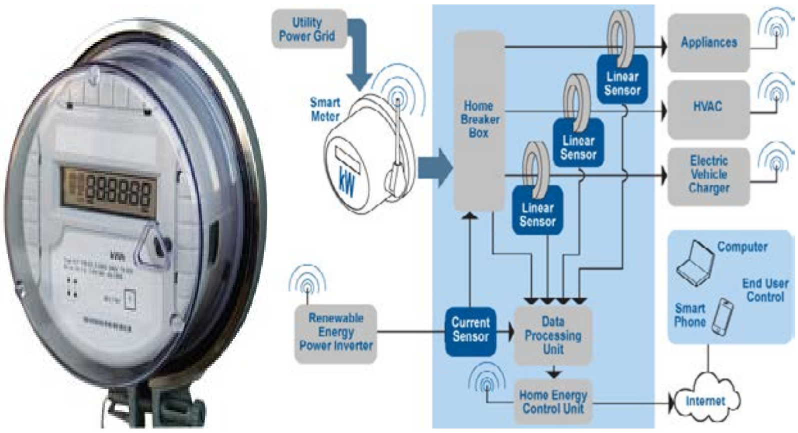
1. Giriş

Dünya nüfusu hızla artmakta ve şehirlerde yoğunlaşmaktadır. 2025'te dünya nüfusunun 8 milyara erişmesi öngörülüyor. 2035 yılında, enerji tüketiminin tüm dünyada %40 artmış olacağı hesaplanıyor. 2050 yılındaysa dünya nüfusunun %70'inin şehirlerde yaşaması bekleniyor. Günümüz dünyasında tüketim açısından daha çok insanın yoğun olarak şehirlerde yaşadığı dolayısıyla daha çok enerjiye ihtiyaç duyulduğu bir sürece girilmektedir. Tüm dünyada olduğu gibi ülkemizde de enerji ihtiyacı ve enerjinin verimli kullanımı en önemli gündem konusudur. Türkiye'de enerji verimliliği konusunda önemli handikaplar bulunmaktadır. Bugün Türkiye dünyanın en çok elektrik enerjisi tüketen 22'nci ülkesi konumundadır. Yılda 119,5 milyon ton petrole eşdeğer enerji tüketmekte ve Avrupa'nın 6'ncı büyük enerji piyasası konumundadır. Ülkemizde elektrik talep artışının 2014-2024 yılları arasında yıllık yaklaşık %6,5-7,5 civarında olacağı hesaplanmaktadır. Bu oranla Türkiye, elektrik tüketim talep artışında dünyada Çin'den sonra ikinci sıradadır. Bu oran Avrupa'da sadece %1,6'dır. Türkiyedeki elektrik şebekelerinde kayıp kaçak oranı ortalama %15 cıvarındadır. Sadece kayıp kaçak elektrik nedeniyle Türkiye'de hane başına ortalama yılda 120 TL'lik fazladan ödeme yapılmaktadır. 2023 yılında elektrik enerjisi ihtiyacımızın, bugüne kıyasla iki kat artarak yaklaşık 500 milyar kWh olacağı tahmin edilmektedir (Enerji ve Tabii Kaynaklar Bakanlığı, 2015:07.04.2015). Bu talebi karşılayabilmek için bugün ülkemizde mevcut kurulu güç en az iki katına çıkarılmalıdır. Yenilenebilir enerji kaynaklarının payı artırılmalı ve enerji verimliliğinde gelişmiş ülkelerin standartlarına erişilmelidir (Cengiz, 2014:149; Cengiz ve Rüstemli, 2014:76). Bu doğrultuda dağıtım şirketlerinin özelleştirilmeleri, yasal ayrışma gereksinimi, artan rekabet ve teknolojik gereksinimler neticesinde dağıtım sektöründe akıllı sayaç ihtiyacı ön plana çıkmıştır. Akıllı sayaç tüketicinin enerji tüketimini ölçen ve diğer sayaçlara kıyasla elektrik şirketine bilgi veren bir enerji ölçüm cihazıdır. Akıllı sayaçlarda çift yönlü iletişim söz konusu olmakla birlikte gerilim değerleri, faz açısı, faz frekansı ve güvenli veri iletişimi de dâhil olmak üzere gerçek zamanlı enerji tüketim bilgileri okunabilir. Bu sayede sistem hakkında bilgi toplanabilir.

Bir akıllı sayaç sisteminde; sayaç, iletişim altyapısı ve kontrol cihazları bulunur. Böylelikle dağıtım şebekesinden tüketici bilgileri alınabilir, diğer sayaçlarla iletişim kurulabilir ve şebekeden elektrik tüketimi ölçülebilir. Müşteriye ait dağıtık üretim kaynakları veya akü sistemlerinden çekilen enerji yoksa akıllı sayaçlarla sadece tüketilen güç faturalandırılır. Akıllı sayaçlar maksimum enerji tüketim miktarıyla sınırlandırılabilinir ve istenildiği zaman iptal edilebilir veya tekrar bağlanabilir. Bir akıllı sayaç, sistem verilerini çeşitli kontrol cihazları ve birçok sensör ile algılar. Gelecekteki elektrik dağıtım şebekelerinde, akıllı sayaçların performansı ve yük enerji kulanım özelliklerinin izlenmesi önemli rol oynayacaktır. Akıllı sayaç sistemi ile düzenli olarak tüm müşterilerin enerji tüketim verilerinin toplanması ve hizmet şirketlerinin tüketimleri göz önünde bulundurularak hizmet şirketinin müşterilerine maliyet açısından tavsiyelerde bulunulması sağlanacaktır. Akıllı sayaçlar ev aletleri ve diğer cihazları kontrol etmek için programlanabilir. Buna ek olarak akıllı sayaç entegrasyonu, dağıtım verimliliği ve güç kalitesinin iyileştirilmesi açısından izinsiz tüketime ve elektrik hırsızlığı tespiti için hizmet şirketlerine yardımcı olur (Cengiz, 2013:206). Şekil 1'de akıllı sayaç ve çalışma mantığı görülmektedir.



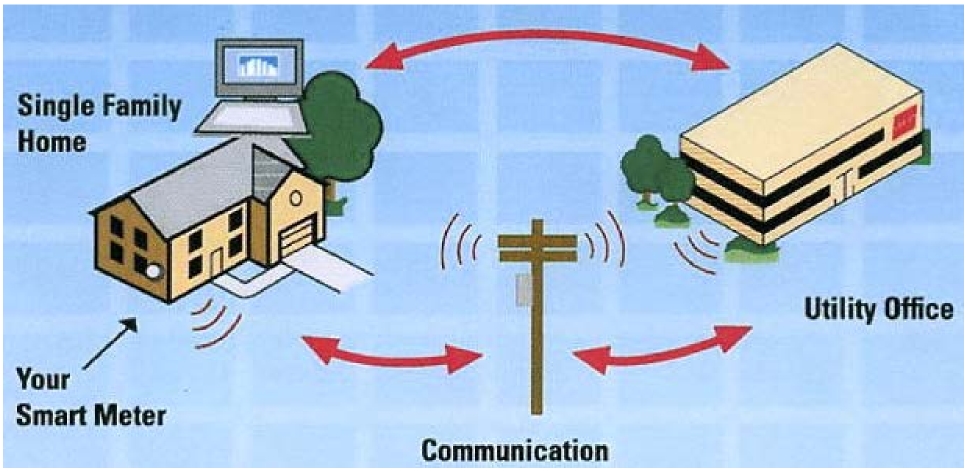
Şekil 1. Akıllı sayaç ve çalışma mantığı

2. AKILLI SAYAÇLARDA HABERLEŞME

Akıllı sayaçlarda haberleşme işlemi için iletişim cihazları ve iletişim ağı karmaşık gereksinimleri karşılayacak şekilde olmalıdır. Akıllı sayaç sistemi, akıllı sayaç ve diğer şebeke elemanları arasında veri transferini yönetir. Bu veriler gizli olup, özel hayatı ilgilendiren bilgiler olduğundan bilgilere erişim mümkün olan en az personelle sınırlı olmalıdır.

İletişim standartları ve kuralları ağ içindeki veri aktarımının güvenli olması için formüle edilmiş olmalıdır. Bu veriler enerji tüketimi hakkında ayrıntılı bilgi verdiği için manipülasyonlar ve yanlış hesaplamalar açısından önemlidir. Bu sayede müşterinin kullandığı enerjinin ve diğer enerji sistem bileşenleri ile cihaz arasındaki enerji akış yönüne dair bilgiler görülebilmektedir. Bu bilgiler bir akıllı sayaç ya da bir müşteriye atanmış bir cihaza verilen kriptonik kimlikler tarafından teminat altına alınmıştır. Seçilen haberleşme ağı akıllı sayaç üzerinden enerji kesintisini algılamalı ve destek dağıtım otomasyonuna bilgiyi ulaştırmalıdır (Amin ve Wollenberg, 2005:34).

Kontrol sinyallerinin haberleşmesi ve enerji tüketim verilerine ulaşmak için bluetooth olası bir seçenek olabilir. Power Line Carier (PLC) ve Boardbord Power Line (BPL) haberleşmesi, TCP/IP gibi veri aktarımı diğer olası seçeneklerdir. Kablosuz modem, mevcut internet bağlantısı, güç hatları üzerinden haberleşme, RS-232/485, Wi-Fi, Wimax ve Eternet veri yükleme işlemleri için kullanılabilir (Garrity, 2008:38). Şekil 2'de akıllı sayaçlı bir dağıtım şebekesinde haberleşme durumu gösterilmiştir.



Şekil 2. Akıllı sayaçlı bir dağıtım şebekesinde haberleşme durumu

3. AKILLI SAYAÇ ENTEGRASYONUNU ETKİLEYEN OLUMSUZ FAKTÖRLER

Akıllı sayaç entegrasyonu yeni nesil şebekelerin oluşmasıyla gelecekte en önemli sorun haline gelecektir. Şebekenin yeniden tesis edilmesi yöntemi yerine, mevcut şebekeyi yenileştirme alternatif bir çözüm olabilir. Şebekenin çalışma kapasitesi, teknik avantajları ve ar-ge açısından akıllı şebeke entegrasyonu mevcut şebekenin yönetilmesinde en önemli çözüm olarak değerlendirilebilir. Ancak mevcut şebekenin tasarım ve bakımı birçok sorun ve zorluğu barındıracaktır. Mevcut sistemle yeni teknolojiyi birleştirebilmek için uygun altyapı eksikliğinin giderilmesi ve akıllı sayaçların şebekeye yerleştirilmesi gereklidir. Müşteri ağının artması sistemi karmaşık hale getirir. Enerji tüketimi ve veri toplama otomatik olarak yapılan sürekli bir süreçtir (Mcdaniel ve Mclaughlin, 2009:75). Bu bağlamda bazı gizlilik ve güvenlik riskleri oluşabilir. Ayrıca adres bilgileri, kullanılan aletler, insanlarla ilgili bilgiler vb. bilgilere ulaşılabilir. Temelde iletilecek parametrelerin seçimi ile ilgili sorun ve bu bilgilere erişmek için yönetici kimliğine sahip olmak gerekir.

4. AKILLI SAYAÇLARIN SISTEME KAZANDIRDIKLARI

Akıllı sayaç sistemiyle iş gücü akışı, iş gücü yönetimi ve faturalandırmanın sistematik bir biçimde yönetimi sağlanır, Akıllı sayaçlar sayesinde SCADA sistemleri arttırılabilir, güç sisteminin kontrolü gibi çeşitli faydalarının yanında kesinti ve kayıpları en alt düzeye indirmek için gerektiği zaman operasyonel kararlar alınabilir. Özellikle mikro şebekeler sayesinde akıllı sayaçların enerji maliyetlerinin düşürülmesi, hata analizi, talep kontrolü ve güç analizi yapılabilir. Akıllı sayaçlar doğru faturalandırma yapmak, arıza önleyici bakımı planlamak, arıza kaynağını tespit etmek ve arızanın giderilmesine yardımcı olmakta kullanılabilir. Buna ek olarak akıllı sayaçlar ile sistemden kaynaklanan istenmeyen harmonik bileşenlerin varlığı tespit edilebilir (Cengiz vd., 2013:155).

Manuel okuma süreklilik ve daha fazla maliyet gerektiren bir iştir. Geleneksel ölçüm sisteminde sayaç manuel olarak okunur. Bütün bu süreç bir akıllı sayaç ve uygun bir iletişim mekanizması yardımıyla basitleştirilebilmektedir. Akıllı sayaç kurulumuyla enerji güvenilirliği ile birlikte enerji tasarrufu ve devamlılığı da sağlanır. Akıllı sayaç, tüketicilere enerji tüketim miktarı ve maliyeti açısından bilgi vererek tasarruf yapma hususunda yönlendirme yapabilmektedir.

Uzak mesafede bulunan trafolar enerji dağıtım esnasında gerilim dalgalanmalarına ve yük dengesizliğine sebep olur. Akıllı sayaç ile alçak gerilim şebekelerindeki dalgalanmalar analiz ve kontrol edilebilmektedir. Ayrıca kullanıcıya gerekli yük ve maksimum yük talebinin kontrolü ile ilgili bilgi sağlayabilmektedir. Akıllı sayaç puant (pik) yük esnasında kullanıcıların maksimum yük taleplerini kontrol ederek herhangi bir müşterinin sınırı aşması durumunda enerjiyi keserek sistemi koruyabilmektedir.

Mevcut şebeke sistemleri tek yönlü güç akışı için tasarlanmıştır. Akıllı sayaç sistemine ek cihazlar entegre edilerek akıllı ölçümleme teknolojisinin yetenekleri arttırılabilir. Coğrafi Bilgi Sistemi (CBS) potansiyel bir arızanın coğrafi konumu hakkında detaylı bilgi elde edebilmek için akıllı sayaç sistemine entegre edilebilir. Bu sayede elektrik şirketleri arızaların hızlıca tespit edilmesi ve arızanın giderilmesinde daha kısa sürede çözüme ulaşabilir. Yani akıllı sayaçlar sayesinde elektrik kesintilerine ve arızalara daha hızlı cevap verilerek, enerji kesinti süreleri ortalama 4-6 dakikaya kadar düşürülebilir.

Bir akıllı sayaç sisteminde elektrik şirketi bir merkezi kontrol noktası oluşturarak belirlenen plan çerçevesinde müşteri için ev aletlerini kontrol etmek ve bu aletleri çalıştırmak için akıllı sayacı yönlendirir. Akıllı sayaç uygulaması hizmet şirketlerinin tarife planlarını değiştirip yeni tarifelerini tanıtmasını sağlar (Mcgranaghan vd., 2008:1). Böylelikle müşteriye fayda sağlayan önemli argümanlar ve yeni dinamik tarife planlarının tanıtılmasına olanak tanır.

Kullanım tarifesi ve gerçek zamanlı fiyatlandırma şemalarına ek olarak ön ödemeli akıllı kart sistemi tanıtımı ile hizmet şirketleri tüketicilerin yararı için tüketicilere makul bir tarife sunabilecektir.

Sonuç olarak tüm bu bilgiler ışığında akıllı sayaçlar (Rüstemli vd., 2011:108; Rüstemli vd., 2013:30);

- Operasyonel Maliyetlerin Azaltılması: Dağıtım şirketlerinin sayaç bilgilerini toplama ve işgücüne dayalı olan sayaç okuma giderlerini azaltma faydasını sağlar. Bununla birlikte dağıtım şirketlerinin, abone kesintilerini uzaktan görüntüleyerek, abone telefonları veya arıza bildirimlerine karşı oluşan ulaşım maliyetlerini de azaltır.

- Gelirlerin Korunması: Gerçek zamanlı ve daha kesin fatura bilgileri sağlayarak aylık fatura tahmin ihtiyacını ortadan kaldırır. Bu model, gelir koruma adına hem ön ödeme sistemleri hem de faturasını ödemeyen abonelerin elektriklerini uzaktan kesme sistemlerini desteklemektedir. Son olarak ta dağıtım şirketlerinin kayıplarını azaltmak için ''Enerji Hırsızlığı Tespiti" uygulamasını destekler.

- Talep Yönetimi: Abonelerin elektriği gün içerisinde kullandığı zamana göre fiyatlandırma ve/veya kritik pik oranlarına göre fiyatlandırma gibi elektrik dağıtım firmalarının ileri düzeyde fiyatlandırma politikaları için şebekeden ve abonelerden tek tek veri toplar. Bununla birlikte dağıtım şirketleri abonelerinin, kendi tüketim miktarlarını görmeleri ve yük oranlarını değiştirilebilmeleri imkanı sağlar.

5. GELİŞEN ÜLKELER İÇİN AKILLI SAYAÇLARIN KATKILARI

Gelişmekte olan birçok ülkede müşteriler tarafından tüketilen enerji faturalandırılması için geleneksel enerji sayaçları kullanılmaktadır. Akıllı sayaçların ev aletleri kullanım kolaylığı sağlama, teknik olmayan kayıpları kontrol etme, geliştirilmiş yük paylaşımı sağlama, güç kalitesinde iyileştirme ve şebeke izleme gibi olanakları gelişen ülkelere tanıtılmalıdır. Çünkü hizmet şirketlerinin teknik olmayan kayıpları dünya çapında her yıl yaklaşık 20 milyar dolardır. Buna ek olarak artan teknik olmayan kayıpların çoğalması ile hırsızlık ve faturalandırmada usulsüzlük, gerçek ve şeffaf ölçüm yapmayı zorlaştırır. Ancak akıllı şebeke ve akıllı sayaç sisteminin kurulması için devasa bütçeler gereklidir. Kamu hizmetleri şirketleri sayesinde veya kamu teşvikleriyle bu altyapıya milyarlarca dolar yatırım yaparak ulaşılabilir.

Gelişmiş haberleşme yeteneği ve gelişmiş yazılım araçları ile akıllı sayaçlar dağıtım verimliliğini arttırır. Akıllı sayaçların entegrasyonu üretim aygıtlarının dağıtılmış gücünün depolanmasını kolaylaştırmıştır. Yakın gelecekte toplam enerji talebinin mevcut talebin iki katına çıkması beklenmektedir (Rüstemli ve Cengiz, 2015). Bu durum göz önünde bulundurulduğunda pek çok gelişmekte olan ülke ek kaynaklar konusunda yeterli kapasiteye sahip değildir. Bu boşluğun doldurulması için, mevcut üretim kapasitesi yönetilebilir, müşteri talepleri doğrultusunda mevcut yük kontrol edilebilir ve artan kaçak elektriğin önüne geçilebilir.

6. AKILLI SAYAÇ VE KÜRESEL BAZDA KULLANIMI

Avantajları ve uygulamaları göz önünde bulundurulduğunda akıllı sayaç sistemleri dünya çapında büyük ölçekli dağıtım şirketleri tarafından kullanılıyor. Örneğin Austin Energy, yaklaşık 400.000 müşteri ile ABD’nin en büyük elektrik hizmet şirketlerinden biridir. 2008 yılında yaklaşık 260.000 müşteri konutuna akıllı sayaç dağıtmaya başlamıştır. Houstan merkezli bir elektrik hizmet şirketi olan Centerpoint Energy, Houston-Metro ve Galveston yerlerinde 2012 yılına kadar 2 milyon müşteriye akıllı sayaç dağıtmıştır. ABD’de akıllı sayaçların hedeflenen uygulaması 50 milyarlık bir yatırım gerektirir. İtalya’da Enel, Avrupa’da Thirdlargest enerji sağlayıcıları 27 milyon müşteri ile akıllı sayaç dağıtımına başlayarak dünyanın en büyük akıllı sayaç dağıtım projesini oluşturmuştur. Kanada, Ontario hükümeti 2007 yılı sonrasında konut ve küçük işletmeler dahil olmak üzere yaklaşık 800.000 tüketiciye akıllı sayaç dağıtmayı planlamıştır. Kore’de Kore Electric Power Corporation (KEPCO) 2000 yılında sanayi müşterileri için AMR tabanlı enerji ölçüm sistemi uygulamasına başlanmıştır. Şu anda bu sayaç yaklaşık 130.000 yüksek gerilim tüketicisinin enerji tüketim bilgilerini iletir. KEPCO bu akıllı sayaç sistemlerini kullanarak düşük voltajlı müşterilerinin yaklaşık 55.000’i için katma değerli hizmetler sağlar. Avustralya’da Temel Hizmetler Komisyonu Victoria yaklaşık 2,6 milyon elektrik tüketicisi için sayaç kurulumunu zorunlu hale getirmiştir.

İnsan işgücü unsurunun olduğu her türlü yapı dış etkilere açıktır. Tüm dünyada bunu iyi bilen şehir ve şirket yöneticileri akıllı şebekelere yönelmektedirler. Özellikle elektrik, su, doğalgaz gibi kaynakların verimli kullanımı için tüm süreçler artık akıllı şebekelerle yönetilmektedir. Enerji kaynaklarının kullanımında verimliliğin artırılması, maliyetlerin azaltılması ve tasarrufun artırılmasında akıllı sistemler önemli bir katma değer sağlamaktadır. Akıllı şebeke sistemleri bugün birçok gelişmiş pazarda önemli enerji projelerinin altyapısını oluşturmaktadır. 2012'de dünya çapında 186 milyon aktif akıllı sayaç vardı. 2022'de 1,7 milyar akıllı sayacın kullanılacağı öngörülmektedir (Ipakchi ve Albuyeh, 2009:52). Örneğin, Amsterdam, Barcelona gibi şehirlerin altyapı çalışmaları veya Fransa'da ERDF'in 35 milyon sayaç için başlattığı SOGRID projesi, İtalya'da 32 milyon sayaçlık Enel projesi, İspanya'da 13 milyon adetlik Enel Endesa sayaç projesi, Amerika'da Southern California Edison projesi ve İngiltere'deki 53 milyon adetlik elektrik ve gaz sayacı projeleri dünyanın akıllı şebekelere verdiği önemi göstermektedir.

7.SONUÇ

Bu çalışmada akıllı sayaç birkaç önemli yönden incelenmiştir. Çalışmada şirketin akıllı sayaç kullanımında enerji sisteminde oluşacak avantajlar yanı sıra müşteri bakış açısı da ele alınmıştır. Akıllı sayaç iletişimi için çeşitli potansiyel iletişim ağları sunulmuştur. Buna ek olarak tasarım, geliştirme ve kurulumda ki birçok zorluk, gereksinim ve sorunlar tartışılmıştır. Gelişmekte olan ve akıllı sayaç kurulum statüsünde olan ülkeler için bu ülkelerin akıllı sayaçlara olan ihtiyaçları anlatılmıştır. Son olarak dağıtım şirketlerinin özelleştirilmeleri, yasal ayrışma gereksinimi, artan rekabet ve teknolojik gereksinimler neticesinde Türkiye'nin dağıtım sektöründe akıllı sayaç ihtiyacı ön plana çıktığı görülmüş olup bu doğrultuda dağıtım şirketleri ve diğer paydaşların bu değişim ve dönüşüme hazır olmaları gerektiği belirtilmiştir.

İnsan işgücü unsurunun olduğu her türlü yapı dış etkilere açıktır. Tüm dünyada bunu iyi bilen şehir ve şirket yöneticileri akıllı şebekelere yönelmektedirler. Özellikle elektrik, su, doğalgaz gibi kaynakların verimli kullanımı için tüm süreçler artık akıllı şebekelerle yönetilmektedir. Enerji kaynaklarının kullanımında verimliliğin artırılması, maliyetlerin azaltılması ve tasarrufun artırılmasında akıllı sistemler önemli bir katma değer sağlamaktadır.

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TÜRKMENİSTAN ‘MAVİ ALTINININ’ KÜRESEL ENERJİ GÜVENLİĞİNE OLUMLU ETKİSİ

Dövran ORAZGYLYJOW[*]

GİRİŞ

Kalkınmanın yeni devresini yaşamakta olan, ‘enerji ülkesi’ statüsünü daha da pekiştiren Türkmenistan sınırları içinde hidrokarbon kaynaklarının 71,21 milyar tonyakıta eşdeğer potansiyeli bulunmaktadır. Küresel enerji pazarında akaryakıta olan talebin artmasıyla, Türkmenistan sınırları içerisinde var olan çok büyük miktardaki enerji yataklarının önemi daha iyi anlaşılıyor. Tarihi kaynaklara baktığımızda sanayi bakımından petrolün kullanılmaya başlandığı ilk yerlerinden birisinin şimdiki Türkmenistan sınırları içerisinde olduğunu görüyoruz. “Kara Altın” olarak da adlandırılan, geçen yüzyılda etkisini oldukça fazla göstermiş olan petrolün Türkmenistan sınırları içinde önemli rezervleri bulunmaktadır. Milyonlarca ton petrol üreten Türkmenistan, söz konusu petrolü rafine edebilme kabiliyeti giderek artmaktadır. Ülkede üretilen yüksek kaliteli petrol ürünleri uluslararası piyasada büyük rağbet görüyor.

“Mavi Altın” olarak adlandırılan, içinde bulunduğumuz yüzyılın yakıt türü olan doğalgaz konusunda Türkmenistan, dünyanın önemli ülkelerinden biri kabul ediliyor.Uluslararası analistler tarafından onaylanmış olan, “Galkınış” gaz yatağının potansiyelinin 26,2 trilyon metre küp olduğunu dikkate aldığımızda,günümüzde kanıtlanmış doğalgaz kaynakları bakımından dünyada dördüncü olan Türkmenistan’ın gelecekte daha ileri seviyelere çıkabileceğini söylememiz uygun olacaktır.

Son zamanlarda alternatif enerji kaynaklarının kullanım alanlarını genişletmek, bu alanda yeni teknolojileri geliştirmek konusunda dünyada önemli projeler hayata geçirilmektedir. Güneş enerjisi, rüzgar, biokütle gibi alternatif enerji çeşitlerinin kullanımı devamlı ve ivmeyle artmasına karşın, bu yüzyılın ilk yarısında, fosil yakıtların tüketiminin yüzde 70-80 civarında olacağı öngörülüyor. Diğer bir ifade ile, ‘Yeşil enerji’ olarak isimlendirilen güneş, rüzgar enerjisi gibi alternatif kaynaklar özellikle 2050 yılından sonra küresel enerji pazarına daha etkili olmaya başlaması düşünülmektedir. Ayrıca belirtmek gerekir ki Türkmenistan’da, ‘Yeşil teknoloji’konusunda da büyük birpotansiyelin olduğunu belirtmek gerekir.

Bu nedenle “Kara Altının”, “Mavi Altının”hem de “Yeşil Altının” büyük potansiyelini barındıran Türkmenistan günümüzde ‘Enerjinin altın ülkesi’ adını almayı hakkediyor.

Enerjinin diğer kaynakları bakımından büyük potansiyeli olmasına karşın Türkmenistan dünyada özellikle doğalgaz konusunda daha fazla öne çıkıyor. Günümüzde doğalgaz kaynakları bakımından zengin olduğunu ispatlayan Türkmenistan yatırım ve başarı ile yürüttüğü enerji politikası sonucunda bu enerji kaynaklarının çıkarılması ve dış piyasaya ihraç edilmesikonusundaki potansiyeli ile öne çıkıyor. Günümüzde Türkmenistan doğalgaz ihraç eden ülkeler listesinde ilk onda yer alıyor. Enerji alanında uluslararası analistlerin belirttikleri gibi, kısa vadede, yani birkaç yıl sonra Türkmenistan bu listede ilk sıralara yüksek potansiyeli vardır.

[*] “Atavatan Türkmenistan” Dergisi Genel Yayın Yönetmeni

1.21.YÜZYIL, DOĞALGAZIN ALTIN ASRI

Küresel enerji kaynaklarının tüketimi 1965 yılında 3 milyar 755 milyon tona eşdeğer yakıt olarak kayıtlara geçmiştir. Geçen 50 yıla yakın zaman içerisinde bu rakam 3 kat artarak, 2012 yılının sonunda 12,5 milyar tona eşdeğer yakıta ulaşmıştır. 'BP Energy Outlook 2035: 2014' raporuna göre, bu rakamın 2035 yılına kadar yüzde 41 artarak, toplamda 17 milyar 566 milyon ton olması beklenmektedir. Uluslararası Enerji Ajansı'nın tahminlerine göre, 2040 yılında tüm ülkeler tarafından toplam 18 milyar 293 milyon ton yakıtın tüketilmesi bekleniyor. 2040 yılında yüzde 74'ününfosil kaynakların oluşturması bekleniyor.

Uluslararası Enerji Ajansı'nın tahminlerine göre, 2040 yılında petrol tüketimi 4,76 milyar tona, doğal gazın ve kömürün tüketimi ise 4,4 milyar tona ulaşması bekleniyor. 2012 yılında küresel enerji piyasasında 4,1 milyar ton petrol, 3,87 milyar ton kömür ve 2,84 milyar tona eşdeğer doğal gazın tüketildiğini dikkate aldığımızda, diğer yakıt türlerine nazaran küresel doğal gaz piyasasının ne kadar hızlı geliştiğini daha açık görebiliriz. Diğer bir ifade ile 2040 yılına kadar küresel petrol ve kömür piyasası yılda ortalama yüzde 0,5, küresel doğalgaz piyasasının her yılda ortalama yüzde 1,6 büyümesi tahmin ediliyor. Günümüzde uluslararası enerji piyasasında tüketilen enerjinin yüzde 31'ini petrol oluştururken bu rakamın 2040 yılında yüzde 26'ya kadar, kömürün kullanımı yüzde 29'dan yüzde 24'e kadar azalması bekleniyor. Fakat doğalgazın payının yüzde 21'den yüzde 24'e kadar olması bekleniyor. Bu rakamlar diğer enerji türlerine olan talebin miktar olarak artmasına rağmen doğalgazın içinde bulunduğumuz yüzyılın en önemli yakın maddesi olarak daha öne çıkacağını gösteriyor. Bu nedenle 21. yüzyıla doğal gazın asrı deniyor…

2.ULUSLARARASI DOĞALGAZ PİYASASI BÜYÜYOR

Uluslararası Enerji Ajansı'nın geçen yılın Kasım ayında yayınladığı "World Energy Outlook-2014" raporunda, 2040 yılında küresel doğalgaz tüketiminin 5,4 trilyon metreküp olması bekleniyor. Günümüzde bu rakam 3,4 trilyon metre küpten fazladır. Tahminlere göre, 2040 yılına kadar küresel doğal gaz pazarının ortalama yüzde 1,6 büyümesi bekleniyor. Bölgelere göre baktığımızda özellikle Asya, Afrika ve Güney Amerika ülkelerinde gaz pazarının yüksek hızla büyüdüğünü görüyoruz. Doğalgaza olan talep 2040 yılından sonra da artışını sürdürmesi bekleniyor ve doğalgazın 21. yüzyılda etkisini sürdürmesi öngörülüyor. Uluslararası Gaz Ofisinin"Global Vision for Gas" adlı raporunda belirtildiği gibi 2050 yılında dünya nüfusu 9,3 milyara ulaşması, o zamana kadar doğalgaz tüketimi 6,4 trilyon metreküpe ulaşması bekleniyor. Dünyada doğalgaza olan talebin arttığını dikkate aldığımızda ise doğalgazın çok büyük potansiyeli olan Türkmenistan'ın küresel doğalgaz haritasındaki yeri daha sağlamlaşıyor.

Uluslararası Enerji Ajansı'nın 2013 tahminlerine göre, küresel çapta ispat edilmiş doğalgaz miktarı toplam 216 trilyon metreküptür. Bu gaz sahalarının önemli kısmı içerisine Türkmenistan'ı da kapsayan Avrasya bölgesindedir. Bilindiği üzere, Türkmenistan ispat edilmiş gaz yatakları bakımından dünyada dördüncü sıradadır. Tahminlere göre bu rakamların gelecekte daha da artması beklenmektedir.

İspat edilmiş küresel gaz yatakları günümüzde şimdiki hızıyla tüketilmeye devam ederse 63 sene yeterli olur. Burada son 120 yıl içerisinde tüketilen doğalgazın miktarı 100 trilyon metreküp olduğunu belirtmek gerekiyor. Bu durumda yeni gaz yataklarının ispat edilmesi küresel enerji güvenliği için büyük önem arz ediyor. Uluslararası Enerji Ajansı değişik kaynakları analiz ederek, günümüzde dünya gaz yataklarının toplamda 806 trilyon küp metre olduğunu, bunun sadece yüzde 25'nin ispat edilmiş olduğu hesaplanmaktadır. Var olduğu tahmin edilen gaz yataklarının dörtten birinin, daha doğrusu 189 trilyon metreküpü Türkmenistan'ı da kapsayan alan Avrasya bölgesinde olduğu yönündeki tahminler Türkmenistan'ın dünyanın önemli doğalgaz ülkesi olduğunu konusundaki bilgilere yenilerini ekliyor.

Gaza olan talebin artması, doğalgazın yeni yataklarını keşfetmek konusundaki çabaları artırıyor ve bu alanda her yılda büyük yatırımlar hayata geçiriliyor. Mesela 2007 yılında tüm dünyada ispat edilmiş gaz yataklarının toplamı 177,3 trilyon küp metre iken, bu rakam 2011 yılının sonu itibariyle 208 trilyon metre küpe kadar ulaşmıştır. Geçen zaman içerisinde çıkarılan doğalgazı dikkate almadığımızda küresel doğal gaz potansiyelinin yüzde 17,5 artmış olduğunu görüyoruz. Bu büyümenin önemli miktarının Türkmenistan'a ait olması gurur verici olmakla beraber, ülkemizin küresel enerji güvenliğini sağlanmasındaki yerini göstermesi bakımından da önemi haizdir. Bu gelişmeler Türkmenistan'da, "Mavi Altının' büyük potansiyelinin olduğu gerçeğinin herkese duyurulmasına neden oldu. Bu nedenle dünyanın önemli enerji pazarları ve öncü şirketleri gaz sektöründe ülkemiz ile iyi ilişkileri geliştirmeye çalışması doğal bir durumdur. Ayrıca Bağımsız ve Tarafsız Türkmenistan dünya piyasasına gaz sağlayan önemli ülkeler arasında geleceği büyük, güvenli ortak olarak kendini ön plana çıkardı.

3.ULUSLARARASI İLİŞKİLER GELİŞİYOR

Dünya enerji pazarının yıl geçtikçe büyüdüğü günümüzde, enerji üreten ve ihraç eden ülkelerin uluslararası alandaki önemi daha da artmaktadır. Tükettiği enerjiyi ithal eden ülkeler için sadece satın alması değil, güvenilir ortaklardan satın alınması da önemini korumaktadır. Buna günümüzde 'Enerji güvenliği' de deniyor. Yukarıda kesin rakamlar ile belirtildiği gibi günümüzde uluslararası enerji ticaretinin büyük bölümünü petrol ve doğalgaz oluşturmaktadır. Son zamanlarda alternatif enerji kaynaklarına olan talebin artmasına rağmen petrol ve gaz gibi fosil enerji türleri dünya enerji piyasasındaki üstünlüğünü koruması öngörülüyor.

Dünyada doğalgaza olan bu artış doğalgazın büyük yataklarına ev sahipliği yapan ve üretim ve ihracat kapasitesi yüksek olan ülkelerin uluslararası önemini daha da artırıyor. Bu bağlamda Türkmenistan Devlet Başkanımız Gurbanguli Berdimuhamedov liderliğinde yürütülmekte olan enerji politikası ile uluslararası önemi artan ülke olmakla beraber aynı zamanda uluslararası prestiji de artmakta olan ülke konumuna geldi. Türkmenistan çok büyük gaz potansiyeline ve yüksek üretim ve ihracat kapasitesine sahip olmanın yansıra,Türkmen 'Mavi Altınını' tüm insanlığın ortak menfaatine yönlendiren politika izliyor. Türkmenistan liderinin inisiyatifiyle ile bu alanda ortak hukuki temeli oluşturmak konusunda uluslararası çabalarının hayata geçirilmeye başlandığını yeri gelmişken belirtmekte yarar var. Bilindiği gibi 2008 yılında Birleşmiş Milletler Genel Kurulu'nun 63. oturumunda 63/210 numaralı 'Enerji kaynaklarının güvenli ve istikrarlı transit aktarılması hem de sürdürülebilir kalkınmayı ve uluslararası işbirliğini sağlamaktaki faydası' konusunda karar kabul edildi. Ayrıca 17 Mayıs 2013yılında Birleşmiş Milletler Genel Kurulu Türkmenistan Devlet Başkanı Sayın Gurbanguli Berdimuhamedov'un girişimi ile hazırlanan 67/263 numaralı enerji kaynaklarının güvenli ve istikrarlı bir şekilde transit aktarılması kalkınmayı ve uluslararası işbirliğinin geliştirilmesindeki kararı oybirliği ile kabul edildi.

4.TRİLYON METREKÜPLÜK GAZ PAZARI

Küresel gaz üretiminde Türkmenistan'ın sahip olduğu yeri daha iyi yansıtmak için uluslararası gaz üretimini analiz etmek faydalı olacaktır. Uluslararası Enerji Ajansı'nın tahminlerine göre, gaza olan talebin artması sonucu 2040 yılına kadar küresel gaz üretim kapasitesinde 1,94 trilyonluk bir ek artış sağlanacak. Yıllık artış miktarı ve yıllık ortalama artış yüzdesini beraber hesaba kattığımızda Türkmenistan ek kapasiteye en çok katkı yapan ülke olarak öne çıkmakta olduğunu görüyoruz. Daha doğrusu,2040 yılına kadar küresel doğalgaz üretiminin ortalama artışı ile Türkmenistan'ın gaz üretim kapasitesinin ortalama artışını kıyasladığımızda, Türkmenistan'ın gaz üretiminin artışı küresel üretimden 2,31 kat daha fazla olacaktır. Bu durumda 2040 yılına kadar küresel gaz üretiminin yılda ortalama yüzde 1,6 artarak toplam her yılda 5,37 trilyon metre küp olması bekleniyor.

Uluslararası Enerji Ajansı 2040 yılına kadar ek gaz üretimini artıracak ülkelerin listesini hazırladı. Listede Türkmenistan doğalgaz üretimini en çok artıran ülkeler arasında ilk dörde giriyor. Gaz üretimi miktarını en çok artıran ülkelerin arasında Atavatanımız ile beraber Çin ve Hindistan'ın olduğunu da belirtmekte yarar var.

Türkmenistan doğalgazı için en yakın ve önemli gaz pazarları olarak Çin, Hindistan ve Avrupa ülkeleri öne çıkıyor. Çin, Hindistan ve AB ülkelerinin 1,36 trilyonmetre küp kapasiteye ulaşması bekleniyor. Bu ülkelerin tüketeceği doğalgazın büyük bölümünün ithalat ile karşılanacağı düşünüldüğünde yakın gelecekte bu pazarlara yılda 800 milyar metre küp ihraç edileceği öngörülmektedir.

5.TÜRKMENİSTAN'IN "MAVİ ALTINI' ÇİN'DE

Yakın gelecekte Türkmenistan'dan ithal ettiği doğalgazın miktarını daha da artırmayı planlayan Çin'in gaz piyasasının büyüklüğünün 2040 yılında 603 milyar metreküpe ulaşması bekleniyor. Bu ülkede 2012yılında 148 milyar metreküp doğalgaz tüketildi. 1990 yılında Çin'in sadece 16 milyar metre küp doğalgaz tüketiminin olduğu düşünüldüğünde ülkenin gaz pazarının son birkaç yılda ne kadar geliştiğini ve gelecekteki büyüme potansiyelini daha açık görebiliriz. Çin'in tükettiği doğalgazın miktarının artması ülkenin iç enerji piyasasındaki doğalgazın payının artmasına etki ediyor. Mesela günümüzde Çin'in enerji pazarındaki doğalgazın yüzde 4 olan oranı, 2040 yılına kadar 3 kat artarak yüzde 11'e kadar çıkması bekleniyor.

Çin'in gaz pazarının gelişmesi bu ülkenin küresel gaz piyasasındaki önemini artırıyor. Çin günümüzde ABD, Rusya ve AB ülkelerinden sonra dördüncü en büyük pazarı oluşturuyor. Ülke 2030 yılına gelindiğinde büyüklük olarak Rusya'yı geride bırakarak, üçüncü, 2040 yılında ise AB ülkelerinin toplam tüketimini geride bırakarak ikinci büyük pazarı oluşturacaktır. Bu ise gaz üreten ülkeler için dikkatlerin AB'den Çin'e kaydığını gösteriyor. Burada sayın Devlet Başkanımızın liderliğinde Türkmenistan'ın gaz pazarı konusunda tahminleri önceden görüp analiz ederek dünyanın en büyük önemli gaz pazarına ilk olarak gaz ihraç etmeyi başaran ülke olduğunu sevinçle belirtmemeniz gerekiyor.

Çin'in gaz tüketiminin hızlı bir şekilde atması ve iç üretiminin bu artışı yeterince karşılayamaması nedeniyle ülke tükettiği gazın büyük bölümünü ithal etmek durumunda kalıyor. Tahminlere göre, Çin'in 2040 yılında tüketeceği doğalgazın yüzde 39'unu ithal etmesi gerekecektir. Diğer bir ifade ile gelecek 25 yılda Çin'in yıllık gaz ithalatı 234 milyar metre küpe kadar çıkacaktır. Bu durumda Çin güvenli ortak, üzerine aldığı yükümlülükleri tamamen yerine getiren ülke olan Türkmenistan'dan ithal ettiği doğalgazla bu artışı sağlamayı planlıyor.

6.ASYA'NIN ENERJİ HARİTASI YENİDEN ŞEKİLLENİYOR

Bilindiği üzere 2009 yılının sonunda Türkmenistan'dan başlayan yüzyılın enerji hattı olan Türkmenistan-Çin doğal gaz boru hayata geçirilmişti. O zamandan beri milyarlarca metreküp Türkmenistan"Mavi Altını" Çin'e ulaştı. Dünyanın önemli enerji pazarı olan Çin'in günümüzdeki gaz ithalatının büyük bölümü Türkmenistan'dan gidiyor. Daha açık söylemek gerekirse, Türkmenistan, özelde Çin'in, genelde Asya'nın doğalgaz güvenliğine olumlu etki sağlıyor. Büyük doğal gaz yataklarına sahip olan Türkmenistan üretim ve ihracat kapasitesinin yüksek olmasının yanı sıra üzerine aldığı uluslararası yükümlülüklerini eksiksiz yerine getirmesi ile de kendini ispat etmiştir. Bu nedenle dünyanın en önemli enerji pazarı olan Çin Türkmenistan'dan ithal ettiği doğalgazın miktarını daha da artırmak istiyor, bu konuda yeni anlaşmalar yapılıyor.

Asya'nın diğer önemli gaz pazarlarının biri olan Hindistan ise günümüzde hızla gelişen doğalgaz pazarını oluşturuyor. Hindistan'ın gaz üretiminin 2040 yılında 112 milyar metre küp olması bekleniyor. Ama ülkenin doğalgaz üretiminin artmasına karşın doğalgaza olan talebin daha fazla artması nedeniyle Hindistan'ın 2040 yılında tükettiği doğalgazın yarısına yakınını ithal etmesi bekleniyor. Tahminlere göre, Hindistan'ın 2040 yılında gaz piyasasının büyüklüğü 202 milyar metre küp olması bekleniyor. Diğer bir ifade ile Hindistan 2040'ta yılda ortalama 91 milyar metre küp doğalgazı ithal etmesi gerekecek. Bu nedenle TAPI (Türkmenistan-Afganistan-Pakistan-Hindistan) doğalgaz boru hattı projesinin hayata geçmesi Asya'nın doğal az haritasını yeniden şekillendirmenin yanısıra Hindistan'ın enerji güvenliği için olumlu etki sağlayacaktır.

7.AVRUPABİRLİĞİ: ENERJİ GÜVENLİĞİ İÇİN TÜRKMEN"MAVİ ALTINI"

Tahminlere göre, Avrupa Birliği'nin gaz pazarının büyüklüğü şimdiki üyelerini dikkate aldığımızda, 2040 yılında 559 milyar metreküp olması bekleniyor. Bu tarihte Birlikteki gaz üretimi yılda106 milyar metre küp olması bekleniyor. 2012 yılının sonu itibariyle Birliğin gaz üretiminin 174 milyarmetre küp olduğu düşünüldüğünde Avrupa'nın ithal etmesi gereken doğalgaz artışı gaz pazarının büyümesinden ziyade doğalgaz üretiminin azalması nedeniyle olacaktır. AB'nin 2025 yılında 386 milyar, 2040 yılında ise 453 milyar doğalgaz ithal etmesi bekleniyor. Diğer bir ifade ile AB tükettiği doğalgazın yüzde 81'ini ithal etmek durumunda kalacak. Doğalgaz ithalatı devamlı artan AB gaza olan talebini karşılamak hem de enerji güvenliğini sağlamak için Türkmen doğalgazını ithal etmek istiyor ve gerekli çabayı sarf ediyor. Çünkü günümüzde doğalgazın sadece satın alınması yetmiyor. Aynı zamanda doğalgazın birkaç ülkeden satın alınmasının önemi de artıyor. Üzerine aldığı yükümlülükleri eksiksiz yerine getiren güvenli ortaklarda doğalgazın satın alınması ise enerji güvenliğinin en önemli şartı kabul ediliyor.

8.TÜRKMEN-TÜRK DOĞALGAZ İŞBİRLİĞİ GELİŞİYOR

Türkiye doğalgaz piyasası bakımından devamlı gelişmekte olan bir ülkedir. Grafikte de görüldüğü üzere Türk doğalgaz pazarının beş yıllık gelişimine baktığımızda her beş yıllık zaman diliminde ülkenin gaz pazarı iki kat büyüyor. Türkiye iç petrol ve doğalgaz üretimini artırmak için petrol yasasını çıkarmışsa da ispat edilen doğalgaz yataklarının çok az olması nedeniyle tükettiği doğalgazın tamamına yakınını ithalat yoluyla karşılıyor. Enerji güvenliğinin özellikle de doğal gaz güvenliğinin öneminin daha fazla arttığı günümüzde bölgesel ve uluslararası konularda daha aktif hale gelmekte olan Türkiye için doğalgaz temininin çeşitlendirilmesi büyük önem arz ediyor. Türkiye'nin jeostratejik konumu da dikkate alındığında, Türkiye sadece doğalgazı satın almak ve transit geçirmek istemiyor. Aynı zamanda uluslararası doğalgaz pazarında da söz sahibi olmak istiyor. Türkmenistan'da ise doğalgazın büyük potansiyeli mevcuttur. Türkmenistan'ın ispatlanmış doğalgaz kaynakları Türkiye'nin günümüzdeki doğal gaz tüketimini 500 yıldan fazla karşılayabilir. Bu durumda "Kemik kardeşlerin", yani Türkmenistan ve Türkiye'nin arasındaki doğalgaz alanındaki işbirliği büyük önem arz ediyor. Malum olduğu üzere Cumhurbaşkanı Recep Tayyip Erdogan'ın 6-7 Kasım 2014 tarihinde Türkmenistan ziyaretinde iki ülkenin işbirliğinin daha da geliştirilmesi adına birçok anlaşmaya imza atıldı. Söz konusu anlaşmalar arasında "Türkmengaz" devlet kurumu ve 'Atagas Dogalgaz Ticaret A.Ş.'şirketi arasında doğalgazın satın alınması, satılması konusunda çerçeve anlaşması imzalandı. Bu anlaşmanın yakın gelecekte başarılı bir şekilde hayata geçirilmesi ile Türkmen-Türk ilişiklerinin enerji alanında da gelişeceğini söyleyebiliriz.

9."MAVİ İPEK YOLU"HAYATA GEÇİYOR

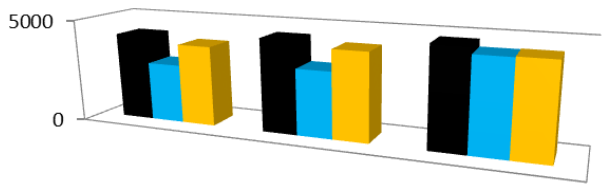
Türkmenistan'dan başlayan bir taraftan Çin'e ve Hindistan'a doğru yol alan, diğer taraftan Türkiye ve Avrupa ülkelerine kadar ulaşacak olan, Türkmenistan'ın"Mavi Altını", tarihi ipek yolunun belki de tekrar canlanmasının yeni yansımasını oluşturacak. Belki de bu doğalgaz hatlarına gelecekte "İpek yolu doğal gaz hattı" veya "Mavi İpek yolu' adı verilecek. Ama şu bir gerçek ki Türkmenistan'dan her yıl ihraç edilecek milyarlarca metreküp doğal gazın uluslararası piyasalara olumlu etkisinin olacağı bir gerçektir.

10.RAKAMLARLA TÜRKMENİSTAN'IN "MAVİ ALTINI"

- Uzmanların değerlendirmelerine göre, Türkmenistan'ın hidrokarbon kaynaklarının toplam kapasitesi 71,2 milyar ton yakıta eşdeğer.
- Türkmenistan'ın hidrokarbon kaynaklarının toplam potansiyelinin53 milyar tonu karada, 18,2 milyar tonu ise denizin altında.
- Türkmenistan'ın hidrokarbon kaynaklarının toplam kapasitesinin yüzde 70'den fazlasını doğal gaz oluşturuyor.
- Dünyada doğalgaz rezervi bakımından dördüncü olan Türkmenistan, günümüzde Rusya, İran ve Çin'e ihracat gerçekleştiriyor.
- Eylül 2013'te Türkmenistan'ın ve Çin Halk Cumhuriyeti'nin devlet başkanları yıllık 25 milyar metre küp kapasiteli doğalgaz hattının dördüncü hattının inşası konusunda anlaşma imzaladılar
- Türkmenistan-Çinboru hattının yılda 25 milyar metre küp kapasitesi olan üçüncü hattınıninşası 2014 yılının sonunda tamamlandı.
- 2015 yılında Türkmenistan'dan Çin'e ihraç edilen doğalgazın miktarı 55 milyar metre küpe ulaşacak.
- Türkmenistan-Özbekistan-Tacikistan-Kırgızistan-Çinüzerinden geçecek yeni hattın inşasının 2017 yılında tamamlanması öngörülüyor.
- 2017 yılına kadar doğu hattının kapasitesi yıllık 80 milyar metreküpe kadar artırılacak.
- Çin'in CNPC milli petrol ve gaz şirketi ile "Türkmengaz" devlet kurumu arasında imzalanan anlaşmaya göre Türkmenistan 2021 yılının sonuna kadar yıllık 65 milyar metre küp doğalgaz ihraç edecek.
- Rusya Federasyonuna giden doğalgaz hattının kapasitesi senede 10 milyar metreküpe kadar yükseltilecek. Mevcut olan bu kapasite gönderilen gazın miktarını artırmaya müsait.
- İran İslam Cumhuriyeti'ne giden hattın yıllık kapasitesi 20 milyar metre küpe kadar çıkarılacak.
- Türkmenistan-Afganistan-Pakistan-Hindistan doğalgaz boru hattının kapasitesi yıllık 33 milyar metreküp olacak.
- Trans Hazar doğalgaz boru hattının kapasitesi senede30 milyar metre küp olacak.

- Türkmenistan’ın toplam ihracatını gelecekte her sene 10 milyar metre küp artarak yıllık 160-170 milyar metreküpe çıkarılabilir.
- Gelecek 30 yıliçerisinde gazın ihracat miktarını 5,4 trilyon metre küpe kadar artırılmasıbeklenmektedir.
- Sadece “Galkınış” ve ‘Yaşlar”sahalarının kapasitesi26,2 trilyon metreküp olmakla beraber, arama faaliyetleri kapasitesinin daha da artacağını gösteriyor.
- 2014 yılında Türkmenistan’da üretilen doğalgazın miktarı 76 milyar metreküp, ihracatı ise 45 milyar metreküpten fazla oldu.
- 2015 yılında Türkmenistan 80 milyar metreküp gaz üretmeyi planlıyor.

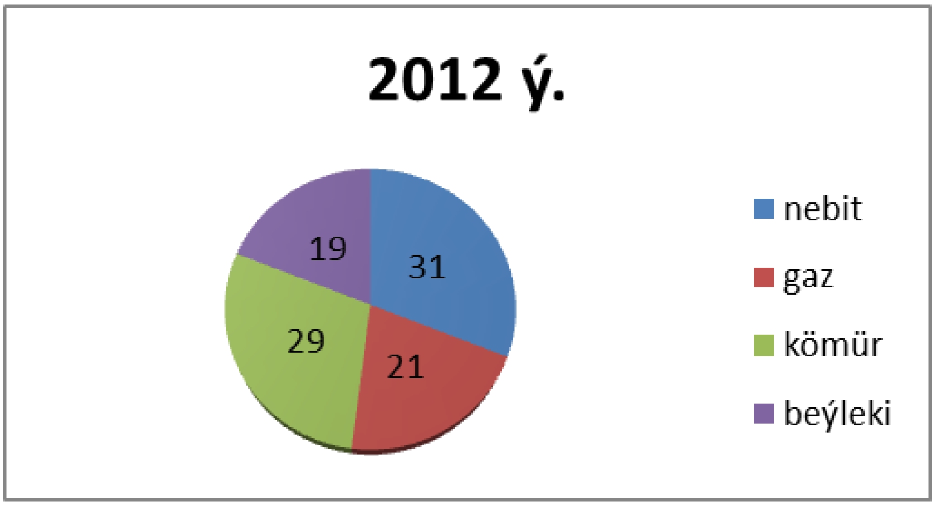
Global Energiýa Bazarynyň ösüş depgini
Küresel Enerji Pazarının Gelişimi



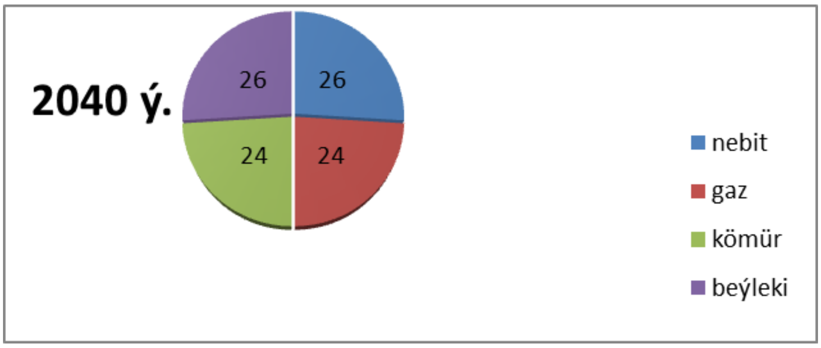
	2012	2020	2040
Nebit	4194	4487	4761
Tebigy Gaz	2844	3182	4418
Kömür	3879	4211	4448

milliard ton şertli ýangyç

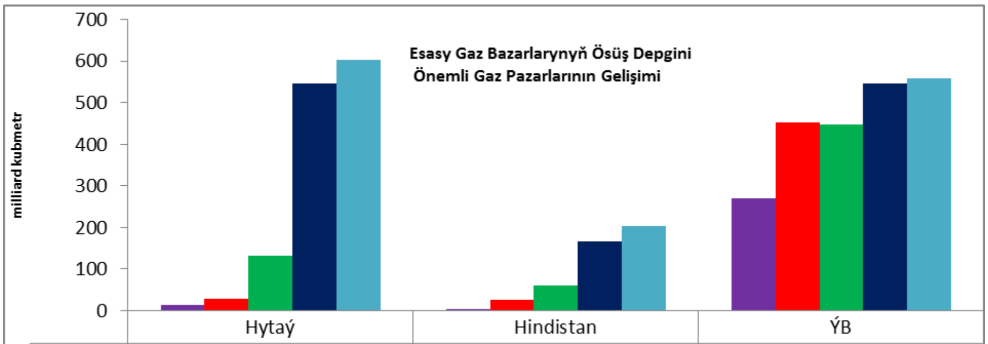
Nebit Tebigy Gaz Kömür



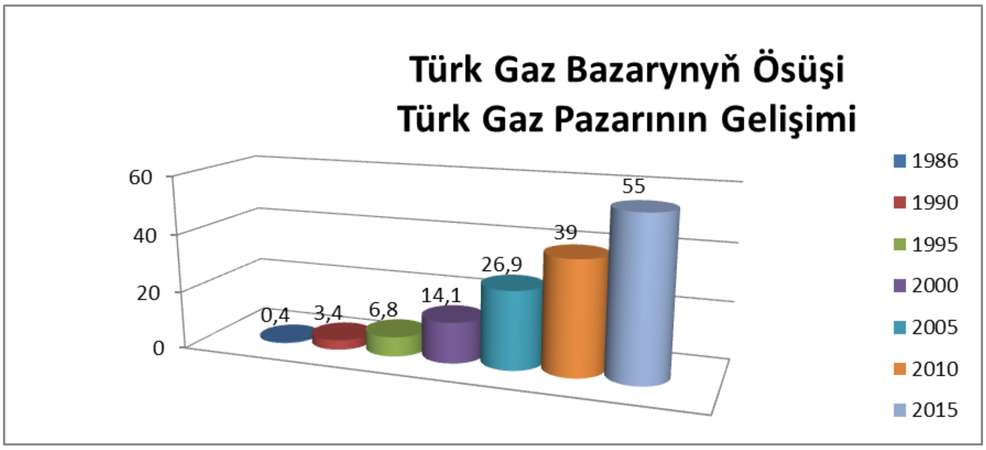
	Hytaý	Hindistan	ÝB
2012 ý.	40	18	304
2025 ý.	171	44	386
2040 ý.	234	91	453



Global Energiýa Bazarynda Ýangyç serişdeleriniň orny



	Hytaý	Hindistan	ÝB
1981 y.	12,7	2,1	269,1
2001 y.	27,4	26,4	451,9
2011 y.	130,7	61,1	447,9
2035 y.	545	167	546
2040 ý.	603	202	559


Türk Gaz Bazarynyň Ösüşi
Türk Gaz Pazarının Gelişimi
60
40
20
0
0,4
3,4
6,8
14,1
26,9
39
55
1986
1990
1995
2000
2005
2010
2015

ENERJİ FİYATLARININ SANAYİ ÜRETİMİ ÜZERİNE ETKİSİ: TÜRKİYE ÖRNEĞİ (2005-2014)

EFFECTS OF ENERGY PRICES ON INDUSTRIAL PRODUCTION: THE CASE OF TURKEY (2005-2014)

Fatmanur GÜDER[*]
Ahmet KAHILOĞULLARI[†]

ÖZET

Ülkelerin ekonomik performanslarını göstermede önemli bir veri olan sanayi üretiminin başlıca girdisi enerji kaynaklarıdır. Bu çalışmada enerji kaynaklarında görülen fiyat artışı ile sanayi üretimi arasındaki ilişki incelenmiştir. Çalışmada Türkiye'nin 2005-2014 dönemi aylık verileri kullanılarak Granger Nedensellik Analizi uygulanmıştır. Sonuçlar enerji fiyatları ile sanayi üretimi arasında tek yönlü bir nedensellik ilişkisi olduğunu göstermiştir. Enerji fiyatlarında görülen değişim sanayi üretim miktarını etkilemektedir.

Anahtar kelimeler: Sanayi üretimi, Enerji fiyatları, Granger Nedensellik Analizi

ABSTRACT

The major input of industrial production, which is an important data showing the economic performance of countries, is the energy resources. In this study, the relationship between enegy prices and industrial production is examined. The study carries out the Granger Causality Test by using the monthly datas during the period 2005 –2014 in Turkey. The results indicate that energy prices have an effect on industrial production.

Key Words: Industrial production, Energy prices, Granger Causality Test

1.GİRİŞ

Küresel dünyada rekabet içinde olan ekonomiler kalkınmayı sağlamak için üretim ve istihdam yapısını tarım yerine sanayi ve hizmet sektörleri vasıtasıyla sağlamaya çalışmaktadır. Sanayi üretimindeki artış ülkelerin ekonomik hasıla verilerini artırmakta ve makro iktisadi göstergeler üzerinde olumlu etkiler yaratmaktadır. Öte yandan enerji, sanayi üretiminin ana girdisidir. Enerji, rezerve sahip ülkeler için avantaj olabileceği için rezerv yoksunu olan özellikle gelişmekte olan ülkeler için de bir sorun teşkil etmektedir. Rezerve sahip olmayan ülkeler enerjiyi ithalat yoluyla sağlamakta ve böylece üretimi artırmayı hedeflemektedir. Ancak enerjide dışa bağımlılık, dış gelişmelerden daha kolay etkilenmesine sebep olmaktadır.

Dünya'daki enerji kaynakları dönüştürülebilirliklerine göre birincil (kömür, petrol, doğal gaz, nükleer, biyokütle, hidrolik, güneş, rüzgar, dalga) ve ikincil (elektrik, benzin, mazot, motorin, ikincil kömür, kok, petrokok, havagazı, lpg) enerji kaynakları olarak ayrılmaktadır. Bu kaynakların tüketim oranları incelendiğinde birincil enerji tüketiminin

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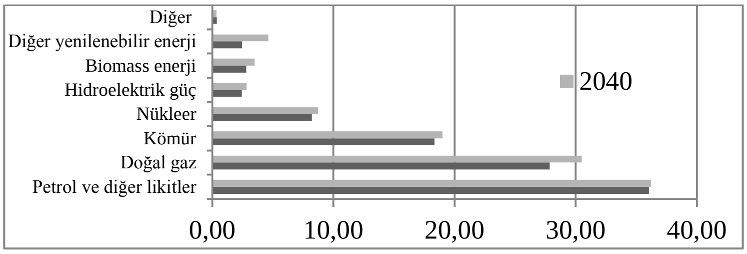
büyük bir yer kapladığı görülmektedir. Birincil enerji kaynakları içerisinde en çok tüketilen enerji kaynakları ise petrol, doğal gaz ve kömürdür. EIA'nın tahminlerine göre 2040 yılında bu üç enerji kaynağının tüketimi artış gösterecektir. En fazla artışın ise doğal gaz tüketiminde görüleceği öngörülmektedir (Grafik 1). Bu sebeple çalışmada petrol, doğal gaz ve kömür fiyatlarını içeren enerji fiyat endeksi kullanılmış, bu fiyat endeksinin sanayi üretimi üzerine etkisi analiz edilmiştir.

Grafik 1. Dünya'da Enerji Kaynaklarına Göre Tüketim (Katrilyon Btu)



Kaynak: U.S. Energy Information Administration (EIA, 2015).

Dünyada olduğu gibi Türkiye'de de en çok tüketilen enerji kaynağı birincil enerji kaynaklarıdır. Türkiye, enerji talebi yurt içinde üretilenden daha fazla olduğu için gerekli ihtiyacını ithalat yoluyla sağlamaktadır. Sanayi sektörünün girdisi olan enerji kaynaklarının fiyatlarında görülen değişimin maliyetleri etkileyerek sanayi sektörüne etki edeceği öngörülmektedir. Bu çalışmada bu etkinin Türkiye için geçerli olup olmadığı sınanmıştır.

2. LİTERATÜR

Enerji fiyatlarının makroekonomik etkileri üzerine yapılan araştırmalar iktisat literatüründe oldukça fazladır. Türkiye ve benzeri ekonomik yapıya sahip ülkelerde sanayi ve enerji üretiminde petrol ve yan ürünlerini yoğun olarak kullanıldığı için enerji fiyatlarından ziyade petrol fiyatları veri olarak alınmıştır. Enerji veya petrol fiyatlarının ülkelerdeki makroekonomik değişkenler üzerine etkilerini tartışan çok sayıda çalışma olsa da spesifik olarak sanayi üretimini baz alan araştırma sınırlıdır.

Barışık ve Yayar (2012) sanayi üretimi ile iktisadi değişkenler arasındaki nedensellik ilişkilerini ortaya koymak amacıyla Türkiye'nin Ocak 1998- Aralık 2010 dönemi aylık sanayi üretim endeksi verileri ile Varyans Ayrıştırması Analizi'ni gerçekleştirmiş ve petrol fiyatlarının sanayi üretimi üzerinde etkili olduğu sonucuna ulaşmışlardır. Öte yandan Eksi vd. (2011), bazı OECD ülkelerinin verilerini ele alarak ham petrol fiyatlarının sanayi üretimi üzerine etkisini incelemiştir. Sonuçlara göre kısa dönemde Fransa hariç tüm ülkelerde ham petrol fiyatlarından sanayi üretimine doğru bir nedensellik ilişkisi bulunmuştur. Fransa'da ise kısa dönemde sanayi üretiminden petrol fiyatlarına doğru bir nedensellik ilişkisi söz konusudur. Öte yandan Hata Düzeltme Modeli kullanılarak uzun dönemde Amerika'da petrol fiyatlarının sanayi üretimini etkilediği sonucuna ulaşılmıştır. Kısaca bu çalışmada petrol fiyatlarının sanayi üretimi üzerinde etkisi olduğu sonucuna ulaşılmıştır. Bu çalışmada bulunan bir diğer önemli sonuç ise petrol ihracı ve ithali yapan ülkelerde de benzer sonuçların gözlenmesidir.

Bayar ve Kılıç (2014), panel regresyon yöntemiyle 18 ülkenin Ocak 2001- Eylül 2013 dönemi verilerini kullanarak petrol ve doğal gaz fiyatlarının sanayi üretimi üzerine etkisini incelemişlerdir. Çalışma sonucunda petrol ve doğal gaz fiyatlarının sanayi üretimi üzerine negatif bir etkisi olduğu tespit edilmiştir. Petrol fiyatlarının sanayi üretimine negatif etkisi olduğunu savunan diğer çalışmalar ise Lee ve Ni (2002), Jiménez-Rodríguez (2007), Lippi ve Nobili (2008), Bredin vd. (2008), Kumar (2009) and Tang vd. (2010) şeklinde sıralanabilir. Cobo-Reyes ve Quiros (2005) da petrol fiyat şokları ile sanayi üretimi ve sanayi üretimi ile hisse senedi getirisi arasındaki ilişkiyi araştırdıkları çalışmada, petrol fiyatlarında görülen artışın sanayi üretimi ve hisse senedi getirilerini negatif ve anlamlı bir şekilde etkilediği sonucuna varmışlardır. Ancak bu artış, hisse senedi getirileri üzerinde sanayi üretiminden daha fazla etkili olmuştur.

Mehrara ve Sarem (2009) ise petrol ihraç eden İran, Suudi Arabistan ve Endonezya ülkelerinde 1970-2005 yıllık verilerini kullanarak petrol fiyatlarının sanayi üretimi üzerine etkilerini araştırmıştır. İran ve Suudi Arabistan'da petrol fiyatlarından sanayi üretimine doğru güçlü bir ilişki bulunmuştur. Öte yandan Endonezya'da ne kısa ne de uzun dönemde anlamlı bir ilişki söz konusu değildir. Faria vd. (2009), çalışmasında Çin'in 1992-2005 aylık verilerini kullanarak petrol fiyatlarındaki artışın etkilerini tespit etmiştir. Sınır testi yaklaşımının uygulandığı analizde petrol fiyatlarının ihracata pozitif etki ettiği sonucu bulunmuş, bunun yanı sıra petrol fiyatlarının sanayi üretim endeksi üzerine etkisi pozitif olsa da anlamlı bulunmamıştır. Ayadi (2005) ise 1980-2004 Nijerya verileri ile uyguladığı VAR modelinde petrol fiyatlarının sanayi üretimi üzerinde bir etkisi olmadığı sonucuna ulaşmıştır.

Sanayi üretim endeksi yerine ekonomik büyümeyi veri alan ve enerji fiyatlarının ekonomik büyüme üzerine etkisini tartışan birçok çalışma bulunmaktadır. Hamilton (1983), 1948-1980 Amerika Birleşik Devleti verileri ile Korelasyon ve Granger Nedensellik Analizi yöntemini kullandığı çalışmasında, petrol fiyatları ile ekonomik büyüme arasında negatif yönlü bir ilişki bulmuştur. Hooker (1996) ise Amerika için petrol fiyatlarının ekonomik büyüme, işsizlik gibi makroekonomik değişkenlerin Granger nedeni olduğu sonucuna ulaşmıştır. Ancak bu ilişkinin 1973 sonrası dönemde güçlü olmadığını ortaya koymuştur.

Yaylalı ve Lebe (2012), ithal ham petrol fiyatlarının makroekonomik aktiviteler üzerindeki etkisini araştırmıştır. Türkiye'nin 1986-2010 çeyrek dönem verileri ile Vektör Otoregresif Model Analizi'nin (VAR) kullanıldığı çalışmada, ham petrol varil fiyatının büyüme, enflasyon, para politikası ve döviz kuru üzerine etkisi incelenmiştir. Büyüme yerine sanayi üretim endeksi verilerinin kullanıldığı çalışmada, ithal ham petrol fiyatlarının Türkiye'nin makroekonomik performansı üzerinde etkili olduğu sonucuna ulaşılmış, en büyük etkisinin ise para arzında görüldüğü vurgulanmıştır.

Hossein, vd. (2012), OPEC ülkeleri verilerini ele alarak enerji fiyatları, enerji tüketimi ve ekonomik büyüme arasındaki ilişkiyi analiz etmek amacıyla Eşbütünleşme ve Hata Düzeltme Modelini uygulamıştır. Test sonuçlarına göre kısa dönemde İran, Irak, Katar, Birleşik Arap Emirlikleri ve Suudi Arabistan ülkelerinde enerji ve fiyatlardan ekonomik büyümeye doğru dolaylı bir nedensellik söz konusudur. Katar, Suudi Arabistan ve Nijerya'da bu nedensellik ilişkisi çift yönlü değildir.

Jiménez-Rodríguez ve Sánchez (2004) ise petrol şoklarının bazı OECD ülkelerindeki etkilerini incelemiştir. VAR analizinin kullanıldığı çalışmada petrol fiyatlarının ekonomik büyüme üzerinde doğrusal olmayan bir etkiye sahip olduğu sonucuna varılmıştır. Çalışmaya göre petrol fiyatlarında görülen artış, büyüme üzerinde petrol fiyatlarındaki azalmadan daha büyük bir etkiye sebep olmaktadır. Petrol ithal eden ülkelerde ise petrol fiyatlarında görülen artışın büyüme üzerinde negatif etki yaptığı görülmüş ancak bu durumun Japonya için geçerli olmadığı kanıtlanmıştır. Öte yandan petrol ihraç eden ülkelerde ise iki farklı durum söz konusudur. Bu çalışmada petrol fiyatlarında görülen artış İngiltere'deki büyüme rakamlarını negatif, Norveç'i ise pozitif etkilemiştir.

Asafu-Adjaye (2000) da Endonezya, Filipinler ve Tayland için enerji fiyatları, gelir ve enerji tüketimi verilerini incelemiştir. Uzun dönemde Hindistan ve Endonezya için enerji ve fiyatlardan gelire doğru tek yönlü Granger nedensellik söz konusudur. Tayland ve Filipinler'de ise enerji tüketimi, gelir ve enerji fiyatlarının karşılıklı olarak nedensel olduğu sonucuna varılmıştır. Saari, vd. (2013) ise enerji fiyatlarının Malezya'da üretim maliyeti ve hane halkı yaşam giderleri üzerine etkilerini incelemişlerdir. Sonuçlara bakıldığında elektrik ve petrol fiyatları birlikte arttığında enerji fiyatları, üretim maliyetleri ve hane halkının yaşam giderlerini ciddi anlamda etkilemektedir.

Literatür taramasında görüldüğü üzere enerji fiyatlarının makroekonomik etkileri ülkelere göre değişim göstermektedir. Enerji fiyatlarında görülen değişim bazı ülkelerde sanayi üretimi üzerinde etkili olsa da bazı ülkelerde bu ilişki söz konusu değildir. Bu çalışmada bu durumun Türkiye için geçerli olup olmadığı araştırılmıştır.

3. VERİLER, YÖNTEM, ANALİZ

Çalışmada Vektör Otoregresyon (VAR) ve Granger Nedensellik Analizleri kapsamında 2005-2014 dönemi aylık verileri kullanılarak sanayi üretim endeksi ve enerji endeksi arasındaki ilişki incelenmiştir. Sanayi üretim endeksi serisi Türkiye İstatistik Kurumu'nun (TÜİK) veri tabanından alınmıştır. Petrol, doğalgaz ve kömür fiyatlarını içeren enerji endeksi serisi ise Uluslararası Para Fonu (IMF) veri sisteminden elde edilmiştir. Veriler mevsim ve takvim etkisinden arındırılmış verilerdir. Sonuçların anlamlılığı %5 seviyesinde tespit edilmiştir.

Kullanılan değişkenler sembolleri ile birlikte Tablo 1.'de sunulmuştur.

Tablo 1. Analizde Kullanılan Değişkenler ve Sembolleri

Değişkenlerin Sembolleri	**Değişkenler**
Sanayi	Sanayi Üretim Endeksi (2010=100)
Enerji	Enerji Endeksi (2005=100)

İki değişken arasındaki nedenselliğin tespiti için literatürde çoğunlukla Granger (1969) testi uygulanmaktadır. Bu analiz, serilerin durağan olduğu varsayımı altında gerçekleştirilir. Bu sebeple bu bölümde sanayi ve enerji endekslerinin durağan olup olmadığı test edilmiştir. Durağanlığın analizi için 1979 yılında Dickey ve Fuller tarafından geliştirilen ADF (Augmented Dickey Fuller) testi kullanılmıştır.

$$\Delta Y_t = \alpha + \gamma T + \rho Y_{t-1} + \sum_{i=0}^{k} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

Test kapsamında ortaya konan 1 numaralı denklemde ΔY_t değişkenin birinci farkını, T trendi, ΔY_{t-i} ise gecikmeli fark terimlerini göstermektedir. Bu denklemde analiz edilen ρ değişkenin sıfıra eşit olup olmadığıdır. Kurulan hipotezler şu şekildedir;

H_0: seride birim kök vardır, seri durağan değildir. (ρ=0)

H_1: seride birim kök yoktur, seri durağandır. ($\rho \neq 0$)

Boş hipotezin (H_0) reddedilmesi Y değişkeninin durağan olduğunu göstermektedir. H_0 hipotezinin reddedilmemesi durumunda ise serinin birim kök içerdiği ve durağan olmadığı sonucuna varılır.

Bu çerçevede her bir seriye ilişkin üç farklı model kurulmuştur. Bunlar;

- Sabitsiz, trendsiz,
- Sabitli, trendsiz ve
- Sabitli, trendlidir.

Maksimum gecikme uzunluğu 8 olmak üzere Schwartz bilgi kriterine göre uygulanan durağanlık analizi sonuçları Tablo 2'de verilmiştir.

Tablo 2. Augmented Dickey-Fuller Durağanlık Test Sonucu

Sabitsiz, Trendsiz			
	Gecikme	**İstatistik**	**P – değeri**
lenerji	1	-0.023973	0.6728
denerji	0	-6.300460	0.0000
lsanayi	0	1.471847	0.9716
dsanayi	1	-6.199629	0.0000
Sabitli, Trendsiz			
	Gecikme	**İstatistik**	**P – değeri**
lenerji	1	-2.702127	0.0767
denerji	0	-6.266781	0.0000
lsanayi	0	-0.793560	0.8170
dsanayi	1	-6.463415	0.0000
Sabitli, Trendli			
	Gecikme	**İstatistik**	**P – değeri**
lenerji	1	-2.503525	0.3260
denerji	0	-6.410744	0.0000
lsanayi	1	-2.270148	0.4464
dsanayi	1	-6.444407	0.0000

Analiz sonuçlarına göre serilerin, logaritmalı hallerinin (lsanayi-lenerji) düzeyde birim kök içerdiği görülmektedir. Birinci farkı alınan enerji ve sanayi serileri (dsanayi-denerji) durağan hale gelmiştir. Durağan hale gelen seriler ile analize devam edilmiştir.

Granger Nedensellik testinde kullanılacak optimum gecikme uzunluğunun belirlenmesi amacıyla VAR modeli kurulmuş, Tablo 3.'de beş farklı çeşit bilgi kriteri dikkate alınarak optimum gecikme uzunluğu belirlenmiştir.

Tablo 3. Gecikme Uzunluğunun Belirlenmesi

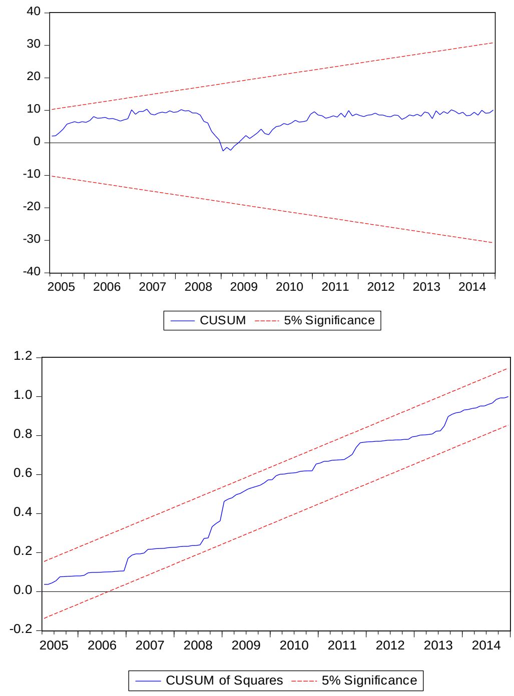
Lag	LogL	LR	FPE	AIC	SC	HQ
0	420.9687	NA	1.81e-06	-7.548986	-7.500165	-7.529181
1	449.6609	55.83338	1.16e-06*	-7.993890*	-7.847428*	-7.934475*
2	450.9325	2.428701	1.22e-06	-7.944730	-7.700628	-7.845705
3	451.7385	1.510310	1.29e-06	-7.887180	-7.545437	-7.748545
4	453.0155	2.346942	1.35e-06	-7.838117	-7.398734	-7.659872
5	456.6662	6.577915	1.36e-06	-7.831824	-7.294800	-7.613969

6	465.3713	15.37107*	1.25e-06	-7.916600	-7.281935	-7.659135
7	466.5863	2.101643	1.32e-06	-7.866420	-7.134114	-7.569345
8	469.3876	4.744501	1.35e-06	-7.844821	-7.014875	-7.508136

Tablo 3.'te görüldüğü üzere Final Prediction Error (FPE), Akaike (AIC), Schwarz (SC) ve Hannan-Quinn (HQ) bilgi kriterlerine göre optimum gecikme uzunluğunun 1 olduğu tespit edilmiştir.

Gecikme uzunluğunun belirlenmesinin ardından değişkenlerin yapısal kırılma içerip içermediği araştırılmıştır. Yapısal kırılmanın varlığını araştırmak amacıyla CUSUM ve CUSUM Q (Brown ve Durbin ve Evans, 1975) testleri uygulanmıştır (Grafik 2).

Grafik 2. Cusum ve Cusum Q Test Sonuçları



Çalışma döneminde serilerde yapısal bir kırılmanın varlığına rastlanmaması sebebiyle modelde bir yapay değişkene ihtiyaç duyulmamıştır. Bu testin ardından değişkenler arası nedenselliğin yönünün tespiti için Granger Nedensellik Analizi uygulanacaktır.

Granger Nedensellik Analizi için kullanılan boş hipotez nedensellik ilişkisinin olmadığını gösterirken, boş hipotezin reddedilmesi halinde alternatif hipotez nedensellik ilişkisinin mevcut olduğunu gösterir.

H_0: Nedensellik yoktur.

H_1: Nedensellik vardır.

Granger Nedensellik Analizi'nde kullanılan modeller 2 ve 3 numaraları ile belirtilmiştir.

$$Y_t = \alpha_0 + \sum_{i=1}^{k1} \alpha_i Y_{t-i} + \sum_{i=1}^{k2} \beta_i X_{t-i} + \varepsilon_t \quad (2)$$

$$X_t = \chi_0 + \sum_{i=1}^{k3} \chi_i X_{t-i} + \sum_{i=1}^{k4} \delta_i Y_{t-i} + v_t \quad (3)$$

Granger Nedensellik Analizi, 2 ve 3 numaralı denklemlerde hata teriminden önce gelen bağımsız değişkenin gecikmeli değerlerinin katsayılarının grup halinde sıfıra eşit olup olmadığı sınanarak uygulanır. 2 numaralı modeldeki βi katsayılarının sıfırdan farklı bulunması halinde 'X değişkeni Y değişkeninin nedenidir' sonucuna ulaşılır. Benzer durum 3 numaralı model için de geçerlidir. 3 numaralı modeldeki δ i katsayılarının sıfırdan farklı çıkması durumunda Ho hipotezi reddedilir ve Y değişkeninin X değişkeninin nedeni olduğu sonucuna ulaşılır.

Tablo 4. VAR Granger Nedensellik Test Sonuçları

Nedenselliğin Yönü	Enerji Fiyatları > Sanayi üretimi
Chi-sq	32.88374
df	1
Prob.	0.0000
Karar	H_0 reddedilir.

Analiz sonuçlarına bakıldığında H_0 boş hipotezi reddedilmektedir. Enerji fiyatlarından sanayi üretimine doğru bir nedensellik söz konusudur. Enerji fiyatları Türkiye'de sanayi üretim indeksinin Granger nedenidir.

4. SONUÇ

Küresel rekabet ortamında ülkeler tarım yerine sanayi ve hizmet sektöründe gelişim göstermeyi hedeflerler. Ülkelerin sanayileşme düzeyleri bir gelişmişlik göstergesidir. Sanayi sektöründe üretimini arttırmaya çalışan ülkeler enerjiye ucuz ve kolay yolla ulaşabilmeyi tercih ederler. Ancak yeterli enerji rezervine sahip olmayan ekonomiler gerekli enerji girdisini ithal edecekleri için enerji fiyatlarında görülen değişimden etkilenebilmektedirler.

Çalışmada 2005-2014 dönemi aylık verileri kullanılarak petrol, doğalgaz ve kömür fiyatlarını içeren enerji fiyat endeksinin Türkiye'de sanayi üretimi ile ilişkisi Granger Nedensellik Analizi ile test edilmiştir. Araştırma sonuçları enerji fiyatlarının sanayi üretiminin Granger nedeni olduğunu ortaya koymaktadır. Enerji fiyatlarındaki değişim Türkiye'deki sanayi üretim miktarını etkilemektedir.

Sanayi üretim miktarını arttırarak uluslararası rekabette kendine yer edinmeye çalışan Türkiye'nin, enerji fiyatlarından direkt olarak etkilenmemek için çeşitli önlem alması gerekmektedir. Bunun için ihracata dayalı büyüme modelini benimseyen Türkiye, ihraç malı ürünlerinde kullandığı ithal girdiyi yurt içinde üretmeyi teşvik etmeli, petrol arama faaliyetlerini arttırılmalı, enerji üretim kapasitesinin kullanım oranını arttırmalıdır. Öte yandan alternatif enerji kaynaklarından faydalanmalı ve yerli kaynakları daha etkin kullanarak ithalata bağımlılığını azaltmalıdır.

Bu çalışma, diğer ülkeler için yapılacak benzer çalışmalar için öncü olacaktır. Ayrıca çalışma detaylı olarak sanayi sektörünün alt dalları ele alınarak genişletilebilir.

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KÜRESEL GÜÇ MÜCADELESİNDE ENERJİ FAKTÖRÜ
ENERGY FACTOR IN GLOBAL POWER STRUGGLE

Osman TEKİR[*]

ÖZET

Enerji, özellikle petrolün 1800'lü yılların ortalarından itibaren kullanılmaya başlanması, 1900'lü yılların başlarında en önemli üretim ve ulaşım maddesi olarak kullanımının yaygınlaşması, dünya siyaseti ve ekonomileri bakımından başat öneme sahip olmasını beraberinde getirmiştir. Enerji, bu kaynaklara sahip olan ülkeler için bir taraftan zenginlik ve refah kaynağı, diğer taraftan ise küresel güçlerin mücadele sahası olmasından dolayı siyasi ve ekonomik istikrarsızlık sebebi olabilmektedir. Ayrıca ülkeler için enerji kaynaklarına sahip olmak kifayet etmemekte, bu enerjinin arzı için küresel güçlerin ekonomik ve siyasal güçlerine ihtiyaç duymaktadırlar. Bu da bir küresel güç mücadelesini beraberinde getirmekte, enerji arzını kontrol eden ülkeler küresel ölçekte güç sahibi olabilmektedirler.

Bu çalışmada enerji arzının güvenliği ve kontrolü çerçevesinde başta ABD olmak üzere AB, Rusya ve Çin'in sahip oldukları ve ihtiyaç duydukları enerji istatistiki verilerle ortaya konulmaya çalışılacak ve bu uğurda yürütülen ekonomik ve siyasal güç mücadelesi analiz edilmeye çalışılacaktır.

Anahtar Kelimeler: Enerji, Hegemonik Siyaset,Küresel Güç

ABSTRACT

Energy, especially after oil started to be used in mid-1800s and it has become the most important production and transportation matter after 1900s, brought about its prevailing importance for world politics and world economics. Energy might provide wealth and welfare for those countries which possess the resources. On the other hand, energy might cause political and economic instability due to being an area of contest among global powers. Moreover, it is not sufficient to possess energy resources for those countries which possess. These countries need economic and political strength of global powers for supply of energy resources. This brings global power contest. As a result of contest, countries which control energy supply can increase its strength in global scale.

This study analyzes the production and consumption data of the USA, the EU, Russia, and China and the economic and political struggle among these countries in the context of energy supply security and control

Key Words: Energy, Hegemonic Politics, Global Power

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GİRİŞ

Tarihin en eski dönemlerinden itibaren toplumlar diğer toplumlar üzerinde hakimiyet kurmak istemişler, bu da ülkeler arasında rekabeti getirmiş, düşmanlıklara neden olmuştur. Ülkelerin geçmişteki egemenlik mücadeleleri günümüzdeki mücadele arasında amaç yönünden farklılık olmasa da teknolojinin gelişmesi ve değişmesi ile nitelik açısından farklılıklar söz konusudur. Geçmişte bir kara parçasına veya deniz sahasına sahip olan, hükmeden veya nüfuzu altında bulunduran ülkeler hakimiyetlerini kabul ettirebilirken; günümüzde küresel güç iddiasında bulunan güçler dünyanın hemen hemen her bölgesinde denetim gözetim açısından etkin olmak durumundadır.

Yirminci yüzyılın ortalarına kadar küresel egemenlik kurmanın en önemli araçlarından biri olan toprak ve deniz üzerindeki hakimiyet alanlarına, yirminci yüzyılın ikinci yarısından sonra "uzay egemenliği" unsuru da eklenmiştir.

Askeri ve ekonomik yönden üstün olmak küresel egemenliğin temelini oluşturur. Eğer küresel güç tesis edilmesi ve bu gücün sürekliliğinin sağlanması söz konusu ise hakimiyet alanındaki bölgenin yönetimi için gereken maliyetin yine aynı bölgeden karşılanabilirliği önem taşıyacaktır.

Bu maliyetin karşılanmasında gerek enerji kaynaklarına sahip olma gerekse de enerji güzergahlarının kontrolü de gereklilik arzedecektir. Bu kontrol küresel güç olmak isteyen veya küresel gücünü devam ettirmek isteyen ülkelerin sanayi üretimine katkı sağlarken, diğer güçlerin üretimlerinin kontrol edilmesini de sağlayacaktır. Küresel emperyal gücün ilk oluşumunda askeri iktidar ilk planda yer alırken, daha sonraki aşamada ideolojik iktidara dönüşmesi maddi ve meşruiyet maliyetlerini azaltıcı bir işlev görecektir. İkinci Dünya savaşından sonra özellikle yirminci yüzyılın sonlarında ve yirmibirinci yüzyılın başlarında gerçekleştirilen siyasi ve askeri müdahalelerde "demokrasi" bu işlevi görmüştür.

Amerika Birleşik Devletleri, İkinci Dünya Savaşından sonra küresel emperyal gücü Britanya İmparatorluğu'ndan devralmıştır. Savaşta büyük ölçüde tahrip olan Avrupa'nın imarı ve Batı Avrupa'nın himayesi ABD tarafından üstlenilmiş, bu da Avrupa üzerindeki emperyal gücün tesisini beraberinde getirmiştir. Bu nedenle Avrupa'nın tekrar ABD'ye karşı ekonomik ve siyasal rakip güç olma potansiyelini bertaraf etmiş en azından ertelemiştir. Avrupa'nın tekrar ABD'ye rakip bir güç haline gelmemesi için en fazla ihtiyaç duyduğu enerjinin kontrol edilmesi gerekmektedir. Öte yandan 1990'lı yıllarda Sovyetler Birliği'nin dağılmasından sonra bu birliğin içinde veya nüfuzu altında bulunan ülkelerin sahip olduğu zengin enerji kaynakları diğer güçlerin müdahale tehlikesiyle karşı karşıya kalmıştır. Amerika Birleşik Devletleri 11 Eylül olaylarını bahane ederek Afganistan'ı, önce işgaline göz yumup, daha sonra Kuveyt'i işgal ve daha önce değindiğimiz ideolojik bir aygıt olarak "demokrasi götürmek" bahanesi ile Orta Doğu coğrafyasında kontrol ve nüfuzunu arttırarak gücünü pekiştirmiştir.

Bunun yanında bir kısım Amerika ve Avrupa sermayesinin ABD'ye karşı bir güç ortaya çıkarmak için Çin'e yatırımlarını yoğunlaştırmaları, ABD'nin bu ülkeye karşı özellikle enerji konusunda politik ağırlığını Pasifik'e kaydırmasını beraberinde getirmiştir.

Bu çalışmada önce Avrupa Birliği ve Rusya arasındaki petrol ve doğal ilişkileri ele alınacak, daha sonra Çin'in enerji ihtiyacı ve enerji politikaları gözden geçirilecek ve bu ülkelerin politikaları üzerindeki Amerika Birleşik Devletleri politikaları analiz edilmeye çalışılacaktır.

1.AB VE RUSYA İLİŞKİLERİNDE ENERJİ FAKTÖRÜNÜN EKONOMİ - POLİTİĞİ

Enerji, AB ve Rusya arasındaki ilişkilerde önde gelen konu ve sorunların başında gelmektedir. Rusya zengin enerji kaynaklarını politik ve ekonomik araç olarak kullanarak Avrupa Birliği'ni kendisine bağımlı hale getirmek isterken; Avrupa Birliği de enerji güvenliğini sağlamak için enerji ithalatını çeşitlendirmek suretiyle ekonomik ve siyasal gücünü pekiştirmek istemektedir.

Enerji, AB ve Rusya arasındaki resmi ve gayri resmi ilişkilerde başta gelen konuyu oluşturmaktadır. AB ve Rusya'nın bulunduğu coğrafi konum göz önünde bulundurulduğunda enerjiyi talep eden ve tedarikçisi ülke arasında karşılıklı bir bağımlılığın olduğu görülmektedir. Her iki aktör arasında bağımlılık derecesinin kendi lehlerine yoğunlaştırma çabası (Tichy, 2015) enerji politikalarının temel konusu olmaktadır.

AB'nin enerji politikalarının temelinde enerji kaynaklarının ithalatı ile ilgili bağımsızlığı azaltmak ve enerji güvenliğini sağlama çabası yatmaktadır. Bunun iç ve dış iki boyutu vardır. AB'nin enerji politikasının iç boyutunun temel hedeflerinden biri liberal bir iç Pazar oluşturmak, dış boyutunun en önemli amacı da doğal gaz arzını çeşitlendirmek suretiyle enerji güvenliğini sağlamaktır. Bununla birlikte, Avrupa Birliği'ni oluşturan ülkeler teker teker ele alındığında pozisyonlarının farklı olduğu görülecektir. Kimi ülkelerin Rusya'ya olan enerji bağımlılığı üst noktalarda hatta yüzde yüze yakın iken, bazı ülkelerin bağımlılığı daha azdır. Bunda AB'nin ortak bir enerji politikasının oluşturulamamış olması önem taşımaktadır ki, bu elbette Rusya'nın işine gelmektedir

Rusya, dünyanın en büyük ihracatçısı ve ikinci büyük üreticisidir. Bunun yanında dünyanın en fazla doğal gaz rezervlerini elinde bulundurmaktadır. Ayrıca dünyanın kanıtlanmış sekizinci en büyük petrol rezervine sahip ülkedir. Rusya'nın üzerinde bulunduğu geniş topraklar ve keşfedilmemiş enerji kaynakları da göz önünde bulundurulduğunda doğal gaz ve petrol sektörü bakımından büyüme potansiyeli en fazla olan ülke konumundadır.

Rusya'nın yer aldığı coğrafya mevcut enerjinin ihracatı ve enerji politiğinde önemli avantajlar da sağlamaktadır. Dünyanın en büyük enerji ithalatçı iki ülkesi ile sınırları vardır. Bu ülkeler, Avrupa Birliği ve Çin'dir. Her iki ülke de açık bir şekilde doğal gaz ve petrole ihtiyaç duymaktadır (Shaffer, 2009:117).

Rusya'nın 2014 yılında Kırım'ı ilhak etmesinden sonra AB ve NATO çevrelerinde Rusya'dan enerji ithalatı ve enerji güvenliği konusunda tartışmaları başlatmıştır. Bilindiği gibi enerji güvenliği günümüzün en önemli sorunlarından ve konularından biridir. Enerjide geniş ölçüde dışa bağımlılık milyonlarca Avrupalı için çok ciddi sonuçları doğuracak niteliktedir (Lidegaard and Bildt, 2014). Enerji güvenliği; güvenilirlik, uygun fiyat ve çevre dostu olmak üzere üç bileşenden oluşmaktadır (Shaffer. 2009:117).

Enerji, politikanın etkili bir aracı olarak kullanıldığında ortaya çıkabilecek muhtemel aksaklıklar bireylerden işletmelere bütün ekonomik ve sosyal hayatı etkileyebilecek hayati öneme sahiptir. 2006, 2009 ve 2013-2014 yıllarında Ukrayna ve Rusya arasında yaşanan krizler AB'nin enerji güvenliği konusunda önemli riskleri barındırdığını göstermiştir. AB'nin, söz konusu yıllarda bu iki ülke arasında yaşanan doğal gaz fiyat anlaşmazlığı nedeniyle ortaya çıkan krizlere hazırlıksız yakalandığı söylenebilir. Doğal gazın Ukrayna'ya karşı politik bir silah olarak kullanılması, AB içinde enerji güvenliği ile ilgili algıların değişmesinde etkili olmuştur (Özer, 2013:69) Dolayısıyla bu konu sadece Avrupa iç pazarı veya küresel rekabet açısından değil, belirlenecek enerji politikalarının aynı zamanda Avrupa'nın güvenlik politikasının da belirleneceği anlamına gelmektedir (Lideaard and Bildt, 2014).

Enerji fiyatları Avrupa açısından rekabeti körükleyen en önemli araç durumundadır ve piyasanın iyi işlemesi için enerji bağımlılığının azaltılması gerekir. Son yirmi yılda önemli artışlar gösteren doğal gaz ve petrol fiyatlarının, 2035'li yıllardan önce %80'den daha fazla artış göstereceği beklenmektedir (Lideaard and Bildt, 2014).

2014 yılında Rusya'nın Kırım'ı ilhak etmesinden itibaren AB ve NATO, Rusya ile işbirliğinde önemli kırılmalar yaşanmıştır. Bu durum söz konusu çevrelerde enerji ithalatı ve enerji güvenliği konusundaki endişelerin artmasına sebep olmuştur. Çünkü şu anda Avrupa Birliği'nin doğal gaz ithalatının yaklaşık %39'u Rus devlet şirketi Gazprom tarafından sağlanmaktadır. Diğer %33 Norveç, %22'si de Kuzey Afrika'dan gelmektedir. Gazprom'a göre, 2013 yılında Almanya, Polonya ve NATO üyesi Türkiye Rusya'nın Avrupa'da en büyük ithalatçısı ülke konumundadırlar. Almanya yıllık doğal gaz tüketiminin %44'ünü Rusya'dan ithalat yolu ile sağlamaktadır. Eski Sovyet cumhuriyetleri Estonya, Litvanya, Bulgaristan, Slovakya doğal gaz açısından %100 Rusya'ya bağımlıdır. AB ve NATO üyesi Yunanistan ve Çek Cumhuriyeti tükettikleri doğal gazın %70'ni Rusya'dan ithal etmektedir. AB ve NATO üyesi ülkelerden sadece Almanya, Avusturya ve Polonya tükettikleri doğal gazın yarısından azını Rusya'dan ithal yolu ile sağlayan ülkelerdir (C.K.John, 2015).

Ukrayna krizinin politik ekonomik sebepleri sonuçları farklı değerlendirilmesi gereken önemli bir konu olmakla birlikte, bu kriz sonunda Avrupa Birliği ve Rusya arasındaki ilişkiler bozulma dönemine girmiştir. Enerji arzının politik bir silah olarak kullanılması bazı Rus elitleri tarafından "paha biçilemez" şeklinde değerlendirilmekte, ekonomik ve siyasal gelecek için "anahtar" görevini göreceği dile getirilmektedir. Enerjinin politizasyonunu üç faktörle açıklamak mümkündür: güçlü küresel talep, Avrupa gaz piyasasının liberalizasyonu ve enerji sektörünün kamulaştırılması (Dragonova, 2013:75). Enerji Rusya'nın gücünü göstermesinin önemli bir aracıdır. Bu durum AB ve Rusya arasındaki ilişkilerde ağırlıklı olarak hissedilmektedir. Çünkü enerji, işbirliği içinde bulunmanın ve işbirliğini geliştirmenin önemli bir faktörüdür. Ancak son yaşanan olaylardan sonra enerji yavaş yavaş bir "gerilim" unsuru haline geldi. Avrupa'nın endişesi tükettiği enerjinin %50'sinin ithalat yoluyla karşılanması ve bu oranın 2030'lu yıllarda %70'e ulaşması endişesinden kaynaklanmaktadır. Bu nedenle Avrupa'nın tükettiği enerjinin en büyük tedarikçisi Rusya'ya bağımlılığı devam edecektir. Soruna Rusya açısından bakılacak olursa enerji silahını kullanmak zorunda olduğu görülecektir. Çünkü Rusya'nın ihracat gelirlerinin %75'i Avrupa'ya ihraç ettiği enerjiden sağlanmaktadır. Gazprom şirketinin ödediği vergi Rusya'nın vergi gelirlerinin yaklaşık %5'ini oluşturmaktadır (Dragonova, 2013:75). Bu rakamların ülkelerin ihracat ve vergi gelirleri ile karşılaştırıldığında ne denli önemli olduğu görülecektir. Dolayısıyla Avrupa Birliği'nin enerji ithalatını çeşitlendirmesi durumunda Rusya'nın ihracatının dolayısıyla ekonomisinin kırılgan yapısı iç ve dış politikada yumuşak karnını oluşturmaktadır.

Rusya daha önce ifade edildiği gibi Avrupa Birliği'nin ana tedarikçisi durumundadır. Rusya'dan gelecek gazı çeşitlendirmek orta vadede mümkün görülmemekle birlikte bazı teknik ve siyasi engellerin aşılması yönünde politikalar üretilmesi çabaları görülmektedir. Bu nedenle Avrupa Birliği Komisyonu 2015 yılının şubat ayında dönem başkanı Donald Tusk'un başkanlığında toplanmış, Avrupa Birliği'nin enerji konusunda iki temel güvensizlik kaynağının, Avrupa enerji piyasasındaki özellikle orta ve doğu Avrupa'daki boşluklar ve ithalattaki aksaklıklar olduğu vurgulanmıştır. Bu sorunlarla mücadele etmek için bir "enerji birliği" oluşturulması ve AB'nin doğal gaz ithalatını çeşitlendirmesi gerektiği dile getirilmiştir. Çünkü Rusya'nın güvenilirliği konusunda 2006, 2009 ve 2013-2014 yıllarında Ukrayna'da meydana gelen olaylar Rusya'nın güvenilirliği hakkında olumsuz kanaatlerin oluşmasına neden olmuştur. Bu sebeple AB'nin oluşturacağı enerji birliği stratejisi içte ve dışta Avrupa'nın güvenliğini arttırmak için bazı önlemlerin alınması önerilmektedir.

Avrupa Birliği kısa dönemde Kuzey Afrika ve Ortadoğu'dan, Türkmenistan gazının Kazakistan ve Azerbaycan yoluyla Avrupa'ya taşınabilmesi için Güney Gaz Koridoru üzerinde yoğunlaşılması, Afrika, Avustralya ve ABD'den sıvılaştırılmış doğal gaz ithalatı ile çözüm bulmaya çalışmaktadır. Bu önlemler önümüzdeki yirmibeş yıl için öngörülen önlemler olup; AB'nin Rusya ile yaptığı anlaşmaların vadesinin bu süre sonunda sona ereceği beklenmektedir (Tcherneva, Slavkova, Chyong, 2015).

AB'nin bölge alternatifleri zengin gaz ve petrol yatakları ile enerji arzını sağlayacak potansiyel kaynakları oluşturmaktadır.

İran, zengin petrol ve doğal gaz kaynaklarına rağmen kısa ve orta dönemde Rus doğal gazına alternatif oluşturabilecek bir ülke gibi görünmemektedir. Bununla birlikte İran'ın nükleer programı konusunda Lozan'da varılan çerçeve antlaşmasının ötesinde başarıya ulaşması halinde AB'ye enerji sağlayabilecek önemli bir ülke olmaya adaydır. Ancak İran üzerindeki uluslararası yaptırımlar, bulunduğu coğrafya alt yapı eksiklikleri gibi bazı engellerin aşılması kolay gözükmemektedir.

Cezayir, Rusya'dan sonra yirmibeş milyar metreküp ile AB'nin ikinci büyük tedarikçisidir. Ancak ihracat potansiyelinin sınırlı olması nedeniyle enerji çeşitlemesinde önemli bir alternatif oluşturmamaktadır.

AB'nin bir başka alternatif tedarikçi ülkesi Türkmenistan'dır. Ancak Türkmen gazının Avrupa'ya getirilmesi için Hazar Denizinin altından inşa edilmesi gereken boru hattı üzerindeki tartışmalar bu alternatifi riskli hale getirmektedir. Bu riskleri bertaraf etmek için 1 Mayıs 2015 tarihinde Avrupa Komisyon başkan yardımcısı Maros Sefcovic, Türkmenistan Hidrokarbon Kaynakları Ajansı başkanı Yagsheldy Kakayev, Türkmen başbakan yardımcısı Baymurad Hojamukhamedov Azerbaycan Enerji Bakanı Natık Aliyev ve Türkiye'nin Enerji Bakanı Taner Yıldız Türkmen doğal gazının Avrupa'ya aktarılması konusunu görüşmek üzere Aşkaabat'da bir araya geldiler. Sefcovic, gazın Avrupa'ya aktarılması ile ilgili görüşmelerin olumlu geçtiğini, bu yönde önemli adımlar atıldığını, Avrupa Birliği'nin ithalatını çeşitlendirmesi kadar, Türkmenistan'ın da ihracatını çeşitlendirmesinin önemli olduğunu vurguladı. Yapılan görüşmelerde Türkmenistan gazı, Hazar Denizi'nin altında inşa edilecek 187 kilometrelik bir hatla TANAP'a (Trans-Anadolu Doğal Gaz Boru Hattı Projesi) bağlanacak, Türk-Gürcü sınırından başlayarak Yunanistan ve Bulgaristan yoluyla Avrupa'ya aktarılması ve 2018 yılında da tamamlanması öngörülmektedir.

Ancak Gazprom'un Avrupa'ya sağladığı doğal gaz miktarının 540 milyar metreküpe ulaşmış olması, Türkmenistan gazının Avrupa'nın tükettiği gazın sadece bir bölümünü karşılar nitelikte olduğunu göstermektedir. Bir başka göz önünde bulundurulması gereken husus, Türkmenistan'ın Rusya, İran ve Kazakistan'la komşuluğunun bulunmasıdır. Bu ülkeler enerji ve enerji politikası ile yakından ilgili ülkelerdir. Öngörülen projeye Kazakistan sessiz kalmakla birlikte Rusya ve İran Hazar ekolojisine zarar vereceği gerekçesi ile itiraz etmektedirler. Ayrıca Türkmenistan'ın önde gelen müşterisinin Çin olduğu (C.K.John, 2015), bu ülkenin enerji tedarikinde önemli sorunlar yaşadığı dikkate alındığında, bu projeye olumlu bakmayacağını tahmin etmek güç değildir.

Sadece AB ve Rusya arasındaki enerji ilişkilerinde değil, küresel düzeyde enerji arzı ve enerji güvenliği konusunda en önemli ülkelerden biri Türkiye'dir. Üstelik bu önem, enerji kaynaklarına sahip olmadan ortaya çıkmıştır ki, enerji arzının Türkiye hesaba katılmadan çok zor hatta imkansızlığı doğuran coğrafi konumundan kaynaklanmaktadır.

Türkiye, Rusya'nın ihraç etmek istediği enerjiyi, Avrupa kıtasına aktarma konusunda kilit bir ülke konumuna gelmiştir. Esasında, Türkiye uzun bir süreden beri küresel boru hatlarının merkezinde bir ülkedir. Avrupa, 1990'lardan itibaren Orta Asya ve Kafkasya'dan taşınacak enerjinin 'Güney Akım' projesini destekliyorken; 2014 yılı Aralık ayı başında Türkiye Cumhurbaşkanı Tayip Erdoğan'ın Rusya'yı ziyaretinde görüşülmüş, 15 Mart 2015 tarihinde de "planlanan" boru hattı iptal edildi.

2007 yılı başlarında Rusya devlet başkanı Putin, Rus gazını Türk sularından Bulgaristan'a, oradan da Avrupa'ya taşıyacak Güney Akım'ın inşa edileceğini ifade etmişti. Ancak Rusya 2014 yılında gerek AB ile olan hukuki uyumsuzluk gerekse de Brüksel'in petrol ve doğal gaz üzerinde bir ülkenin yani Rusya'nın tekel oluşturmasından rahatsız olduğu görülmektedir. Rusya da Ukrayna krizi nedeniyle kendisini sıkıştırmaya çalışan Avrupa Birliği'ne karşı enerji kartını (yine) politik bir araç olarak kullanarak, Aralık ayında ekonomik ve ticari görüşmeler için Ankara'ya yaptığı bir günlük ziyarette sert bir biçimde "Güney Akım"ın öldüğünü yeni Türk Akımı projesinin görüşmelerinin yapılacağını kamuoyuna ilan etti. Bu da Türkiye'nin var olan önemini daha da arttırmış, kilit bir konuma (Johnson, 2015:80) getirmiştir.

Türkiye, Rusya ile birlikte geliştirdikleri bu politika ile Avrupa Birliği'nin rüyalarını sona erdirecek gibi görünmekte, özelde Avrupa güvenliğini, genelde küresel düzeni belirleyebilecek ve bir çok ülkeyi de etkileyebilecek enerji güzergahları ile ilgili politika yürütmektedir.

Türkiye'nin enerji açısından transit bir ülke olması Brüksel açısından enerji arzı güvenliğinin sağlanması yönünden daha güvenli olacaktır, ancak Rusya ve Avrupa arasındaki boru hattı farklılığından dolayı Türk Akımı Avrupa Birliğine doğal gaz veremeyecektir.

Türk Akımı projesinin inşa edilmesi Rusya açısından Ukrayna'nın izolasyonu politikasında başarıyı beraberinde getirecek ve Rusya enerjisi Avrupa'nın önemli bir kısmı için ihtiyaç olmaya devam etmesi anlamına gelecektir.

Türk akımı projesinin hayata geçirilmesinin Türkiye açısından getireceği avantajlar ise uzun yıllardır enerji güzergahlarının merkezi olma konusundaki politikalarının başarıya ulaşması demektir. Bu da yukarıda ifade edildiği gibi Türkiye'yi küresel enerji politikalarında anahtar bir ülke konumuna getirecek, siyasi ve ekonomik olarak elini güçlendirecektir.

2.ÇİN'İN ENERJİ İHTİYACI VE ENERJİ POLİTİKASI

Dünya'da enerji tüketim yoğunluğunun en yüksek olduğu ülkeler Çin, ABD ve Avrupa ülkeleridir. Bu ülkeler dünyanın en gelişmiş ekonomileri olup; enerji arzındaki en küçük aksaklığın ekonomik, dolayısıyla siyasal ve sosyal etkileri de büyük olacağından hem alternatif enerji kaynakları hem de tedarik yollarını ve ülkelerini çeşitlendirmek çabası içerisindedirler (Sevim, 2010:59).

Enerji ve enerji politikaları bağlamında küresel güç mücadelesi gündeme geldiğinde ilk akla gelen ülkelerden biri Çin'dir. Bu nedenle Çin üzerine gerek stratejik gerekse de akademik birçok çalışmanın yapıldığı görülmektedir. Bunun temel nedenlerinden biri son yıllarda hızlı büyüyen bir ekonomiye sahip olması ve bu hızlı büyüyen ekonominin temel dinamiğinin büyük çapta dışarıdan ithal edilen enerjiye bağlı olmasıdır.

Çin, üç nedenden dolayı enerjiyi çeşitlendirmek istemektedir (Burke, 2015). Birincisi ülke güvenliği ile ilgili genel bir ilkedir. Eğer enerjideki çeşitlilik sağlanamaz ise doğal afetler, siyasal, ekonomik istikrarsızlıklar ve olası uluslararası yaptırımlar söz konusu olduğunda ülke savunmasız hale gelebilecektir.

İkincisi ekonominin gelişmesidir. Yıllar arasında bir karşılaştırma yapılacak olursa 1990'da sekiz milyon olan özel araç sayısı 2013 yılında yüzbeş milyona ulaşmıştır. Çin'de uygulanan ulaştırma sektöründeki yöntem petrol üzerinde ezici bir bağımlılık yaratmaktadır. Arzın çeşitlendirilmesi bu bağımlılığın azaltılmasına yardımcı olacaktır.

Üçüncüsü de çevredir. Çin yönetimi kömürden diğer enerji kaynaklarına geçiş için hedefler belirlemiştir. Çünkü çevre gerçekten çevre insan hayatı için önem taşımakla birlikte, uluslar arası baskıların bir aracı olarak da kullanılabilmektedir.

Çin'in petrol ithalatının çoğunluğu İran ve Irak'tan karşılanmaktadır. Dolayısıyla petrol ithalatının yaklaşık %55'i Basra Körfezinden yapılmaktadır. Çin, enerji kaynakları talebini daha esnek hale getirmek, ABD ve diğer batı ülkelerinden petrol konusunda bağımsızlığı azaltma çabası içindedir. Bu amacı gerçekleştirebilmek için ithalatçısı olduğu körfez ülkelerinde aynı zamanda yatırımcı bir ülke olarak da ortaya çıkmaktadır.

Enerji güvenliği ile genel ilgili tanım, Çin için farklı bir anlam taşımamakla birlikte, ekonomik büyüme, güçlü ordu, yönetimin sürekliliği gibi faktörler tanımdaki temel farklılıkları ortaya koymaktadır. Çin'in enerji güvenliğinde;

-Enerjinin tedariki, ABD ordusunun %80'nini kontrol ettiği deniz yollarından sağlanması

-Enerji kaynağını çeşitlendirme ve enerjiyi kaynağından elde etmedeki zorluklar

-Enerji kaynaklarının ve enerji güzergahlarının bulunduğu bölgelerde var olan sürekli istikrarsızlıklar

-Enerji fiyatlarının belirlenmesinde inisiyatifinin sınırlı olması (Karaca, 2012:99) vb. konular önemli bir risk oluşturmaktadır

Çin, körfez ülkelerinden en büyük ithalatı gerçekleştiren ülke olarak ABD'yi geçmiştir (Andersen and Jiang, 2014). Çin'in körfez ülkelerinden petrol ithalatında ABD'yi geçmesini temel nedenlerinden biri tüketimden kaynaklanan enerji talebi olduğu kadar, ABD'nin Kuzey Amerika'daki enerji kaynaklarını canlandırması sonucunda ABD'nin körfezden ithalatı küçülmesi ve Ortadoğu petrollerine Çin'den daha az bağımlı hale gelmesidir(Plummer, 2014). Gerçekten Çin'in petrol ihtiyacı 2004 yılından günümüze 2.3 kat artmış, bu süre içerisinde petrolün toplam ithalat içindeki payı %43'ten %56'ya yükselmiştir (Shimbun, 2015).

İran Körfezi, 1800'lerden itibaren önemli bir güvenlik rolü oynamıştır. Arap körfez ülkeleri İngiliz İmparatorluğu için İngiltere ve Hindistan arasında tampon bölge işlevini görmüştür. Bu ülkeler, İngilizlerin bölgeden çekilmesiyle 1820'den 1871'e kadar manda olarak kalmışlardır. Körfez limanları bunun yanında İngiliz deniz stratejisinde önemli bir fonksiyon ifa etmiş, Sovyetlerin güneye inmesini engelleyerek küresel bir egemenlik haline gelmiştir.

1900'lü yılların başında petrol, atların ve lokomotiflerin yerini alınca, ayrıca Churchill'in stratejik bir kararla gemilerde katı yakıt yerine petrolü ikame etmesiyle (Yergin, 2014:11) bölgenin stratejik önemi bir kat artmıştır. Dünyanın bilinen enerji kaynaklarının üçte ikisinin bölgede olması ve İran'ın enerji piyasasına dahil olması bölgedeki mücadeleyi daha karmaşık hale getirmiştir.

1971 yılında İngilizlerin bölgeden çekilmesiyle birlikte körfez ülkeleri ile yakın ilişkiler kuran ABD körfezi stratejik güvenlik merkezi haline getirdi.

Çin de son yıllarda bölge ile yakından ilgilenmektedir. Bu ilginin temel nedeni elbette petroldür. 2013 yılında kullandığı enerjinin yaklaşık %18'ini petrol oluşturmuştur.

Diğer önemli enerji kaynağı doğal gazdır ve 2013 yılında ülke içerisinde kullanılan doğal gazın %5'i bölgeden sağlanmıştır. Çin'in 2013 yılındaki petrol ithalatı tüketiminin yarısından fazlasını oluşturmuştur (Andersen and Yang, 2014) ve gelecek yıllarda bu oranın daha da artması beklenmektedir. Çünkü ekonomik büyümesi petrol ithalatına bağlıdır. Enerji gerektiren bu büyüme, 1980'den bu yana %500'den daha fazla artmıştır (Burke, 2015)

Çin enerji şirketlerinin dış ülkelerdeki yatırımları 2000'li yıllarda canlılık kazanmaya başlamıştır. Devam eden ekonomik büyümenin enerjiye olan talebi arttırması, Çin enerji şirketlerinin yeni rezervler ve uzun vadeli enerji kaynakları tedariki için yatırım yapmayı gerekmektedir.

Enerji ile ilgili yatırımlarda başı çeken en önemli şirketleri; Çin Ulusal Petrol Şirketi (China National Petroleum Corporation-CNPC), Çin Ulusal Off Shore Petrol Şirketi (CNOOC), ve Çin Petrol ve Kimya AŞ veya yaygın bilinen adıyla SİNOPEC'tir.

Dünyadaki diğer petrol şirketleri de benzer faaliyet gösterirken; Çin enerji şirketleri ABD ve diğer petrol şirketlerinin aksine Çin'in enerji politikasına ve enerji güvenliğine katkıda bulunmak için faaliyet göstermektedirler (China Economic Review, 2014).

Çin'in Irak'tan gerçekleştirdiği petrol ithalatı ABD Irak savaşından sonra önemli ölçüde artmıştır ve Irak petrol üretiminin %50'sini ithal etmektedir. Bu oranın %70'e çıkarılması planlanmışken, ortaya çıkan DAEŞ (veya İslam Devleti) terör örgütü nedeniyle bunun gerçekleştirilmesi riske girmiştir (Andersen and Yang, 2014). Ayrıca, Çin'li şirketler aktif olmalarına rağmen bölgede BP, Total gibi uluslararası güçlü şirketlerle rekabet etmek durumundadırlar.

Basra Körfezi enerji trafiğinde alternatifi olmadığından önemli bir güzergahtır. Çünkü Suudi Arabistan, Katar, Irak İran ve Birleşik Arap Emirlikleri bu körfezi kullanarak enerji sevkiyatını gerçekleştirmektedirler (Demir, 2014:8).

Şekil:1

Source: US Government

Irak'taki son ayaklanma Çin'in enerji arzı güvenliği riskini arttırmıştır. DAEŞ terör örgütü istikrarsızlık yaratarak Çin'in güneydeki petrol çıkarlarını tehdit etmektedir.

Çin, petrol kullanımı açısından %60'lar oranında dünya pazarlarına bağlıdır. Çin'in ulusal petrol şirketi Corp, Güney Irak'taki en büyük enerji yatırım şirketi olarak faaliyet göstermektedir ki şirket 2013 yılında yurt dışına ihraç ettiği petrolün neredeyse üçte birini üretmiştir.

Çin şirketlerinin ürettiği veya Çin'in doğrudan ithal ettiği enerji veya doğal gazın, dünya petrol güzergahlarının önemli boğazlarından olan Hürmüz Boğazından geçtiği düşünüldüğünde bu güzergahın Çin için muhtemel riskler barındırdığı görülebilir. Petrol talebinin 2025 yılında %40 daha artabileceği (Plummer, 2014) göz önünde bulundurulduğunda küresel bir güç olma iddiasını sürdürebilmek için enerjiyi ve enerji tedarikinde bulunan ülkeleri çeşitlendirmek zorunda olduğu ortaya çıkmaktadır.

Enerji ithalatında bir diğer kullanılan güzergah Malakka Boğazıdır. Çin, petrol ithalatının yaklaşık %80'nini Malakka Boğazı ve Güney Çin Denizinden taşımaktadır.

Şekil:2 Malakka Boğazı

Source: CIA Factbook (Erişim tarihi:10.5.2015)

Şekil 2'de görüldüğü gibi Malakka Boğazı Çin için büyük önem taşımaktadır. Boğazın yıllık kapasitesi yılda 50.000 gemidir. Bu bütün dünyadaki deniz ticaret hacmini gerçekleştiren gemilerin dörtte biridir. Uluslararası İstatistik Ajansının verilerine göre, 2030 yılına kadar Malakka Boğazı aracılığıyla petrol taşıyan tankerlerin sayısı iki kat artabilecektir (Halilov, 2012). Çin'in güney batısında bulunan Myanmar, ABD ve Çin açısından büyük önem taşımaktadır. Myanmar'ın Çin açısından önemini daha iyi anlayabilmek için, enerji kaynaklarının Çin'e ulaştırılmasında Malakka Boğazını bypass edecek alternatif güzergah olarak sadece Myanmar toprakları kullanılabilmektedir.

Her ne kadar Yeni Zelanda ve Endonezya ordusunca önlemler alınmış olsa da, Çin yönetimi, Malakka Boğazındaki yaygın korsanlık ve Güney Çin'deki arazi anlaşmazlıkları nedeniyle enerji stratejisinin yenilenmesinin bir sonucu olarak enerji güzergahlarını çeşitlendirmek çabası içerisindedir. Bu nedenle de Myanmar aracılığıyla Bengal Körfezinden Güney Çin'e boru hattı inşa etmiştir ki bu boru hattı ile Çin'e pompalanacak petrol, Çin'in toplam petrol ithalatının yüzde sekizine karşılık gelmektedir. Ayrıca Myanmar'da yıllık 22 milyon ton petrol depolayabilecek liman (depo) inşa etmiştir.

Çin, enerji tedarikini çeşitlendirebilmek amacıyla Afrika'da özellikle Nijerya ve Sudan'da önemli yatırımlar gerçekleştirmiş, son on yılda Afrika'daki faaliyetlerinde önemli gelişmeler kaydetmiştir. Özellikle batılı ülkelerin Hristiyan çoğunluğun yaşadığı Güney

Sudan'ın bağımsızlığı çabalarının üst seviyeye çıktığı sıralarda Sudan ile Çin arasındaki ilişkiler dostluk düzeyine ulaşmıştır. Bunun en önemli nedeni elbette petroldür (Erem, 2011). Sudan, zengin petrol kaynaklarına sahip olmasından dolayı ülkenin bir mücadele sahası olacağı ve güçlü ülkelerle baş etmesinin mümkün olmamasından dolayı kendisi açısından son derece isabetli bir politika oluşturarak, Çin ile enerji antlaşmaları gerçekleştirmiş ve küresel güçlerin karşısına bir başka küresel gücü çıkarmıştır.

1990'larda soğuk savaşın sona ermesiyle birlikte Afrika'daki Rus etkisinin azalması sonucunda ABD bütün dünyada olduğu gibi Afrika'da da en büyük güç konumuna gelmiştir. Ancak yukarıda da ifade edildiği gibi 2000'li yılların başında Çin'in bölgede etkinliğini arttırması ABD tarafından küresel gücüne bir tehdit algılamasına neden olmuştur (Boztaş, 2014:157). Gerçekten Afrika, Çin petrol ithalatının ikinci büyük tedarikçisidir. Sudan'da günlük petrol üretimi 500 bin varildir ve bunun %60'ını Çin'e ihraç edilmektedir (Erem, 2011).

Şekil:3 Bab-ül Mendeb Boğazı

Kaynak: www.google.com.tr/searc?q-bab ül+mendeb

Şekil 3'te görülen Bab-ül Mendeb Boğazı enerjinin nakli konusunda bir başka önemli geçiş noktasıdır. Babül-ül Mendeb Boğazı Afrika boynuzu ile Orta doğu arasında bir tıkanma noktasıdır ve Akdaniz ile Hint Okyanusu arasında stratejik bir bağlantı sağlar. Boğaz, Yemen, Cibuti ve Eritre arasında bir yerden Arap Denizi ve Aden Körfezi ile Kızıldeniz'i birbirine bağlar. 2013 yılında 3.8 milyon varil ham ve işlenmiş petrol bu yol kullanılarak Avrupa'ya sevkedilmiştir (www.eia.gov, 2014).

3.ABD VE ÇİN'İN KÜRESEL GÜÇ İDDİASI VE KÜRESEL POLİTİKALARI

Yeryüzünde insanların toplumlar halinde yaşamaya başlamasından itibaren, birbirleri üzerinde egemenlik kurma, yönetme, yönlendirme çabaları hep olmuştur. Belli dönemlerde belli ülke veya imparatorluklar küresel hakimiyet kurmuş, dünya siyasal sistemini kendi çıkarları doğrultusunda belirlemişler veya en azından etkilemişlerdir.

İlk çağlardan başlayarak, Roma, Fransa, İspanya, Portekiz, Osmanlı, Britanya ve Sovyetler, son olarak da ABD küresel düzeyde bir güç olarak ortaya çıkmıştır.

İkinci Dünya Savaşından sonra İngiltere'nin küresel gücünün yerini "emperyal bir güç" olarak kendisini tanımlamasa da ABD aldı. Friedman'a göre ABD gerçekten kendisini emperyal bir güç olarak görmüyordu ve böyle de görülmek istemiyordu. Çünkü, ABD modern çağın ilk anti-emperyal projesi olması nedeniyle ilkeler açısından imparatorluk fikrine karşıydı. Daha da önemlisi imparatorluk devlet kaynaklarını tükettiğinden refah kaynağı olamazdı. Fakat İkinci Dünya Savaşı sonrası ortaya çıkan şartlardan en kazançlı ülke olarak ABD'yi bir imparatorluk olarak sahneye sürmüş oldu (Friedman,2015).

ABD İkinci Dünya Savaşı sonrasında liberal ve demokratik değerlerin temsilcisi olarak kendisini kabul ettirmiş ve rızaya dayalı hegemonyasını dünya genelinde kurmayı başarmıştır. Amerikan hegemonyası, liberal düşünce ve değerlerin Batı Avrupa ve üçüncü dünya ülkeleri elitlerince büyük ölçüde benimsendiği, bunlara karşı çıkanların da etkin bir biçimde çevrelendiği düzen 1945 sonrası dönemde kurulmuştur (Çiftçi, 2009:207). Çünkü imparatorluklar emperyal güçlerini devam ettirebilmek için yönetim maliyetlerini düşürmek zorundadırlar. Bunu sağlamanın en kolay yolu siyasi ve ideolojik iktidarın daha yoğun bir biçimde devreye sokulmasıdır. Özellikle ideolojik iktidar kurmak askeri iktidar kurmaya göre çok daha ekonomiktir (Münkler, 2012:84).

Kuveyt'in işgali ABD'nin lehine bir gelişme olarak kabul edilebilir. Körfez savaşı ABD'nin hegemonik gücünü güçlendiren bir olay niteliğindedir. Çünkü Birinci Dünya Savaşına borçlu olarak giren ABD savaş sonunda dünyanın en büyük alacaklı ülke konumuna gelmişti. Ayrıca Avrupalı rakiplerinin üzerindeki savaşın getirdiği yük ABD için bir avantaj oluşturmuş ve bu avantajla Britanya, Almanya ve Japonya'nın boşalttığı piyasalara girme imkanı buldu. Dolayısıyla savaşın getirilerinin de olabileceğini gören ABD, Vietnam'da tam tersi sonuçla karşılaşıp savaşın getirdiği mali ve psikolojik yükü omuzlamak zorunda kalması bir travma yaratsa da Körfez Savaşında elde AB ve Çin'in petrol tedarik yollarını kontrol etmekte elde edilen başarı küresel güç mücadelesinde askeri ve psikolojik üstünlüğü geri getirmiştir. Üstelik 1991'deki Körfez Savaşının 61 milyar dolarlık maliyetinin yüzde sekseninin müttefik ülkelerce üstlenilmesi (Münkler,2012:249), ABD ekonomisi üzerinde bir yük oluşturmadığından ABD halkının yoğun baskısıyla karşılaşılmamıştır.

İkinci Dünya Savaşı sonrası imparatorlukların yıkılması ile birlikte ortaya çıkan alanların istikrarlı hale getirilebilmeleri için bu yeteneğe sahip dışarıdan bir gücün müdahalesi gerekir. ABD bu görevi savaştan sonra yerine getirirken "imparatorluk" konumu almamaya özen göstererek bu "görevi" yerine getirmiştir. ABD'nin küresel bir güç olmasını sağlayan en önemli nedenlerden biri bu görevdir. Ferguson bunu ABD'nin "anti-emperyalizminin emperyalizmi" olarak nitelemektedir (Ferguson, 2004:205 Aktaran: Münkler, 2012:235).

ABD'nin İkinci Dünya Savaşından sonra ortaya çıkan ve Sovyetler Birliği'nin dağılmasıyla birlikte pekişen küresel güç konumunu muhafaza etme konusunda küresel ölçekte politikalar üretmesi gerekmektedir. Çünkü Avrupa, Rusya ve Çin küresel güç mücadelesinde önemli aktörlerdir. Örneğin Rusya Avrupa'da ağırlığı giderek artan bir oyuncu olarak özellikle enerji piyasasında sadece enerji tedarikçisi değil, aynı zamanda enerji fiyatlarını belirlemede bir küresel aktör olma isteği içinde olacağı (Özer, 2013:69) açıktır. Ancak 2014 Haziran ayında 115 dolar olan petrol varilinin fiyatı ABD'nin telkinleriyle Suudi Arabistan'ın petrol arzını arttırmasıyla aynı yılın aralık ayında düşüşe geçmiş ve 2015 yılı mayıs ayına kadar ortalamasının 65 dolara gerilemesi Rusya ekonomisi için olumsuz bir gelişme olmuş ve Rusya bu gelişme karşısında etkisiz kalmıştır. Bunun yanında Rusya bütçesinin %50 üzerinde enerji sektörü üzerine kurulu olması ülke gelirlerinin önemli ölçüde azalmasını beraberinde getirmiştir. 2015 yılında Rusya ekonomisinin %3 oranında küçülmesi beklenmektedir (Energyglobal.com:2015). Bu durum küresel güç mücadelesinde ABD'ye kısa dönemde de olsa Rusya karşısında avantaj sağlamıştır. Bu da ABD politik ağırlığının Çin üzerine yoğunlaşmasını sağlayacaktır. Avrupa Birliği zaten yaşadığı mali kriz ve iç sorunlar nedeniyle bu yarışta geri kalmış görünmektedir.

Küresel güç mücadelesi içinde bulunan ülkelerin kullanacağı kültürden eğitime, finanstan çok uluslu şirketlere vb. çeşitli enstrümanlar elbette vardır. Ancak bu araçlardan en önemlisi silahlı güçleridir. ABD ordusu, ABD'nin çıkarlarını korumak üzere dünyayı beş bölge komutanlığına ayırmıştır. Latin Amerika, Avrupa, Ortadoğu, Pasifikler ve Kuzey Amerika'dan sorumlu bölge komutanlıklarının dışında önemli askeri gücü vardır ve 150'den fazla ülkede 700'ün üstünde askeri "üs"te en kısa sürede devreye girebilecek hazır birlikler ve mühimmat bulunmaktadır (Johnson, 2003:205, Aktaran:Münkler, 2012:235). Bu birlikler devreye sokulmasa bile askeri üsler sürekli nüfuz alanları yaratmaktadır. Ülkelerdeki yönetimlerin istikrarlı hale getirilmesi, "gözdağı" verilmesi bu üsler aracılığıyla olmaktadır. Chalmers'e göre bunların beş önemli fonksiyonu vardır. ABD'nin dünya üzerinde hakimiyet kurması, önemli bilgilere ulaşmak için bireylerin, hükümetlerin ve özellikle şirketlerin dinlenmesi, petrol kaynaklarının ve enerji güzergahlarının kontrol altına alınması, petrolün sanayi-asker bloğuna gelir ve iş güvencesi sağlanması, ABD'de orduya asker bulma şansını arttırmak için askerler ve ailelerine yüksek bir hayat standardı sağlanmasıdır (Johnson, 2003:205, Aktaran:Münkler, 2012:235).

Ekonomik kalkınması için ihtiyacı olan enerji, Çin'in bölgesel ve küresel politikasını şekillendiren önemli faktördür. Daha önce de ifade edildiği gibi enerji arz kaynaklarının çeşitlendirilmesi ve enerji ulaşım yollarının güvenliğinin sağlanması enerji siyasetinin iki temel sütununu oluşturmaktadır. Çin, bu nedenle, enerji zengini ülkelerle ilişkilerini geliştirmekte, enerji ulaşım yollarının kontrolü için projeler geliştirmekte, denizdeki Amerikan hakimiyeti nedeniyle demiryolu ve boru hatları projelerini gündemine almaktadır (Atman, 2014:64).

Günümüzde enerji kaynaklarının tedarik edilip tüketilmesi kadar, uluslar arası pazara aktarılması konusunda büyük rekabet yaşandığı görülmektedir. Bu rekabet bölgesel ve küresel güç çekişmelerinde zincirin en önemli halkasını oluşturmaktadır (Ayan, 2010:38). Bu meyanda İkinci Dünya Savaşının ardından ABD özellikle Çin'in bölgedeki gücüne karşı askeri varlığını arttırmış; Japonya'dan Singapur ve Avustralya'ya kadar uzanan ve Batı Pasifik'le Hint Okyanusu'nun doğusunu kapsayan alanda bir çok üs kurmuştur. Dikkati çeken husus İkinci dünya Savaşında Japonya'nın silahsızlandırılması ve bir nevi ülke güvenliğinin ABD'ye teslim edilmesinden sonra bu üslerin kurulmasıdır (Dünya bülteni, 2014:8).

Bunun yanında ABD, Sovyetler Birliği'nin dağılmasından sonra Kafkasya ve Orta Asya'da doğan boşluğu, Avrasya'daki güç dağılımı çerçevesinde küresel egemenliğine karşı bir tehdit olarak algılamıştır. Bu nedenle 11 Eylül bahane edilerek Orta Asya'ya yerleşmiştir. Çünkü bu alan hem bölgede hem de küresel bir güç olan Çin, Rusya'nın etkisi ve tehdidi altında idi. Putin'le birlikte imparatorluğa dönüş arayışında olan bir Rusya, 1980'lerden itibaren "ejderhanın uyanışı" adı verilen bir kalkınma hamlesi gerçekleştiren Çin bölgede etkili olan ülkelerdi (Ayan, 2010:41). Afganistan'da ABD askerinin bulunması, ABD'nin aynı zamanda Rusya ve Çin ile komşu olması demektir ki sadece Rusya ve Çin'i değil, diğer Orta Asya ülkelerinin kontrol edilmesi anlamına gelmektedir.

Çin de ABD'nin doğu Asya'daki etkisini azaltmak ve Japonya-Tayvan-ABD stratejik işbirliği aracılığıyla kendisine karşı oluşturulan çevreleme politikasını etkisiz hale getirmek için daha ılımlı bir politika izlemekte ve komşu ülkeler ile olan sorunlarını barışçıl yöntemlerle çözmeye çalışmaktadır (Efegil-Musaoğlu, 2015). Çin, ABD ile birlikte dünyanın iki büyük ekonomisinden biridir ve aynı zamanda başta küresel oyuncular olmak üzere bir çok devletle ortaklıklar oluşturmuş (Oğuzlu, 2015)ve oluşturmaya devam etmektedir.

Günümüzde ABD'nin Çin'e bu günkü yaklaşımı, soğuk savaş sırasında uyguladığı stratejinin aksine, bilinçli bir planlamanın sonucu değildir. Çin güçlendikçe, ABD de kendi askeri yeteneklerini takviye etmiş, geleneksel müttefikleriyle işbirliğinin yanı sıra Japonya, Vietnam, Singapur gibi ülkelerle yeni ortaklılar oluşturmuştur (Friedberg, 2012).

Çin de benzer şekilde, en büyük rakibine karşı temelde değişmeyen bir yaklaşım sergilemektedir. ABD ile doğrudan karşı karşıya gelmekten kaçınmakta, fakat aynı zamanda ekonomik büyümesini de sürdürmektedir. Çin yönetimi küresel bir güç olma iddiasını yüksek sesle dile getirmekten kaçınsa da uzun vadede ABD'nin yerini alacak, bölgede üstünlüğü olan bir güç olarak hak ettiklerini düşündükleri konumu elde etmeyi arzulamaktadır.

Sonuç olarak ABD "cin"i (Çin) şişeden çıkarmamak için politik ağırlığını Çin'e kaydırırken, Çin de kendisini bölgesel güç konumundan küresel güç konumuna taşımak istemektedir. Dolayısıyla önümüzdeki dönemde bu mücadelenin artarak büyüyeceği beklenmektedir.

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TÜRKIYE'DE YEŞIL EKONOMIYE İNSANGÜCÜ YETIŞTIRME POLITIKALARI: EĞITIM ILE İSTIHDAM BAĞINI YENIDEN GÜÇLENDIRME FIRSATI

EDUCATING MANPOWER TO GREEN COLLAR ECONOMY IN TURKEY: A CHANCE TO RE-STRENGTHEN THE LINKS BETWEEN EDUCATION SYSTEM AND EMPLOYMENT

Aygülen Kayahan KARAKUL [*]

ÖZET

Çağlardan beri süregelen insanın doğaya karşı mücadelesi, doğanın nesneleştirilerek, kaynaklarının sömürülmesi suretiyle tahakküm altına alınmaya çalışılması olmuştur. Bugün insanlık gittikçe azalan doğal kaynaklar, tahrip edilmiş iklim – ozon - buzullar; ritmi değişen mevsimler; küresel ısınma; tarımsal alanların azalması gibi devasa sorunlar ve bu sorunların insan ve doğadaki diğer canlıların yaşamında özellikle de doğanın kendi varoluşunda oluşturduğu tehditlerle karşı karşıya kalmıştır. İnsanlık bu sorunlarla, ihtiyaç duyulan enerjinin doğal kaynakların doğrudan kullanılması yerine, var olan kaynaklardan daha fazla kaynak üretilmesi esasına dayanan yenilenebilir enerji kaynakları oluşturmak suretiyle mücadele etmektedir. Kuşkusuz ki, bu mücadelenin bir parçası da diğer işkollarına kıyasla görece yeni olan bu alanlarda çalışabilecek işgücünün yetiştirilmesidir. Bu işgücünün yetiştirilmesi, işgücü piyasalarına uyumu 2000'li yıllardan sonra hızla azalan eğitim sistemi için eğitim-istihdam bağlarının yeniden kurulması noktasında önemli bir fırsattır. Literatürde yeşil ekonomi olarak değerlendirilen yenilenebilir enerji alanında yetişmiş işgücü yeşil yakalı çalışanlar olarak adlandırılmaktadır. Bu çalışmada Türkiye'de yeşil yakalıların eğitim sistemi yolu ile yetiştirilme politikaları değerlendirilecek; ortaöğretim düzeyinde mesleki ve teknik eğitim kurumları ile yükseköğretim kurumlarının yeşil ekonomiye insangücü yetiştirme alanındaki çalışmaları analiz edilecektir. Çalışmada belge ve istatistikî verilerin taranması yöntemi kullanılacaktır.

Anahtar Sözcükler: Yeşil ekonomi, eğitim-ekonomi ilişkisi, yeşil yakalı işgücünün yetiştirilmesi.

ABSTRACT

The struggle of human being against the nature has come to the point that nature has been objectified and dominated by exploitation of its sources. Today, human being has come up against huge problems like decreasing natural resources; destroyed climate-ozone layer-glaciers; changing the rhythm of seasons; global warming, decreasing agricultural areas etc. These problems cause threats the life of all living creatures in the nature and especially existence of nature itself.

Humanity is struggling against those problems as creating renewable energy sources instead of using the natural resources directly in order to generate the energy that is needed for continuing the life. Certainly, one of the parts of this struggle is to educate the

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laborforce that will be employed in those relatively new areas. This will be an important chance for Turkish Education System to strengthen its consistency with the labor markets that is rapidly weakened after 2000s. The laborforce in the renewable energy area, which is called as green economy in literature, is called as green collar workers. In this study, the policies of educating green collars by the Turkish Education System has been evaluated; the studies of vocational-technical education institutions, in the level of secondary education and of the universities in the level of tertiary education has been analyzed with the methodology of investigating the documents and statistical data.

Keywords: Green economy, the relationship of education and economy, educating the green collar laborforce.

Eğitim- Ekonomi İlişkisi

Eğitimin özgürleştirme, toplumsal ilerlemenin bir parçası haline getirme gibi toplumsal (Freire,2000) sistemin devamını sağlayacak yurttaş yetiştirme gibi siyasal ideolojik(Althusser, 2002) sosyal köken farklılıklarını yeniden damgalayarak kültürel sermayeyi yeni nesillere aktarma gibi kültürel (Bourdieu,2000) işlevleri olduğu kadar toplumsal işbölümünü sağlama ve ekonomiye insan gücü yetiştirme gibi ekonomik işlevleri de bulunmaktadır (Bowles-Gintis, 2002).

Sanayi devrimi sonrasında kurulan ulus devletlerin önemli bileşenlerinden birisi haline gelerek kurumsallaşan eğitim sistemlerinin yeni üretim ilişkileri içinde yeni üretici gücün oluşturulması noktasında önemli bir ekonomik işlevi olmuştur. Sanayi devrimi sonrasında fabrikalarda çalışacak işçilerin en azından fabrikadaki makinelerin nasıl kullanılacağı bilgisi ile aksilik durumunda yönergeleri takip edebilecek kadar okuma yazma bilgisine sahip olması için okuryazarlık ve temel hesap becerilerini bilmeleri gerekliydi (Spring 1997,21). Sanayileşme sonrasında işgücünün eğitilmesinin ulus devletlere kalkınmada, milli gelirin artışında önemli katkısı olduğu görülmüş, eğitim sayesinde yetiştirilmiş işgücü üretim fonksiyonunun bir parçası olarak görülmeye başlamıştır. Bu durum döngüsel olarak ilkönce temel eğitim basamaklarından başlanarak eğitimin devlet eliyle parasız olarak arzını, yaygınlaştırılmasını sağlamıştır.

İkinci dünya savaşından sonra elektronik, mekanik ve kimya sanayinin gelişimi; nükleer ve mikro teknolojilerin gelişimi vasıflı işgücüne daha fazla ihtiyaç duyulmasını sağlamış, bu durum da eğitimin daha fazla kitleselleştirilmesine neden olmuştur. Ülkeler arasındaki gelişmişlik düzeyleri farkları belirginleştikçe insanı üretim fonksiyonu içinde bir sermaye olarak gören İnsan Sermayesi Kuramının temelleri atılmaya başlamıştır. Söz konusu kuram 1960'lı yıllarda Nobel ödüllü iktisatçı Becker ile Schultz tarafından geliştirilmiş bir kuram olup, temeli insanın üretim maliyetlerini düşürecek bir etmen olarak görülmesi esasına dayanmaktadır. Kuramın pratiğe uygulanması ile insan üzerine gerek bireyin kendisinin gerekse devlet ve işverenlerin eğitim yatırımı yapılması ile insanda bulunan potansiyel sermayenin kullanılabilir hale getirilmesidir (Schultz, 1966, s.414).

Eğitimin ekonomik işlevinin keşfedilmesinin bireye getirisi ise devletin üstlendiği eğitimi yaygınlaştırma politikalarından yararlanması olmuştur. Parasız olarak yaygınlaştırılan ilk ve temel eğitim sayesinde okuryazarlık oranları yükseltilmiştir. Orta dereceli okullar ve üniversite eğitimleri de yaygınlaştırılarak geniş halk kesimlerinin bunlardan faydalanması sağlanmıştır.

Eğitiminekonomiyle bağının kurulması aynı zamanda istihdamla bağının olması anlamına gelmekte, kişiler aldıkları eğitim düzeyi ile ilişkili işlere girmektedir. İnsan sermayesi kuramının temel varsayımlarından birisi de daha üretken işçilerin daha çok gelir elde edeceği, daha uzun süre eğitim almış olanların gelecekte daha çok kazanacaklardır (Becker, 1964). Kuramın bu varsayımlarının uzun yıllar boyunca geçerli olduğu söylenebilir. Türkiye'de sosyal devletin özellikle en parlak dönemlerini yaşadığı 1950-1970 arasındaki dönemde eğitimin istihdamla sıkı bağları sayesinde eğitim toplumsal tabakalar arasında hareketlilik sağlayan önemli bir unsur olmuştur. Özellikle yüksek eğitim düzeylerinden mezun olanlar eğitimleri ile ilişkili olan beyaz yakalı işlere girmişler, yüksek öğrenim basamaklarından mezun olanlar hem görece daha iyi koşullarda olan daha yüksek ücretle zihinsel emek gerektiren işlere girmişlerdir.

Ancak bu durumun 2000'li yıllardan sonra işgücü piyasalarındaki, dünya ekonomik gündemindeki değişimlerle etkisini yitirdiği söylenebilir. 1990'larda körüklenen üniversite mezunlarının iyi ücretlerle ve iyi koşullarda çalışacağı söylemi, bugün itibari ile önemli oranda değer kaybına uğramıştır. Artan işsizlik oranları, piyasadaki kısa dönemli, geçici, sözleşmeli işlerin artışı ve Türkiye gibi çevre ülkelerde bedensel emeğe dayalı işleri artıran esnek üretim biçimlerinin yaygınlaşması bedensel emekle yapılan işlerin yaygınlaşmasına neden olmakta, özellikle eğitilmiş emeğin de eğitim gerektirmeyen işlere doğru sürüklenmesine neden olmaktadır.

Eğitimin istihdamla bağlarının koptuğunun bir göstergesi olan eğitimli nüfusun artan işsizliği ya da eğitim düzeyinden daha düşük düzeyde işleri yapar hale gelişidir. Bu durum beyaz yakalıların mavi yakalı çalışanlar hale gelmesidir. İşgücü piyasalarındaki değişimler ve esnek çalışma koşullarının yaygınlaşması ile modern toplumdaki iş, istihdam güvencesi gibi klasik kavramlar yerini "bilgi toplumunun gerektirdikleri", "işsizlik riski altındaki gençler" gibi kavramlara bırakmış ve "Risk Toplumu" kavramı modern toplumdan post modern topluma geçiş sürecini açıklamaya yardımcı olmuştur (Bessant, 2002).

Bir yandan eğitim görmenin getirilerine ilişkin beklentiler büyütülürken, Türkiye için başlangıcı 1980'li yıllar olmakla birlikte 2000'ler sonrasında hızlanan küreselleşme ile birlikte, neoliberal politikalar eğitim alanı da dâhil olmak üzere birçok alanda önemli değişiklikler gerçekleşmesini sağlamıştır. 2000'li yıllar sonrasında iş bulmada eğitim değişkeninin önemi oldukça azalmış, iş bulmada sosyal ağlar ve networklerin, kültürel, sosyal sermayenin, kimlik, aidiyet ve sınıfsal özellikleri belli eden işaretlerin ve sembollerin önemi artmıştır (Aksoy, 2007). Bu durum gerek dünyada gerekse Türkiye'de diplomalı işsizliğin çoğalışı ile sonuçlanmakta, üniversite mezunlarının işsizliği gittikçe artmaktadır. Diplomalı işsizlik olgusunun yaygınlığının artışı, duyulur olmasına da etki etmiş, bir dönemin "Çoban Sülü'nün başbakanlığa yükselişi miti" 2000'li yıllar sonrasında yerini "madencilik yapan öğretmen", "pazarcılık yapan kaymakam adayı" veya "şoförlük yapan mühendis" hüsranına bırakmıştır.

Uluslararası Çalışma Örgütü tarafından açıklanan "Global EmploymentTrends" (Küresel İstihdam Eğilimleri) Raporlarına göre dünyadaki işsizlik oranı 2007'de % 5,7 iken 2008'de % 5,8; 2009'da % 6,6; 2010'da % 6,2'dir (ILO,2010; ILO,2011).

Tablo1:G-20[*]Ülkelerinde* Üniversite Mezunları** Arasında İşsizlik Oranları (%)			
	Kadın	Erkek	Toplam
Avustralya-2006	1,7	1,5	1,6
Japonya-2013	3,3	3,4	3,4
Arjantin-2014	3,9	2,3	3,2
Brezilya-2013	3,8	2,4	3,2
ABD-2014	3,5	3,2	3,4
Güney Kore-2014	4,1	3,2	3,5
Rusya-2013	3,5	3,7	3,6
Almanya-2014	5,6	4,6	5,0
Kanada-2014	4,9	5,6	5,2
Endonezya-2013	6,4	5	5,6
Meksika-2013	6,1	5,5	5,8
Fransa-2014	6,2	6,3	6,2
İngiltere-2014	6,4	6,4	6,4
İtalya-2014	8,7	6,3	7,3
Güney Afrika-2013	11,8	8	9,9
S.Arabistan-2013	31,7	2,2	10,5
Türkiye-2013	13,4	6,7	9,3
Türkiye-2014	30,4	15,2	21

**ISCED 1997'ye göre Yükseköğretimin 5 ve 6. Düzey eğitim basamağı mezunları.
*G-20'nin diğer iki ülkesi olan Hindistan ve Çin'deeğitim düzeyine göre ayrıştırılmş işsizlik oranı verileri mevcut değildir.

Kaynak: ILO, 2015. LabourStatistisby Country.

Üniversite mezunlarının işsizlik oranları Almanya'da 3,1 ABD 4,9 İngiltere 4,1 Endonezya 1,1 Bulgaristan 4,5 Hindistan 3,4 Türkiye 9,8 (ILO, 2012).

Tablo 2: Türkiye'de Yıllara Göre Üniversite Mezunlarının İşsizlik Oranları (%)

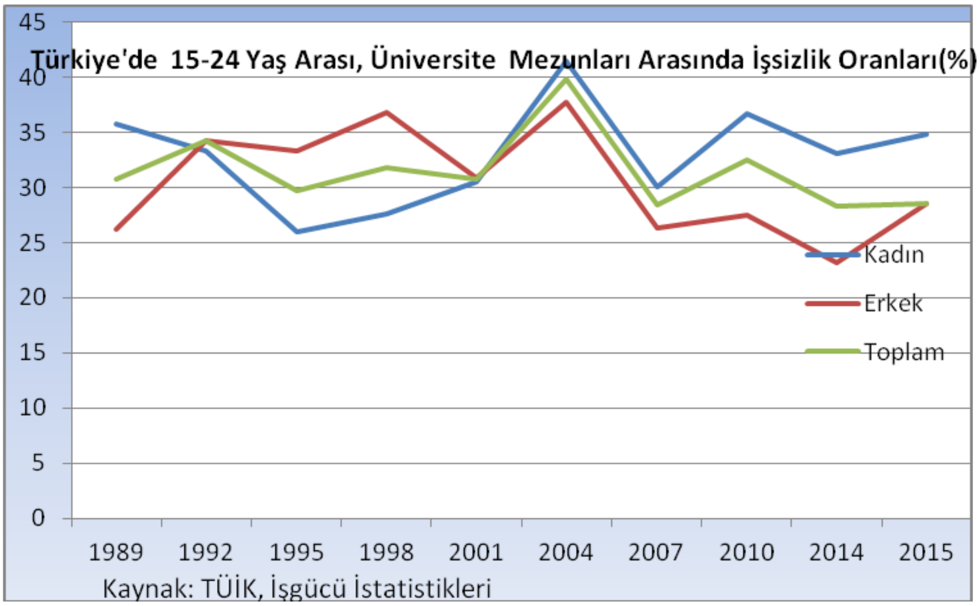
	15 yaş ve üstü			**15-24 yaşlar arası**		
Yıllar				**Kadın**	**Erkek**	**Toplam**
1989	9,8	5,5	6,6	35,8	26,2	30,7
1992	11,9	6,8	8,4	33,3	34,3	34,2
1995	8,0	5,6	6,4	26,0	33,3	29,7
1998	10,8	7,2	8,4	27,6	36,8	31,8
2001	10,0	6,6	7,8	30,5	30,9	30,7
2004	16,9	9,8	12,2	41,5	37,7	39,8
2007	13,9	7,4	9,7	30,1	26,3	28,4
2010	15,9	8,1	11,0	36,7	27,5	32,5

[*] G-20 ülkeleri: Almanya, Amerika Birleşik Devletleri, Arjantin,Avustralya, Brezilya, Çin, Endonezya, Fransa,
Güney Afrika, Güney Kore, Hindistan, İngiltere, İtalya, Japonya, Kanada, Meksika, Rusya, Suudi Arabistan, Türkiye ve Avrupa Birliği Komisyonu

2013	15,1	7,4	10,3	33,1	23,2	28,3
2015*	16,1	7,7	10,9	34,8	28,6	28,6

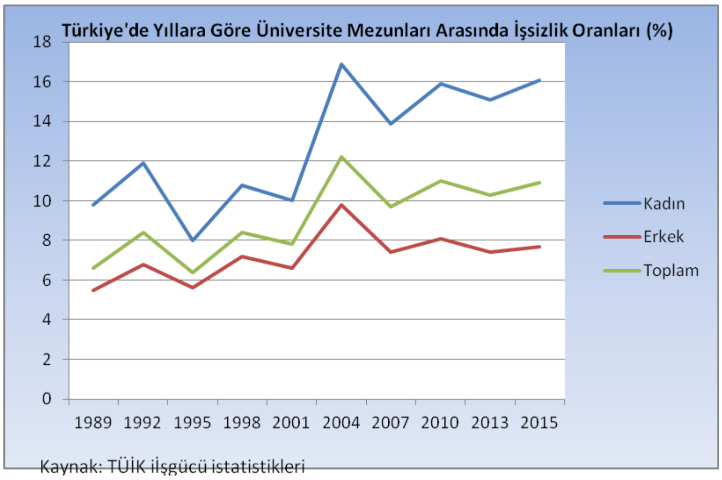
*: 2015 yılının açıklanan verileri ocak-şubat aylarının ortalaması alınmıştır.

Grafik1:



Çizelge 1'e göre fakülte veya yüksekokul mezunu olanlarda hem 15 yaş ve üstü için hem de 15-24 yaş arası için işsizlik oranlarının yıllar içinde genel olarak artış eğiliminde olduğu görülmektedir.

Grafik 2:



Üniversite mezunları arasında işsizlik oranlarının artışı üniversite mezunlarının lise mezunlarının yaptığı işlere ve daha alt düzeyde eğitim gerektiren işlere talip olmaları durumunu arttırmaktadır. Üniversite mezunları özellikle belli bir dönem işsiz kalmışlarsa gelir elde etmek için vasıf gerektirmeyen işleri yapmakta bir yandan da iş aramaya devam etmektedir.

Tüm bu istatistiki veriler Türkiye'de eğitimin istihdamla bağlarının zayıfladığını, eğitimin iş bulmada etkisinin azaldığını, toplumsal tabakalara arasındaki sosyal mobiliteye etkisinin azaldığını göstermektedir.

Eğitimin istihdamla bağının zayıflamasınınönemli nedenlerinden birisi olarak altı çizilen dünya ekonomik gündemindeki değişimler karşısında eğitim sisteminin bu değişimlere duyarlı hale getirilmesi vezayıflayan bağların güçlendirilmesi gerekmektedir. Bu duyarlılık yeni ekonomik ilişkilere göre eğitim sistemleri üzerinde uyarlanacak dönüşümlerdir. Genellikle gelişen teknolojiye göre eğitim sisteminin duyarlığı yüksektir, politika belirleyici unsurlar gelişen teknolojinin bileşenlerini eğitim sistemi içine dahil etmektedir. Ancak işgücü piyasalarındaki ve üretim biçimlerindeki değişimlerin eğitim sistemine uyarlanması noktasında zayıf kalınmaktadır.

İşgücü piyasalarında yeni bir çalışan tipi olarak yeşil yakalıların eğitim sisteminden yetiştirilmesi eğitim istihdam bağının kurulmasında önemli bir köprüdür.

Yeşil Ekonomi ve Yeşil Yakalı Çalışanlar

İnsanın doğa ile mücadelesinin bugün itibari ile geldiği nokta, ileri sanayi toplumlarının bir sonucu olarak nasıl bir ekonomik sistem içinde olursa olsun doğanın temellükü esasına dayalı bir sömürü ve nesneleştirme süreci olmuştur (Marcuse, 1986). Doğal kaynakların, gelecekteki sonuçlarının ne olacağına odaklanılmadan ekonomiye girdi olarak kullanılması, sanayi toplumlarında ülkelerin tek amaçlarının kalkınma ve ekonomik büyüme olması gözle görülmeye başlayana yok sayılmıştır. Petrol doğal gaz gibi yakıtların atmosferde oluşturduğu etkiler ve insan eliyle iklimlerde oluşan değişiklikler, buzullarda meydana gelen çözünmeler sonucu 1990 lar dünyada yaşanan en sıcak on yıl olmuş, 2003 yılında sadece Avrupa'da 20.000 den fazla kişi aşırı sıcağın getirdiği etkiler nedeniyle ölmüştür (Keskin & Gürbüz, 2004). 20. yy'nin ikinci yarısından sonra başlayan bir süreç olarak insani kalkınma anlayışı, sürdürülebilir kalkınma anlayışı gibi insanı ve doğayı merkeze alan kalkınma yaklaşımları ortaya çıkmıştır. Sürdürülebilir kalkınma BM Çevre ve Kalkınma Dünya Komisyonu tarafından 1987 yılında ortaya atılmış bir kavram olup kaynakların sürdürülebilirliği esasına dayanmaktadır (Kulözü,). Sürrülebilir kalkınmanın ekonomi alanındaki yansıması olan yeşil ekonomi kavramı da doğaya ve doğal kaynakların sürdürülmesi esasına dayanan bir kavramdır. Temelde doğayı kirleten yok eden kaynaklar yerine alternatif enerji kaynaklarına ve yenilenebilir enerji kaynaklarına yönelimi içerir.

Yeşil ekonominin ürettiği çalışan tipi ise yeşil yakalı çalışanlar olarak adlandırılmaktadır. Çalışanların yaka renklerine göre kategorize edilmesi 20. Yüzyılın ikinci yarısından sonra yapılır hale gelmiş, sanayide fiziksel emeğe dayalı işlerde çalışan vasıfsız emekgücü mavi yakalı olarak adlandırılırken eğitimli olup görece iyi işlerde çalışanlar beyaz yakalı terimi ile ifade edilmiştir (Hoberek, 2005, p.5-6). Beyaz yakalı-mavi yakalı ayrımı kafa kol emeği bölünmesine de işaret etmektedir. Son yıllarda bu terimlere altın yakalılık, pembe yakalılık, gri yakalılık, çelik yakalılık ve yeşil yakalılık gibi bir bölünmeye ya da eğitim düzeyine göre ayrışmaya işaret etmese de belirli çalışma alanlarına ya da yeterliklere işaret eden terimler de eklenmiştir.Yeşil yakalı çalışanlar yeşil ekonomi kavramının ürettiği bir çalışan tipi olarak doğal kaynakların tüketilmesini reddeden bunun yerine alternatif ve yenilenebilir kaynakların kullanımına odaklanan bir çalışan tipi olup özel olarak bir sektörü işaret etmekten ziyade hemen her çalışma koşunda bulunabilecek özellikleri taşıyan bir kitledir.

Yeşil yakalılar genel olarak şu mesleklerle özdeşleştirilebilir: Yenilenebilir enerji danışmanlığı, yenilenebilir enerji mühendisliği, rüzgar enerjisi uzmanlığı, rüzgar enerjisi teknikerliği, karbon satış uzmanlığı, çevre ve enerji hukuku uzmanlığı, organik tarım mühendisliği, ekolojik turizm danışmanlığı, ısı yalıtım uzmanlığı, çevre mühendisliği, ekolojik bina tasarımcılığı, atık su uzmanlığı vs. (Erdal, 2012, s.172)

Lund (2009) Danimarka'da ekonomik büyümeye yönelik, istihdam artırıcı ve CO2

azaltmak için geliştirdiği stratejilerin ve yenilenebilir enerjide devletin sağladığı sübvansiyonların, istihdam üzerinde net pozitif etki ettiğini bulmuştur.

Yeşil yakalı çalışanların eğitim sisteminden yetiştirilmesi yeşil ekonomiye yapılacak önemli bir katkıdır. Türk Eğitim Sisteminden tam da yukarıda sayılan isimlerle meslek Eğitim sisteminde sanayiye ara eleman yetiştiren kurumlar olan mesleki ve teknik eğitim okulları ve bu alandaki vasıflı işgücünü yetiştiren üniversite programları değerlendirilmiştir. Mesleki ve teknik eğitim kurumlarının, meslek yüksek okullarının, üniversitelerin

1.MESLEKİ VE TEKNİK LİSELERDEN YEŞİL EKONOMİYE İNSANGÜCÜ YETİŞTİRME

Türkiye'de de ilk defa 2012- 2013 yılında Niğ Türk2014-2015 Öğretim Yılı itibari ile Türkiye'de 30 mesleki ve teknik okulda Yenilenebilir Enerji Teknolojileri adı altında bir alan bulunmaktadır. Bu okullardan 27 sinde bu alanın Güneş Enerjisi Sistemleri dalı, 17 sinde rüzgar teknolojileri dalı bulunmaktadır. Mesleki ve teknik liselerin bu alanları rüzgar ya da güneş enerji santrallerinde, rüzgar ve güneş tribünü kurulum firmalarında, güneş ve rüzgar tribünü üreten firmalarda, güneş paneli üreten firmalar için işgücü üretmektedir. Ayrıca bu alan mezunları diğer elektrik santrali gibi yerlerde de çalışabilmektedir.

Tablo 3: Yenilenebilir Enerji Teknolojileri Alanı bulunan Meslek Liseleri

	İl	İlçe	Kurum Adı
1	ADANA	CEYHAN	Ceyhan Mesleki ve Teknik Anadolu Lisesi
2	ADANA	ÇUKUROVA	Kurttepe Mesleki ve Teknik Anadolu Lisesi
3	ADANA	SEYHAN	Akkapı Mesleki ve Teknik Anadolu Lisesi
4	ADIYAMAN	MERKEZ	Adıyaman Mimar Sinan Mesleki ve Teknik Anadolu Lisesi
5	AFYONKARAHİSAR	ŞUHUT	Şuhut Mesleki ve Teknik Anadolu Lisesi
6	ANTALYA	KEPEZ	Baraj Mesleki ve Teknik Anadolu Lisesi
7	AYDIN	EFELER	Mimar Sinan Mesleki ve Teknik Anadolu Lisesi
8	BALIKESİR	ALTIEYLÜL	Organize Sanayi Mesleki ve Teknik Anadolu Lisesi
9	BALIKESİR	GÖNEN	Gönen Ticaret Odası Mesleki ve Teknik Anadolu Lisesi
10	BALIKESİR	SUSURLUK	Susurluk Mesleki ve Teknik Anadolu Lisesi
11	BARTIN	MERKEZ	Bartın Mesleki ve Teknik Anadolu Lisesi
12	BURSA	YILDIRIM	Yeşilyayla Mesleki ve Teknik Anadolu Lisesi

13	DENİZLİ	MERKEZEFENDİ	İş Adamları Mesleki ve Teknik Anadolu Lisesi
14	ESKİŞEHİR	TEPEBAŞI	Şehit Murat Tuzsuz Mesleki ve Teknik Anadolu Lisesi
15	GAZİANTEP	ŞEHİT KAMİL	Kanuni Sultan Süleyman Mesleki ve Teknik Anadolu Lisesi
16	GİRESUN	BULANCAK	Bulancak Mesleki ve Teknik Anadolu Lisesi
17	ISPARTA	MERKEZ	İMKB Mesleki ve Teknik Anadolu Lisesi
18	İSTANBUL	ATAŞEHİR	Dr.Nurettin Erk-Perihan Erk Mesleki ve Teknik Anadolu Lisesi
19	İSTANBUL	BAHÇELİEVLER	Yenibosna Mesleki ve Teknik Anadolu Lisesi
20	İSTANBUL	BEŞİKTAŞ	İSOV-Dinçkök Mesleki ve Teknik Anadolu Lisesi
21	KARAMAN	MERKEZ	Temizel-Ünlü Mesleki ve Teknik Anadolu Lisesi
22	KOCAELİ	BAŞİSKELE	Başiskele Selim Yürekten Mesleki ve Teknik Anadolu Lisesi
23	KOCAELİ	İZMİT	Atatürk Mesleki ve Teknik Anadolu Lisesi
24	KONYA	EREĞLİ	Fatih Mesleki ve Teknik Anadolu Lisesi
25	MALATYA	YEŞİLYURT	Şehit Gökhan Ertan Mesleki ve Teknik Anadolu Lisesi
26	MERSİN	AKDENİZ	Mersin Mesleki ve Teknik Anadolu Lisesi
27	NİĞDE	MERKEZ	Niğde Mesleki ve Teknik Anadolu Lisesi
28	RİZE	ÇAYELİ	Çayeli Barbaros Mesleki ve Teknik Anadolu Lisesi
29	SAKARYA	HENDEK	Hendek Mesleki ve Teknik Anadolu Lisesi
30	TRABZON	ORTAHİSAR	Trabzon Mesleki ve Teknik Anadolu Lisesi
Kaynak: MEB, 2014.			

2.İKİ YILLIK MESLEK YÜKSEKOKULLARINDAN YEŞİL EKONOMİYE İNSANGÜCÜ YETİŞTİRME

Mesleki ve teknik ortaöğretim kurumlarının mezunlarının işe girmek yerine yükseköğretim kurumlarına yönelmeleri durumunda sınavla girebilecekleri bölümler ve sınavsız geçiş hakları olan 2 yıllık bölümler mevcuttur. Mesleki ve teknik eğitim kurumlarının Yenilenebilir Enerji Teknolojileri Alanı mezunlarının sınavsız geçiş yapabileceği 2 yıllık meslek yüksek okulların bölümleri 1. Alternatif Enerji Kaynakları Teknolojisi ve 2. Elektrik Enerjisi Üretim İletim ve Dağıtımı bölümleridir.

Tablo 4: Alternatif Enerji Teknolojileri Bölümü Bulunan Meslek Yüksek Okullar		
Üniversite	Meslek Yüksek Okulu	Kontenjan
Ankara Üniversitesi	Gama Meslek Yüksek Okulu	30
Hacettepe Üniversitesi	**Hacettepe Ankara Sanayi Odası 1. OSB Meslek Yüksekokulu**	30 , 30 ikinci öğretim
Adnan Menderes Ü	Söke Meslek Yüksek Okulu	40
Mehmet Akif Ersoy Ü	Bucak Emin Gülmez Teknik Bilimler Meslek Yüksek Okulu	40

Pamukkale Üniversitesi	Denizli Teknik Bilimler Meslek Yüksek Okulu	40
Düzce Üniversitesi	Gölyaka Meslek Yüksek Okulu	20
Erzincan Üniversitesi	Meslek Yüksek Okulu	35
Gümüşhane Üniversitesi	Gümüşhane Meslek Yüksek Okulu	50
Yaşar Üniversitesi	Meslek Yüksek Okulu	Tam burslu: 2 % 50 burslu: 13
Erciyes Üniversitesi	Mustafa Çıkrıkçıoğlu MYO	40
Muğla Sıtlkı Koçman Üniversitesi	Muğla Meslek Yüksek Okulu	30, İ.Ö: 30
Nevşehir Hacı Bektaş Üniversitesi	MYO	40
Kaynak: ÖSYM, 2014		

Ayrıca Meslek Yüksek Okullarının Alternatif Enerji Teknolojileri bölümlerine Tesviye ve Uçak Elektroniği Alanı mezunları da yerleşebilmektedir.

Tablo 5: Elektrik Enerjisi Üretim İletim ve Dağıtımı Bölümü Bulunan Meslek Yüksek Okulları		
Üniversite	Meslek Yüksek Okulu	Kontenjan
Gazi Üniversitesi	Teknik Bilimler MYO	30
Artvin Çoruh Üniversitesi	Borçka Acarlar MYO	40
Bilecik Şeyh Edebali Üniversitesi	MYO	30
Çanakkale 18 Mart Üniversitesi	Biga MYO	40
Çanakkale 18 Mart Üniversitesi	Çan MYO	70, İÖ 70
Fırat Üniversitesi	Keban Meslek Yüksek Okulu	30
Erzurum Atatürk Üniversite	Aşkale MYO	40
Erzurum Atatürk Üniversite	İspir Hamza Polat MYO	40
Eskişehir Anadolu Ü	Açıköğretim	2500
Eskişehir Anadolu Ü	Eskişehir MYO	30
Hakkari Üniv	Çölemerik MYO	50
Süleyman Demirel	Keçiborlu MYO	50
Süleyman Demirel	Yalvaç Teknik Bilimler MYO	40
Kahramanmaraş Sütçü İmam Ü	Andırım MYO	40
Kahramanmaraş Sütçü İmam Ü	Elbistan MYO	80, İ.Ö.80
Kastamonu Ü	**Araç Rafet Vergili Meslek Yüksekokulu**	50
Nevşehir Hacı Bektaş Veli Ü	Hacı Bektaş Veli MYO	40
Kaynak: ÖSYM, 2014		

Ayrıca Elektrik Enerjisi Üretim İletim ve Dağıtım bölümüne Uçak Elektroniği, Tesviye alanı mezunları da girebilmektedir.

3.ÜNİVERSİTELERİN 4 YILLIK LİSANS BÖLÜMLERİNDEN YEŞİL EKONOMİYE İNSANGÜCÜ YETİŞTİRME

Mesleki ve Teknik Ortaöğretim kurumlarından mezun olan ancak mühendislik fakültelerine girişte merkezi yerleştirme sınavında dezavantajlı durumda olan öğrencilerin de mühendis olabilmeleri için 2009 yılında kurulmuş, ilk defa 2010-2011 öğretim yılında öğrenci almaya başlamıştır. Bu öğrenciler meslek liselerinden belirli bir alanın temel becerileri sahip olarak mezun olmuş ve sanayi ve büro işleri için ara eleman olarak yetiştirilmiştir. Bu potansiyel işgücünün nitelik birikiminin tekrar eğitilmek suretiyle değerlendirilmesi ve işgücü piyasasına mühendis olarak kazandırılması amacıyla kurulan Teknoloji Fakültelerin genel lise mezunlarının bulunabileceği genelde sayıca çok az; sadece meslek lisesi mezunlarının tercihte bulunabileceği ayrı ve genelde çok fazla kontenjanları bulunmaktadır. .Mesleki ve teknik ortaöğretim kurumlarının Yenilenebilir Enerji Teknolojileri alanı mezunlarının alanları ile ilişkili olarak girebildikleri Teknoloji Fakültesi Bölümü Endüstriyel Tasarım Mühendisliği bölümüdür. 4 yıllık lisans eğitimi sonrasında mezunlar mühendis ünvanı almaktadır. Ancak Türkiye'de 2014-2015 öğretim yılı itibari ile sadece üç üniversitenin teknoloji fakültesinde Endüstriyl Tasarım Mühendisliği bulunuyor.

Tablo 6: Endüstriyel Tasarım Mühendisliği bulunan Teknoloji Fakülteleri

Üniversite	Fakülte	Kontenjan
Erciyes Üniversitesi	Teknoloji Fakültesi	40, İ.Ö 40
Gazi ÜNİVERSİTESİ	Teknoloji Fakültesi	29, MTOK:13
Karabük Ü	Teknoloji Fakültesi	48, MTOK: 21; son yerleştirme MTOK dan 8 kişi boş kalmış

Kaynak: ÖSYM, 2014

Türkiye'de 109 devlet, 84 vakıf üniversitesi olmak üzere 193 üniversite bulunmaktadır .

Tablo 7: Enerji Sistemleri Mühendisliği bölümü bulunan üniversiteler

Atılım Üniversitesi Mühendislik Fakültesi (3 tam burslu + 5 %75 burslu + 17 % 50burslu) yerleşen 25	Giresun Ü Müh Fak 41, i.ö:41	Karadeniz Teknik ÜniversitesiTek.Fak 29 MTOK:13
BahçeşehirÜnversitesi Mühendislik Fakültesi (60ücretli + 7burslu) yerleşen(34+7)	İstanbul Bilgi Ü Tam burslu :5 %50 burslu: 45 yerleşen37	Karamanoğlu Mehmet bey MÜH fAK 31
Batman Üniversitesi Teknoloji Fak 36İ.Ö: 36, i.ö yerleşen:20 MTOK: 16, Yerl:eşen:1 MTOK, İ.Ö: 16, Yerleşen:1	Kadir Has Ü TAM BURSLU: 5 %50 BURSLU: 20 yerleşen: 5	Kilis 7 ARALIK 26, Mtok: 12
Beykent Ü. Tam burslu:6 % 50 Burslu: 54, yerleşen: 12	Karabük Ü 69 İ.Ö:69	Muğla Sıtkı Koçman Ü 29, mtok:13

	Mtok: 30 Mtok İ.Ö:30	
Erciyes Üniversitesi: 46 i.ö:46		Konya Necmettin Erbakan Ü. Müh Fak 41
Elazığ Fırat Üniversitesi 66, i.ö:66 MTOK:28 MTOK:İ.Ö: 28, YERLEŞEN 15	Recep T.E Üniversitesi 41	Okan Ü Tam burslu: 3 %50 burslu: yerleşen:1 Ücretli:20 yerleşen yok
Gazi 48, MTOK: 21 Kktc Uyruk:1	SÜLEYMAN Demirel Ü. Teknoloji Fak 51 İ.Ö: 51 Mtok: 22 MTOK İ.Ö: 22	Osmaniye Korkut Ata Ü. Müh Fak 52 İ.Ö:52
Şırnak Ü Müh Fak 52	Yalova Ü 62	Yaşar Ü Tam burslu: 3 %50 burslu:27
Girne Amerikan Ü Tam burslu: 5, yerleşen:3 %50 burslu: 5 yerleşen yok Ücreti:25 yerleşen yok	Uluslar arası Kıbrıs Ü TAM BURSLU: 15 yerleşen:1 %75 burslu: 15 yerleşen yok % 50 burslu yerleşen yok Ücretli: 5 yerleşen yok	

Mesleki teknik ortaöğretim kurumlarının Yenilenebilir Enerji Teknolojileri alanlarından yönlendirilerek gelinen Endüstriyel Tasarım Mühendisliği dışında, Teknoloji Fakültelerinin Enerji Sistemleri Mühendisliği bölümleri de yenilenebilir enerji ile ilişkili alanlara insangücü yetiştirmektedir.

4. LİSANSÜSTÜ DÜZEYDE YEŞİL EKONOMİYE İNSANGÜCÜ YETİŞTİRME

A)Gebze Teknik Üniversitesinde 2002 yılında Yenileneblilir Enerji Kaynakları Araştırma Merkezi kurulmuştur. Araştırma merkezinde devam eden projeler arasında Akdeniz ve Ege havzasında yaygın kullanılan solar kolektörler için emme katsayılarını artırıcı seçici yüzey kaplamalarının geliştirilmesi, güneş kolektörlerinden hidrojen eldesi ,evsel küçük rüzgar türbinleri ve küçük hidroelektrik santralleri projeleri bulunmaktadır. Araştırma merkezi yenilenebilir enerji kaynakları alanında doğrudan bir insan kaynağı yetiştirme programı kapsamasa da gerçekleştirilen projelerde çalışan öğretim üyeleri ve diğer kişilerin yenilenebilir enerji alanında niteliklerini arttırıcı bir etkisi olmaktadır.

B) İTÜ bünyesinde 2003 yılında Enerji Enstitüsü kurulmuştur. Enstitünün 5 anabilim dalı Nükleer Araştırmalar, Yenilenebilir Enerji, Konvensiyonel Enerji, Enerji Planlaması veYönetimi, Enerji Bilim ve Yönetimi bölümleridir.

Enstitüde enerji konusunda ileri düzey araştırmalar, projeler ve aboratuar çalışmalar yapılmaktadır. Aynı zamanda Enerji Bilim ve Teknoloji yüksek lisans ve doktora programı ile ‘ Radyasyon Bilim ve Teknoloji’ yüksek lisans programı vardır.

C)Ege Üniversitesi’nde 1978 yılında kurulmuş olan Güneş Enerjisi Enstitüsü bulunmaktadır. Enstitü şu an Enerji ve Enerji Teknolojisi adı ile iki bilim dalı içermektedir. Enstitü bünyesinde Güneş ısıl sistemleri, fotovoltaik, yeni nesil fotovoltaik, güneş mimarisi, biyokütle enerjisi, rüzgar enerjisi, jeotermal enerji, enerji verimliliği ve yönetimi, güneş ışınımlı fotokimya ve optoelektronik konularına yönelik araştırmalar ve lisansüstü tezler yürütülmektedir. yeni ve yenilenebilir enerji kaynaklarından, güneş, biyokütle, rüzgâr, jeotermal gibi enerji kaynakları ile ilgili uygulamaya yönelik araştırmalar ve lisansüstü tezler yürütülmektedir. Aynı zamanda enerji yönetimi, enerji verimliliği gibi konular da bu anabilim dalının lisansüstü öğretim programı içerisinde yer almaktadır. 2013 yılı itibari ile Enstitüden 145 yüksek lisans ve 86 doktora öğrencisi mezun olmuş, 55 yüksek lisans ve 62 doktora öğrencisi lisansüstü öğrenimine devam etmektedir (http://eusolar.ege.edu.tr/hakkimizda.html) ve (İzmir İli Yenilenebilir Enerji Sektör Analizi)

Enstitü ile Mesleki Yeterlilik Kurumu tarafından “Yenilenebilir Enerji Kaynakları” alanına ilişkin meslek standardlarının belirlenmesi konusunda görevlendirilmiştir. Bu kapsamda “Yenilenebilir Enerji Kaynakları” alanına ilişkin 4 mesleğin 3’er farklı seviyede (3., 4. ve 5. seviye) olmak üzere 12 standardı oluşturulmuş ve mesleki eğitim çalışmaları prosedürlerinde yer alan “Ulusal Yeterlilik” belgesi düzenleme çalışmaları başlatılmıştır. Bu meslekler şunlardır:

Biyogaz sistemleri personeli: Biyogaz Sistemleri Personeli (Seviye 5), iş sağlığı ve güvenliği ile çevreye ilişkin belirlenmiş önlemleri alarak, kalite sistemleri çerçevesinde; planlı ve programlı bir şekilde iş organizasyonu yapan, biyogaz sistemlerindeki mevcut bileşenlerin mekanik ve elektrik montajı ile tesisatın test ayarlarını yapan ve sistemi devreye alma çalışmalarını gerçekleştiren, tesisi periyodik olarak kontrol eden, bakım ve onarımını gerçekleştiren, tesisin işletmeye alınması iş ve işlemlerinde görev alan, hammadde giriş ve son ürün çıkış işlemlerinde denetim yapan, otomasyon sisteminde ölçüm ve kontrol elemanlarını denetleyerek dahili kalibrasyonlarının yapılmasını sağlayan, tesisi bilgisayar üzerinden izleyerek kontrol altında tutan ve mesleki gelişim faaliyetlerini yürüten nitelikli kişidir. Mesleğin Uluslararası Sınıflandırma Sistemlerindeki Yeri Enerji üretim tesisi operatörü ile özdeştir (MYK,2012a).

Fotovoltaik güç sistemleri personeli: Fotovoltaik Güç Sistemi Personeli (Seviye 4), iş sağlığı ve güvenliği ile çevreye ilişkin belirlenmiş önlemleri alarak, kalite sistemleri çerçevesinde; tasarımı ve iş programı tamamlanmış ve gerekli teçhizatı temin edilmiş fotovoltaik güç sistemlerinde, montaj şemalarına uygun biçimde denge bileşenlerinin ve fotovoltaik modüllerin montajını ve sistem içi elektriksel bağlantılarını yapan, kurulum sırasında kurulum yerinin uyarlanması için gerekli gördüğü değişiklikleri üstlerine bildiren, montaj işlemleri sırasında kullanılacak araç, gereç, malzeme ve ekipmanı hazırlayan, sistem bileşenlerini montaj şemasına uygun biçimde konumlandıran, çalışılan yerin temizliğini ve emniyetini sağlayan, kullanılan ekipmanın bakımını üstlenen, bakım-onarım sırasında sistemin elektriksel sürekliliklerini ölçen ve buna göre hataları gideren ve mesleki gelişim faaliyetlerine katılan nitelikli kişidir (MYK, 2012b).

Güneş ısıl sistemleri personeli: GüneĢ Isıl Sistem Personeli (Seviye 5), iĢ sağlığı ve güvenliği ile çevreye iliĢkinbelirlenmiĢ önlemleri alarak, kalite sistemleri çerçevesinde; tasarımı ve iĢ programı tamamlanmıĢ ve gerekli teçhizatı temin edilmiĢgüneĢ enerjisiyle su ve havuz ısıtma sistemlerinde, denge bileĢenlerinin, toplayıcıların ve diğer aksamı taĢıyacak mekanik alt yapının, yerleĢim planına ve talimatlara uygun olarak kurulmasını, sistem içi elektriksel bağlantıların yapılmasını sağlayan, kurulum planlarının oluĢturulmasında ve kurulum yerine uyarlanmasında görev alan kiİidir. Montaj iİlemleri sırasında kullanılacak araç, gereç, malzeme ve aparatların hazırlanmasını sağlamak, sistem bileĢenlerini montaj Ģemasına uygun biçimde konumlandırmak, mevcut bileĢenlerin mekanik ve elektrik montajı ile tesisatın test ayarlarını yapmak ve sistemi devreye alma çalıĢmalarınıgerçekleĢtirmek Güne Isıl Sistem Personeli (Seviye 5)'in mesleki yetkinliğini gerektirir. Tesisi periyodik olarak kontrol etmek, bakım ve onarımını üstlenmek, tesisin işletmeye alınması i ve işlemlerinde görev almak ve mesleki gelişim faaliyetlerini yürütmek Güneş Isıl Sistem Personeli (Seviye 5)'in sorumlulukları arasındadır (MYK,2012c).

Rüzgar güç sistemleri personeli: Rüzgâr Güç Sistemi Personeli (Seviye 5), iş sağlığı ve güvenliği ile çevreye ilişkin belirlenmiş önlemleri alarak, kalite sistemleri çerçevesinde; rüzgâr güç sistemi işletmelerinde montaj şemalarına uygun olarak üstleri tarafından verilen talimatlar doğrultusunda elektrik**,** elektronik ve mekanik malzemelerin, parçaların ve cihazların rüzgâr türbini ve saha montaj işlemlerinin gerçekleştirilmesini sağlayan, montajı tamamlanan parçaların, teknik talimatlarda belirtilen özelliklere sahip olmasını sağlayan, montaj işlemleri sırasında yapılan mekanik ve elektriksel ölçümleri değerlendiren, bu değerlendirmeye uygun talimatları ilgili personele ileten, teknik kontrolleri yapan, montaj hatalarını tespit edip düzeltilmesini sağlayan ve mesleki gelişim faaliyetlerini yürüten nitelikli kişidir.(MYK,2012d)

5.YEŞİL YAKALILARIN KAMUDA İSTİHDAMI POLİTİKALARI

2014 KPSS / 2 yerleştirmesinde bir kamu krumu 1 kişilik enerji sistemleri mühendisi kadro ilanı vermiş. Osmaniye Korkut Ata Üniversitesine 1 kişi 86 puanla atanmıştır. (Yerleştirme sonuçları, ösym)

2014 /1-3-4 Enerji sistemleri müh ve endüstriyel tasarım müh kadro yok. Alternatif Enerji Teknolojileri önlisanspor gramı mezunları için kadro yok. Elektirik iletim dağıtım önlisans için kadro yok. Yenilenebilir enerij teknolojileri için klavuzda nitelik kodu bile yok.

2013 / 1-2 de endüstriyel tasarım önlisans mezunu alımı yok. Enerji sistemleri mühendisi alımı yok. Endüstriyel tasarım mühendisliği klavuzda kod olarak bile yok.

SONUÇ:

Eğitim sisteminin istihdam ve ekonomi ile kopan bağlarını yeniden güçlendirmek için günümüzün ekonomi anlayışına odaklanan bir eğitim sisteminin kurgulanması gerekmektedir. Bunun önkoşullarından birisi de son yıllarda ekonomi anlayışında meydana gelen değişimler çerçevesinde bir insangücü planlaması yapılmasıdır. Dünya ekonomik anlayışı insanlığın doğayı sömürüsü esasına dayanan bir sistemden doğanın ve doğal kaynakların korunması, srdürülmesi esasına dayanan yeşi ekonomi kavraına doğru evrilmiştir. Şüphesiz yeşil ekonominin gerektiridiği ve ihtiyaç duyduğu insangücü eskiye oranla oldukça farklı özellikleri olan bir işgücüdür. Yeşil yakalı çalışanlar olarak adlandırılan günümüz yeşil ekonomisinin çalışanlarının eğitim sisteminden yetiştirilmesi gerekmektedir.

Türk Eğitim Sisteminde insangücü planlamasına bakılırsa henüz yeni başlamış olan yeşil yakalı nitelikli insangücü yetiştirme politikalarının ve pratiklerinin değerli olmakla birlikte henüz çok yetersiz olduğu görülmektedir. Araştırmadan elde edilen sonuçlara göre Türkiye'de yeşil ekonomiye sadece teknik personel yetiştirilmesine odaklanılmış, yeşil ekonominin hukuki, yönetimsel, iletişimsel boyutlarına ilişkin bir insangücü planlaması politikasının olmadığı görülmüştür.

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HEGEMON GÜÇLERİN ENERJİ SİYASETİ: ORTA ASYA TÜRK CUMHURİYETLERİ ÖRNEĞİ

HEGEMONIC POWERS' ENERGY POLITICS: EXAMPLE OF CENTRAL ASIA TURKISH REPUBLICS

Taner KARAKUZU*
İlker LİMON**

ÖZET

Enerji, üretimde kullanılan en önemli girdilerinden biri olup, devletlerin iktisadi kalkınmasında ve sosyal refahın gelişiminde en önemli aktörlerden biridir. Enerjinin, bu önemlerinden ötürü, hegemon devletlerin temel odak noktaları, enerji kaynaklarının yoğun olduğu bölgeler olmuştur. Artan enerji ihtiyacı karşısında, Orta Asya Türk Cumhuriyetleri'nin enerji rezervleri bakımından zengin olmalarından ötürü, Türk Cumhuriyetleri'nin makroekonomik göstergeler üzerinde olumlu etki yaratabileceğini göstermektedir. Bu durum uluslararası hegemon güçlerin bölgeye ilgisini arttırmaktadır. Orta Asya Türk Cumhuriyetleri gerek bulunduğu konum, gerekse sahip olduğu enerji kaynaklarından dolayı tarihsel olarak hegemon güçlerin oyun sahası içinde yer almıştır.

Bu bildiride öncelikle hegemon gücün ne olduğu tanımlanacaktır. Ardından Bölge üzerinde hegemon güç olarak kabul edilen Rusya Federasyonu (RF), Amerika Birleşik Devletleri (ABD) ve Çin'in bölge üzerindeki enerji siyaseti incelenecektir.

Anahtar Kelimeler: Hegemon, Enerji, Orta Asya Türk Cumhuriyetleri

ABSTRACT

Energy is one of the most important inputs that used in production. Also energy is one of the most important actor that the states of economic development and development of social welfare.The main focus of the hegemonic states, areas where energy resources are intense. Central Asia Turkish Republics are substantial in terms of energy reserves. The interest of international hegemonic powers increase about the region.

This article, first will define what the hegemonic power is and than the hegemonic powers of the region that Russian Federation (RF), United States (US) and China will be examined on the energy policies.

Keywords: Hegemon, Energy, Central Asia Turkish Republics

Giriş

Uluslararası seviyede sürdürülebilir kalkınma ve sosyal standartların artmasında önemli bir faktör olan enerji kaynakları, kıt kaynak olması ve giderek azalması sebebiyle devletlerin geleceği ile ilgili olarak önem derecesi sürekli yükselmektedir. Teknolojinin

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sürekli ilerlemesi, iletişim ve rekabetin hızla yükseldiği 21.yüzyılda enerji küresel ekonomilerinin etkin olarak çalışabilmesi için temel girdi kaynağı olarak kabul edilmektedir. Enerji, üretimde kullanılan başat girdilerinden biri olup, devletlerin iktisadi büyüme, kalkınma ve sosyal refahın yükselmesinde en önemli aktörlerden biridir. Devletlerin iktisadi gelişim süreçlerinde enerjinin kullanımı büyük önem taşımaktadır. Enerjinin, bu önemlerinden ötürü, hegemon devletlerin temel odak noktaları, enerji kaynakları bakımından zengin olan coğrafyalar olmuştur. Dünyada sürekli yükselen enerji ihtiyacı ve bununla birlikte enerji kaynaklarının dengesiz dağılımı karşısında, enerji ihtiyacı olan ülkelerin dışa bağımlılığı gelişmişlik düzeylerine paralel olarak artmaktadır. Artan enerji ihtiyacı karşısında, Orta Asya Türk Cumhuriyetleri[*]'nin enerji rezervleri bakımından zengin olmalarından ötürü, Türk Cumhuriyetleri'nin makro- ekonomik göstergeler üzerinde olumlu etki yaratabileceğini göstermektedir (Kuzu, 2012: 241). Bu durum uluslararası hegemon güçlerin bölgeye ilgisini arttırmaktadır. Orta Asya Türk Cumhuriyetleri gerek bulunduğu konum, gerekse sahip olduğu enerji kaynaklarından dolayı tarihsel olarak hegemon güçlerin oyun sahası içinde yer almıştır.

Türklerin ana vatanını, ortak tarihinin ve kültürünün şekillendiği zorlu coğrafyayı teşkil eden Orta Asya ve Kafkaslar bölgesini, kara hâkimiyet teorisyeni Mackinder "Eurasian Heartland-Avrasya Kalpgah" bölgesi olarak tanımlanmıştır. Sovyetler Birliği'nin (SSCB) 1991 yılında dağılmasının ardından ortaya çıkan yeni güçler mücadelesi, uluslararası ilişkiler yazınında "Yeni Büyük Oyun'' olarak betimlenmiştir. Bu coğrafya jeopolitik anlamda bu rekabetin merkezine yerleşmiştir (Caşın, 2012:52). Gerçekten de, 21. yüzyılda Orta Asya'da mevcut durumu, 19. yüzyılın sonlarından itibaren Birleşik Krallık ile Rus Çarlığı'nın bu coğrafyadaki rekabetine verilen isim olan "Büyük Oyun" ile özdeşleştirenler oldukça fazladır. Yeni Büyük Oyunun yeni aktörleri; Amerika Birleşik Devletleri (ABD), Rusya ve yükselmekte olan güç Çin'dir (Erhan, 2014). Yeni Büyük Oyunda ise, büyük güçler, Orta Asya devletleriyle iyi ilişkiler kurarak işbirliğini artırmak ve böylece bölgenin petrol ve doğal gaz rezervleri üzerinde söz sahibi olmayı amaçlamaktadırlar (Bahar, 2014:23).

Orta Asya coğrafyasındaki hidrokarbon kaynaklarının görece fazlalığı, birçok devletin dikkatini bu coğrafyaya çekmesine neden olmaktadır. Diğer taraftan bölgenin ulaşım ve enerji nakil ağlarının kavşak noktasında olması bölgenin değerini arttırmaktadır, çünkü Orta Asya'nın hidrokarbon kaynaklarının taşındığı bölgelerinden güney ve doğu yönünde nakil hatlarının yapımı kaçınılmazdır. Bu nakil hatlarının bulunduğu güzergâhlarının istikrarlı olması, nakil hatlarının güvenliği bakımından oldukça önem arz etmektedir. Öte yandan Orta Asya Türk Cumhuriyetleri'nin, Rusya, Çin, Pakistan, İran ve Afganistan'a sınırının bulunması konumunu güçlendirmektedir. Bu çalışma, Orta Asya'da küresel hegemon güçlerin (ABD, Rusya ve Çin) enerji siyaseti ile sınırlandırılmıştır. Ayrıca Orta Asya Türk Cumhuriyetleri; Kazakistan, Türkmenistan, Özbekistan ve Kırgızistan olmakla beraber Farisi kökenli olan Tacikistan'da bölgedeki önemi nedeniyle çalışmaya dahil edilmiştir.

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[*] Orta Asya Türk Cumhuriyetleri: Sovyetler Birliği'nin 1991'de yıkılmasından sonra ortaya çıkan jeopolitik bölgelerden biridir. Uluslararası ilişkiler yazınında Orta Asya, Sovyetler Birliği'nin parçalanması ile bağımsız olan beş devletin (Kazakistan, Kırgızistan, Tacikistan, Türkmenistan ve Özbekistan) yer aldığı bölgeyi tanımlamak için kullanılan bir kavramdır. Orta Asya'nın anlamı, kapsadığı alan, taşıdığı önem gibi özellikler beşeri bilimlerin çeşitli dallarına göre farklılık gösterebilir. Çoğu tarihçi, sosyolog ve antropolog ise Orta Asya diye bir kavramlandırmayı doğru bulmaz. Bunun yerine Türkistan veya Batı Türkistan kavramını kullanmayı tercih eder. Bknz. Fırat Purtaş, "Orta Asya'nın Bütünlüğü Sorunsalı ve Orta Asya'da Bölgesel Entegrasyon Girişimleri", der. M. Turgut Demirtepe, Orta Asya, Kafkasya Güç Politikası, 1. baskı, USAK Yayınları, Ankara 2008, s. 31.

1. TEORİK ÇERÇEVE: HEGEMONYA VE ENERJİ

Hegemonya kavramını Antik Yunana kadar götürmek mümkündür. Hegemonya kavramı, Yunanca 'lider' anlamına gelen "hegemon" sözcüğünden türemiştir (Gills, 2003: 237). Hegemonya kavramı ise diğerleri üzerinde sistemde bir elemanın baskın ve baskıcı durumunu ifade eder (Yılmaz, 2010: 194). Daha açık bir ifade ile "Bir devletler topluluğu içerisinde bir devletin diğerlerine önderlik etmesi" (Sönmezoğlu, 2010: 320) şeklinde tanımlamak doğru olacaktır.

İtalyan düşünür Antonio Gramsci, modern anlamda ilk kez hegemonya kavramını kullanmasına karşın kavramın ilk halini Marksist yaklaşımda görmek mümkündür (Beyer, 2014: 33). Bu yüzden Gramsci'yi 20. yüzyılın en önemli post Marksist düşünürü ve hegomanya kavramının fikir babası olarak belirtmekte yarar vardır (Aytaç, 2015: 469). Gramsci'nin hegemonya tanımını, benzer siyasi tarihe sahip, ulusal sorunları karakterize eden ilişkileri ve bilhassa sosyal sınıf ilişkilerini açıklamak için kullanmıştır. Hülagü'ye göre Gramsci'nin hegemonya anlayışı, "İdeoloji kavramından farklıdır. Hegemon'yaratılan anlamlar ve değerler bütünü sayesinde kurulan özel bir hükmetme biçimidir."(Hülagü, 2014: 197) Bu hükmetme için salt ideolojik araçlar değil başka yöntemlerde kullanılabilir. Bu durumlara örnek olarak; yandaş yaratmak amacıyla vergi sisteminin yeniden düzenlenmesi ve aristokrat işçi kesiminin yaratılması gibi."(Hülagü, 2014: 197)

Gramsci, "hegemonya"yı özel bir güç ilişkisi olarak tanımlamaktadır. Bir diğer ifadeyle egemen toplumsal grupların imtiyazlı durumlarını karşılıklı uzlaşmayla güvenceye aldıkları bir durumdur. Söz konusu toplumsal güçler, hakim egemen grupların rızasını sağlayıcı bir ideoloji geliştirmektedir. Düşünür, hegemonyayı tarihsel bir süreç içinde almaktadır ve bir hegemonik sınıfın yerini bir başkası almaktadır (Arı, 2013: 464).

Gramsci'den de faydalanarak hegemonya kavramına uluslararası ilişkiler disiplini perspektifinde yeni bir anlam kazandıran Cox'un tanımına da kısacayer vermek doğru olacaktır. Cox'a göre; "hegemonya devlet-sivil toplum karşılıklı ilişkilerinin bir uzantısı olan kurulmuş dünya düzenini, diğer bir deyişle kapitalist üretim tarzının uluslararasılaştırılması sürecine anlam verir. Böylece hegemonya, dünya düzeni, toplumsal güçler ve devletler arasında 'bir eklemlenme noktası' olarak tanımlanır." (Çiftçi, 2009: 205)

Hegemon devletin bazı özellikleri vardır. Para biriminin uluslararası alanda geçerli olması, dünyanın, her yerinde üsler ve müttefikler bulundurması, bölgesel kriz ve çatışmalara müdahale ederek liderliğini göstermesi gibi, lakin bu konumun sürmesi için sadece güç yeterli bir öğe değildir. En önemlisi diğer ülkelerden önemli bir kısmının da rızasını alması ve kendi liderliğine onları inandırması gerekmektedir. Yine bu düzlemde, hegemon gücün olarak kendi yaşam biçimini, kültür ve değerlerini bütün dünyaya yayarak ve kabul ettirerek bu konumunu meşrulaştırması gerekmektedir (Uzgel, 2012: 31).

1648 Vestfalya Antlaşması'ndan bu yana 'devletler', devletlerarası sistemin temel ve en güçlü aktörleri olarak kabul görmektedir. Uluslararası ilişkileri düzenleyen bir üst otoritenin olmadığı ortamda, devletler siyasi meşruiyetin evrensel standardını oluşturmaktadır. Bu nedenle güvenlik hükümetlerin esas sorumluluğu olduğu sonucunu beraberinde getirir. Devletler, varlıklarını güvence altına almak için kendi kendine yeterliliğe dayanan bir dünyada, çıkarlarını korumak dışında seçenekleri olmadığı düşüncesindedirler (Baylıs, 2014: 154).

Enerji arz güvenliği, realizme göre uluslararası sistemde devlet tarafından sağlanır. Öte yandan, hegemon devletin olduğu bir uluslararası sistemin enerji arz güvenliği ve dış siyaset etkisi, dünya ticaretine tesirinden farklı olabilir. Hegemonik istikrar kuramına göre başat güç liderliğinde ticaret, finans, hava taşımacılığı, telekomünikasyon, enerji gibi başka platformlarda belirlenen kurallar, uluslararası rejimlerin doğmasına ön ayak olur. Bu rejimlerin hegemon gücün zayıflamasına karşın devam etmesi, uluslararası sistemin yapısının belirlediği ve özellikle devletlerin yeterliliklerinin dağılımına göre beliren asimetrik bir bağımlılıkla açıklanır (İpek, 2012: 229).

Devletlerin gücü ile dünya ticaret yapısının serbest ya da korumacı olması arasındaki ilişkiyi sorgulayan realist yaklaşıma göre hegemon gücün var olduğu bir uluslararası sistemde ekonomik gücün dağılımı dünya ticaretinin serbest olmasını sağlar. Bir başka ifadeyle; politik gücün ve iktisadi gelişmenin ticaret yapısına etkisi sorgulanır. Korumacı ya da kapalı bir yapının ticaret yapan taraflara göreceli maliyetleri düşünülerek, bir devlet için ticaret yapısının serbest olmamasının göreceli maliyeti arttıkça, bu devletin uluslararası sistemde siyasi konumunun zayıfladığı savunulur lakin bu genellemenin önemli bir istisnası vardır; petrol ihraç eden ülkeler (İpek, 2012: 229).

Orta Asya ve Ortadoğu bölgesi gibi dünya petrol rezervlerinde büyük paya sahip devletler için gelişmiş bir ekonomi olmamalarına karşın, dünya ticaretinin kapanmasının göreceli maliyeti düşüktür. Nitekim 1973 petrol krizinde* dünya petrol ticaretinin sekteye uğraması, petrol sektöründe güç dengesinin değişmesiyle açıklanır. Buna göre; ABD 1971'den sonra en büyük petrol üreticisi konumunu yitirmiş ve petrol üretiminde üstünlük Suudi Arabistan ve genel olarak OPEC (Organization of Petroleum Exporting Countries) ülkelerine geçmiştir. Bir başka ifadeyle 1960'ta kurulan OPEC'in petrol ambargosunu 1973'te uygulayabilmesi, petrol sektöründe değişen güç dengesiyle açıklanır (İpek, 2012: 230).

Enerji kaynaklarının bölgede olmasının bölgeye barış değil şiddet getirdiği, petrol gelirinin bölge ülkelerinin çehresini olumlu değiştirmediği, tehdit yoluyla kaynakların paylaşılması çabalarına yol açtığı, bölgenin sürekli savaş ve yıkımla terörün adresi halini aldığı yadsınamaz bir gerçektir. Bu duruma bakılırsa Orta Doğu ve Orta Asya coğrafyasının hegemon güçler arası enerji kaynakları savaş alanına döndüğünü söylemek yanlış olmayacaktır. Hatta günümüzde Baltık denizi ile Hazar denizi vb. alanlarda bir 'petrol diplomasisi' ortaya çıktığı, dünyadaki tüm değişimlere rağmen geleneksel jeostratejinin bu sahada tekrar sahnelendiği vurgulanmaktadır. Devletlerin enerjiye bağımlılığı kritik hale gelirken, bu alanda rekabet hızlanmakta, enerji şirketleri ulusal olmak yerine küresel olsa ve blok güç olarak ortaya çıksa bile bu alanın uluslararası bir gerilim alanı olarak öne çıktığı ve önemli olduğunun altını çizmekte fayda vardır (Yılmaz, 2013: 321).

Kısacası enerji güvenliği 1970 ve 1980'ler boyunca, 1970'lerde yaşanan krizin etkisi altında "çeşitlilik-çeşitlendirme"(diversificaion) olgusu ışığında, siyasi ve jeopolitik bir konu olarak tanımlandı. Bu çerçevede enerji güvenliği, Churchill'in yaptığı tanımla da uyumlu biçimde, dar bir çerçevede ve özellikle başta OECD üyesi petrol ithalatçısı ülkelerin öncelikleri bağlamında petrol tüketimi ve ithalatının devamlılığının sürekli biçimde sağlanması olarak görülmeye devam edildi.

1990'lı yıllarda yaşanan askeri (İran-Irak Savaşı, Kuveyt Krizi ve Körfez Savaşı ile Ortadoğu'daki diğer gelişmeler), siyasi (dondurulmuş anlaşmazlıklar, Rusya faktörü vb.), ekonomik (Asya ekonomik krizi ve azalan petrol arzı ile yükselen fiyatlar), ticari, çevresel (küresel ısınma vb.) gelişmeler ve doğal afetler (kasırga, deprem vb.) enerji güvenliği konusunu 1990'lı yılların ikinci yarısından itibaren farklı ve daha kapsamlı bir

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* 1948 yılında başlayan Arap-İsrail Savaşları 1973 yılına kadar devam etmiştir. 1973'deki Arap-İsrail Savaşı'nda petrol stratejik bir silah olarak kullanılmıştır. 1973'de yaşanan bu savaş dünya petrol fiyatları üzerinde kriz olarak ifade edilebilecek bir etki yaratarak 2,59 $\varil olan ham petrol fiyatının bir yıl içinde 11,65$\varile yükselmesine neden olmuştur. Bkz. Cenk Sevim, Küresel Enerji Stratejileri ve Jeopolitik, Seçkin Yayınevi, 2. Baskı, Ankara 2013, s.17.

içerikle yeniden gündeme taşımıştır. Yeni dönemde çeşitlendirme, rekabet ve arz güvenliği gibi başlıklar hala enerji güvenliğinin anahtar unsurları olarak konumlarını korumakla birlikte, son on yılda içerik ve çerçevenin büyük ölçüde değişmeye başladığını söylemek yanlış olmayacaktır. Bu bağlamda bilhassa hidrokarbon yatakları bakımından zengin olan Orta Asya Türk Cumhuriyetleri hegemon güçlerin çekim alanında yer almaktadır. Hegemon devletler, bölgeyi kendi çıkarları doğrultusunda yönetmeyi hedef almışlardır.

2. ORTA ASYA TÜRK CUMHURİYETLERİ'NİN PETROL VE DOĞALGAZ GENEL GÖRÜNÜMÜ

SSCB'nin dağılmasının ardından, birçok nedenden dolayı Orta Asya Türk Cumhuriyetleri'nde hidrokarbon üretiminde büyük düşüşler ortaya çıkmıştır. 1991-1995 dönemi için bölge devletlerindeki endüstriyel düşüş %50, petrol çıkarımındaki düşüş %38 olmuştur (Yücel, 2006: 152).

Soğuk Savaş sonrası Orta Asya coğrafyasına yönelen petrol şirketleri bölgedeki enerji kaynaklarına yoğun ilgi göstermişlerdir. Ancak önceden tahmin edildiği gibi bölgenin enerji kaynaklarının, doğrudan ABD'nin petrol ve Avrupa'nın gaz ihtiyacını karşılayacak miktarda olmadığı anlaşılmıştır. Bununla birlikte bölgenin, ikinci bir Suudi Arabistan veya İran kadar olmasa da, Katar'dan fazla ve Libya ile eşdeğer oranda enerji potansiyeline sahip olduğu tespit edilmiştir. Dolayısıyla bölgeye yönelen ABD ve Çin'den daha fazla enerji kaynaklarına sahip olan orta Asya Bölgesi, aynı zamanda zengin petrol ve gaz rezervlerine bölgenin sahip olduğu petrolün iki katına, gazın yedi katından fazlasına sahip olan Rusya'da bölge ülkelerinin enerji sektörüne yoğun ilgi göstermiştir (Nogaveya, 2011: 5). Dünyadaki enerji üretim payının büyük kısmına sahip olmak isteyen bir devlet için Ortadoğu hegemonyası birinci sırada yer almaktadır. Ortadoğu'nun istikrarsızlığı göz önüne alındığında Orta Asya'daki kaynaklar yedeklik bakımından stratejik bir seçenek olarak değerlendirilmektedir. Rus enerji kaynaklarına olan yoğun bağımlılık ise devletlerin istemedikleri bir durumdur (Çınar, 2008: 26).

Tablo1: Orta Asya Türk Cumhuriyetleri Enerji Rezervleri

Ülke	Petrol (milyon ton)	Dünya toplam rezervine oranı	Doğal gaz (trilyon m^3)	Dünya toplam rezervine oranı
Kazakistan	5.300	%3	1.82	%1
Türkmenistan	100	-	8.1	%4.3
Özbekistan	100	-	1.68	%0,9
Kırgızistan	5	-	6 milyar m^3	-
Tacikistan	2	-	6 milyar m^3	-
Toplam	5.507	%3	11.60	%6.2

Kaynak: Yusuf Yazar, Türkiye Cumhuriyetleri'nin Bağımsızlıklarının 20. Yılı Vesilesiyle Enerji İlişkileri Bağlamında Türkiye ve Orta Asya Ülkeleri, Hoca Ahmet Yesevi Uluslararası Türk Kazak Üniversitesi İnceleme Araştırma Dizisi, Yayın no: 1, Ankara 2011 : 21-22.

Tablo 1 incelendiğinde gerek petrol ve gerekse doğal gaz da Kazakistan ve Türkmenistan'ın kayda değer rezervleri olduğu görülmektedir. İç tüketimlerinin çok üstünde bir üretim yapabilme olanak ve potansiyeline sahip oluşu (Yazar, 2011: 23), bu ülkeleri hegemon devletler nazarında daha önemli kılmaktadır. Özbekistan'ın da doğalgaz rezervleri bakımından önemli bir zenginliği bulunduğunu söylemek yanlış olmayacaktır. Kazakistan tek başına dünya petrol rezervlerinin %3'üne sahiptir. Doğal gaz da ise

Türkmenistan, Kazakistan ve Özbekistan bilinen rezervlerinin de %6,2'sine sahiptir. Kırgızistan ve Tacikistan'ın petrol ve doğal gaz kaynakları neredeyse yok denilecek kadar azdır. Bilhassa Tacikistan kış aylarında sık olarak elektrik kesintisine uğramaktadır. Tacikistan'da zengin su kaynakları bulunmaktadır. Bu nedenle ülkede büyük hidroelektrik santralleri (HES) kurulması enerji arzında sorunların azalmasına neden olacaktır (Rahman, 2014).

Tablo 2: Orta Asya Türk Cumhuriyetleri'nin Petrol Üretimi, Tüketimi ve İhracatları

Ülkeler	**1990**	**1995**	**2000**	**2005**	**2010**	**2020**
Kazakistan						
Üretim	25,2	20,5	40	55	75	130
Tüketim	27,2	10,4	15,6	24,4	31,6	51,9
Net İhracat	-2	10,1	24,4	30,6	43,4	78,1
Türkmenistan						
Üretim	3,4	3,5	6	6,5	7	8
Tüketim	4,8	5,7	6	6,5	7	8
Net İhracat	-1,4	-2,2	0	0	0	0
Özbekistan						
Üretim	2,8	7,6	9	10	11	13
Tüketim	10,2	8,6	8,7	9	9,5	11
Net İhracat	-7,4	-1	0,3	1	1,5	2
Toplam						
Üretim	31,4	31,6	55	71,5	93	151
Tüketim	42,2	24,7	30,3	39,9	48,1	70,9
Net İhracat	-10,8	6,9	24,7	31,6	44,9	80,1

Kaynak: Çağrı Kürşat Yüce, Kafkasya ve Orta Asya Enerji Kaynakları Üzerinde Mücadele, Ötüken Yayınları, İstanbul 2006, s. 403.

Tablo 2 incelendiğinde, Orta Asya'da petrol üretimi yapan ülkelerin 1990'da başlayarak, üretim, tüketim ve net ihracatları gösterilmiştir. Ayrıca 2020 yılında olması beklenen enerji projeksiyonu da verilmiştir. Kazakistan bölgenin önemli petrol rezervlerine sahiptir. 1995 yılında üretimde ve tüketimde ciddi düşüşler olmasına karşın, net ihracatın bağımsızlıkla birlikte yükseldiği görülmektedir. 2000-2005-2010 yılları sürecinde üretim-tüketim ve net ihracatın artış göstererek büyümeye devam ettiği görülmektedir. 2020 projeksiyonu ise, 2010 yılındaki üretim miktarının %73'ü kadar daha artacağını öngörülmektedir. Üretimdeki artışın, tüketim ve net ihracata olumlu yansıdığı görülmektedir. Türkmenistan'da ise, 1990-1995 yıllarında petrol üretiminin, tüketimi karşılamadığı görülmektedir. Bu nedenle bu yıllarda enerji ihracatı negatif olarak gerçekleşmiştir. 2000 yılından 2010 yılına kadar üretim-tüketim dengesi sağlanmış, 2020 projeksiyonunda da bu durumun devam edeceği öngörülmüştür. Özbekistan'da 1990 yılında üretim tüketimi karşılamazken, 1995 yılından itibaren bu açık büyük ölçüde kapanmıştır. 2000 yılından itibaren ise, toplam üretim, tüketimi geçmiş olup, az da olsa bölgenin toplam ihracat oranına katkıda bulunmuştur. 2020 senaryosunda Özbekistan'ın toplam ihracata olumlu artışların varlığında katkıda bulunacağını söylemek mümkün gözükmektedir. Tacikistan ve Kırgızistan'ın kayda değer petrol üretim ve tüketimleri bulunmadığından tablo dışında bırakılmıştır.

3. HEGEMON GÜÇLERİN ORTA ASYA'DA ENERJİ PARADİGMALARI

Orta Asya Türk Cumhuriyet'leri sahip oldukları enerji kaynakları sebebiyle, bölgede Rusya ve Çin, okyanus ötesinde ise ABD'nin, Orta Asya'da var olan enerji kaynaklarını yönetmek adına girdikleri mücadelenin oyun alanı halini almıştır. Çalışmanın bu bölümünde, bölgeye yakınlığı sebebiyle, öncelikle Rusya'nın, ardından ABD'nin ve son olarak bölgenin yükselen gücü Çin'in, bölgedeki enerji kaynaklarının yönetimindeki politikaları incelenecektir.

3.1. Rusya

SSCB'nin parçalanması ardından bağımsızlıklarını kazanan Orta Asya devletleri, sosyalist ekonomik sistemden, liberal ekonomiye geçme konusunda iktisadi dönüşüm programlarını başlatmışlardır. Bu dönemde, geleneksel üretim şekli ve buna paralel olarak klasik arz ve tedarik sisteminin büyük oranda devam etmesi, bu devletlerin Rusya'ya bağımlılıklarının görece devamına yol açmıştır (Özdemir ve Çakır, 2009: 33). Ancak, enerji kaynakları bakımından zengin olan Kazakistan, Türkmenistan ve Özbekistan, bu rezervler sayesinde çok kısa zamanda iktisatlarını kalkındırmayı ve bölgede önemli bir aktör hâline gelmeyi amaçlamışlardır. Bunun için de öncelikle ellerindeki enerji rezervlerini dünya pazarlarına ulaştırmaları gerekiyordu. Ancak, bu devletlerin enerji rezervlerini dünya pazarlarına nakil edecek boru hatlarına ve alt yapıya sahip olmamaları, enerji nakil planların ertelenmesine sebep olmuştur (Kamalovi, 2011: 44). Orta Asya'daki zengin yeraltı zenginliklerinin batıdaki ve doğudaki pazarlara ulaştırılmasıyla ilgili "yeni büyük oyunun" başladığı savunulmuş ve bu oyunculardan biride Rusya olarak kabul edilmiştir (Özkani, 2010: 19). SSCB döneminde, Moskova yönetimi Orta Asya coğrafyasını daha çok tarım bölgesi olarak görmüş ve buradaki hidrokarbon yataklarına gereken önemi vermemiştir. Bu durumdan ötürü bölge devletleri çıkarttıkları rezervlerin bir bölümünü kendi ihtiyaçları için harcamış, artan kısmı da Rus nakil hatlarına aktarmıştır. Dış ticaret amaçlı bu devletlere nakil hatları inşa edilmemiştir (Kamalovi, 2011: 45).

Rusya'nın Orta Asya'daki devletlerle ilişkilerini güçlendirmenin temel öğelerinden biri ekonomi olmuştur. Rusya'nın Orta Asya ülkelerindeki gelişmelere kayıtsız kalmamasında rol oynayan en önemli iktisadi neden ise, SSCB döneminde, Rusya ile Orta Asya'daki Cumhuriyetler de dâhil olmak üzere tüm Sovyet Cumhuriyetleri arasındaki iş bölümüdür. Bu nedenle güçlü bir karşılıklı bağımlılık oluşmuştur. SSCB sonrası Cumhuriyetlerin ekonomik sorunlar karşısında birbirinden farklı yaklaşımları hayata geçirmeleri, bir eşgüdüm içinde ele alınması gereken iktisadi reformların başarısız olmasına neden olmuştur.

Rusya, enerji politikaları alanında Orta Asya Türk Cumhuriyetleri'nin kendi yaklaşımına uygun bir şekilde hareket etmesini beklemiştir. Rusya hidrokarbon enerji kaynakları bakımından çok zengin bir coğrafyada yer almaktadır.[*] Kazakistan, Türkmenistan ve Özbekistan'ın enerji kaynaklarını Rusya dışındaki bir güzergâh ile uluslararası pazarlara ulaştıramayacak durumda olması, Rusya açısından kendi hegemonyasını pekiştirmek için bir araç olmuştur. Bu ülkeler Rusya üzerinden geçen boru hatları ile petrol ve doğalgazı ihraç edebileceklerinden, Rusya bu devletlerin enerji

[*] Rusya eski SSCB'nin sahip olduğu yüzölçümünün yüzde 75'inden fazlasını elinde tutmakta ve devamı olduğu bir önceki devletten mineral kaynak mirasının önemli bir bölümü devralmış bulunmaktadır. Bknz. Ewan W. Anderson, Liam D. Anderson , Strategic Minerals: Resource Geopolitics and Global Geo-Economics, Wiley-Blackwell, 1997, s. 74.

kaynaklarını çok düşük bir fiyat karşılığında alıp, çok yüksek bir fiyat karşılığında yeniden ihraç ederek çok büyük bir kar elde etmektedir (Tanrısever, 2013: 7-8).

Rusya'nın iç ve dış siyaset parametrelerinde, Vladimir Putin'in 2000'de devlet başkanı seçilmesi bir dönüm noktası olmuştur. Putin'in devlet başkanlığı ile birlikte Rusya'da büyük reformlar yaşanmaya başlanmıştır. Putin'in uygulamaya başladığı merkeziyetçi politikanın yardımıyla Federasyon içinde kontrolü tekrar kurmayı başarmıştır (Kısacık, 2014). Rusya'da 2000 sonrasında gerek "Yakın Çevresi"[*] si, gerek diğer komşu ülkelerle ilişkileri şu temel unsurlar çerçevesinde şekillendi: Enerji kaynaklarını öne çıkartmak, ticari ilişkilere öncelik vermek, etnik anlaşmazlıklar ile çatışmaları kullanarak bölgesel dengeleri belirlemeye çalışmak ve terörle mücadele (Oran, 2013: 532).

Dünyada küreselleşmeyle aynı düzlemde yükselen özelleştirme ve şirket birleşmeleri liberal sistemin bir öğesi halini almaya başlamıştır. Putin'in bu durumun aksine böyle bir dönemde Lukoil ve Gazprom vb. enerji şirketlerini Rus dış siyasetin önemli bir aktörü haline getirmiştir. Bu durum Rusya'ya, diğer enerji alanında hegemon güçlere karşı üstünlük sağlamıştır. Putin'e göre "küresel enerji; sosyo-ekonomik gelişimin en önemli aktörü durumundadır ve küresel enerji sorunu milyonlarca insanın refahını doğrudan etkilemektedir" (Akgül, 2007: 132).

Putin'in dış politika anlayışını genel olarak, İşyar şu şekilde değerlendirmektedir: "Çıkara dayalı işbirliği ve medeni bir rekabetin olduğu çok kutuplu dünya düzeni içerisinde Rusya'nın yeniden bir dünya gücü haline gelmesi, bu konuda Batı'yla işbirliği yapılırken, pragmatik olarak Asya kartının da sıkça kullanılması savı üzerine kurulmuştur."(İşyar, 2004: 51) Enerjinin denetiminin sağlanmasını Rus dış politikasının en önemli öğesi haline getirmiştir. Rusya bu sava karşı çıkmaktadır.[†]

Rusya, enerji piyasalarındaki avantajlı durumunu korumak istemektedir ve bu duruma yönelik stratejiler geliştirmektedir. Bu stratejilerinin en üstünde "Orta Asya'daki enerji arzı üzerindeki tekel konumunu korumak ve buradaki enerji kaynaklarının kendi kontrolünde olmayan alternatif boru hatlarıyla dünya pazarlarına açılmasını engellemek…" (Hasanoğlu, 2014) yer almaktadır.

Rusya, politikalarında başat rolü olan enerji rezervlerinin kontrolü ve nakli konularında, bilhassa Orta Asya coğrafyasındaki doğal gazın Avrupa pazarına taşınması enerji politikalarının ana hedefi durumuna gelmiştir. Aralık 2007'de imzaladığı anlaşma ile Kazakistan ve Türkmenistan doğal gazlarının (DW Akademisi, 2014) Çınar'a göre; "Avrupa'ya satılması yetkisine sahip olan Rusya, kendi jeopolitik konumuna benzer olan

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[*] Rusya, başlangıçta yaşadığı kargaşanın etkisi ile ABD ve Avrupa ile yalnızca uyumlu değil bağımlı politikalarda izledi. Daha sonra 1994'ten itibaren Asya'ya da yönelerek kendisini tek yönlü bağımlılıktan kurtarmaya çalıştı. Rusya Federasyonu dış politikasındaki dönüşümün en çarpıcı göstergelerinden biri, izlediği Yakın Çevre politikası oldu. Rusya Federasyonu'nun Monroe Doktrini olarak adlandırılan bu politika eski SSCB topraklarının Rusya Federasyonu'nun ekonomi ve güvenlik açısından yaşamsal çıkar alanı olduğunu ileri sürerek buradaki gelişmeleri denetlemeyi öngörüyordu. Realist ekolün Rusya'nın "emperyal" kimliğine yeniden dönmesi gerektiğini savunan grubun düşüncesi, Rusya'nın Batı yanlısı politika izleyerek "Yakın Çevresini" ihmal etmesi stratejik hatadır. Bu durum Rusya'nın Yakın Çevresinde güven boşluğu oluşturmuştur. Bu görüşü savunanlara göre, SSCB dağıldıktan sonra Rusya dış siyasetinde önceliğini Kazakistan, Gürcistan, Ermenistan ve diğer eski Sovyet cumhuriyetlerine vermelidir. Bknz: Baskın Oran, Türk Dış Politikası, Kurtuluş Savaşından Bugüne Olgular, Belgeler, Yorumlar, Cilt II, 1980-2001, 11. Baskı, İstanbul, 2009, s. 208. ve Nurşin Ateşoğlu Güney, "Rusya Federasyonu'nun Yeni Güvenlik Politikası Çerçevesinde Türkiye'ye Bakısı", Türkiye'nin Komsuları, Mustafa Türkeş ve İhan Uzgel (der.), İmge Yayınları, Ankara, 2002, s. 335.

[†] 2006 yılında Rusya'da gerçekleşen G-8 zirvesinin de en önemli gündem maddesini oluşturmuştur. Rusya, enerji gücünü bir dış politika aracı olarak kullandığı yönündeki eleştirileri şiddetle red etmiştir. Bknz: Halit Gülşen, Rusya-AB Anlaşmazlığı ve Dış Politika Aracı Olarak Enerji, http://www.euractiv.com.tr/4/analyze/rusya-ab-anlasmazligi-ve-dis-politika-araci-olarak-enerji-004481, E.T. 05.08.2014.

tek köprü ülke olan Türkiye'yi de bertaraf etmiştir" (Çınar, 2008: 28). Türkiye'nin ekonomik kalkınma için umut bağladığı Türkmen doğal gazının Türkiye üzerinden Avrupa'ya taşınması üzerine kurulmuş olan NABUCCO projesinin de bu anlaşma ile ümidinin azaldığı görülmektedir (NTVCNBC, 2013).

Rusya'nın neden Orta Asya Türk Cumhuriyetleri'nde hegemon güç olma isteğini birde enerji nakil hatlarının büyüklüğü açısından değerlendirmekte fayda vardır. Bunlardan ilki, yapımına 1967' yılında temelleri atılan Orta Asya-Merkez Doğal Gaz Boru Hattı'dır. 1985'e kadar geliştirilmiştir. Yıllık 10,5 milyar m^3 kapasiteye sahip hattın ilk bölümü (3.000 km) tamamlandığında, o dönem için dünyanın en uzun enerji nakil boru hattı unvanını almıştır (Kısacık, 2014). Ardından bu kapasite 44 milyar m^3'ten 80 milyar m^3 ulaşmıştır (Zaman Gazetesi, 2014). Astana, Aşkabat ve Taşkent'i Moskova'ya bağlayan bu nakil hattının yapımı esnasında Amu-Derya, Ural, Volga ve Oka nehirleri başta olmak üzere 300 doğal ve suni engel aşılmıştır. İnşaat neticesinde senelik 80 milyar metre^3 kapasiteye sahip çok sayıda ince hatları içerisinde bulunduran ana gaz boru hattı sistemi meydana getirilmiştir (Kısacık, 2014).

Günümüzde bahsi geçen doğal gaz nakil hattı, eko-politik ve jeopolitik önemi Rusya için devam etmektedir (Sabah Gazetesi, 2014). Çünkü bu nakil hattı ile Orta Asya doğal gazı Moskova ve Kiev'e ulaştırılmaktadır. Moskova ile Aşkabat arasında gaz sektöründe işbirliği konusunda 25 senelik bir anlaşması 2003 yılında imzalanmıştır. Bu anlaşmaya göre, Moskova Türkmen gazını ithal edecek ve Aşkabat'a transit garantisini sunacaktır. Bu kapsamda fiyat ve miktar konusunda değişiklik yapılarak 2028 yılına kadar senelik 30 milyar metre^3 doğal gaz alım-satımı gerçekleştirilecektir (Kısacık, 2014).

Rusya için önemli diğer proje ise Hazar Kıyısı (Prikaspiskiy) Boru Hattı Projesi'dir. Mayıs 2007'de Türkmenistan Devlet Başkanı Berdimuhamedov, Rusya Devlet Başkanı Putin ve Kazakistan Devlet Başkanı Nazarbayev'in katıldığı Türkmenbaşı kentindeki üçlü zirvede gündeme gelmiştir. Daha sonra taraflar 20 Aralık 2007'de, Rusya'nın başkenti Moskova'da söz konusu projenin yapımıyla ilgili nihai anlaşmaya imza atmışlardır (Kimyamühendisi.com, 2014). Bu boru hattı aracılığıyla Türkmenistan'dan yıllık 30 milyar metre^3, Kazakistan'dan ise 10 milyar metre^3 doğalgaz taşınacaktır. 1700 km olan hattın 1200 kilometresi Kazakistan, 500 kilometresi ise Türkmenistan topraklarından geçecektir (Kısacık, 2014a).

Diğer önemli proje ise, Kazakistan'daki Atırau şehrinden Rusya'nın Samara şehrine kadar uzanmakta olan 1232 km uzunluğundaki Atırau-Samara (UAS) Boru Hattı Projesi'dir. Günlük kapasitesi 300.000 varildir. Fakat Moskova, bu kapasiteyi 500.000 varile kadar çıkartmayı amaçlamaktadır (Kısacık, 2014a).

Yukarıdaki bilgiler ışığında Rusya'nın Orta Asya'daki rolüne ve etkinliğine ilişkin iki önemli husus ön plana çıkmaktadır. Rusya, öncelikle dünyanın stratejik bakımdan en önemli bölgelerinden biri olan bu bölgede, sahip olduğu liderliğini korumak istemektedir. Rusya hegemon bir güçtür. Gücünü bugün de mümkün olduğunca artırmak istemektedir. Bu gücün devamını realist politikalarla sürdüreceği yadsınamaz bir gerçektir. Rusya için Orta Asya jeopolitiği ve enerji kaynakları milli çıkarları doğrultusunda hayati önem arz etmektedir. Bu durum Orta Asya Türk Cumhuriyetlerini, "Yeni Büyük Oyunun" en önemli oyun sahası haline getirmektedir.

3.2. ABD

"Hegemonya insanlık kadar eskidir. Ama Amerika'nın var olan küresel üstünlüğü, ortaya çıkışının hızlılığı, dünya çapındaki faaliyet alanı ve uygulanış biçimiyle diğerlerinden ayrılır. Tek bir yüzyıl içerisinde Amerika kendini, Batı Yarıküre'de oldukça soyutlanmış bir ülkeden dünya çapında örneği görülmemiş bir erişim ve kontrol gücüne sahip bir ülkeye dönüştürmüş ve aynı zamanda uluslararası dinamikle dönüştürülmüştür."(Brzezinski, 2005: 17)

ABD'nin Orta Asya'ya ilk kez ilgi duyması İkinci Dünya Savaşı'ndan sonra Soğuk Savaş'ın başlamasıyla olmuştur. Jeopolitiğin kurucusu sayılan Mackinder'in Orta Asya'nın merkez bölgeyi kontrol edebilmek için kilit bölge olduğunu ortaya koyduğu eser Amerikan politikalarına yol göstermiştir (Öğün, 2014).

1990'lı yıllarda Hazar'daki enerji kaynakları üzerinde yoğunlaşarak, Basra Körfezi'ne olan bağımlılığını azaltmaya çalışan ABD, bu bağlamda enerji kaynaklarının güvenli bir şekilde uluslararası pazarlara ulaştırılmasına yönelik olarak Rusya'nın etkisini azaltmak için bazı girişimlerde bulunmuştur (Pirinççi, 2008: 212). SSCB'nin dağılmasından sonra ilan ettiği "Yakın Çevre" doktrini, bölgede Çin'in etkili olma çabaları ve ABD petrol şirketlerinin çıkarları gibi unsurlar, ABD'nin Orta Asya coğrafyasına ilgisini yavaş yavaş arttırmıştır. Ayrıca bölge devletlerinin NATO'nun Barış İçin Ortaklık (BİO) programına dâhil edilmesi ve ABD'nin 1992'den sonra bölge devletlerinin başkentlerinde daimi temsilcilikler açması, bölgeye yönelik yerleşme çabalarının açık kanıtıdır (Erhan, 2003a: 6). ABD'nin bölgeye yönelik 1999'da ABD kongresinden geçen "İpek Yolu Yasası"[*] bölgede Amerikalı yatırımcıların ticari çıkarlarını kolaylaştıracak bir eksene oturmuştur. 1999'da İstanbul'da imzalanan Bakü- Tiflis- Ceyhan (BTC) boru hattı antlaşması da Rusya'nın hâkimiyetinde bulunan enerji nakil hatlarına alternatif oluşturacağından ötürü ABD tarafından desteklenmiştir (Yılmaz, 2014).

ABD'nin Orta Asya coğrafyasındaki hedeflerini iki temel strateji üzerinden analiz etmek mümkündür. Bunlardan ilki, ABD'nin küresel güç denklemindeki rolü ile ilgilidir. ABD, Orta Asya üzerinden iki büyük bölgesel gücün, Rusya ve Çin'in, bu bölgedeki hem reel, hem de muhtemel etkinliğini azaltmak ve kontrol etmek istemektedir. İkinci önemli hedef ise, Orta Asya coğrafyasının zengin hidrokarbon kaynaklarına erişim sağlamaktır. ABD'nin Orta Asya'ya yönelik diğer bütün siyasetleri, bu iki temel hedefin türevleri olarak yorumlanabilir (Kireşçi, 2011: 34).

ABD, Orta Asya'daki enerji rezervlerini dünya piyasalarına batılı şirketler vasıtasıyla nakil etmesini ve Orta Asya'nın jeo-ekonomik ve jeopolitik potansiyelinden faydalanmayı hedeflemektedir. ABD, bu coğrafyadaki hidrokarbon rezervlerinin Rusya ve İran'ın kontrolüne girmesini kendi hegemonyası açısından istememektedir. Orta Asya coğrafyasındaki enerjinin anılan bu iki ülke dışındaki güzergâhlardan uluslararası pazarlara naklini desteklemektedir. ABD, bu kapsamda BTC petrol nakil hattı projesini

[*] "İpek yolu Strateji Yasası" ABD'nin Orta Asya ve Kafkasya'ya yönelik politikalarının ana hatlarını açıkça ortaya koymaktadır. İpek yolu Strateji Yasası'nın gerekçesini oluşturan bölümde 7 nokta ön plana çıkarılmaktaydı. Buna göre:"1-Bir zamanlar Orta Asya ve Güney Kafkasya'nın en önemli ekonomik hattı olan tarihi İpek yolu; Azerbaycan, Ermenistan, Gürcistan, Kazakistan, Kırgızistan, Özbekistan, Tacikistan ve Türkmenistan'dan geçmekteydi; 2-İpek yolu üzerindeki halkların birbirine bağımlılığı ve karşılıklı işbirliği yoluyla eski ekonomik ilişkilerini tekrar tesis etmeleri, egemenliklerinin teminat altına alınması kadar demokratik ve Pazar reformlarının başarısı için de önemliydi; 3-Orta Asya ve Güney Kafkasya ülkeleri arasında siyasi, ekonomik ve güvenlik ilişkilerinin güçlendirilmesi bölgenin istikrara kavuşmasına da hizmet edecekti; 4-Bölgede demokrasilerin ve serbest pazar ekonomilerinin gelişimi, uluslararası özel sektör yatırımcılarının bölgeye girişlerini teşvik edecekti; 5-Bölgedeki Müslüman ülkeler, ABD ile yakın ittifak kurmak isteyen ve İsrail'le yoğun ticari ve diplomatik ilişkiler içinde bulunan laik yönetimlere sahip bulunmaktaydı; 6-Bölgede, ABD'yi sorunlu Basra Körfezi'ne bağımlı olmaktan kurtaracak çok değerli enerji kaynakları bulunmaktaydı; 7-ABD dış politikası ve uluslararası yardımları bölge ülkelerinin ekonomik ve siyasal bağımsızlıklarının yanı sıra, demokrasi inşası, serbest pazar politikaları, insan hakları ve bölgesel ekonomik bütünleşme konularına da yoğunlaşmalıydı."Bknz. Soner Özçelik, Küresel Güç ABD: Değişen Avrasya Bakışı, Akademik Perspektif, http://akademikperspektif.com/2012/04/17/kuresel-guc-abd-degisen-avrasya-bakisi/, 10.08.2014.

desteklemiştir. Budak'a göre; "Kazakistan'ı bu hatta petrol tedarik etmesi için teşvik ederek petrolün uluslararası pazarlara ulaştırılmasında Rus tekelinin sona ermesini sağlamıştır. ABD, Orta Asya enerji kaynaklarını Türkiye üzerinden Avrupa'ya ve dünya pazarlarına ulaştıracak Hazar geçişli boru hattı projesini ve Türkmenistan gazını Pakistan ve Hindistan'a taşıyacak doğal gaz boru hattı projesini teşvik etmektedir" (Budak, 2014).

ABD'nin jeoekonomik ve jeopolitk çıkarlar doğrultusunda bölgede bilhassa Kazakistan'la güçlü ilişkiler geliştirme arayışında olduğu gözlemlenmiştir. Tengiz sahasındaki petrolü çıkarmak için Kazakistan ile ortak bir konsorsiyum oluşturan ABD'li enerji devleri Chevron ve Exxon Mobil, Kazakistan'daki petrol üretiminin yaklaşık dörtte birini gerçekleştirmektedir (Yeniçağ Gazetesi, 2014). ABD'li diğer enerji şirketleri de (Texaco, Mobil Oil, Haliburton) Hazar bölgesinde faaliyet göstermektedir. Yılmaz'a göre "ABD'nin enerji bağımlılığı ve kaya gazı alanındaki mevcut belirsizlikler dikkate alındığında Orta Asya'daki enerji kaynakları, ABD için enerji arz çeşitliliği açısından önem arz etmektedir, ancak ABD 11 Eylül 2001 sonrası dönemde Rusya, Çin ve İran'ın çevrelediği bu bölgeye daha çok küresel hegemonya hedefi doğrultusunda odaklanmıştır" (Yılmaz, 2014). Budak ise; "Orta Asya devletleriyle Afganistan'daki lojistik ihtiyaçları kapsamında işbirliği geliştirmiştir. 11 Eylül sonrası dönemde ABD'nin Orta Asya ülkeleriyle stratejik ortaklık tesis etme arayışının finansal kriz nedeniyle, Obama iktidarı döneminde ise nispeten zayıfladığı görülmektedir" (Budak, 2014).

"Orta Asya devletleri, ABD ve Rusya dışında Çin'in içinde yer aldığı önemli denklemlerle kendi enerji kaynaklarını çevre ülkelere bağlama eğilimdedirler. Örneğin, Orta Asya Bölgesel Ekonomik İşbirliği Örgütü, Asya Kalkınma Bankası'nın koordinatörlüğünde altı büyük bölgesel enerji hattını hayata geçirmek üzere projelendirmiştir. Afganistan, Pakistan, İran ve Azerbaycan gibi ülkelerin de proje güzergâhlarında yer alması, ABD'yi ilgilendirmektedir. Kuşkusuz ABD ve ABD'li şirketler bu projelerde yer almak isteyecektir. ABD açısından asıl hedef doğal olarak Orta Asya enerji kaynaklarının bir kısmını alternatif kanallarla Avrupa'ya bağlamak; bir kısmını da Güney Asya bölgesine indirerek bu projelerde gerek ekonomik, gerekse de güvenlik bakımından söz sahibi olmaktır "(Kireşçi, 2011: 41).

3.3. Çin

Çin ekonomisi, 1980'den itibaren günümüze kadar durmaksızın büyümektedir. Bu nedenle Çin, dışa açılma ve reform politikasının uygulamaya konulduğu 1980'den itibaren her yıl artan şekilde enerjiye ihtiyaç duymaktadır. Çin'in ekonomik büyümesini devamını sağlayabilmek için ihtiyaç duyduğu en önemli enerji kaynağı petrol ve doğalgazdır (Fidan, 2011: 23).

Son yıllarda sürekli gelişmekte olan Çin'in "Yeni Büyük Oyunda", yani enerji kaynakları ile zengin olan Orta Asya'nın, özellikle de Hazar bölgesinin petrol ve gaz rezervlerine gittikçe daha aktif yer almaya gayret gösterdiği gözlenmektedir. Çin stratejisinin itici gücü aşırı yüksek ekonomik büyüme sürecinde enerji kaynaklarına talep artışı olmuştur. Çin, SSCB'nin dağılmasıyla "Orta Asya" yönünde kendisinin uzaklara kadar giden jeopolitik amaçlarını gözetlemeyi ana hedef olarak belirlemiştir. Çin, Orta Asya Türk Cumhuriyetlerinin ülkelerinin beşi ile özellikle de Kazakistan`la hem siyasi, hem de ekonomik ilişkilerini arttırma yoluna gitmiştir (Hüseyin, 2014).

1997'de Çin, Kazakistan'ın önemli bir petrol bölgesinde, başarılı bir şekilde petrol çıkarmak ve nakledilmesini içeren hakları kapsayan, bir anlaşma ile orta bölgeye girmiştir. Çin'in bu atağı bazı çevrelerde Bölgede Çin hegemonyası olarak algılanmıştır (Uğrasız, 2002: 231). Orta Asya enerji kaynaklarına, Çin'in giderek artan petrol tüketimini karşılayan bir coğrafya olarak bakılmaktadır. Çin uzmanlarının gözünde Orta Asya, petrol ve doğal gaz ile ilgili jeopolitik haritanın merkezini oluşturmaktadır. Bu görüşe göre hangi aktör Orta Asya enerjisi kaynaklarını kontrol altına alabilirse küresel stratejik konjonktürde aktif konuma sahip olacaktır (Ekrem, 2011: 29).

Çin'in Orta Asya enerji boru hatları yatırımlarına kısaca değinmek konunun özü için faydalı olacaktır. Bu yatırımlar:

"I.İnşa edilen 3666 km'lik Orta Asya-Çin Boru Doğalgaz Boru Hattı (Türkmenistan, Özbekistan, Kazakistan, Çin) 2009 yılında faaliyete geçmiştir.

II.CNPC (China National Petroleum Corporation) ve Kaz Munai Gas ortaklığıyla kurulan 'Sino-Kazahk Oil Pipeline Co.Ltd.' tarafından 3000 km'lik 700 milyon USD maliyetle Kazakistan-Çin (Atasu-Sincan) Petrol Boru Hattı inşa edilmiş ve 2006 yılında faaliyete geçmiştir.

III. 2009 yılında Kazakistan'da Çin Yatırım Şirketi (China Investment Corporation), Kaz Munai Gaz'ın % 14,5 ve CNPC Mangistaumunaigaz'ın % 49 hissesini almıştır.

IV. Çin Ulusal Petrol Şirketi (China National Petrolium Corporation), Türkmenistan'da petrol ve doğalgaz bulma anlaşması imzalamıştır." (Azer, 2014: 238-239)

Orta Asya'nın Doğu Türkistan'a komşu olması ve transit yol olma özelliği Çin bakımından son derece önemlidir (Çakıroğlu, 2014). "2013'de Çin Devlet Başkanı Xi Jinping'in Orta Asya Türk devletlerine gerçekleştirdiği ziyaret ve bu ziyaretler sonucunda yapılan anlaşmalar, Çin'in canlandırmak istediği ''Yeni İpek Yolu'' ticareti açısından bölgeye verdiği değeri göstermektedir. Jinping'in Orta Asya turu enerji ve enerji güvenliği konularını içermektedir. Jinping'in Türkmenistan ziyareti ''A'' ve'' B'' doğalgaz nakil hatlarının güvenliği ve aktarıma devam etmesi, öte yandan ''C'' doğalgaz boru hattının yakında tamamlanacak olması, ''D'' hattının ise 2016 yılı itibari ile doğalgaz transferine başlatılacak olması konularını içermektedir" (Çakıroğlu, 2014). Bu ziyarette, Çin-Türkmenistan arasında, 2020 yılında 65 milyar m^3 bulacak olan doğalgaz anlaşması imzalanmıştır (TÜSİAD, 2013: 9-10). Bu anlaşmaya göre "Türkmenistan, Çin'in en büyük doğalgaz tedarikçisi konumuna gelirken Çin de, Türkmenistan'ın en büyük doğalgaz alıcısı durumuna gelmiştir. Türkmenistan-Çin doğalgaz boru hattı bu iki devletten hariç, topraklarından geçecek olan Özbekistan, Tacikistan ve özellikle 225 km'si topraklarından geçecek olan Kırgızistan'ı da yakından ilgilendirmektedir. İktisadi olarak diğer Türk cumhuriyetlerine göre daha zayıf olan Kırgızistan, bu hattan geçiş ücreti olarak 2 milyar dolar alacağı iddia edilmektedir. Ayrıca Çin'in, Kırgızistan'a 3 milyar dolarlık yatırım yapması beklentiler arasındadır" (Çakıroğlu, 2014).

Orta Asya hidrokarbon rezervleri ve nakil hatlarının güvenliği de Çin'in bu coğrafyadaki önemli çıkarlarındandır. Çin'in petrol ve doğalgaz gibi enerji tüketimi, ekonomik büyüme hızıyla birlikte artmaktadır. Dışa bağımlılığı %50'yi aşmış durumdadır. Uluslararası Enerji Ajansı'nın raporuna göre Çin, 2009 yılından itibaren ABD'yi geride bırakarak dünya enerjisini tüketen en büyük ülke hâline gelmiştir. Rapora göre, Çin'in enerji tüketiminde ileriki yıllarda daha fazla artış olacak ve 2010 yılındaki %17'den2035 yılında %22'ye yükselecektir (Uğrasız, 2002: 67). Bu açıdan Çin, Orta Asya'yı enerji bağımlılığını azaltmada bir araç olarak görmektedir.

SONUÇ

Çalışma Orta Asya'nın enerji kaynakları ile sınırlandırıldığından Tacikistan ve Kırgızistan üzerinde durulmamıştır. Tacikistan'ın zengin uranyum ve gümüş madenleri bulunmakla birlikte zengin bir su kaynaklarına sahiptir. Bu su kaynakları, enerji üretiminde daha aktif bir rol oynamalıdır. Kırgızistan "demokrasi adası" olarak isimlendirilse de birçok renkli devrime sahne olmuş ve bunun neticesinde siyasi istikrar tam olarak sağlanamamıştır. Bu renkli devrimlerin perde arkasında hegoman güçlerin, Kırgızistan'ın zengin yeraltı kaynaklarına sahip olma çabası yatmaktadır.

SSCB'nin dağılması ile birlikte ortaya çıkan "jeopolitik boşluk" nedeniyle bölge ülkeleri, etnik ve dinsel açıdan heterojen yapıları nedeniyle hegemon güçlerce kullanılmaya elverişli bir oyun sahası haline gelmişti. Bilhassa "Avrasya Balkanları" olarak adlandırılan Kazakistan, Özbekistan, Türkmenistan, Kırgızistan, Tacikistan ve Afganistan son dönemlerde ABD'nin bölgeyi domino etmek için kullandığı piyonlar olma yolunda ilerlemekteydi (Bozkurt, 2006: 121).

1990'lı yılların başında bağımsızlıklarına kavuşan Batı Türkistan Türk Cumhuriyetleri sürekli renkli devrimler ya da dış müdahaleler yüzünden öz kimliklerine kavuşamamışlardır. Bölge olarak sahip oldukları jeopolitik ve enerji kaynaklarının tekelini hegemon güçlerin eline bırakmıştır. Türk Cumhuriyetleri, tek çatı altında aynı ülküler doğrultusunda birleşmedikleri sürece hegemon güçlerin tekelinde kalacaklardır.

Turan'a göre "Orta Asya Türk Cumhuriyetleri'nin ülkelerinin özellikle küresel güç odaklarının hedef alanında olmaları nedeniyle varlıklarını korumak için petrol, doğal kaynaklar ve nükleer güçlerini kendi ulusal yararları doğrultusunda değerlendirmeleri, belki de kısa ve orta erimde görece mümkün olmadığı söylenebilirse de Orta Asya ülkelerinin kutuplaşmaya gitmeden ulusal birlik ve beraberliklerini geliştirmeleri daha yerinde olacaktır' (Turan, 2014: 1048).

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DOĞU AKDENİZ ENERJİ KAYNAKLARI ÜZERİNDEKİ TÜRK VE RUM REKABETİ: JEOPOLİTİK VE JEOEKONOMİK BİR ANALİZ

TURKISH AND GREEK COMPETITION ON EASTERN MEDITERRANEAN ENERGY RESOURCES: GEOPOLITICS AND GEOECONOMIC ANALYSIS

Zafer AKBAŞ[*]
Dilaver GEDİK**

ÖZET

Dünya nüfusunun artması, iklim değişiklikleri, küreselleşme sürecinin hızlanması ve teknolojinin gelişmesine paralel olarak enerji kaynaklarına olan ihtiyaç ile enerji tüketimi artmıştır. Enerji ihtiyacı, enerji kaynaklarına sahip olmayan Türkiye gibi ülkeleri ekonomik bakımdan dışa bağımlı hale getirmektedir. Bu dışa bağımlılık ekonomik nitelikli olmakla kalmayıp, aynı zamanda askeri ve politik bakımdan bağımlılığı da doğurmakta ve ülkeler için büyük bir güvenlik sorununa dönüşmektedir. Bu nedenle günümüz devletleri, enerji kaynakları elde etmeye, enerji bölgelerini kontrol etmeye, kaynaklarını çeşitlendirmeye ve tedarikçi ülke sayısını artırmaya yönelik politikalar izlemektedirler.

Akdeniz Bölgesi; Asya, Avrupa ve Afrika üçgeninde yer almaktadır. 21. yüzyıl "Afrika Yüzyılı" olarak ifade edilmektedir ve buraya açılan en önemli kapı Doğu Akdeniz'dir. Mahan'ın öğretisinden hareketle, Akdeniz'i kontrol etmenin; Ortadoğu, Avrupa, Kuzey Afrika'yı ve buralardaki enerji kaynaklarını kontrol bakımından büyük bir avantaj sağlayacağı ifade edilebilir. Akdeniz Bölgesi, yakın dönemde Türkiye'nin siyasal ilişkilerinin sorunlu olduğu Suriye, İsrail, Mısır gibi aktörler ile Kıbrıs Adası'nı ve Yunanistan gibi ortak bir NATO ülkesini de barındırmaktadır. Benzer şekilde, bölgede Libya gibi petrol zengini ve parçalanmakta olan bir ülkenin, Süveyş Kanalı ve Filistin'in varlığı, bölgeyi jeoekonomik ve jeopolitik bakımdan önemli kılmakta ve büyük aktörlerin çatışma alanı haline dönüştürmektedir. Bütün bu gelişmeler Türkiye'nin de çıkarlarını doğrudan etkileme potansiyeli taşımaktadır.

Anılan enerji bölgesinin toplam enerji rezervi yaklaşık olarak 30 milyar varil petrole eşdeğer bir rakama ulaşmaktadır. Bu rakamın piyasa değeri yaklaşık 1,5 trilyon dolar olarak hesap edilmektedir. Bölge, dünyanın en önemli enerji koridoru ve merkezi haline gelmiş bir bölge niteliğindedir. Bölgenin jeopolitik ve jeoekonomik özellikleri Türk ve Rum kesimlerini karşı karşıya getirmiştir. Rum kesiminin İsrail ile imzaladığı ekonomik anlaşma ve Türkiye'nin Barbaros Hayrettin Paşa sismik araştırma gemisini bölgede görevlendirmesi suların giderek ısınmasına sebep olmuştur.

Enerji kaynakları sorununun bir boyutunun "tehdit" diğer boyutunun ise "çıkar" kavramıyla izah edilmesi mümkündür. Bu çalışmanın amacı, bölge enerji kaynakları üzerindeki rekabetin analiz edilmesidir. Çalışmada Doğu Akdeniz'in ve bölge enerji kaynaklarının Türkiye'nin geleceği açısından yaşamsal önemi haiz olduğu kabul edilerek, Mahan ve Spykman'ın öğretilerinden hareketle jeopolitik ve jeoekonomik yöntemle, Türkiye'nin izleyebileceği stratejilerin neler olduğuna dair çıkarımlar yapılmıştır.

Anahtar Kelimeler: Doğu Akdeniz, Enerji Kaynakları, Jeoekonomik, Jeopolitik, Kıbrıs

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ABSTRACT

Growing world population, climate changes, the accelaration of globalization process and increased need for energy resources in parallel with the development of technology have increased energy consumption. Energy demand made countries such as Turkey, which has not had energy resources, dependent on outside energy resources. This external dependency becomes not only an energy-based one, but also military and political based one, and thereby, it becomes a very significant security problem for the countries. For this reason, the countries are pursuing policies aimed at obtaining energy resources, controlling energy regions, diversifying the resources and increasing the number of energy supplier countries.

Mediterranean Region is located in the triangle of Asia, Europe and Africa. 21st century is referred as “Africa Century” and the most important gate opening to Africa is the Eastern Mediterranean. According to the Mahan’s teaching, controlling the Mediterranean means taking advantage of controlling Middle East, Europe, North Africa and energy resources around these regions. Together with actors like Israel, Egypt and Syria, with which Turkey recently has problematic political relationships, Mediterranean Region encompasses Cyprus Island, NATO-partner country Greece. Likewise, the presence of Suez Canal, Palestinian and Libya, a country which is an oil-rich country and is being disintegrated, makes the region geopolitically and geoeconomically important, and transforms it an area for which major actors are in conflict. All these developments have the potential of directly affecting the interests of Turkey.

Total energy reserve of the aforementioned energy region is amounted to a figure, which is equivalent of approximately 30 billion barrels of oil. The market value of this figure is calculated as nearly $ 1.5 trillion. The region has turned out to be the most important energy corridor and center of the world. The geopolitical and geoeconomical characteristics of the region have confronted the Turkish and the Greek sides. The economic agreement of Greek side with Israel and the commission of Barbaros Hayrettin Pasha seismic research vessel by Turkey has led to increase the political tension in the region.

It is possible to that one dimension of energy resources problem can be explained with the concept of “threat” and as for the other dimension, with the concept “interest”. The purpose of this study is to analyze the competition on energy resources of the region. Accepting the vital importance of the Eastern Mediterranean and energy resources around the region in terms of Turkey’s future, in this study, conclusions were made about which strategies Turkey would follow, based on Mahan and Spykman the teachings with geopolitical and geoeconomical methods.

Key words: Eastern Mediterranean, Energy Resources, Geoeconomy, Geopolitics, Cyprus

GİRİŞ

Dünya nüfusunun artması, kentleşme, küreselleşme gibi süreçler günümüz dünyasında enerji kaynakları üzerindeki rekabeti artırmıştır. İktisadi kaynakların kıtlığına mukabil insanoğlu adeta sınırsız ihtiyaçlara sahiptir. Güç ve çıkar ise insanoğlunun varoluşuyla birlikte hep peşinden koşulan ve uluslararası aktörler arasındaki rekabet ve çatışmayı savaşa kadar götürebilen olgular olmuştur.

Enerji bağımlılığından kurtulmak günümüz modern devletlerinin en önemli sorunlarından biridir. Enerji arz edicisi durumunda olan aktörler ise diğer aktörlere karşı sadece ekonomik değil ama aynı zamanda politik ve askeri üstünlük avantajını da ellerinde bulundurmaktadırlar. Bu nedenle milenyumun en önemli çatışma alanı enerji kaynakları üzerindeki jeopolitik ve jeoekonomik rekabettir. Bu bakımdan gün geçtikçe önemi artan bölgelerin başında da Doğu Akdeniz gelmektedir.

Doğu Akdeniz Bölgesi Ortadoğu, Afrika ve Avrupa bağlamında stratejik konumdadır. Ayrıca Kızıldeniz, Süveyş Kanalı ve Cebelitarık Boğazına ve buralardan da okyanuslara doğrudan erişimi olması, ticaret yolları üzerinde bulunması nedeniyle bir rekabet alanıdır. Bölgenin sahip olduğu doğal gaz rezervi ise bölgesel rekabeti küresel rekabete taşımaya adaydır.

Yeni ortaya çıkmaya ya da yeni şekillenmeye başlayan uluslararası sorunlar ya da rekabet alanları ile ilgili olarak hızlı hareket eden, proaktif politika izleyen aktörlerin her zaman avantaj elde ettiği ve bu avantajların daha sonra elden alınamadığı görülmektedir. Doğu Akdeniz'te Rumların girişimiyle başlayan doğal gaz aramalarından Rumların elde ettiği ya da edeceği avantajların da geri döndürülmesi büyük olasılıkla mümkün olmayacaktır. Rumlar, Rus, Mısır, İsrail, Yunanistan, Libya gibi aktörler ve Batı menşeli çokuluslu şirketlerle doğal gaz aramalarında işbirliğine giderek Türk tarafına üstünlük sağlamaya çalışmaktadır. Bu nedenle Türkiye ve Kuzey Kıbrıs Türk Cumhuriyeti (KKTC)'nin hızlı hareket etmesi gerekir.

Çalışma jeopolitik teoriden hareketle Doğu Akdeniz coğrafyasında yaşanan jeopolitik ve jeoekonomik rekabeti incelemeye odaklanmıştır. Bu nedenle kuramsal kısımdan sonra bölgenin politik ve ekonomik önemi üzerinde durulmuş ve aktörler arası rekabet jeopolitik ve jeoekonomik yönlerden ele alınarak analiz edilmiştir.

1. DOĞU AKDENİZ BÖLGESİ VE ENERJİ KAYNAKLARININ ÖNEMİ

1.1. Jeopolitiğin Tarihsel Gelişimi

Jeopolitik kelimesi eski Yunan dilinde arz (yer) anlamındaki "geo" ile yönetim sanatını ifade eden "politika" kelimelerinin bir araya gelmesiyle oluşmuştur. Genel olarak "coğrafyaya dayanan politika" veya "coğrafyanın yönlendirdiği politika" anlamında kullanılmaktadır (Ulaş, 2011: 21). Jeopolitiğin genel amacı, bir ülkenin dünya üzerinde bulunduğu coğrafi konuma göre hem ülke hem de ülke dışında izleyeceği siyaseti, izleyeceği yol güzergâhını ve icra edeceği planlama ve siyaseti belirlemektir. (Çakır, 2011: 14). XIX. yüzyıl sonlarından itibaren, gerek bilimsel bir alan gerekse araştırma konusu olarak dünya gündemine giren "jeopolitik" terimi, ilk defa İsveçli bilim ve siyaset adamı Rudolf Kjellen (1864-1922) tarafından 1899 yılında kullanılmıştır.

Aslında uluslararası politika çözümlemelerinde coğrafyanın kullanılması yeni bir olgu değil; fakat son zamanlara kadar özellikle XX. yüzyılda gerek askeri, silah, ulaşım ve iletişim teknolojisinde meydana gelen baş döndürücü gelişmelerin gerekse uluslararası politikada yaşanan değişimlerin etkisiyle bu alanda yürütülen araştırmalarda coğrafyaya yeterince önem verilmemiştir. Özellikle Sovyetler Birliği'nin dağılmasıyla başlayan dönemde, "Avrasya" olarak adlandırılan bölgenin dünya tarafından fark edilmesiyle "jeopolitik" kavramı, Amerika ve Rusya'nın dış politikalarındaki önemi artmıştır. XIX. yüzyılda jeopolitiğe gösterilen ilginin tekrar ortaya çıkmasını sağlamıştır. (Coşkun, 2013: 182). Jeopolitik kelimesi ilk olarak XIX. yüzyılın sonunda yüksek kültürün ülkesi ama aynı zamanda uzun süredir sayısız krallık ve prensliğe bölünmüş bir ülke olan Almanya'da, nazizmle birlikte sözde bilimsel bir slogana dönüşen jeopolitik fikri, Alman halkının İkinci Dünya Savaşı'na katılmasının en önemli sebeplerinden biri olmuştur. 1945'ten sonra "jeopolitik" kelimesi yaklaşık kırk yıl boyunca pek fazla kullanılmamıştır (Lacoste, 2008: 18).

Bugün sayısız kullanıma sahip olan jeopolitik terimi aslen topraklar ve o topraklarda yaşayan insanlar üzerinde sahip olma ve iktidar kalabilme yarışıyla ilgili her şeyi ifade etmektedir. Özellikle devletler arasında değil, her türlü siyasi güç arasındaki çekişmedir. Ayrıca yasadışı silahlı gruplar arasındaki mücadeleler, büyük veya küçük her türlü toprak üzerinde kontrol sağlamak ve baskı kurmak için girilen mücadelelerdir. Jeopolitik akıl yürütmeler, bir ülke içindeki veya devletler arasındaki çatışmaların sebeplerini daha iyi anlamaya yaramaktadır. Ayrıca söz konusu çatışmaların yakın veya uzak ülkelerde, hatta dünyanın başka yerlerinde nasıl sonuçlanacağını düşünmeye yarar sağlamaktadır (Lacoste, 2008: 8). Herhangi bir devletin uyguladığı jeo-politik düşünce onun coğrafyasına ilişkin ürettiği politikadan çok, siyası iktidarın devamını sağlayacak politikayı destekleyen bir unsurdur. Uluslararası sistemde yer alan aktörlerin belirli bir coğrafyayı işaret ederek tanımladıkları politikaları, o coğrafi alanın jeopolitik önemini oluşturmaktadır. Bu jeopolitiği anlayabilmek için de klasik jeopolitik söylemin ekonomik, sosyal ve kültürel öğeleri ile siyasi karar sahiplerinin tezlerin çözümlemesinin yapılması gerekmektedir. XXI. yüzyıl jeopolitiğinin perspektif bakış açısıyla okunması, güncel politiğin anlaşılabilmesi açısından da önem taşımaktadır (Erbaş, 2011: 451). Jeopolitik kavramından kaçınmak için jeo-strateji kavramı daha çok tercih edilirken; aynı zamanda ekonominin artan rolüyle birlikte jeo-ekonomi kavramı da jeopolitik çalışmalara Soğuk Savaş döneminde dâhil edilmiştir. Bu dönemde devlet gücünün sürdürülmesi için coğrafyanın ve jeopolitiğin bir meşrulaştırma aracı olarak kullanılmıştır (Canbolat, 2014: 232). Güç ve ulusal güç kavramları tanımlanırken belirtildiği gibi güç, bir devlete ekonomik ve siyasal alanda bir şeyler yapmasını veya yapmamasını sağlayan en önemli unsurdur. Ulusal güç unsurları arasında en başta askeri güç gelmektedir. Askeri güç unsurunun yanında siyasal alt yapı, coğrafi konum ve büyüklük, ekonomik durum, nüfus ve teknolojik düzey aynı oranda önemlidir.

1.2. Deniz Hâkimiyeti Teorisi

Realist yazarlar ile jeopolitik teoriyi benimseyenler arasında önemli bir benzerlik ulusal gücün ele alış biçimleridir. Morgenthau gibi Mahan da ulusal gücün öğelerini sıralarken bunların aşağı yukarı aynı öğeler olduğunu belirtmektedir. A.T. Mahan, "Deniz Gücünün Tarihe Etkisi" (The Influence of Sea Power Upon History:1660-1783) başlığını taşıyan ve uluslararası ilişkilerin temel klasiklerinden olan çalışmasında deniz gücünün unsurları adını verdiği başlıca temel kavramlar; ülke büyüklüğü, nüfus, topografik özellik, coğrafik konum, askeri güç, ulusal karakter ve hükümet karakteri olarak belirtilmiştir. Görüldüğü gibi bunlardan ilk üçü doğrudan coğrafyayla ilgilidir. Morgenthau ise ulusal gücün unsurlarını, endüstriyel kapasite, nüfus, coğrafya, doğal kaynaklar, askeri güç, ulusal karakter, ulusal moral, diplomasinin niteliği ve hükümet niteliği olarak belirtmiştir.

Realistler coğrafyanın, dış politikanın oluşmasında etkili olan öğeler arasında yer aldığını kabul etmektedirler (Coşkun, 2013: 184).

Jeopolitiğin yeni bir disiplin olarak ortaya çıkması, özellikle XIX. yüzyıl sonlarında cereyan eden bilimsel, teknolojik ve siyasal gelişmelere dayanmaktadır. Amerikalı Amiral Alfred T.Mahan (1840-1914) jeopolitiğin öncülerinden biri olarak kabul edilmektedir. ABD Deniz Harp Akademisi'nde iki kere başkanlık yapmıştır. İngiltere'nin dünyaya hükmettiği bir dönemde, ülkesi ABD'nin dünya gücü olması amacıyla jeopolitik düşünceler geliştirmiştir. Düşünceleri, önce Deniz Kuvvetleri Komutan Yardımcısı daha sonra da Devlet Başkanı olan ve ABD'nin lider deniz gücü olmasında ciddi katkıları bulunan Theodore Roosevelt'i büyük oranda etkilemiştir. Tarihsel bir bakış açısıyla yaptığı çalışmalar sonucunda; İngiltere'nin güçlü bir donanmayla dünya denizlerine hâkim olduğu, ayrıca deniz yolları üzerindeki tüm stratejik noktaları denetim altına aldığı ama bir yandan da denizlerde başka bir rakiple karşılaşmamak için Avrupa kıtasındaki devletler arasında mevcut güç dengelerini koruyan politikalar izlediği ve bu yolla dünya lideri olduğu sonucuna ulaşmıştır. Büyük devletlerin güvenlikleri, siyasi ve ekonomik varlıkları deniz güçlerine ve deniz hâkimiyetlerine bağlıdır. Denize çıkışı olmayan devletler için dahi deniz hâkimiyetinin düşman ya da dost devletin elinde bulunması bir güvenlik sorunu haline gelebilmektedir (Ulaş, 2011: 26). Mahan'ın emperyalist düşüncelerini deniz hâkimiyeti üzerine kurmasındaki en önemli etkenlerden biri Panama Kanalı dışındaki tüm denizlerin İngiltere'nin kontrolü altında olmasıdır. Mahan'ın düşünceleri ABD'nin İngiltere ile rekabetinde ABD'nin eksik yönlerini ve gerekliliklerini analiz edilip uygulanması bakımından faydalı olmuştur. Mahan, ABD'nin etkin ve donanımlı bir deniz gücüne sahip olması durumunda, ülke ticaretini daha geniş alanlara yayma fırsatını bulacağını değerlendirmiştir. Bu durumda da yeni pazarlara ve egemenlik sağlayacağı bölgelere sahip olabileceğini belirtmiştir (Karabulut, 2005: 49). İngiltere donanmasının kabiliyetleri hakkında eserlerinde söz eden Mahan, İngiltere'yi ticari faaliyetleri deniz kuvvetleri faaliyetleriyle birleştiren büyük bir güç olarak tanımlamıştır (Sumida, 2003: 71).

Tüm bu veriler değerlendirildiğinde, Mahan'ın deniz hâkimiyet teorisinin temelinde ABD-İngiltere rekabeti, özelde ise petrol konusundaki rekabet bulunmaktadır. Deniz Hâkimiyet teorisinin ortaya çıktığı dönem, ABD'ye ait Standard Oil ile İngiltere'ye ait Royal Dutch şirketlerinin enerji egemenlik alanlarını kendi lehlerine genişletme çaba ve uğraşlarının yaşandığı bir zamana denk gelmektedir. Royal Dutch Şirketi, Birinci Dünya Savaşı'nın başlamasından beş sene önce, ABD için stratejik bir önemi bulunan Panama Kanalı'nın yakınında olan Venezüella'nın küçük bir adasında büyük bir faaliyete başlamıştır. Şirket kısa bir sürede Venezüella'nın bütün petrol kaynakları üzerinde imtiyaz sahibi konumuna ulaşmıştır (Karadağ, 2003: 142). Buna karşın Standard Oil yetkilileri yaşadıkları bu mağlubiyetleri deniz hâkimiyetine bağlamışlardır. Hükümete yaptıkları baskıda, "Tatbik edilecek olan bahri programla denizlerde üstünlüğü sağladığımız gün Standard Oil, dünya petrol hâkimiyetini eline geçirmeyi bilecektir" demişlerdir (Karadağ, 2003: 142). Mahan'ın deniz hâkimiyet teorisini temelinde petrole dayandırmak doğru olmasa da, söz konusu teorik çerçeve içinde bulunduğu dönemin şartları içerisinde ve ticarete yaptığı vurgu ile değerlendirildiğinde petrolün bu teoriyi etkileyen faktörlerden biri olduğu söylenebilmektedir (Çakır, 2011: 15).

2. KARA HÂKİMİYET VE KENAR KUŞAK TEORİLERİ: DOĞU AKDENİZ

İngiliz coğrafyacı olan Halford Mackinder "Kara Hâkimiyeti Teorisi" ile ilk jeopolitik teoriyi oluşturmuştur. Mackinder'in "Kara Hâkimiyeti Teorisi"nde Doğu Avrupa ile Sibirya'yı dünyanın kalbi (Heartland) olarak tanımlamıştır. Söz konusu bölgede hâkimiyetini sağlayan milletin dünya egemenliğini de elinde bulunduracağını belirtmiştir. Jeopolitikçilerin birçoğu tarafından Mackinder'in görüşleri benimsenmiş ve desteklenmiştir. Almanya gibi bazı ülkeler tarafından ülke politikalarında önemli bir rol almıştır. Mackinder'in teorisi sonrasında farklı yeni görüşlerin ortaya çıkmasına neden olmuştur.

1944 yılında Spykman'ın ölümü sonrasında yayımlanan "Barışın Coğrafyası"(The Geography of the Peace) adlı eserde, Mackinder'in Kalpgah teorisinin dışında "Kenar Kuşak (rimland)" teorisi ortaya çıkarılmıştır. Spykman'ın jeopolitik teorisi, Amerika Birleşik Devletleri'nin ülke güvenliği açısından ele almıştır. Bu kapsamda ABD'nin Ortadoğu, Avrupa ve Doğu Asya-Pasifik'e kıyısı olan kenar ülkelerini kontrol etmesi halinde Avrasya Kalpgahı'nın gücünü engelleyeceği belirtilmiştir. Bu açıdan Mackinder'in ünlü sözünü, "Kenar kuşak ülkelerini hâkimiyet altında tutan; Avrupa ve Asya'ya hükmedebilir. Avrupa ile Asya'ya hükmeden, dünyanın kaderine hâkim olur" şeklinde değiştirmiştir. Spkyman, dünya coğrafyasını Mackinder'in ayırmış olduğu aynı jeopolitik bölgelere ayırmış ancak Mackinder'in merkezden dışa doğru olan teorisini, dıştan merkeze doğru değerlendirmiştir. Bu kapsamda, "Kuzey Amerika'ya sahip olan Güney Amerika, Avustralya ve Afrika'ya hükmeder". Spykman, temelde dünya hâkimiyetinin sadece ABD tarafından sağlanabileceğine dikkat çekmektedir. Spykman'in bu fikirleri göz önünde bulundurulduğunda II. Dünya Savaşı sonrası ABD'nin emperyalizmine sağlayabileceği görüşü dikkat çekmektedir (Taban, 2006: 26).

Kenar Kuşak Teorisi'ne göre dünya egemenliği ancak dışarıdan içeriye doğru gerçekleşmektedir. Bu durumda dış kuşak bölgeleri olan Avrupa, Türkiye, Irak, İran, Pakistan, Afganistan, Hindistan, Çin, Kore ve Doğu Sibirya'ya hâkim olmak gerekmektedir (Demirci, 2005:7). Kenar Kuşak devletleri; Rusya hariç, bütün Avrupa, Türkiye, Irak, İran, Afganistan, Pakistan, Hindistan, Çin, Kore ve Doğu Sibirya'dır. Dolayısıyla bu teoriye göre Doğu Akdeniz, Kenar Kuşak devletlerinden Yunanistan, Türkiye ve dolaylı olarak İran ve Irak ile temas halinde olan bir denizdir ve kenar kuşağın önemli bir kısmını denetlemeye yardımcı olacak konumdadır (Yıldız, 2012: 43). Buradan hareketle Doğu Akdeniz'i kontrolü altında tutan gücün, Yunanistan, Türkiye, İran ve Irak gibi ülkeleri de elinde tutup, kontrol edebileceği sonucu çıkarılabilir.

3. DOĞU AKDENİZ'İN JEOSTRATEJİK VE JEOEKONOMİK ÖNEMİ

Dünya coğrafyasının merkezi olarak ortaya çıkan Doğu Akdeniz bölgesi aynı zamanda jeopolitik olarak da dünyanın ortasıdır. Akdeniz'in coğrafi konumu Mediterranean'ın dünyanın merkezi anlamına geldiğini düşünenleri haklı çıkartacak bir konumdur (Yıldız, 2012: 17). Bugün Doğu Akdeniz'in, Tunus'daki Bon Burnu ile İtalya'ya bağlı Sicilya Adası'nın batıya uzanan ucundaki Lilibeo Burnu arasında çizilen hattın doğusundaki bölgeyi kapsadığı konusunda genel bir görüş bulunmaktadır. Ayrıca Doğu Akdeniz; İtalya, Slovenya, Hırvatistan, Bosna-Hersek, Karadağ, Arnavutluk, Yunanistan, Türkiye, Suriye, Lübnan, İsrail, Filistin, Mısır, Libya ve Tunus kıyıları ile çevrilidir (Yıldız, 2008: 4). Anakaralar üç kıtanın birliği çerçevesinde ele alındığında; merkezi coğrafya bölgesi üç kıtanın bir araya geldiği hatta daha da ileri giderek, birleştiği bir alan olarak önem kazanmaktadır. Söz konusu bölgeye birçok bilim adamı dünyanın "sıklet merkezi" olarak nitelemekte, aynı zamanda İngilizce "Heartland" kavramının karşılığı olarak "kalpgah" da eski dilden gelen bir kavram ile tanımlamaya çalışmışlardır. Akdeniz, bazı bilim adamlarının Merkezi Coğrafya olarak isimlendirdikleri bu bölgenin merkezindeki deniz olmuştur (Yıldız, 2012: 38-39).

Doğu Akdeniz'in jeostratejik önemini şekillendiren gelişmelerin en önemlisi olarak 1869 yılında Süveyş Kanalı'nın açılmasını göstermek mümkündür. Söz konusu kanalın açılması ile o zamana kadar Ümit Burnu'nun çevresi dolaşılarak yapılmakta olan deniz ticaretinin süre ve maliyetinde ciddi tasarruf sağlanmış; Asya, Afrika ve Avrupa pazarları birbirine bağlanmıştır. Günümüzde Akdeniz'de yılda ortalama 220 binden fazla geminin seyir yaptığı tahmin edilmektedir. Bu rakam dünya deniz ticaretinin yaklaşık üçte birlik bir kısmına tekabül etmektedir (Mevlütoğlu, 2014: 14). Sanayi Devrimi'nin ekonomik ve toplumsal yaşamı değiştirmesiyle birlikte, uluslararası ilişkilerin ekonomi ile sıkça birleştiği alanlardan biri enerji olmuştur. 1903'te İngiltere Dışişleri Bakanı Lord Lansdowne, "ülkesinin çıkarlarının Basra Körfezi'nde güçlü bir donanımlı bir deniz üssü kurulmasının gerekli kıldığını ve İngiliz çıkarlarına yönelecek tehditlere karşı her türlü yola başvuracaklarını" ifade ederken bölgedeki potansiyel enerji kaynaklarına ve bu kaynakların ülkesi için gelecekteki önemine işaret etmektedir. Amerika'nın, hemen her başkanlık seçiminde adayların enerjide dışa bağlılığının azaltılması konusunda sürekli demeç verdikleri ve benimseyecekleri politikaları kamuoyuna açıklama ihtiyacı duydukları bilinmektedir (Öztürk, 2012, 434).

Herodot, Nil ve Levant Havzaları ikinci zamanda yer kabuğunda meydana gelen tektonik deformasyonlar sonucunda ortaya çıkan pasif kıta kenarları olarak nitelendirilmiştir. Adana-Mersin-Antalya, İskenderun-Lazkiye ve Mesarya-Güzelyurt Havzaları da hidrokarbon oluşumuna uygun havzalar olarak değerlendirilmektedir. Herodot Havzası'nda Oligosen, Miyosen, Pliyosen ve Pleyistosen kumtaşlarında, Levant Havzası'nda Orta Miyosen, Erken Piyosen yaşlı şeyller ve kumtaşları içinde hidrokarbon kaynakları tespit edilmiştir. Bu bölgede yapılan arama çalışmaları sonucunda belirlenen toplam doğalgaz miktarı 13,2 trilyon m^3, petrol ise 3,5 milyar varildir (Gözler, 2014: 3). Bölgenin sahip olduğu bu ekonomik zenginlik bölgenin stratejik ve ekonomik önemini artırmakta ve bölgesel rekabete yol açmaktadır.

Son dönemlerde ülkelerin dış politikalarını belirleyen unsurların içerisinde enerji kaynaklarının önemi artmaktadır. Dünyanın en önemli enerji kaynağı konumunda bulunan petrol ve doğal gazın aranması, çıkartılması ve elde edilmesi dünya siyasetinin en önemli faktörünü oluşturmaktadır. Bu kapsamda, özellikle denizlerdeki ve kutuplardaki yeni enerji kaynaklarının keşfi ve paylaşımı bütün dünya ülkelerinin dikkatlerini yoğunlaştırmalarına neden olmaktadır (Yaycı, 2007: 18) Günümüzde ortaya çıkarılan hidrokarbon kaynakları Doğu Akdeniz'i gerek uluslararası enerji sektöründe gerekse jeopolitiğin merkezi haline dönüştürmüştür. Doğu Akdeniz'de son zamanlarda yaşanmakta olan gelişmelerin Akdeniz havzasındaki enerji tablosunda olduğu gibi bölgesel faktörleri önemli miktarda değiştirmesi düşünülmektedir. Ayrıca ekonomik değeri tahmin edilen enerji kaynaklarının toplam varlığı dikkate alındığında, Doğu Akdeniz, bölgeden çıkarılacak kaynakların taşınmasında önemli bir kavşak olmakla kalmayacak, ayrıca önemli bir enerji merkezi haline gelecektir (Sandıklı, 2014: 1). Avrupa, Asya ve Afrika'ya eşit mesafede olması nedeniyle dünya içinde merkezi bir öneme sahip olan Kıbrıs Adası, Asya-Afrika, Avrupa-Afrika, Avrupa-Asya arasında stratejik bağlantıları etkileyebilecek bir hat üzerinde bulunmaktadır.

4. DOĞU AKDENİZ'DE YAŞANAN BÖLGESEL REKABET VE AKTÖRLERİN TUTUMU

Doğu uç noktasıyla Orta Doğu'ya yönelmiş bir ok gibi duran Kıbrıs adası, batı uç noktasıyla Doğu Akdeniz, Balkanlar ve Kuzey Afrika'daki stratejik dengelerde önemli bir yer tutmaktadır. Kıbrıs'ın dar ölçekli jeostratejik önemi, Doğu Akdeniz'de ortaya çıkan Türkiye-Yunanistan-KKTC ve Güney Kıbrıs Rum Yönetimi (GKRY) dengeleriyle ilgilidir. Bu dengeler adaya hâkim olan tarafın Doğu Akdeniz'de güçlü olmasıyla bağlantılıdır

(Akgün, 2010: 727). 1959'da sırasıyla Zürih ve Londra'da yapılan konferanslar sonucunda bağımsız bir Kıbrıs Cumhuriyeti kurulması karara bağlanmıştır. Bu konferansların ardından imzalanan Garantörlük Antlaşması'na göre, kurulacak cumhuriyetin bağımsızlığı, toprak bütünlüğü ve anayasal düzeni İngiltere, Yunanistan ve Türkiye'nin garantisi altına alınmıştır.

Bölgesel rekabetinin önemli bir boyutu enerji kaynakları oluşturmaktadır. Doğu Akdeniz üzerindeki rekabetin kaynağı sahip olduğu stratejik konum ve ekonomik imkânlardan kaynaklanmaktadır. Ayrıca bölgenin tarihsel geçmişi de bölgesel rekabeti besleyen bir diğer olgudur. Bu rekabet devletlerin enerji kaynaklarına olan bağımlılığının artmasıyla daha da önemli bir hal almaya başlamıştır. Doğu Akdeniz bölgesinde enerji kaynaklarının keşfedilme mücadelesi yüzyılımızın ortalarında başlamıştır. İsrail 1960 yılından itibaren bölgede petrol ve doğal gaz arama çalışmalarına devam etmektedir. Mısır açıklarındaki Belayim sahasında 1961 yılında İtalyan enerji şirketi olan ENI, bölgede petrol bulduğunu açıklamıştır. Söz konusu şirket Mısır kıyılarında bulunan ve Abu Madi olarak adlandırılan bölgede 1967'de doğal gaz yatakları olduğunu duyurmuştur. Doğu Akdeniz açıklarında uzun bir dönem önce yoğun enerji çalışmaları yapan en önemli ülkelerden biri de Mısır'dır. Mısır, başta doğal gaz olmak üzere enerji ihraç eden ülkelerden biri olan 2013 yılı itibarıyla günlük enerji üretiminin yüzde 80'e yakın bir kısmını Akdeniz'deki enerji kaynaklarından sağlamaktadır. (Sünnetçioğlu, 2011: 159-160).

Açık denizlerde enerji kaynakları arama çalışmalarına başlaması ve söz konusu alanlara yatırım yapması, arama faaliyetlerinde kullanılan teknolojik imkânların gelişimini artırmıştır. Yapılan bu gelişmeler sonucunda günümüzde denizlerde "derin" ve "ultra-derin" bölgelerde sondaj çalışmaları yapılması mümkün olmuştur. İsrail bölgede teknolojik gelişmeleri en iyi şekilde kullanan ülkelerin başında gelmektedir. 1999 yılında İsrail kıyılarına yakın bir bölge olan "Noa Sahası"nda ve 2000 yılında "Mari-B" olarak isimlendirilen sahada az miktarlarda hidrokarbon yatağı keşfetmeyi başarmıştır. Mısır kıyılarında yapılan araştırma sonucunda Doğu Akdeniz bölgesinde geniş miktarlarda enerji kaynaklarının olabileceği değerlendirilmiştir. Mısır açıklarında bulunan "Nil Deltası"nda sondaj çalışmaları yapmakta olan Shell şirketi, Nil Deltası'nın kuzeydoğusunda bulunan "NEMED" (North East Mediterranean) bölgesinde büyük bir miktarda hidrokarbon kaynakları keşfetmiştir. Günümüzde "NEMED" bölgesinde toplam 42 milyar m^3 doğal gaz olduğu değerlendirilmektedir. Mısır bölgesinde yapılan çalışmalar sonucunda Doğu Akdeniz Bölgesi'nde enerji kaynakları arama faaliyetleri artmıştır. İsrail açıklarında arama çalışmaları yapmakta olan Amerikan ve İsrail şirketleri 2009 yılında "Tamar-1" ve "Dalit-1" bölgelerinde önemli miktarda doğal gaz yatakları olduğunu belirtmişlerdir. Söz konusu sahalarda bulunan toplam doğal gaz miktarı 255 milyar m^3 olduğu değerlendirilmektedir. Bölgede arama çalışmaları yapmakta olan petrol şirketinin tahminlerine göre Tamar-1 ve Dalit-1 sahalarında bulunan toplam doğal gaz rezervi İsrail'in 20 yıllık enerji ihtiyacını karşılayabilecek büyüklüktedir. (Bilgesam, 2013: 10)

İsrail'in Doğu Akdeniz'deki doğalgaz kaynaklarını korumak için ciddi mali kaynaklar ayırmasının yanında Türk Deniz Kuvvetlerinin gücünü de kendisine olası tehdit olarak görmesi söz konusudur. İsrailli savunma planlayıcıları, diplomatik ilişkilerin alt seviyelere inmiş Türkiye ile İsrail'in doğrudan ve sürekli temasta olabileceği tek yerin Doğu Akdeniz'in mavi suları olduğunun farkındadır. Böyle bir durumda Türk Deniz Kuvvetlerinin kendisini her türlü senaryoya hazırlama zorunluluğu kaçınılmazdır (Topuz, 2014:4) Türkiye özellikle askeri bakımdan deniz gücünü artırmalı ve Doğu Akdeniz de aleyhte oluşabilecek ittifaklara yönelik karşı ittifaklar oluşturmalı, diplomatik, ekonomik ve askeri alternatifleri de dış politika aracı olarak girift bir yöntem izlemelidir. KKTC ile askeri, ekonomik, diplomatik, politik ve teknolojik işbirliği artırılmalıdır.

Rusya, Kafkasya bölgesi üzerinden Orta Doğu'ya ve Doğu Akdeniz'e geçmeyi düşünmektedir. Doğu Akdeniz'de keşfedilen enerji kaynakları bölgenin stratejik ve ekonomik öneminin artmasına neden olmuştur. İran ve Çin'de bölgede Rusya gibi etkin bir güç olma politikası izlemeye başlamıştır. Rusya, Akdeniz'de varlığını gösterme politikalarından biri de askeri varlığını artırma çalışmalarıdır. Bu kapsamda askerî işbirliğini genişletmek maksadıyla GKRK ile görüşmelere başlamasıdır. Rusya'nın amacı, Rumlarla yapmış oldukları kredi anlaşmaları karşılığında askerî işbirliğini güçlendirmek ve Doğu Akdeniz'e yerleşmektir. (ATUN, 2013:1) Türkiye özellikle Rusya ile olan doğal gaz işbirliğini artırarak, Rusya'nın karşı ittifakta yer almasını önlemeye yönelik proaktif ekonomik, siyasi, askeri stratejiler geliştirmelidir.

Doğu Akdeniz Bölgesi'nde yapılan aramalar sonucunda keşfedilen enerji kaynakları büyük petrol şirketleri ve küresel aktörlerin bölgeye ilgilerini artırmıştır. Bölgede sismik araştırmalar yapılarak potansiyel enerji rezervinin büyüklüğü ortaya çıkarılmaya çalışılmaktadır. Bu kapsamda Amerikan Jeolojik Araştırmalar Merkezi (USGS) tarafından 2010 tarihinde Doğu Akdeniz'in en önemli sahalarından "Leviathan Havzası" ve "Nil Deltası"ndaki toplam enerji rezervi miktarında iki rapor yayımlamıştır. Söz konusu raporlarda; "Nil Deltası"nda toplam 1.763 milyar varil elde edilebilir petrol, 223.242 trilyon ayak küp doğal gaz ve 5.974 milyar varil sıvı gaz olduğu görülmektedir. Ayrıca "Leviathan" bölgesinde ise potansiyel olarak 1.689 milyar varil petrol ve 122.378 trilyon ayak küp doğal gaz bulunduğu belirtilmiştir. İsrail bölgede gerçekleştirmiş olduğu arama çalışmalarını genişleterek 2010 yılı içerisinde "Leviathan" bölgesinde toplam kapasitesi 17 trilyon ayak küp olan yeni bir doğal gaz sahasının varlığı bulunmuştur. İsrail bölgede keşfettiği hidrokarbon yatakları ile kendi enerji ihtiyacını karşılayacağı değerlendirilmektedir. Doğu Akdeniz'de varlığı saptanan enerji rezervi ile varlığı kanıtlanan enerji rezervi arasında büyük bir fark bulunmaktadır. Bölgede yapılan enerji keşiflerine rağmen İsrail Enerji Bakanlığı'nın verileri incelendiğinde, İsrail'in tespit edilmiş doğal gaz potansiyeli sadece 300 milyar $m^{3'}$tür. Rusya (44.9 trilyon m^3), İran (29.6 trilyon m^3) ve Katar (25.4 trilyon m^3) gibi ülkelerin kanıtlanmış doğal gaz potansiyeli ile karşılaştırıldığında çok düşük bir miktar olduğu görülmektedir (Sandıklı, 2013: 8).

5.DOĞU AKDENİZ'DE KIBRIS MERKEZLİ TÜRK VE RUM REKABETİ

Doğu Akdeniz Bölgesi, Cebelitarık, Süveyş ve Karadeniz bölgelerinde deniz ticaretini etkileyebilecek önemli bir coğrafi konumda bulunmaktadır. Ayrıca, Doğu Akdeniz'de yer alan deniz ulaşım güzergâhları dünya ticareti açısından son derece önemlidir. Ortadoğu ve Hazar Bölgesi'nde bulunan enerji merkezleri ile boru hatlarının kontrolünü sağlamaktadır. Doğu Akdeniz içerisinde bulundurduğu önemli ticaret yolları ve enerji merkezleri açısından dünyanın en stratejik suyolunu oluşturmaktadır. Bölge ekonomik ve stratejik önemi ile egemenlik sağlayacak aktörlere önemli politik imkânlar sunmaktadır. Bu kapsamda, Türkiye'nin bölgede etkin bir rol alması sonucunda kendisine önemli ekonomik, siyasi ve hukuki imkânlar sağlayacaktır. GKRY, önce 2002 yılı içinde öncelikli olarak Rodos'un güneyindeki geniş bir sahada bir Norveç şirketine ait deniz dibi araştırma gemisine "araştırma" yaptırmıştır. Bu çalışmanın sonrasında, Doğu Akdeniz'de Nil Nehri'nden Kıbrıs'a kadar uzanan deniz tabanında doğal gaz ve petrol bulunduğu bilgileri basın-yayın organları tarafından sık sık duyurulmaya başlanmıştır (Başeren, 2007: 24-26). GKRY Parlamentosu, GKRY, Mısır ve Lübnan ile MEB antlaşması imzalamıştır. GKRY, 26 Ocak 2007 tarihinde kabul edilen bir yasa ile Kıbrıs Adası'nın güneyinde belirlenen sınırların içerisinde toplam 13 adet petrol arama ruhsat sahası ilan etmiştir (Başeren, 2010: 13). Karşı hamle olarak Türkiye, 2007 yılında Türkiye Petrolleri Anonim

Ortaklığı (TPAO)'na Kıbrıs'ın batısında kalan ve Türkiye'nin MEB içinde kaldığı değerlendirilen sahalarda petrol ve doğal gaz aramak maksadıyla ruhsat vermiştir. TPAO, Türkiye tarafından kendisine verilen ruhsat ve izinlere dayalı olarak belirlenen sahalarda petrol aramalarına ve sismik çalışmalarına başlamıştır. Yapılan bu çalışmalar sonucunda, Türkiye'nin Doğu Akdeniz'de bütün haklarını koruyacağını ve GKRY'nin bölgede vereceği ruhsatları kabul etmeyeceğini belirtmesi açısından önem taşımaktadır. Ayrıca, GKRY tarafından verilen ruhsatlara dayanarak sahada yürütülecek faaliyetlere izin vermeyeceğini ve müdahale edebileceğini göstermiştir (Çakır, 2011: 30).

Türkiye, Doğu Akdeniz'de kıta sahanlığı ile ilgili bütün uluslararası hukuksal haklarını korumaya yönelik politikalar oluşturmakta ve bu politikalar doğrultusunda gerekli uygulamaları yapmaktadır. Bu uygulamalardan birincisi, Bakanlar Kurulu'nun 2 Temmuz 1974 tarihli ve 7/8594 sayılı kararnamedir. Bu kararname hükümleri kapsamında Türkiye Petrolleri Anonim Ortaklığı'na (TPAO) Rodos Adası'nın güneydoğusunda belirlenen petrol arama bölgesinde ruhsat verilmiştir. Söz konusu bölgenin, Türk kara suları dışında ve Türk kıta sahanlığında bulunması nedeniyle arama izni verilmiştir. Bu uygulama, Türkiye tarafından bölgede gerçekleştirilen ilk devlet uygulaması olarak önem taşımaktadır. İkincisi ise, 15 Mart 2002 tarihinde Doğu Akdeniz'de Türkiye'nin muhtemel kıta sahanlığı sınırları içinde bir Norveç Şirketi adına jeofizik araştırmalarda bulunan R/V "Northern Access" isimli araştırma gemisi, Türk Savaş Gemisi tarafından Türk kıta sahanlığı üzerinde araştırma yapmakta olduğu yönünde ikaz edilerek rotasından döndürülmüş ve sahadan uzaklaştırılmıştır. Bu olay Türkiye tarafından Doğu Akdeniz'de gerçekleştirilen ikinci devlet uygulaması olarak önem taşımaktadır. Şirket yetkilileri daha sonra Türk kıta sahanlığında izinsiz araştırma yaptırdıkları için özür dilemişlerdir. Türkiye bu davranışıyla, Anadolu sahilleri ile Afrika sahilleri (Mısır) arasındaki orta hatta kadar uzanan kıta sahanlığında haklarını koruma kararlılığını ortaya koymuştur (Öztürk, 2003, 129). GKRY, Rodos-Meis-Kıbrıs hattının güneyinde bulanan bölgede Türkiye'nin kıta sahanlığı haklarını almaya yönelik politikasına benzerlikte bir davranış göstermektedir. GKRY bu kapsamda, Kıbrıs'ın kıta sahanlığı sınırlandırması konusunu Türkiye'nin dışında bir çözüm yolu bulmaya çalışmaktadır. 24 Ağustos 2001 tarihinde GKRY Hükümet Sözcüsü, Kıbrıs deniz alanlarındaki petrol yatakları konusunda hükümetinin Suriye ve Mısır'dan sonra, Lübnan, İsrail ve Libya ile görüşmelerde bulunacağını belirtmiştir (Öztürk, 2003: 137).

Doğu Akdeniz'de keşfedilen enerji kaynakları GKRY basınında Ocak 2001'den itibaren geniş şekilde yer almaya başlamıştır. Kıbrıs'ın güneyinde petrol bulunduğuna ilişkin bu haberler bölgeye olan ilgiyi artırmıştır. GKRY Sanayi, Ticaret ve Turizm Bakanı, 11 Eylül 2002 tarihinde yaptığı açıklamada, Münhasır Ekonomik Bölge (MEB)'ye ilişkin oluşturulan taslağın GKRY Bakanlar Kurulu tarafından onaylandığını belirtmiştir. Bu tasarı ile ilgili olarak Mısır ile temaslarda bulunulacağını ve anlaşmanın tahminen önümüzdeki dönemde imzalanacağını ifade etmiştir. Türkiye tarafından yapılan siyasi girişimlere rağmen GKRY ile Mısır arasında MEB sınırlandırmasını kapsayan anlaşma GKRY ve Mısır tarafından 17 Şubat 2003 tarihinde imzalanmıştır. GKRY ve Mısır basınında, söz konusu anlaşmaya "Ortak Ticaret Bölgesi" Anlaşması olarak nitelendirilmiştir. Bu anlaşma hükümlerine göre, her iki ülke arasında kalan MEB sınırları, Kıbrıs Adası ile Afrika sahilleri arasında belirlenen sekiz nokta ile ana kara statüsünde ve coğrafi açıdan güçlü olan Mısır'ın Doğu Akdeniz'deki haklarının kaybettirilerek eşit uzaklık çizgisi esasında meydana getirilmiştir. Türkiye bu anlaşmayı tanımamaktadır (Kaya, 2007: 19-55).

Mısır Petrol Bakanı Fahmy ile GKRY Ticaret, Sanayi ve Turizm Bakanı Yorgos Lillikas arasında 19 Temmuz 2005 tarihinde "Anlayış Memorandumu"nun imzalanması ve 8 Eylül 2005 tarihinde imzalanan ve Akdeniz'de petrol yataklarının aranmasını da öngören "Petrol Araştırmaları İş Birliği Protokolü" ile memorandumun uygulanmasını hedeflenmiştir. GKRY kıta sahanlığı ile ilgili olarak kanun düzeyinde bir iç hukuk düzenlemesine sahiptir. Bu düzenlemeye göre, kara suları genişliğinin oniki deniz mili olduğunu ve iki yüz metre derinlik ya da işletilebilirlik esasında kıta sahanlığına sahip bulunduğu belirtilmektedir. Yunanistan'ın Rodos-Meis-Kıbrıs hattının güneyinde Türkiye'nin kıta sahanlığı haklarını elinden alma politikasına yönelik GKRY de aynı şekilde bir davranış göstermektedir. GKRY uyguladığı politika esasları çerçevesi içerisinde, Kıbrıs'ın kıta sahanlığı sınırlandırmasını Türkiye'yi dışlayarak çözmeye çalışmaktadır. GKRY Hükümet Sözcüsü tarafından yapılan açıklamada, Kıbrıs deniz alanlarındaki petrol yatakları konusunda hükümetin Suriye ve Mısır'dan sonra, Lübnan, İsrail ve muhtemelen Libya ile görüşmelerde bulunacağını belirtmiştir. Ocak 2001'den itibaren GKRY basınında Kıbrıs'ın güneyinde petrol bulunduğu konusundaki haberler geniş bir şekilde yer almıştır. Bu haberler bölgeye olan ilgiyi arttırmaktadır. Doğu Akdeniz'de bulunan kaynaklara başta Türkiye ve Yunanistan olmak üzere, İsrail, Suriye, Mısır ve Lübnan'ın ilgilerinin artığı görülmektedir (Sandıklı, 2013: 26). Türkiye ile KKTC arasında 16 Eylül 2011'de Türk kesiminde yapılan görüşme sonrasında GKRY'nin adanın güneyinde arama faaliyetlerine başlaması durumunda, KKTC'nin Türkiye Cumhuriyeti ile Kıta Sahanlığı Sınırlandırma Anlaşması yapacağı ve TPAO'ya adanın çevresinde bulunan deniz sahalarında arama ruhsatı verilmesi karara bağlanmıştır. Bu kapsamda Türkiye tarafından Koca Piri Reis Araştırma Gemisi bölgeye görevlendirilmiş ve Rum tarafının doğalgaz sondajına başladığı Kıbrıs'ın güneyinde "G Bölgesi" ya da Rumların "Afrodit" olarak tanımladıkları bölgeye 3.700 km. sismik kayıt alınarak TPAO'ya teslim edilmesi sağlanmıştır. Türkiye bölgede Koca Piri Reis'le Akdeniz'in güneyinde sismik araştırmalar yaptıktan sonra "Bergen Surveyor" isimli bir sismik gemiyi ve Norveşli CGG Veritas şirketine ait 93 metre uzunluğundaki "Oceanic Challenger" ile Alanya açıklarında 25 Ekim 2011'de üç boyutlu sismik çalışmalara başlamıştır (Yıldız, 2012: 179).

Dünyada artan enerji ihtiyacının yanında AB'nin Rusya'ya olan enerji bağımlılığının da Doğu Akdeniz'de keşfedilen yeni doğalgaz yataklarının öneminin artmasında sebep olmuştur. Ukrayna Krizi AB'nin enerji güvenliği ve enerjide Rusya'ya bağımlılığı nasıl azaltabileceği konusunu tekrar gündeme taşımıştır. AB Enerji Komiseri Günther Öttinger yapmış olduğu basın toplantısında, Birlik ülkelerinin petrolde %90, doğal gazda %66, katı yakıtlarda %42 ve nükleer yakıtta %40 dışa bağımlı olduğunu dile getirmiştir (Sandıklı, 2014: 2). Türkiye, 2013 yılında 55,9 milyar dolar seviyesinde enerji harcaması yapmıştır. Yaptığı enerji tüketiminin %71,5'ni dışarıdan karşılayan Türkiye, yıllık enerji ithalatının %64'ünü Rusya, %19'unu da İran'dan karşılamaktadır. Avrupa ülkelerinde olduğu gibi Rusya'ya bağımlılık söz konusudur. Enerji ithalatı yaptığı ülkeleri çeşitlendirmeye ihtiyaç duymaktadır. Bu nedenle hem Rusya'ya olan enerji bağımlığını azaltmak, hem de doğal gaz kaynaklarının ülke üzerinden AB ülkelerine taşınması açısından, Doğu Akdeniz'de keşfedilen doğal gaz yatakları, Türkiye için büyük önem taşımaktadır (Sandıklı, 2014, 3). GKRY'nin, bağımsız bir deniz kuvveti teşkilatı bulunmamaktadır. Rum Milli Muhafız Ordusu (RMMO) bünyesinde, sahil güvenlik gücü niteliğinde bir Deniz Birlikleri Komutanlığı mevcuttur. Söz konusu birimin görevleri, terörizm ve kaçakçılıkla mücadele, GKRY'nin kıyı şeridinin muhafazası, arama ve kurtarma olarak sayılabilmektedir. Doğu Akdeniz'de yapılan hidrokarbon keşifleri sonrasında, 2010 Aralık ayında İsrail Münhasır Ekonomik Bölge (MEB) sınırlarının tespiti için İsrail Altyapı Bakanı Uzi Landau ve GKRY Dışişleri Bakanı Markos Kiprianu tarafından bir anlaşma imzalanmıştır. Anlaşma, tarafların keşfedilen kaynakların paylaşımı ve ortak kullanımı hususlarında işbirliğine gitmesini kapsamaktadır. Söz konusu anlaşmanın imzalanmasından kısa bir süre sonra İsrail, RMMO deniz biriminin güçlendirilmesi için GKRY'ne kapsamlı bir modernizasyon paketi teklif etmiştir (Mevlütoğlu, 2014: 21). İsrail, Doğu Akdeniz'in derin deniz alanında yaptığı doğal gaz keşifleriyle önemli bir ekonomik ilerleme sağlamıştır. 1999 yılında, deniz alanında “Mari-B” sahasında ve Filistin bölgesinde “Gaza Marine” sahasında yapılan tuz üstü keşifleri ile Noble Energy tarafından 2009’da Tamar bölgesinin keşfi yapılmıştır. Keşfedilen hidrokarbon potansiyeli arama şirketlerini bu bölgeye olan ilgilerini artırmıştır. İsrail açıklarındaki Tamar ve Dalit olarak adlandırılan sahada uzmanlara göre özellikle 160 milyon m^3 rezerv tahmin edilmektedir. İsrail son doğal gaz keşifleriyle birlikte son 20 yılda ihtiyaç duyacağı enerjiyi karşılayacağı değerlendirilmektedir (Ceyhun, 2014: 34).

Doğu Akdeniz’de yaşanan küresel ve bölgesel gelişmelerin sonucu olarak, gelecek dönemde bölgenin ve Kıbrıs’ın jeostratejik önemi artacağı değerlendirilmektedir. Bu durum, Akdeniz Bölgesi’nin ekonomik ve politik değerini artırabilecektir. Ancak diğer taraftan bölgede gerilim ve çatışma ortamını artırarak, Akdeniz’deki deniz güvenliğini etkileyecektir. Özellikle Libya, Mısır ve Suriye’de yaşanan siyasi gelişmeler sonrasında oluşan güvensizlik ortamında, teröristler, kaçakçılar ve suç örgütleri için daha rahat hareket edebilmelerine imkân sağlayan kontrolsüz deniz sahalarının ortaya çıkmasına sebep olmuştur. Gelecek dönemde bölgede yaşanacak başka bir sorun ise, Doğu Akdeniz’deki keşfedilen doğal gaz kaynaklarının İsrail ve Türkiye’nin karışabileceği bir çatışmaya neden olacaktır. Deniz yetki alanlarında uyuşmazlıkları ve doğal enerji kaynaklarına ilişkin artan politik çatışmalar, bölgesel dayanışmayı olumsuz etkileyecek ve enerji kaynaklarının birlik içerisinde kullanılmamasını sağlayacaktır (Şeker, 2014: 51). Doğu Akdeniz’de keşfedilen yeni enerji kaynakları aralarında siyasi sorunlar bulunan en az yedi farklı ülkeyi ilgilendirmektedir. Bu ülkeler arasındaki ilişkiler ve bölgesel barış ve istikrarın sürdürülebilirliği yüksek maliyet gerektiren yatırımların karlı olabilmesi için çok önemlidir. Yapılan yatırımların en az 20 yıl süreyle aktif olarak çalışmasını sağlayacak güvenli bir uluslararası ilişkiler ortamına ihtiyaç vardır (Sandıklı, 2014: 4).

Avrasya Bölgesi, Ortadoğu ve Rusya’nın hidrokarbon kaynaklarının taşınması konusunda önemli işlev üstlenen Türkiye, bu durumda sözleşmeler ile belirlenen oranlarda bir kısım transit geçiş ücreti almaktadır. Gerek doğal gaz boru hatları gerekse de ham petrol boru hatları inşa edildikleri hat boyunca konuşlanmış ülkeler bahis konusu boru hattının inşa edilmesi süreci maddi fon sağlayan kuruluşlar ve boru hattının işletilmesini sağlayan unsurlar arasında bir karşılıklı bağımlılık ilişkisinin çıkmasına yol açarlar. Kazan kazan ortak prensibi üzerine bina edilmiş bir ilişkiler tarafların zorunlulukları ve zayıflıkları ile doğru orantılı olan pazarlık ve müzakere güçleri ile şekillenmektedir (Demir, 2014: 95). Türkiye-Yunanistan-GKRY-KKTC arasında yapılacak ortak bir anlaşma ile kazan kazan prensipleri doğrultusunda bölgedeki enerji kaynaklarından her ülke fayda sağlayabilecektir. GKRY 17 Şubat 2013 tarihinde imzaladığı Münhasır Ekonomik Bölge (MEB) sınırlandırma antlaşması ile Doğu Akdeniz Bölgesi’nde enerji kaynaklarının paylaşımında ilk adım olmuştur. GKRY bu antlaşma ile Doğu Akdeniz’de son keşfedilen enerji kaynaklarının paylaşımı kapsamında, Türkiye’yi 41 bin kilometrekarelik bir deniz alanına hapsetmek istemektedir. Yapılan siyasi oyunlar ve hesaplar sonucunda imzalanan bu anlaşmanın temelinde, GKRY’nin ortak hatları esas alması ve bunları hakkaniyete uygun hale getirmemesi bulunmaktadır. Ayrıca, GKRY-Lübnan arasında 7 Ocak 2007 tarihinde ve GKRY-İsrail arasında 17 Aralık 2010 tarihinde (Cyprus, Israel Define Sea Border for Energy Search, Dow Jones Newswires) MEB Sınırlandırma Antlaşması imzalanmıştır. Ancak, GKRY-Lübnan arasında imzalanan antlaşma henüz Lübnan’da iç hukuk onay sürecini tamamlamamıştır. Lübnan, bu antlaşmada belirtilen güney başlangıç noktasını esas alan MEB ilanını 19 Ekim 2010 tarihi itibari ile Birleşmiş Milletler (BM)’e bildirmiştir. Diğer taraftan GKRY, Suriye ile de deniz yetki alanı sınırlandırma antlaşması imzalamak üzere görüşmeler yapmıştır. Bu görüşmeler öncesinde Yunanistan ile yapılan anlaşma sonucunda deniz yetki alanı sınırlandırılmasını deklare etmek için uygun ortamı beklemektedirler. Ayrıca Doğu Akdeniz'de GKRY, 21 Mart 2003 tarihinden itibaren geçerli olmak üzere 2 Nisan 2004 tarihinde, Libya ise 27 Mayıs 2009 tarihinde MEB ilan etmiştir. Suriye'nin sınırları belirtilmese de, BM'ye ait internet sayfasında 200 deniz miline uzanan MEB deklarasyonunda bulunduğu gösterilmiştir. Lübnan da, 19 Ekim 2010 tarihinde deniz yetki alanlarını içeren yazılı dokümanları BM'ye sunarak MEB ilan etmiştir (Yaycı, 2007: 18-19). Türkiye'nin dışında ortak menfaatleri bulunan Mısır, Yunanistan ve GKRY, Doğu Akdeniz'de keşfedilen hidrokarbon kaynakları konusunda ortak bir tutum benimsemeye çalışmaktadır. Mısır izlediği dış politika da Türkiye'nin karşısında farklı bir politika takip etmek amaçlarken, Yunanistan MEB'ni GKRY ile birleştirmek istemektedir. İsrail ise Doğu Akdeniz Bölgesi'nde bulunan doğal gazın uluslararası alanda piyasaya kazandırılmasında güvenlik ve ulaşım açısından en uygun yolun Türkiye üzerinden geçmesinin olduğunu bilmektedir. Bölgede yapılacak görüşmelerde izleyeceği politika açısından ortak bir oluşuma girmeyi düşünmektedir. Mısır, Hüsnü Mübarek döneminde, Mübarek'in oğullarının yolsuzlukla elde ettikleri kazançları GKRY bankalarında saklamaları karşılığında, 1982 yılında bir sözleşme imzalamıştır. Mısır, GKRY ile MEB paylaşım anlaşması yapmıştır. Muhammed Mursi göreve geldiğinde, imzalanan bu anlaşma feshedilmiştir. Mursi hükümeti, bölgede doğalgaz arama çalışmaları yapılan 9. ve 12. parsellerin Mısır'a ait olduğunu ilan etmiştir. Söz konusu bölgeler, 1. ve 2. deniz hukukuna göre, Mısır'ın MEB'i içerisinde bulunmaktadır. Sisi hükümeti ise, Kıbrıs bölgesinden çıkarılan doğalgazın Mısır'daki sıvılaştırılmış gaz (LNG) terminallerinde sıvılaştırılıp tankerlerle uluslararası piyasaya satılması maksadıyla GKRY ile müzakere etmektedir. Kıbrıs bölgesinde tespit edilen gaz, adada LNG terminali yapılması için yeterli miktarda değildir. Bu yüzden, GKRY, Mısır'la anlaşarak, orada bulunan LNG terminalleri vasıtasıyla gazını satabileceği görünümü vermek istemektedir (AB Haber, 2015). Doğu Akdeniz de görüldüğü gibi rekabet artmaktadır. Türkiye'nin yakın zamanda İsrail ve Mısır ile ilişkilerinin bozulması, bölgede bulunan çok bilinmeyenli denklemde Türkiye'yi olumsuz etkilemiştir. Bu bağlamda kilit ülkeler Rusya, İngiltere ve ABD'dir. Bu nedenle konuya yönelik bu aktörlerle işbirliğinin artırılması gerekmektedir.

SONUÇ

Doğu Akdeniz, geçmişten günümüze kadar çevresindeki halkların ekonomik, iletişim, fikir ve kültürel etkileşim alanı olmuştur. Doğu Akdeniz trafik yolları ve kuzey-güney-doğu-batı enerji hattının merkezinde yer alması nedeniyle, hayati öneme sahiptir. Dünya ticaretinin önemli bir geçiş bölgesidir. Doğu Akdeniz'i kontrol etmek isteyen uluslararası güçlerin egemenliği altına girmesinin sonucunda getireceği avantajın güç dengeleri üzerinde değişikliğe yol açacağı kesindir. Doğu Akdeniz, dünyanın en önemli enerji hattı haline gelmiştir. Birçok tehlike ve zorlamalara karşı hassas bir bölge niteliğine kavuşmuştur. Özellikle, Karadeniz ve Hazar Bölgesi'nde üretilen petrolün İstanbul Boğazı ve Çanakkale Boğazı vasıtasıyla ve Bakü-Tiflis-Ceyhan petrol boru hattı aracılığıyla dünya piyasalarına aktarılması, Doğu Akdeniz'in deniz emniyet ve güvenliğini ön plana çıkarmaktadır. Bölgede yaşanan son gelişmeler Doğu Akdeniz'de güvenlik sorununu ön plana çıkarmaktadır. Bu güvenliğin oluşturulmasında Türkiye'nin Doğu Akdeniz'in güvenliğine yönelik konularda aktif ve öncü olması gerekmektedir.

Türkiye, özellikle askeri bakımdan deniz gücünü artırmalı ve Doğu Akdeniz de aleyhte oluşabilecek ittifaklara yönelik karşı ittifaklar oluşturmalı, diplomatik, ekonomik ve askeri alternatifleri de dış politika aracı olarak girift bir yöntem izlemelidir. Türkiye, dünyanın en önemli su yollarından biri olan ve alternatifi bulunmayan İstanbul Boğazı ve Çanakkale Boğazı'na sahip bulunmaktadır. Doğu Akdeniz'de de çok önemli su yolu olan Süveyş Kanalı'nı ve Doğu-Batı-Kuzey-Güney enerji hattını kontrol eder durumdadır. Bu nedenle Türkiye, Doğu Akdeniz'e ilişkin stratejik ve jeopolitik önceliklerini, deniz güvenliğine ilişkin önlem ve tedbirlerini yeniden gözden geçirmeye, reaktif politikalar geliştirerek Doğu Akdeniz'de deniz yetki alanlarını belirlemeye yönelik siyaset izlemelidir.

Geleceğin bölgesel ve küresel sorunlarının başında, Doğu Akdeniz'de özellikle Kıbrıs Adası'nın güney ve güney doğusunda bulunduğu iddia edilen zengin petrol ve doğal gaz yatakları üzerindeki çatışmaya da varması muhtemel rekabet gelecektir. En büyük sorunlardan biri de başta GKRY olmak üzere, Doğu Akdeniz'e kıyıdaş ülkelerin ikili ya da çok taraflı antlaşmalarla Türkiye'yi dışlayarak; kendi aralarında kıta sahanlığı sınırlandırması ve yer altı zenginlikleri konusunda ortak araştırmalara yönelmeleridir. Bu konu incelendiğinde, Doğu Akdeniz'de deniz yetki alanlarının sınırlandırılması konusunun öncelikli olarak ele alınması gerekmektedir. Uluslararası hukukta konuya dair ilkeler oluşmamıştır. Bu durum Türkiye'nin aleyhine kullanılmak istenmektedir. Türkiye'nin bu alandaki boşluğu lehine döndürmek üzere politikalar izlemesi gerekmektedir. Bunu da politik, diplomatik ve ekonomik araçlarla gerçekleştirebilir. BM ve Avrupa Birliği gibi aktörlerle birlikte bölgesel ve küresel güçlü aktörleri hesaba katarak tutum izlemesi yararına görünmektedir. Ayrıca bu konudaki en önemli hususlardan biri hızlı hareket etmektir. Bekle gör politikası değil aktif ve çok boyutlu dış politika izlenmesi gerekir.

Türkiye'nin Mısır, Lübnan, Suriye ve Libya gibi aktörler dışında ABD, İngiltere ve Rusya gibi sorunun tarafı olma olasılığı bulunan büyük güçlerle yakın ve iyi ilişkiler kurması ve bu ilişkileri enerji alanında da geliştirmesi çıkarınadır. GKRY ve Yunanistan ile diplomatik kanalları açık tutması da Türkiye'nin çıkarınadır. BM öncülüğünde taraflar arasında kesilen görüşmelerin Mustafa Akıncı'nın KKTC Cumhurbaşkanı olmasından sonra yeniden başlaması ve muhtemel bir Türk Rum uzlaşması ekonomik ve politik olarak sorunların çözümünden de öte çıkarlara hizmet edecektir. Dolayısıyla Türkiye'nin bu barış çabalarına olan desteğini devam ettirmesi ama aynı zamanda en kötü senaryoya yönelik hazırlıklar da yapması en uygun politik tutumdur.

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TRANS ADRİYATİK BORU HATTI PROJESİNİN STRATEJİK BEKLENTİLERİ

STRATEGIC PROSPECTS OF TRANS ADRIATIC PIPELINE PROJECT

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ÖZET

Avrupa Birliği (AB), yüksek oranda seyreden enerji tüketimine rağmen bu tüketimi tek başına karşılayabilecek yeterli enerji kaynaklarına sahip olmadığı gibi mevcut enerji kaynakları da gün geçtikçe tükenmektedir. AB ülkelerinde, özellikle son yıllarda fosil enerji kaynaklarının tüketim oranlarını incelediğimizde, petrol ve kömüre kıyasla, daha az sera gazı salınımına sebep olan doğal gazın kullanım miktarının gittikçe artığını görebiliriz.

Yüksek oranda doğal gaz talebini karşılamak için AB, çeşitli ülkelerden hem boru hatlarıyla hem de LNG formunda doğal gaz temin ediyor. Fakat doğal gaz ithal edilen ülkeler içerisinde, ana tedarikçi ülke olan Rusya, AB'nin gaz talebinin yaklaşık %40'ını tek başına karşılamaktadır. Özellikle Güney Doğu Avrupa ülkelerinde Rusya'dan ithal edilen doğal gaza bağımlılık %90'a ulaşıyor. Son dönemde yaşanan krizlerin de etkisiyle AB, Rusya'ya olan tek taraflı doğal gaz bağımlılığını aşmak, doğal gaz arz güvenliğini ve kaynak çeşitliliğinin sağlayarak daha düşük maliyetlerle doğal gaz temin etmek istemektedir. Bu bağlamda, Hazar Bölgesi enerji kaynakları, AB'nin doğal gaz arz güvenliğinin sağlanması için önemli bir alternatif olarak karşımıza çıkmaktadır. Bu kaynaklarının AB ülkelerine ulaştırılması amacıyla bazı önemli projelere imza atılmıştır. Bu projelerden birisi de Trans Adriyatik Boru Hattı (TAP) projesidir. TAP projesiyle, Türkiye-Yunanistan sınırından teslim alınacak olan Azerbaycan doğal gazı, öncelikle İtalya, Yunanistan ve Arnavutluk'a ulaştırılacak. Daha sonra Yunanistan ve İtalya üzerinden oluşturulacak ara bağlantılarla doğal gazın Doğu ve Merkez Avrupa ülkelerine ulaştırılması hedeflenmektedir.

Bu çalışmada TAP projesinin, AB'nin enerji arz güvenliğine katkısı ve hedef ülkeler açısından stratejik sonuçları analiz edilecektir.

Anahtar kelimeler: Avrupa Birliği, Doğal Gaz, Enerji Arz Güvenliği, Trans Adriyatik Boru Hattı

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ABSTRACT

European Union (EU) doesn't have enough energy sources to meet its high energy consumption on its own and its current energy sources are also coming to an end day by day. When we examine the consumption rates of fossile energy resources in EU countries especially in recent years, we can see that the amount of use of natural gas which causes less greenhouse gas emission compared to petrol and coal increases gradually.

EU gets natural gas from various countries through pipelines and in the form of LNG in order to meet high natural gas demand. However, Russia which is the main provider country in the countries from which natural gas is imported meets approximately %40 percent of EU gas demand alone. Especially in South East European countries dependency to natural gas imported from Russia reaches up to 90%.

With the effect of crisis in the last period EU wants to overcome one sided natural gas dependency to Russia and provide natural gas with lower costs by providing resource diversity and natural gas supply security.

Within this context Caspian Region energy resources come in front of us as an important alternative for providing natural gas supply security of EU. Some important projects were signed in order to transport these resources to EU countries.

One of these projects is Trans Adriatic Pipeline (TAP) Project. Azebaijan natural gas which will be received at Turkey-Greece border will be transported to Italy, Greece and Albania with TAP Project. Later on, the aim is to transport the natural gas to East and Central European Countries through interconnections to be built via Greece and Italy.

In this study, the contribution of TAP Project to energy supply safety of EU and strategical results for the target countries will be analysed.

Key Words: European Union, Natural Gas, Energy Supply Security, Trans Adriatic Pipeline

1.GİRİŞ

Trans Adriyatik Boru Hattı (TAP), Hazar Bölgesi'nden Avrupa'ya doğal gaz taşıyacak olan Güney Gaz Koridoru'nun (GGK), Avrupa kıtasında kalan kısmını oluşturmaktadır. 2012 yılına kadar Batı Nabucco ve TAP, GGK'nın Avrupa kıtasındaki bölümü olmaya aday iki farklı projeydi. Fakat Haziran 2013'de Şah Deniz Konsorsiyumu tercihini TAP'tan yana kullanmıştır. TAP'ın tercih edilmesiyle, Hazar Bölgesi doğal gazının Avrupa'ya Balkanlar yerine daha güneyden giriş yapacağı kesinleşirken, ilk aşamada boru hattından yararlanacak ülkelerin öncelikle İtalya, Yunanistan ve Arnavutluk olduğu belirlenmiş oldu. Ayrıca güzergâh ülkelere ek olarak, Hazar Bölgesi doğal gazının Güney Doğu Avrupa (GDA) ülkelerinin hizmetine sunulabilmesi için bazı projeler gündemde bulunmaktadır. Bu projelerin başında İtalya üzerinde sağlanacak ara bağlantılar, Bulgaristan-Yunanistan Ara Bağlantısı ve İyonya Adriyatik Boru Hattı bağlantısı gelmektedir. Özellikle Avrupa'daki enerji pazarlarını birleştirecek bu ara bağlantılar ile TAP'tan Bulgaristan, Bosna Hersek, Sırbistan, Makedonya, Karadağ ve Kosova gibi GDA ülkelerinin yararlanması hedeflenmektedir. Bağlantı sağlanması düşünülen bir diğer bölge ise Batı Avrupa'dır. İtalya üzerinden TAP ile diğer Avrupa doğal gaz hatları ile sağlanacak bağlantılar ile Hazar Bölgesi doğal gazının, bazı Batı Avrupa ülkelerinin de hizmetine sunulması planlanıyor.

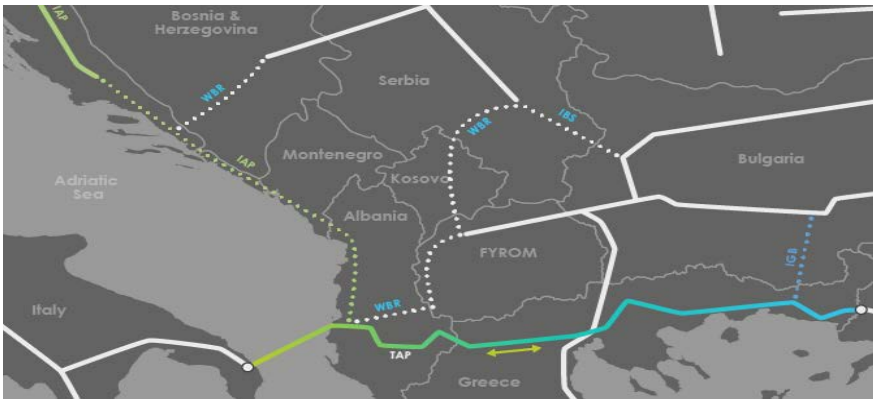
TAP, hedef ülkeler açısından birçok olumlu etkiye sahiptir. Bu kapsamda çalışmamızın ilk bölümünde TAP ile ilgili bilgiler verildikten sonra ikinci bölümde hedef ülkelerin doğal gaz talebi ve bağımlılığı değerlendirilecek olup, TAP'ın söz konusu ülkelere sağlayacağı fırsatlar üzerinde durulacaktır.

2.TRANS ADRİYATİK BORU HATTI

Statoil, BP, Fluxys, Socar, Enagas ve Axpo gibi büyük enerji firmalarının ortağı olduğu TAP, Hazar Bölgesi doğal gazını ilk aşamada, Avrupa'nın güneyine ulaştırmayı hedefleyen bir projedir. Haziran 2012'de TAP ile Şah Deniz ortakları arasında imzalanan işbirliği anlaşması sonrası, Ocak 2013'de güzergâh ülkeler olan Yunanistan, Arnavutluk ve İtalya arasında, TAP'a yönelik hükümetler arası bir anlaşma daha imzalanmıştır. Son olarak Şah deniz Konsorsiyumu Haziran 2013'de Hazar Bölgesi doğal gazını Avrupa'ya taşıyacak rota olarak TAP'ı tercih etmiştir.

Hazar Bölgesi ülkeleri arasında bulunan Azerbaycan şu anda hattın tek tedarikçisi konumundadır. GGK üzerinden geçecek olan doğal gazın belirli bir kısmının TAP'a aktarılması planlanmaktadır. İlk aşamada Azerbaycan'dan gelecek toplam 16 Milyar Metre Küp (mmk) doğal gazın, 6 mmk'sının TANAP ile Türkiye'ye bırakılması, devamında kalan 10 mmk doğal gazın da TAP ile Avrupa ülkelerine ulaştırılması hedefleniyor. Ön fizibilite çalışmaları 2003 yılında başlayan TAP'ın inşasına 2016 yılında başlanması ve ilk gaz akışının ise 2018 yılında sağlanması hedeflenmektedir.[*] (The Trans Adriatic Pipeline AG Web Site, 2015a)

Şekil-1 Trans Adriyatik Boru Hattı ve Ara Bağlantılar[†]



Toplam uzunluğu yaklaşık olarak 870 km olan TAP', TANAP'ın bitiş noktası olan Yunanistan'ın Türkiye sınırından başlayarak, Arnavutluk'un batı sınırına kadar karadan ilerleyecek ve Adriyatik Denizi geçtikten sonra, İtalya'da karaya çıkacak şekilde planlanmıştır. Kara güzergâhı dışında, deniz geçişinin de bulunduğu TAP, gelecekte beklenen doğal gaz talep artışlarını karşılamak üzere tasarlanmıştır. Yıllık 10 mmk olan boru hattın başlangıç kapasitesi, yaklaşık olarak 7 milyon hanenin enerji tüketimini

[*] The Trans Adriatic Pipeline AG Web Site (2015a). "TAP Project Milestones", http://www.tap-ag.com/the-pipeline/project-timeline/tap-project-milestones, 01.04.2015

[†] The Trans Adriatic Pipeline AG Web Site. http://www.tap-ag.com/the-pipeline/the-big-picture/strategic-partnerships

karşılayacak yeterliliktedir. Gelecekteki doğal gaz talebine bağlı olarak hattın kapasitesi, 20 mmk'ye çıkarılabilir. 2016 yılında inşasına başlanacak olan boru hattının, en önemli özelliklerinden birisi de fiziksel ters akış özelliğine sahip olmasıdır. Bu sayede İtalya'dan, GDA ülkelerine doğal gaz akışı sağlanabilecek.[*] (The Trans Adriatic Pipeline AG Web Site, 2015b) Ayrıca son dönemde hattın kapasitesiyle ilgili öne çıkan bir diğer gelişme ise, Türk Akım'ının da TAP'a dâhil olabilme ihtimalinin ortaya çıkmış olmasıdır. Bilindiği üzere, Rusya, Aralık 2014'de Güney Akım projesini iptal ettiğini duyurmuş ve Bulgaristan üzerinden AB ülkelerine sağlayacağı doğal gazı, Türkiye sınırlarından geçecek, Türk Akım'ı ile taşıyabileceğini belirtmişti. Bu gelişme sonrası, Avrupa Komisyonu'nun Enerji Genel Direktörlüğü'nde danışman Brendan Devlin, Türk Akım'ının TAP'a dâhil olmasının önünde bir siyasi ve hukuki engelin bulunmadığını ve TAP anlaşmasına göre Azerbaycan dışında başka bir tedarikçinin ortaya çıkması durumunda hattın kapasitesinin %50 oranında arttırılabileceğini belirtmiştir[†] (Gotev, 2014). Fakat henüz bu konuda taraflar arasında alınmış kesin bir karar bulunmamasına rağmen girişimlerin devam ettiğini belirtebiliriz.

Şekil-2 Trans Adriyatik Boru Hattı İtalya Ara Bağlantılar[‡]

TAP'ın tercih edilmesiyle Batı Nabucco projesi gündem dışı kalsa da, Batı Nabucco'nun hedefindeki ülkeler için Hazar Bölgesi doğal gazına erişim umutları halen devam etmektedir. Yukarıdaki Şekil-1 ve Şekil-2'de görülebileceği gibi, TAP'ın, Batı Avrupa ve GDA yönünde, mevcut ve planlanan birçok boru hattına bağlanması hedeflenmektedir.

İtalya üzerinde TAP ile Trans Avusturya Gaz Boru Hattı (Baumgarten Hub'ı) ve Transitgas Boru Hattı arasında oluşturulacak ara bağlantı ile Batı Avrupa ülkelerine Hazar Bölgesi doğal gazının ulaştırılması söz konusudur. Diğer bir girişim Adriyatik Denizi'nin kıyısında oluşturulacak olan Arnavutluk üzerinde TAP ile bağlantılı İyonya Adriyatik Boru

[*] The Trans Adriatic Pipeline AG Web Site (2015b). "TAP at A Glance", http://www.tap-ag.com/the-pipeline, 01.04.2015

[†] Gotev, D., (2015). "AB: Rusya Trans-Adriyatik Boru Hattı'nı Kullanabilir" http://www.euractiv.com.tr/enerji/article/ab-rusya-trans-adriyatik-boru-hattini-kullanabilir-031182, 01.04.2015

[‡] The Trans Adriatic Pipeline AG Web Site. http://www.tap-ag.com/the-pipeline/the-big-picture/strategic-partnerships

Hattı projesidir. Böylece Karadağ, Bosna Hersek, Hırvatistan gibi GDA ülkelerine doğal gazın ulaştırılması hedeflenmektedir. Yine Balkanlar yönünde oluşturulması planlanan bir diğer ara bağlantıyı Bulgaristan-Yunanistan Ara Bağlantı Boru Hattı oluşturmaktadır. Bunların dışında TAP ile dolaylı olarak bağlantılı olabilecek Arnavutluk-Sırbistan ve Arnavutluk-Makedonya Ara Bağlantıları gündemde bulunmaktadır[*] (The Trans Adriatic Pipeline AG Web Site, 2015c).

Hazar Bölgesi doğal gazının, GDA ülkelerine erişimini sağlayacak bu ara bağlantılar için söz konusu ülkeler arasında bazı somut girişimlerde bulunulmuştur. Bu girişimlerden birisi, Temmuz 2013'de TAP yönetimi ile Yunanistan doğal gaz taşıma sistemi operatörü olan DEFSA arasında imzalanan işbirliği anlaşmasıdır[†] (Independent Balkan News Agency, 2013). Bir diğer girişim olarak, Yunanistan-Bulgaristan ara bağlantısının sağlanması için 2014 yılında TAP AG resmi şirketi ile ICGB AD (Yunanistan-Bulgaristan Doğal Gaz Ara Bağlantısı Resmi Şirketi) arasında bir mutabakat zaptı imzalanmıştır. Planlanan ara bağlantının, yaklaşık olarak 170 km uzunluğa, yıllık 5 mmk taşıma kapasitesine sahip olması ve 2016 yılında tamamlanması hedeflenmektedir[‡] (Euractiv, 2014). Bu ara bağlantı ile Hazar Bölgesi doğal gazı Balkanlara ulaşmış olacaktır.

Söz konusu bağlantıların sağlanmasıyla, Hazar Bölgesi doğal gazını birçok AB üyesi ülkeye ulaştıracak olan TAP, sadece güzergâhındaki ülkeler olan İtalya, Yunanistan ve Arnavutluk için değil, aynı zaman da birçok GDA ülkesi için de stratejik öneme sahiptir. Fakat bu ülkeler arasında TAP'tan en fazla yararlanacak ülke hangisi olacağı sorusuna verilebilecek cevabın İtalya olması muhtemeldir. TAP'ın söz konusu ülkeler için stratejik beklentilerini değerlendirmeden önce, hedef ülkelerin mevcut doğal gaz durumunu incelememiz faydalı olacaktır.

3.TRANS ADRİYATİK BORU HATTI'NIN HEDEFİNDEKİ ÜLKELERİN DOĞAL GAZ GÖRÜNÜMÜ VE STRATEJİK BEKLENTİLERİ

Doğal gaz talebi açısından hedef ülkeler arasında bir değerlendirme yaptığımızda özellikle İtalya'nın durumunun dikkat çekici olduğunu belirtebiliriz. İtalya hedef ülkeler arasında doğal gaz üretimi gerçekleştiren sanayileşmiş bir ülkedir. 2003 yılında 12,7 mmk olan doğal gaz üretimi, on yıl boyunca azalarak, 2013 yılında 7,1 mmk seviyesine gerilemiştir. Aynı dönemde, 2008 yılına kadar artışını sürdüren doğal gaz tüketimi 2013 yılında 64,2 mmk olarak gerçekleşmiştir. 2013 yılında gerçekleştirilen tüketimde 2012 yılına göre % 6,2 oranında bir gerileme yaşanmıştır. İtalya, üretim ve tüketim miktarları arasındaki açığı boru hatları ve LNG formunda (deniz yoluyla) ithal ettiği doğal gaz ile karşılamaktadır. Tedarikçi ülkeler arasında bulunan Rusya, İtalya'nın en çok doğal gaz ithalatı gerçekleştirdiği ülkedir. 2013 yılında İtalya, Rusya'dan 24,9 mmk doğal gaz satın almıştır. Ülke geri kalan doğal gaz talebini ise, Cezayir, Libya, Katar ve Hollanda'dan karşılamaktadır[§] (British Petroleum, 2014:22,23,28).

[*] The Trans Adriatic Pipeline AG Web Site (2015c). "Stratejik Partnerships", http://www.tap-ag.com/the-pipeline/the-big-picture/strategic-partnerships, 02.04 2015

[†] Independent Balkan News Agency (2013). "TAP and DEFSA Sing Cooperation Agreement", http://www.balkaneu.com/tap-desfa-sign-cooperation-agreement/, 02.04.2015

[‡] Euractiv (2014). "Azeri gas to reach Bulgaria Through Interconnector" http://www.euractiv.com/energy/azeri-gas-reach-bulgaria-interco-news-532605 02.04.2015

[§] British Petroleum (2014), BP Statistical Review of World Energy June 2014, http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-full-report.pdf , 01.04.2015

İtalya dışında hedef ülkeler arasında yer alan Yunanistan, Arnavutluk, Bulgaristan, Bosna Hersek gibi GDA ülkelerinde ise doğal gaz tüketimi, İtalya'ya göre oldukça düşük bir orana sahiptir. Örneğin 2013 yılında bu ülkelerdeki doğal gaz tüketimi, Yunanistan'da 3,84 mmk, Bulgaristan'da 2,59 mmk, Sırbistan'da 2,52 mmk, Bosna Hersek'te 0,19 mmk ve Makedonya'da 0,16 mmk olarak gerçekleşmiştir. Aynı yıl bu ülkelerin Rusya'dan gerçekleştirdiği doğal gaz ithalatı ise talep ettikleri hacmin neredeyse tamamına yakındır[*] (Dickel, Hassanzadeh, Henderson, Honore, El-Katiri, Pirani, Rogers, Stern and Yafimava, 2014: 10). GDA ülkelerinde düşük miktardaki tüketime rağmen, doğal gaz talebinin neredeyse tamamının Rusya'dan ithal edilerek karşılanması, bu ülkelerin doğal gaz arz güvenliğini riske atan temel sorunların başında gelmektedir. Özellikle GDA ülkeleri için Rus doğal gazına erişimde transit bir ülke konumunda bulunan Ukrayna ile Rusya arasında Ocak 2009'da yaşanan sorunlar nedeniyle doğal gaz akışının kesilmesi, bölgede ciddi arz güvenliği sorunlarına neden olmuştur. Bu krizin özellikle bölgedeki ülkelerde elektrik ve merkezi ısıtma alt yapısını olumsuz etkilediğini belirtebiliriz[†](Aleksander, 2009: 18)

Ukrayna krizi ile bağlantılı olmasa da, İtalya'da son dönemde önemli enerji krizleriyle karşılaşmıştır. İtalya, Libya ve Hollanda'dan doğal gaz ithal ettiğini güzergâhlar üzerinde yaşanan olumsuzluklar nedeniyle kısa süreli doğal gaz akışı kesintileri yaşamıştır. Bunların dışında, Libya'da yaşanan iç çatışmalar nedeniyle Greenstream akımında ve İsviçre'de yaşanan toprak kayması nedeniyle Transitgas boru hattında kesintiler meydana gelmiştir. Tüm yaşanan bu krizlerinde etkisiyle, İtalya için alternatif satıcılara erişim konusunda TAP projesinin önemini artmıştır[‡] (Sileo, 2014: 85,86). Oldukça farklı ve yeni bir kaynaktan doğal gaz taşıyacak olan TAP, İtalya'nın doğal gaz ithal ettiği mevcut güzergâh ve tedarikçi ülkeleri çeşitlendirecek ve doğal gaz arz güvenliğine ciddi katkıları olacak olan somut bir proje olarak ortaya çıkmaktadır.

TAP, İtalya açısından, sadece doğal gaz arz güvenliği konusunda değil, aynı zamanda siyasi ve ekonomik açıdan da stratejik sonuçlar doğurması beklenen bir projedir. Hedef ülkeler arasında İtalya açısından ekonomik beklentilerin daha yüksek olduğunu belirtebiliriz. Hem hattın inşası süresince yapılacak alt yapı yatırımları ve sağlanacak istihdam açısından, hem de enerji fiyatları konusunda olumlu sonuçlar beklenmektedir. TAP'ın, İtalya enerji pazarına girmesiyle birlikte özellikle doğal gaz fiyatları açısından tedarikçi ülkeler arasındaki rekabetin artması ve bu rekabetin son kullanıcılar açısından önemli faydalar sağlaması beklenmektedir[§] (Magri, 2014: 136). Ayrıca, GGK'ya, Azerbaycan dışında, alternatif doğal gaz kaynağı saylayabilecek başka ülkelerinde dâhil olması durumunda, bu rekabet ortamının daha da kızışması oldukça muhtemeldir. TAP'ın İtalya için diğer bir stratejik önemi ise ülkenin enerji hub'ı rolünü güçlendirecek olmasıdır. İtalya üzerinden, TAP ile Trans Avusturya Gas ve Transitgas boru hatları arasında oluşturulacak bir ara bağlantı ile Batı Avrupa ve GDA enerji pazarları arasında bütünleşme arttırabilir. Ayrıca bu bağlantılar sayesinde Hazar Bölgesi doğal gazı Avusturya, Belçika, Almanya, Fransa ve hatta İngiltere'ye kadar ulaştırılabilir.[**]

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[*] Dickel, R., Hassanzadeh, E., Henderson, J., Honore, A., El-Katiri, L., Pirani, S., Rogers, H., Stern, J., Yafimava, K., (2014)., "Reducing European Dependence on Russian Gas, The Oxford Institute For Energy Studies,

[†] Aleksandar, K., (2009)., The Impact of The Russia-Ukranie Gas Crisis in South Eastern Europe, The Oxford Institute For Energy Studies,

[‡] Sileo, A. (2014), "The Importance of Tap Italy Some Scenarios, Caspian Report, Spring 2014, 80-91

[§] Magri, P. (2014), "The Southern Corridor Relevance For Italy", Caspian Report, Issue:06, 134-137

[**] Agienergia, (2013). "Tap: A Pipeline For Europe's Energy Future, http://www.agienergia.it/Notizia.aspx?idd=1038&id=44&ante=0, 06.04.2015

Güzergâh ülkeler için TAP'ın siyasi ve ekonomik etkisi, son dönemde yaşadığı ekonomik krizinden çıkmaya çalışan Yunanistan açısından da önemlidir. Yunanistan'ın ekonomik toparlanma sürecine önemli bir katkısı olması beklenen TAP ile 2 Milyar Euro değerinde yeni bir yatırımın ülkeye girmesi ve buna bağlı olarak ülke de istihdamın artması bekleniyor[*] (Rzayeva, 2014). Yunanistan'ın, TAP'tan, inşa süresi boyunca 320 Milyon

Euro kazanç elde etmesi ve 2.700 kişiye yeni istihdam sağlaması hedeflenmektedir. Ayrıca gelecek 50 yıl da projeden elde edilecek kazancın yaklaşık 35 Milyar Euro'yu bulacağı belirtiliyor[†] (Kömürcüler, 2013). İnşa sürecinin yakın bir zamanda başlayacak olması son dönemde mali açıdan sıkıntı içerisinde olan Yunanistan ekonomisi için bir can suyu niteliğinde olabilir.

TAP'ın stratejik etkisinin hissedileceği bir diğer ülke ise Arnavutluk'tur. Diğer ülkeler ile karşılaştırıldığımızda, Arnavutluk'un en az doğal gaz tüketimi gerçekleştiren ülke olduğunu belirtebiliriz. Düşük orandaki bu enerji tüketimine rağmen TAP projesi kapsamında Arnavutluk'a farklı roller biçilmiştir. Bunlardan birisi, TAP'ın doğal gaz depolama tesislerinin bu ülkede yapılması yönündeki planlardır. Bu depolama tesisleri, Avrupa enerji arz güvenliği açısından kritik bir öneme sahiptir. Özellikle söz konusu tesisler enerji tüketiminde, mevsimsel değişikliklere bağlı olarak, fiyat hareketliliklerine esneklik kazandırmaktadır. Arnavutluk'a biçilen bir diğer rol ise transit ülke pozisyonudur. Özellikle Balkan ve GDA ülkeleri ile TAP'ın bağlantısını sağlayabilir[‡] (Belet, 2014: 92). Bu bakımdan Arnavutluk GDA ülkeleri arasında daha önemli bir pozisyona yükselecektir. AB'nin enerji güvenliğinde oynayacağı bu roller Arnavutluk'a bölgesinde bazı siyasi avantajlar sağlayabilir. Arnavutluk AB'ye üye olmayı hedefleyen bir ülkedir ve bu yolda önemli mesafeler kat etmiştir. Son olarak 2014 yılında AB tarafından aday ülke ilan edilen Arnavutluk, Avrupa enerji güvenliğinde oynadığı bu kritik rol AB ile entegrasyon sürecinde bazı siyasi avantajlar elde edebilir. Tüm bunların yanında, İtalya ve Yunanistan'a benzer şekilde Arnavutluk'un da hattın inşası sürecinden ekonomik olarak yararlanacağını belirtebiliriz. Bu süreçte, Arnavutluk'un TAP'tan 57 Milyon Euro gelir elde etmesi beklenirken, ülkede 4.200 yeni istihdam yaratacağı tahmin edilmektedir[§](Oxford Economics, 2013).

Arnavutluk, İtalya ve Yunanistan dışında, GDA ülkelerininde inşa edilecek ara bağlantı boru hatlarıyla TAP'tan faydalanması beklenmektedir. AB üyesi ülkelerin çoğu Rusya dışında farklı ülkelerden ve güzergâhlardan doğal gaz temin edebilirken, birçok GDA ülkesinin Rusya dışında doğal gaz temin edebileceği fazlaca bir güzergâh ve satıcı ülke bulunmamaktadır. Fakat Hazar Bölgesi doğal gazını sınırlarına kadar getiren TAP, bu ülkeler için yeni bir umut olmuştur. GDA ülkeleri üzerindeki asıl etkisini, doğal gaz arz güvenliği konusunda göstermesi beklenen TAP'ın, bu kapsamda söz konusu ülkeler için Rusya'ya olan doğal gaz ithalat bağımlılığını azaltacağı düşünülmektedir. Özellikle, gelecek yıllarda, 2006 ve 2009 yılında yaşanan Rusya-Ukrayna krizlerinde olduğu gibi

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[*] Rzayeva, G. (2014), "Baku's Energy Strategy For Southeast Europe" http://www.naturalgaseurope.com/azerbaijan-energy-strategy-southeast-europe?utm_content=buffer64e17&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer, 06.04.2015

[†] Kömürcüler, G.(2013) "Italy, Greece Welcome Selection of TAP Gas Route",Hurriyet Daily News, 28 June, http://www.hurriyetdailynews.com/italy-greece-welcome-selection-of-tap-gas-%20route.aspx?pageID=238&nID=49620&NewsCatID=348, 06.04.2015

[‡] Belet, N. (2014). "The Basic Parameters of European Security of Energy Supply: The Trans Adriatic Pipeline Project-TAP-", European Journal of Research on Education, 2: 87-98

[§] Oxford Economics, (2013). "The Economic Impact of The Trans-Adriatic Pipeline On Albania, http://www.oxfordeconomics.com/Media/Default/economic-impact/economic-impact-home/Economic-Impact-trans-Adriatic-Pipeline.pdf, 06.04.2015 doğal gaz akışının kesintiye uğraması durumunda, TAP bu ülkeler için güvenilir bir doğal gaz güzergâhı olacaktır. Ayrıca, TAP'ın, bölgedeki bir diğer önemli etkisini ise, doğal gaz fiyatları üzerinde göstermesi beklenmektedir. Şu anda GDA enerji pazarında Rusya'nın tekel etkisi nedeniyle doğal gaz fiyatları oldukça yüksek seyretmektedir. Buna rağmen Hazar Bölgesi doğal gazının enerji pazarına girişiyle birlikte oluşacak rekabet ortamının doğal gaz ithalat fiyatlarını ucuzlatacağı belirtilmektedir. Doğal gaz fiyatlarının ucuzlaması sebebiyle GDA ülkeleri ekonomik olarak bir avantaj elde ederken, bölgede kömüre oranla doğal gaz kullanımının artış göstermesi beklenmektedir. Kömür ve petrole oranla daha az sera gazı salınımına sebep olan doğal gaz kullanımı oranındaki artış, GDA ülkelerinin daha temiz bir çevreye sahip olmasını sağlayacaktır[*] (Akhundzada, 2015). GDA'da, henüz AB üyesi olmayan veya aday ülke konumun da bulunan ülkeler yer almaktadır. Doğal gaz kullanımının artışıyla birlikte çevre korunmasına yönelik sağlanacak ilerlemeler ve iyileştirmeler, gelecekte söz konusu ülkelerin AB ile entegrasyon sürecinde çevre konusundaki müzakereleri kolaylaştıracaktır.

4.SONUÇ

Güney Akım projesinin Rusya tarafından iptal edilmesi ve son dönemde Ukrayna ve Rusya arasında yaşanan savaş, Avrupa enerji arz güvenliği bağlamında birçok AB üyesi ülkeyi tedirgin etse de, asıl etkisini, doğal gaz talebinin neredeyse tamamına yakını Rusya'dan karşılayan GDA ülkeleri üzerinde hissettirmektedir. Bu aşamada alternatif bir kaynak niteliğinde olan Azerbaycan doğal gazını Avrupa kıtasına taşıyacak olan TAP'ın İtalya, Yunanistan ve diğer GDA ülkeleri için hayati bir öneme sahip olduğunu belirtebiliriz. Fakat bu noktada güzergâh ülkelerin dışında GDA ülkelerinin TAP ile bağlantısını sağlayacak ara bağlantı boru hatlarının inşa edilmesi oldukça önemlidir. TAP'ın inşa aşamasında, özellikle güzergâh ülkeler olan İtalya, Yunanistan ve Arnavutluk'u ekonomik gelir elde etmesi beklenmektedir. TAP'ın bir diğer etkisi de, söz konusu ülkelere transit veya hub ülke olabilme fırsatını sunmasıdır. Yine de TAP'ın ekonomik ve siyasi olarak asıl etkisinin ise, doğal gaz tüketim oranı diğer ülkelere göre oldukça yüksek olan İtalya üzerinde göstermesi beklenmektedir. İtalya üzerinden, diğer Avrupa doğal gaz boru hatlarıyla sağlanacak bağlantılar sayesinde Batı Avrupa enerji pazarları satıcı ve kaynak ülkeler açısından çeşitlenecektir. Sonuç olarak, planlanan ara bağlantıların sağlanmasıyla TAP'ın etkisinin tüm Avrupa'da hissedileceğini belirtebiliriz. Fakat bu etkinin sağlanabilmesi için altını çizmemiz gereken önemli bir nokta daha bulunmaktadır. Şu anda GGK için tek tedarikçi ülkenin, sınırlı doğal gaz üretim kapasitesiyle Azerbaycan olduğu gerçeği unutulmamalıdır. GGK'nın ve dolayısı ile gelecek de Almanya ve Fransa gibi Batı Avrupa ülkelerine doğal gaz ulaştırmayı hedefleyen TAP'ın, tedarikçi ülke açısından mutlak suretle çeşitlendirilmesi ve kapasitesinin arttırılması gerekmektedir. Bu konuda özellikle Hazar Bölgesi'nde ve Türkiye'nin çevresinde yer alan doğal gaz rezervleri açısından zengin diğer ülkelerin GGK'ya dâhil olması sağlanmalıdır. Kaynak çeşitliliği ve kapasite olarak zenginleşen TAP, hedef ülkeler açısından stratejik beklentileri de artacaktır. Bu etkinin özellikle Rusya'nın tekelinin kırılmasında ve Avrupa doğal gaz pazarındaki ithalat fiyatları açısından görüleceği ve buna bağlantılı olarak ülke ekonomileri üzerinde olumlu etkisi olacağını belirtebiliriz.

[*] Akhundzada, E. (2015). "Energy Security in South East Europe: Role of The Southern Gas Corridor", Caspian Strategy Institute

DEĞİŞEN DOĞU AKDENİZ DENKLEMİNDE MISIR'IN HİDROKARBON POLİTİĞİ VE TÜRKİYE'YE YANSIMALARI

CHANGING BALANCES IN EASTERN MEDITERRANEAN:HYDROCARBON POLICY OF EGYPT AND REPERCUSSIONS ON TURKEY

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ÖZET

Yaptığı darbeyle yönetime gelen Abdülfettâh el-Sîsî, Mısır'ın Doğu Akdeniz politikalarını etkileyen aktörlerden birisi olarak ortaya çıkmıştır. Bu bağlamda ülkesini enerji dağıtım merkezi haline getirmek ve artan iç talebi karşılamak isteyen Mısır yönetimi, İsrail'in Tamar ve Leviathan sahalarından üretilecek olan doğalgazı ülkesine taşıyabilmek ve burada bulunan sıvılaştırma tesislerinden uluslararası piyasalara arz edebilmek için İsrail'le görüşmelere başlamıştır. Ayrıca, GKRY'nin, Doğu Akdeniz'de keşfettiği doğalgazı Mısır üzerinden uluslararası piyasalara aktarması ihtimali belirmiştir. Bunun bir sonucu olarak Doğu Akdeniz'de İsrail-GKRY-Yunanistan arasındaki yakınlaşmanın benzeri Mısır-GKRY-Yunanistan arasında da ortaya çıkmış ve bu devletler Türkiye'nin bölgedeki çalışmalarını durdurmak ve aralarındaki Münhasır Ekonomik Bölge (MEB) alanlarının yeniden belirlenmesini sağlamak hususunda görüşmelere başlamışlardır.

Mısır'ın Doğu Akdeniz politikalarının başarıya ulaşması halinde, Türkiye'nin Doğu Akdeniz'deki çıkarları ciddi bir şekilde zedeleneceği düşünülmektedir. Mısır-GKRY-Yunanistan'ın MEB alanlarını yeniden belirlenmesi, Türkiye'nin bölgede dar bir alana sıkışmasına neden olacaktır. Bölgede çıkarılacak karbon kaynaklarının Mısır üzerinden uluslararası piyasalara arz edilmesi, 'tedarikçi ülke' sayısını artırmak ve enerji koridoru olmak isteyen Türkiye'nin enerji politiği açısından ciddi bir tehdit oluşturacaktır. Ayrıca enerji politiğinin birbirine yakınlaştıracağı Mısır-İsrail-Yunanistan-GKRY arasında kurulacak enerji ittifakı, Türkiye'nin güney sarmalı üzerinde ciddi bir askerî, siyasî, ekonomik vb. hususlarda tehdit oluşturabilecek boyuttadır.

Anahtar Kelimeler: Doğu Akdeniz, Mısır, Türkiye, Kıbrıs, Hidrokarbon Kaynakları.

ABSTRACT

Rising to power with a coup, Aldulfettah El-Sisi is now one of the many who have an influence on Eastern Mediterranean politics of Egypt. In this basis, desiring for becoming an energy hub and meeting the increasing domestic demand, Egyptian government have started negotiations with Tel-Aviv in order to transfer the natural gas extracted in Tamar and Leviathan fields into home and utilizing the liquefaction plants there supply the natural gas to the international market.Furthermore, there is now another option that after research, Greek Cypriot Administration of Southern Cyprus supplies the natural gas liquefacted to the markets via Egypt.As a clear result of this, there is a convergence between Israel- Greek Cypriot Administration of Southern Cyprus-Greece.

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Similarly, Egypt- Greek Cypriot Administration of Southern Cyprus-Greece has converged and they started negotiations in order to prevent Turkey's activities in the region and redefining their EEZ.

Obviously, provided that Egypt becomes successful in her Eastern Mediterranean policies, Turkey's interest in the region will be seriously harmed. The redefinition of EEZ of Egypt-Greek Cypriot Administration of Southern Cyprus-Greece in the region will lead Turkey to be constrained into a narrow area. Supplying the carbon resources via Egypt will highly likely threaten Turkey's energy politics which wants to increase the number of supplier countries and become an energy corridor. Along with that, having converged over an energy politics, a future energy alliance of Egypt-Greek Cypriot Administration of Southern Cyprus-Greece could pose a serious threat for Turkey's south in terms of military, political and economic issues.

Key Words: Eastern Mediterranean, Egypt, Turkey, Cyprus, Hydrocarbon Resources.

GİRİŞ

Bu çalışmada, Arap Baharı ve sonrasında yaşananlarla uluslararası kamuoyunun önemli gündem maddelerinden biri haline gelen Mısır'ın, keşfedilen hidrokarbon kaynaklarıyla önemi artan Doğu Akdeniz ve buna bağlı olarak gelişen Münhasır Ekonomik Bölge (MEB) ve enerji politikalarına ve Mısır'ın bu politikaların bölgeye muhtemel etkilerinin neler olabileceğine bakılmıştır. Bu bağlamda gerçekleştirdiği darbe ile yönetime gelen Abdülfettâh el-Sîsî'nin izlediği politika da Mısır özelinde irdelenmiştir.

Asya, Avrupa ve Afrika kıtaları arasında yer alan, bulunduğu konum gereği medeniyetleri buluşturan/ayrıştıran, uluslararası ticaretin önemli geçiş güzergâhlarından bir olup enerji zengini Ortadoğu bölgesine komşu olan Doğu Akdeniz'in önemi, son dönemde gerçekleşen enerji keşifleriyle oldukça artmıştır. Bu bağlamda özellikle İsrail'in 2009 ve 2010 yılında keşfettiği kaynakları hangi güzergâh üzerinden uluslararası piyasaya arz edeceği, GKRY'nin "*bütün Kıbrıs*" adına devam eden hidrokarbon kaynağı arayışları, GKRY'nin bu faaliyetlerine tepki gösteren Türkiye'nin bölgede artan arama faaliyetleri ve oluşan yeni ittifaklar/eksenler Doğu Akdeniz'de devletlerarası gerilimin artmasına neden olmuştur.

Hiç kuşku yok ki Mısır, Doğu Akdeniz'in önemli aktörlerinden biri olmasının yanı sıra bölgenin ve dünyanın en köklü medeniyetlerinden biridir. XVI. yüzyılın ilk yarısından XIX. yüzyılın son çeyreğine kadar Osmanlı egemenliği altında bulunan ve Süveyş Kanalı'nın açılmasıyla birlikte uluslararası ticarette ve ulaşımda önemi artan Mısır, bu bölgeyi kontrol ederek küresel boyuttaki pozisyonunu kuvvetlendirmek isteyen İngiltere tarafından 1882 yılında 'geçici olarak işgal' edilmiştir. 1914 yılına kadar 'işgalin geçici' olduğunu birçok defa dile getiren İngiltere, Birinci Dünya Savaşı'nın başlamasıyla birlikte Mısır'ın özgürlüğünü bahane ederek bu ülkeyi resmen kendi himayesine almıştır (Fromkin, 2008:347). Fakat İngilizler, savaştan galip çıkmalarına rağmen Mısırlılara bağımsızlık tanımadığı gibi, toplumun önde gelen isimlerini Malta'ya sürmüştür. Bu durum Mısır'da kuvvetli olan milliyetçi duyguların daha da artmasına neden olmuştur. Netice itibariyle İngiltere, 1922 yılında Mısır'a görece olsa da bağımsızlık tanıyan bir antlaşmayı imzalamak zorunda kalmıştır.[*]

[*] Mısır, her ne kadar 1922 yılında İngiltere'den resmi olarak bağımsızlığını almış olsa da imzaladığı anlaşmayla egemenlik haklarını oldukça kısıtlamıştır. Zira yapılan anlaşmada İngiltere, Mısır'ın iletişim güvenliğini sağlayarak, Mısır'ın başka bir devlet tarafından saldırıya uğraması halinde bu devleti savunacağını

1922–1952 yılları arasında kademeli olarak ülkesi üzerindeki egemenliğini sağlayan Mısır, bu tarihe kadar meşrutî monarşiyle yönetilmiştir. Fakat bu süreç içerisinde yaşanan politik ve ekonomik sıkıntılar, toplumdaki huzursuzluğun ciddi bir şekilde artmasına neden olmuştur. Ayrıca İkinci Dünya Savaşı sırasında İngilizlerin Mısır'daki varlığı ve 1948 yılında patlak veren İsrail savaşında alınan yenilgi, ülkedeki milliyetçiliğin yükselmesine ve 1952 yılında Cemal Abdülnasır'ın – resmi olarak 1956'da – devlet başkanlığına geleceği *Hür Subaylar* grubunun darbe yapmasına yol açmıştır. Darbeyle birlikte Mısır'da cumhuriyet ilan edilmiş ve ülke Arap Baharı'yla Hüsnü Mübarek'in iktidarını kaybettiği 2011 yılına kadar otoriter bir rejimle yönetilmiştir. Bu süre zarfında Mısır, Arap Dünyası'nın liderliğini elde edebilmek ve "*Üçüncü Dünya Ülkeleri*" arasında etkin konuma gelebilmek için çaba göstermiş, İsrail'le yapılan savaşlarda başrolde bulunmuş, buna karşın İsrail'le barış anlaşması imzalayan ilk Arap devleti olmuştur.

1980 sonrası dönemde ise Hüsnü Mübarek'in yönetimindeki Kahire, genel olarak ABD ve Batı'yla paralel politikalar izlemiş ve Ortadoğu'nun en önemli aktörlerinden birisi haline gelmiştir. Bununla birlikte Ortadoğu'nun dinamiklerini harekete geçiren Arap Baharı, Mısır'da Mübarek rejimini sona erdiren olaylarla neticelenmiştir. Mübarek'in yerine ise 2012'de ilk defa halk tarafından seçilen Muhammed Mursî gelmiş, fakat ülke içerisindeki siyasî krizi gerekçe gösteren Genelkurmay Başkanı Abdülfettâh el-Sîsî'nin yönetimindeki Mısır ordusunun 2013 yılında gerçekleştirdiği darbe ile iktidarını kaybetmiştir. Geçici rejimin akabinde 2014 yılında yapılan cumhurbaşkanlığı seçimiyle Sîsî, Mısır'ın yeni cumhurbaşkanı olarak görevini sürdürmektedir.

Siyasi olarak hareketli yıllar geçiren Mısır enerji konusunda da dinamik politikalar izlemiş ve izlemeye devam etmektedir. Gerek Akdeniz kıyısındaki Nil Deltası'nda, gerekse Süveyş Bölgesi ve ülkenin çöllük alanlarında doğalgaz ve petrol üretimine geçen Mısır, Akdeniz'in zenginliklerinden de istifade etmek için harekete geçmiştir. Bu çerçevede Akdeniz'in çeşitli bölgelerinde arama ruhsatı çıkaran Mısır yönetimi, bölgede MEB'in belirlenmesi için oldukça aktif politika izleyen GKRY ile 2003 yılında MEB antlaşması imzalamıştır. Bunun yanı sıra Yunanistan'ın da Mısır'la MEB anlaşması yapabileceği ihtimali ortaya çıkmıştır. Fakat söz konusu anlaşma Türkiye'nin yoğun girişimleri neticesinde hayata geçmediği gibi Mısır ve GKRY'nin MEB anlaşması daMursî döneminde iptal edilmiştir.

Sîsî'nin gerçekleştirdiği darbe ve akabinde cumhurbaşkanı olması, Mısır'ın Doğu Akdeniz politikasını önemli ölçüde etkileyip değiştirmiştir. Bu bağlamda ülkesini enerji dağıtım merkezi haline getirmeyi ve artan iç talebi karşılamayı isteyen Mısır, 2012 yılında doğalgaz ihracatını durdurduğu İsrail'in Tamar ve Leviathan sahalarında üretilecek olan kaynağı, ülkesine taşıyabilmek ve ülkesinde bulunan sıvılaştırma tesislerinden uluslararası piyasalara arz etmek için Tel-Aviv ile görüşmelere başlamıştır. Ayrıca GKRY Enerji Bakanı ile yapılan görüşme neticesinde Mısır'ın, "*Kıbrıs gazını*" ülkesine taşıması ihtimali de ortaya çıkmıştır. Bunun yanı sıra Doğu Akdeniz'de İsrail-GKRY-Yunanistan arasındaki yakınlaşmanın bir benzeri, Mısır-GKRY-Yunanistan arasında da ortaya çıkmıştır. Bu bağlamda Sîsî, Yunanistan Başbakanı Samaras ve GKRY Başkanı Anastasiadis, Kasım 2014'te Kahire'de bir araya gelerek işbirliği yapmışlar ve Türkiye'nin bölgedeki çalışmalarını durdurma ve taraflar arasındaki MEB'in belirlenmesi hususunda görüşmelerin başlatılmasına karar vermişlerdir.

belirtmiştir. Bununla birlikte 1936 yılında imzalanan anlaşma ile İngiltere, yalnızca Süveyş Kanalı etrafında asker bulundurmayı ve Mısır'ın dışarıdan saldırıya uğraması halinde bu devleti korumayı Kahire'ye kabul ettirmiş ve böylece Mısır bağımsızlık yolunda önemli bir adım atmıştır. 1956 yılında ise Süveyş Krizi'nin akabinde Cemal Abdülnasır'ın İngilizleri Mısır'dan çıkarması ile devlet tam anlamıyla bağımsızlığa kavuşmuştur. Detaylı bilgi için bkz… William Cleveland, **Modern Ortadoğu Tarihi**, (Çev.) Mehmet Harmancı, Agora Kitaplığı, İstanbul, 2008.

Enerjiyi dış politika unsuru olarak kullanan ve mevcut politikalarını gerçekleştirmeleri halinde başarıya ulaşması muhtemel bu aktörlerin, bölgenin önemli aktörlerinden biri olan Türkiye'nin Doğu Akdeniz'deki çıkarlarına ciddi bir şekilde darbe vuracağı aşikârdır. Her şeyden önce Mısır-GKRY-Yunanistan arasında MEB'in belirlenmesi, Doğu Akdeniz'de en geniş kıyıya sahip olan Türkiye'nin dar bir su alanına sıkışmasına neden olacaktır. Bunun yanı sıra bölgede çıkarılacak kaynakların Mısır üzerinden uluslararası piyasalara arz edilmesi, enerji koridoru olmak isteyen Türkiye'nin güneyinde kendisine rakip bir güzergâhın ortaya çıkmasına sebep olacağı gibi, enerji tedarik ettiği ülke sayısını artırmak isteyen Türkiye'nin, hemen yakınındaki enerji kaynaklarından mahrum kalmasıyla da sonuçlanabilecektir. Bunun yanı sıra enerji paradigmasının birbirine yakınlaştırması muhtemel olan Mısır-İsrail-Yunanistan-GKRY bloğunun kurabileceği askerî bir ittifakın, Türkiye'nin güney bölgeleri üzerinde ciddi bir tehdit oluşturacağı muhakkaktır.

Buna göre çalışma, iki bölümden oluşmaktadır. Birinci bölümde bağımsızlığından Arap Baharı'na kadar olan süreçte Mısır'ın enerji politikaları değerlendirilmiştir. İkinci bölümde Arap Baharı'yla yaşanan dönüşümün Mısır'ın enerji politikalarına etkisi ve Abdülfettâh el-Sîsî'nin izlediği enerji politikasının Doğu Akdeniz'deki yansımaları ele alınmıştır. Sonuç bölümünde ise Sîsî'nin izlediği politikaların Doğu Akdeniz'de neden olacağı muhtemel etkiler ve bu etkilerin Türkiye'ye yansımaları irdelenmiş, Türkiye'nin izlemesi gereken politikalara dair önermelerde bulunulmuştur.

1. KURULUŞUNDAN ARAP BAHARI'NA MISIR'IN ENERJİ POLİTİKASI VE DOĞU AKDENİZ POLİTİĞİNE ARTAN İLGİSİ

Uluslararası ticaret, ulaşım ve hidrokarbon kaynakları başta olmak üzere taşımacılık açısından önemli suyollarından biri olan Süveyş Kanalı'nı sınırları içinde bulunduran, İsrail-Filistin meselesinde izlediği politikalarla Arap halklarının takdirini kazanan veya tepkisini çeken[*] ve bölgeyi etkileyebilme kapasitesine sahip devletlerinden biri olan Mısır, aynı zamanda bir Doğu Akdeniz ülkesidir. Bu yönü ile Mısır, 522 millik kıyı şeridi ile Doğu Akdeniz'de en uzun ikinci kıyı şeridine sahip ülke konumundadır (Yıldız ve Yaşar, 2012: 47). Bölgenin diğer devletleri gibi Mısır da 1958 yılında aldığı bir kararla Doğu Akdeniz sahillerinde 12 millik karasuları rejimini uygulamaya başlamıştır (BM, 2015a). Bunun yanı sıra Kahire, Doğu Akdeniz'de 200 metre veya işletilebilir derinliğe kadar olan bölgeyi, kıta sahanlığı olarak belirlemiş (BM, 2015b) ve 1990 yılında aldığı yeni bir kararla düz esas hatlarını tespit etmiştir (BM, 2015c). Ayrıca Mısır, 1982 Birleşmiş Milletler Deniz Hukuku Sözleşmesi'ni imzalamış ve diğer devletlerin hak ve yükümlülüklerine saygı göstererek, Akdeniz ve Kızıldeniz'de MEB haklarını kullanacağını ilan etmiştir (Başeren, 2011:18).

Deklare ettiği belgelerle egemenlik alanlarından maksimum şekilde faydalanacağını ifade eden Kahire, günümüzde Afrika kıtasının OPEC'e üye olmayan petrol üreten ülkeler arasında 4.4 milyar varil ispatlanmış rezervleriyle en geniş petrol rezervine sahip ülke konumundadır (EIA, 2014). Ayrıca 2013 Ocak ayı verilerine göre sahip olduğu 77,197 tcf (trilyon ayak küp) kanıtlanmış doğalgaz rezervi ile dünyanın 16. ve Afrika kıtasının ise 3. en geniş doğalgaz rezervine sahip ülkesidir (CIA, 2013). Günümüzde hidrokarbon rezervleri açısından dünyanın önde gelen ülkelerinden biri konumunda olan Mısır'ın bu noktaya stratejik planlamalarıyla geldiği düşünülmektedir.

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[*] 1948-1973 arası dönemde izlediği İsrail politikasıyla Arap halklarının desteğini kazanan Mısır, 1978 Camp David ve 1979 İsrail-Mısır Barış Antlaşmaları ile Arap devletlerinin ve halkının şiddetli tepkisine maruz kalmıştır.

Mısır'da ilk petrol 1886 Belçikalı M. de Bay ve M. Barois tarafından Süveyş Kanalı'nın güneyinde Kızıldeniz kıyılarında yer alan RasGemsah'ta keşfedilmiş ve işletmeye açılan kuyulardan, günde 10 varil petrol üretimi gerçekleştirilmiştir (Algarhi, 2015: 3). İki yıl süren çalışmalar, Mısır yönetiminin artan borçlarını ödeyememesi nedeniyle 1888 sonlandırılmış, ancak 1911 yılında Mısır'ın ilk rafinerisinin yapılmasıyla petrol üretimi yeniden başlamıştır (Middle East ReservoirReview, 2000: 22). Petrol üretiminin yanı sıra doğalgaz üretimi de 1930'lu yıllarda başlamış ve *Hür Subaylar*'ın darbe yaptığı 1952 yılına kadar çok sayıda uluslararası şirket Mısır'da etkinlik göstermiştir.

Hür Subaylar darbesinden kısa bir süre sonra Nasır iktidara gelmiş ve Kahire yönetimi hidrokarbon kaynaklarının üretimini millî şirketlerle gerçekleştirmeye başlamıştır. Bu karar çerçevesinde Mısır'da 1962 yılında ilk milli petrol şirketi kurulmuş ve bu kuruluşun yaptığı çalışmalarla Süveyş Bölgesi'nin, Mısır'ın petrol üretim merkezi haline gelmesi sağlanmıştır. Bununla birlikte ilerleyen süreç içerisinde Kahire, uluslararası şirketlerle ortak projeler gerçekleştirmiş ve yapılan çalışmalar neticesinde 1953–1970 yılları arasında ciddi başarılar elde etmiştir. Özellikle Mısır'ın Süveyş havzasında *Belayim* ve *El Morgan*gibi iki büyük petrol üretim sahasında yeni petrol keşifleri yapılmıştır (Middle East ReservoirReview, 2000: 25).

Mısır'ın petrol üretim sahalarını genişletme çabaları, 1970–2000 yılları arasında da devam etmiştir. Bu çerçevede 1977 yılında ülkenin en büyük üçüncü sahası olan October sahası keşfedilmiştir. 1997 yılında Batı Çöl Bölgesi'nde yaklaşık 100 milyon varil petrol rezervine rastlanmıştır. Yapılan keşifler sonucunda Kahire petrol üretiminin yaklaşık %70'ini Süveyş'ten, %16'sını Batı Çöl Bölgesi'nden ve kalan %14'lük kısmı Doğu Çöl Bölgesi ve Sina Yarımadası'ndan gerçekleştirmeye başlamıştır (Middle East ReservoirReview, 2000: 25).Böylece Mısır, 1990'lı yıllardan itibaren günlük 900 bin varilin üzerinde petrol üretme kapasitesine ulaşmıştır (Brown, 2013: 140).

Mısır, petrol üretiminin yanı sıra doğalgaz üretimini de artırmak için çaba harcamıştır. Bu bağlamda 1975 yılında Akdeniz kıyısındaki Nil Deltası'nda yer alan Abu Madi sahasında önemli miktarlarda doğalgaz keşfi gerçekleştirmiştir (EGAS, 2015). Özellikle 1990'lı yıllarda Nil Deltası'ndaki Badreddin ve Abu Qir sahalarının da üretime geçmesiyle birlikte Kahire, doğalgaz üretiminin yaklaşık yarısını bu sahalardan gerçekleştirmeye başlamıştır (Middle East Reservoir Review, 2000: 25). Netice itibariyle Kahire, 1993 yılında 15 tcf olan kanıtlanmış rezervlerini 1999 yılından itibaren 31,5 tcf'ye yükseltmiştir (Middle East ReservoirReview, 2000: 26).

2000'li yılların başından itibaren Kahire yönetimi, enerji çalışmalarını arttırarak devam etmiştir. Bu çerçevede 1999 yılında Shell, BP-Amoco, ElfAquitaine ve ENI-Agip şirketleri, Mısır'ın Akdeniz sularında araştırma yapma hakkını elde etmişlerdir (Middle East ReservoirReview, 2000: 26). 2001 yılındaysa Mısır, Libya sınırına yakın 32 sahada arama yapma ruhsatı vermiştir. 2005 yılında NEMED adıyla isimlendirilecek olan ve Nil Deltası'nda olan sahada yaklaşık 1.5 tcf doğalgaz keşfi gerçekleştirmiştir (Gürel vd., 2013: 1). Yapılan çalışmalar neticesinde 1999–2010 yılları arasında toplam 427 keşif gerçekleştirilmiş (Suding, 2011: 4432) ve ülkenin kanıtlanmış doğalgaz rezervleri Ocak 2011 itibariyle 77,198 tcf'yeyükselmiştir (Gürel vd., 2013: 7).

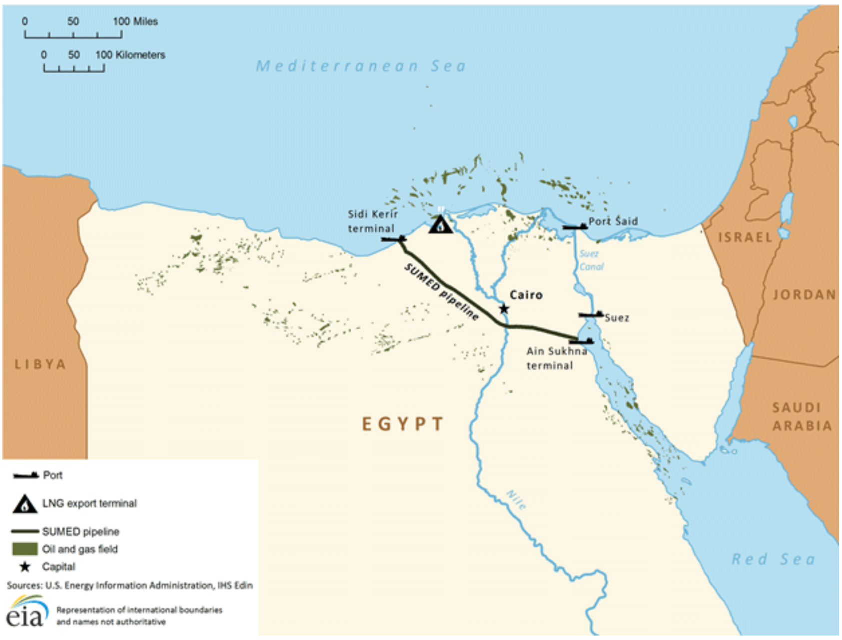
Harita 1: Mısır'ın Petrol ve Doğalgaz Üretim Sahaları

Kaynak: Mısır Petrol Bakanlığı

Yaptığı keşiflerin yanı sıra Mısır, keşfettiği kaynakları uluslararası piyasalara arz etmeye çalışmaktadır. Bu bağlamda 2010 yılı verilerine göre Mısır, günlük 85.000 varil ham petrol arzı ile dünya genelinde 40. sırada yer almaktadır. Doğalgaz ihracı ise 2011 verilerine göre 371 bcf (milyar ayak küp) olarak gerçekleşmiş ve dünyada 23. sırayı elde etmiştir (CIA, 2015). Kahire, ürettiği petrolün bir kısmını 1975 *İkinci Ayırma Antlaşması*, 1978 *Camp David Antlaşmaları* ve 1978 *İsrail-Mısır Barış Antlaşması*'nın bir sonucu olarak İsrail'e satmaya başlamıştır (Armaoğlu, 1991).* 2013 yılı verilerine göre İsrail'in yanı sıra ham petrol ihracının %56'sı Avrupa Birliği ülkelerine, %28'i Hindistan'a ve %13'ü Çin'e gerçekleştirilmiştir (EIA, 2014: 5). Kahire 2013 verilerine göre de ihraç ettiği doğalgazın önemli bir kısmını, Arap Doğalgaz Boru Hattı ile Ürdün'e ve İsrail'e satmıştır. Bunun yanı sıra sıvılaştırdığı doğalgazın %82'sini Asya ülkelerine (Güney Kore, Japonya, Çin, Hindistan ve Tayvan) ihraç etmiştir. Kalan %18'lik kısmını ise Avrupa'ya sattığı bilinmektedir (EIA, 2014: 11)

*Mısır yönetimi, 1975 *İkinci Ayırma Antlaşması*'na göre İsrail'e yıllık 4.5 milyon varil petrol satmayı kabul etmiştir. Detaylı bilgi için bkz… Fahir Armaoğlu, **Filistin Meselesi ve Arap-İsrail Savaşları 1948-1988**, İkinci Baskı, Türkiye İş Bankası Kültür Yayınları, Ankara, 1991.

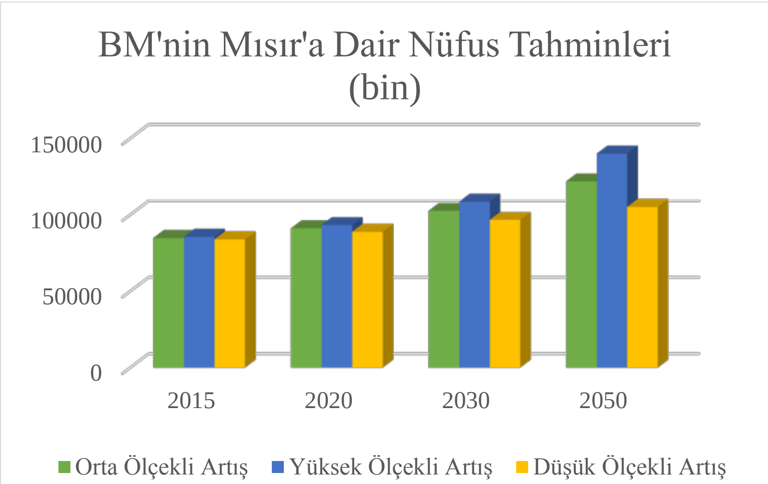
Harita 2: Mısır'ın Boru Hatları ve Sıvılaştırma Tesisleri



Kaynak: EIA

Mısır, her ne kadar sahip olduğu rezervler açısından dikkat çekse de hidrokarbon kaynaklarının uluslararası piyasalara arz edilmesi açısından ciddi bir sorunla karşılaşmaktadır. Zira Afrika'nın en kalabalık 3. ülkesi olan Mısır'ın nüfusu hızla artmakta ve buna bağlı olarak artan nüfusun elektrik, ısınma, ulaşım vb. alanlarda enerji talebi hızla yükselmektedir. Birleşmiş Milletler'in orta ölçekli nüfus projeksiyonuna göre ülkenin 2015 yılında nüfusu 84.706.000'ken 2020'de 91.062.000'ye, 2050'de ise 121.798.000'e çıkacaktır

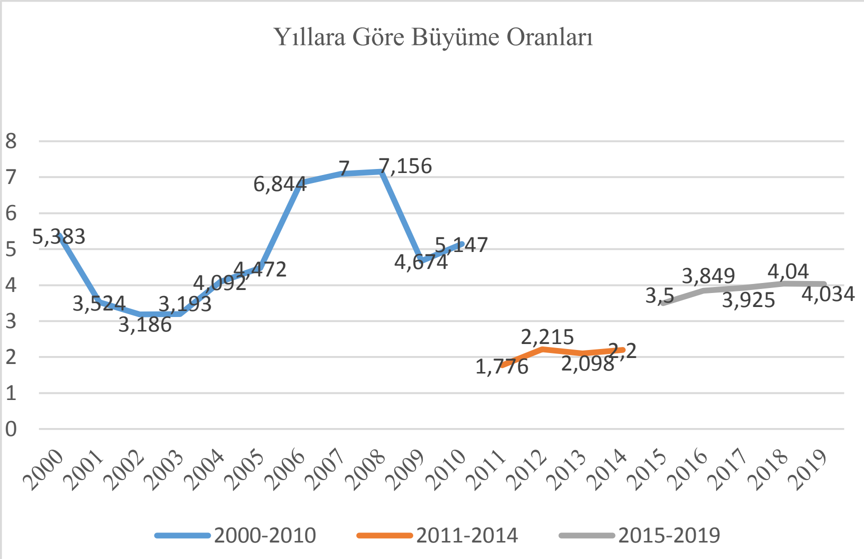
Grafik 1: BM'nin Mısır Nüfus Projeksiyonu



Kaynak: UNDP, 2015.

Nüfus artışına paralel olarak ülkenin gayri safi millî hasılası da 2000–2010 yılları arasında %3'ün üzerinde büyümüştür. Bununla birlikte Arap Baharı süreci nedeniyle 2011 yılında %3'ün altına düşen büyüme oranı, IMF'nin tahminlerine göre 2015 yılından itibaren yeniden %3'ün üzerine çıkacaktır. Ülkede yaşanması beklenen büyümeyle birlikte enerjiye olan talep de artacaktır.

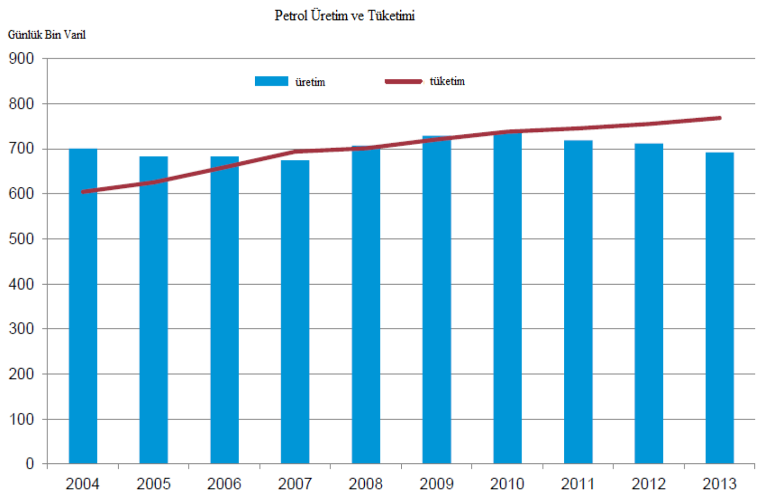
Grafik 2: IMF Verilerine Göre Mısır'ın Yıllık Büyüme Oranları



Kaynak: IMF, 2015.

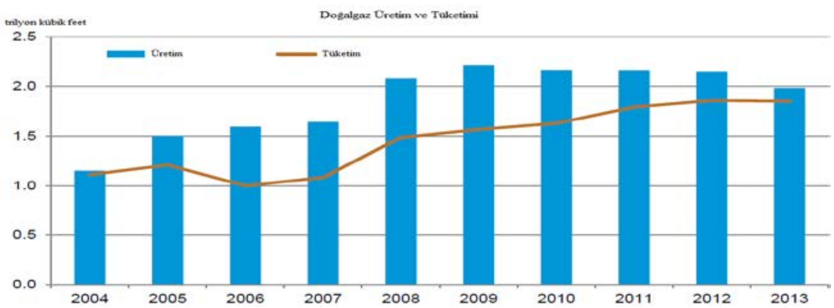
Mısır'ın, gerek nüfus artışına, gerekse ekonomik büyümeye bağlı olarak ortaya çıkan enerji talebini karşılayamadığı ortadadır. Bu durum, ülkenin ihtiyaç duyduğu elektriğin %90'ının petrol (%20) ve doğalgazdan (%70) karşılamasına neden olmuştur. Dolayısıyla Mısır'da elektrik üretim maliyetlerinin yükselmesine ve buna bağlı olarak 2000 yılında %2,8 olan enflasyonun 2010 yılında %11,6'ya çıkmasına yol açmıştır (IMF, 2015a). Artan fiyatların yanı sıra ifade edilen dönemde işsizlik oranının da ortalama %9'un üzerinde olmuş (IMF, 2015b) ve yönetimdeki yolsuzluklar/yozlaşmalarda ortaya çıkmıştır. Dolayısıyla Tunus'ta patlak veren Arap Baharı Mısır'da, ifade edilen sıkıntıların da etkisiyle Hüsnü Mübarek'in 30 yıllık iktidarını kaybetmesiyle ve ülkede yapılan ilk demokratik seçimlerde Muhammed Mursî'nin cumhurbaşkanı seçilmesiyle sonuçlanmıştır (2012). Ancak Mursî'nin izlediği politikaların tasvip edilmemesi ve ekonomik sıkıntıların çözümlenememesiyle başlayan kitle hareketleri, Temmuz 2013'te Abdülfettâh el-Sîsî'nin liderliğindeki ordunun darbe yapmasıyla yeni bir boyut kazanmıştır. Ardından 2014 yılında yapılan cumhurbaşkanlığı seçimlerinde Sîsî, Mısır'ın yeni cumhurbaşkanı olarak göreve başlamıştır.

Grafik 3: Mısır'ın Petrol Üretimi ve Tüketimi



Kaynak: EIA, 2014: 5

Grafik 4: Mısır'ın Doğalgaz Üretimi ve Tüketimi



Kaynak: EIA, 2014: 9

Abülfettah el-Sîsî'nin cumhurbaşkanı olmasıyla birlikte Kahire enerji politikalarını da gözden geçirmeye başlamış ve yeni arayışlar içerisine girmeyi tercih etmiştir. Her ne kadar Sîsî, gerçekleştirdiği darbeyle Mursî'yi iktidardan indirmişse de Mursî'nin iktidarı döneminde izlediği enerji politikalarını aynen sürdürmüştür. Bu minvalde temelleri Mübarek döneminde atılan nükleer enerji tasarısı, Mursî'nin iktidarı döneminde de hız kazanmış ve önemli görüşmeler gerçekleştirilmesine karşın (Hürriyet, 2012), ancak Sîsî somutlaştırmış ve Şubat 2015'te Rusya ile birlikte nükleer enerji santrali kurulmasında protokol imzalanmıştır (Sputnik, 2015).

Yine temelleri Mübarek döneminde atılan yenilenebilir enerji kaynaklarının enerji üretimindeki payını artırma teşebbüsleri (Suding, 2011: 4435), gerek Mursî, gerekse Sîsî yönetimleri de destek vermişlerdir (Mısır Bülteni, 2015). Bunun yanı sıra Sîsî, başta Nil deltası olmak üzere Mısır'ın hidrokarbon üretimi gerçekleştirdiği sahalarda uluslararası şirketlerle işbirliği yaparak, ülke üretimini artırmaya çalışmıştır. Nitekim bu işbirliğin bir sonucu olarak BP, Mart 2015'te Batı Nil Deltası'nda 5 tcf ve 55 milyon varil yoğunlaşmış doğalgaz rezervi bulmuş ve 12 milyar dolar tutarında yatırım yapmayı kararlaştırmıştır (BP, 2015).

Sîsî ifade edilen politikaların yanı sıra gerek bölgesel, gerekse küresel dengeleri değiştirebilecek önemli enerji politikaları da izlemeye başlamıştır. Bu bağlamda karşılıklı gerçekleşen ziyaretlerle Rusya-Mısır ilişkileri önemli gelişme kaydetmiş ve zamanla taraflar arasındaki ekonomik ilişkiler, askerî boyuta da taşınmıştır (Al Jazeera, 2015).

Ortadoğu'da hayatî çıkarları bulunan ve Mısır'dan önemli miktarda doğalgaz ithal eden Japonya da başta enerji sektöründe kullanılmak üzere 360 milyon dolar tutarında yardım yapma kararı almıştır (Ayyad, 2015).

Bu adımların yanı sıra 2000'li yıllarla birlikte Mısır yönetimi, önemi artan ve ciddi miktarlarda hidrokarbon kaynaklarının bulunduğu tahmin edilen Doğu Akdeniz'den daha fazla faydalanma çabasına girmiştir. Bu konuda Mısır, önemli adımlar atmakta birlikte gerek bölgesel, gerekse küresel boyutta sonuçlar doğurabilecek girişimlerde bulunmuştur.

2. SÎSÎ'NİN ENERJİ POLİTİKASI VE DOĞU AKDENİZ'DE TÜRKİYE ALEYHİNE DEĞİŞEN DENGELER

Akdeniz'in en eski medeniyetlerinden biri olan Mısır'ın, Doğu Akdeniz'e olan ilgisi bölgede son dönemde meydana gelen hadiselerle artış göstermiştir. Bu bağlamda İsrail'in 2009 ve 2010 yıllarında gerçekleştirdiği keşiflerle net enerji ihraç edebilecek konuma gelmesi ve GKRY'nin tartışmalı bir şekilde ilan ettiği MEB'de hidrokarbon kaynaklarını keşfetmesi, enerji ihtiyacı her geçen gün artan Kahire'yi harekete geçirmiştir. Bununla birlikte Kahire'nin bölgeden faydalanma isteği 2000'li yılların başında Mübarek döneminde net bir şekilde ortaya çıkmıştır.

1982 BM Deniz Hukuku Sözleşmesi, Doğu Akdeniz'de tartışmaya neden olan Münhasır Ekonomik Bölge kavramını da geliştirmiştir. Bu bağlamda kavram, Anlaşma'nın 55. ve 75. maddeleri arasında düzenlenmiş, karasularının ölçülmeye başlandığı esas hattan itibaren 200 deniz milinin ötesine uzanmaması ön görüşmüş ve kıyı devlete, denizalanı olarak ifade edilen bu bölgenin deniz yatağı üzerindeki sularda, deniz yataklarında ve bunların toprak altındaki alanlarında birtakım hak ve yetkiler tanımıştır. Aynı zamanda Anlaşma'yla birlikte hakkaniyet ilkesi çerçevesinde devletlerin bu alanları tespit edebileceği de öngörülmüştür (UNIC: 2015). Ne var ki Doğu Akdeniz örneğinde olduğu gibi Anlaşma'nın uygulanmasında birtakım sorunların yaşanmaktadır. Zira GKRY'nin "*bütün Kıbrıs*" adına bölge devletleriyle çeşitli anlaşmalar imzalaması ve hakkaniyeti gözetmeksizin MEB alanını Türkiye'nin aleyhine genişletmeye çalışması, bölgede gerilimi hızla artırmıştır (Tamçelik ve Kurt, 2014).

Bölgede gerilimin artmasına neden olan ilk girişimlerden birini de Mısır'ın 2003 yılında GKRY ile imzaladığı MEB anlaşması teşkil etmiştir. Bu bağlamda Mısır yönetimi, GKRY ile *ortay hat* esasını kale alan yeni bir anlaşma imzalamış ve bu anlaşma ile ilerleyen süreçte GKRY'nin bölgedeki arama faaliyetlerini tanımıştır. Mübarek döneminde, GKRY ile görüşmeler devam etmiş ve taraflar 2006 yılında enerji alanında işbirliği anlaşmasını imzalamışlardır. Fakat Türkiye'nin gösterdiği yoğun tepki nedeniyle MEB anlaşması, Mursî döneminde iptal edilmiş ve Mısır-GKRY ilişkileri durağanlaşmıştır. Buna karşın Sîsî'nin iktidara gelmesiyle birlikte anlaşma yeniden gündeme gelmiştir. Bunda Türkiye'nin, Sîsî yönetimine karşı izlediği politikanın ve buna bağlı olarak gerginleşen ilişkilerin etkisi olduğu gibi, uluslararası şirketlerin bu alanda yaptıkları keşiflerin de büyük katkısı vardır. Özellikle çıkarılacak kaynakların uluslararası piyasalara arz edilmesi meselesi, ciddi bir sorun olarak gündeme gelmiş ve bu durum enerji ihtiyacı sürekli artan Mısır'ın öneminin artırmasına neden olmuştur.

Kahire'nin enerji ihtiyacının arttığı bir dönemde İsrail, 2009'da Tamar ve 2010'da Leviathan sahalarında yaptığı keşiflerle '*enerji ithalatçısı*' konumundan,'*enerji ihracatçısı*' konumuna geçmiştir. İsrail, özellikle 2013 yılında Tamar sahasının işletmeye alarak, Mısır'a olan bağımlılığını sona erdirmiş ve iç talebini karşılayabilecek duruma gelmiştir. Tamar sahasından daha büyük olan Leviathan sahasının da 2017 yılında işletmeye alınacak olması, bu kaynağın uluslararası piyasalara hangi yollarla arz edileceği konusunu gündeme getirmiştir. Bu bağlamda bölgede enerji sahalarını işleten NOBLE adındaki şirketin alternatifleri arasında Mısır'ın da yer almasına neden olmuştur. İsrail'in yanı sıra GKRYde önemli sayılabilecek miktarda hidrokarbon kaynağı keşfetmiş ve bölgede arama faaliyetinde bulunan NOBLE şirketiyle tek yanlı ilişkilere girmiştir.

Aslında gerek İsrail'in, gerekse GKRY'nin keşifleri, Sîsî'nin kısa ve uzun vadeli planlarını yeniden tasarlamayı beraberinde getirmiştir. Bu bağlamda Mısır, ihtiyaç duyduğu enerjiyi kısa vadede adı geçen ülkelerden tedarik edebilecektir. Uzun vadede ise Doğu Akdeniz'deki arama faaliyetlerini artırabileceği gibi ülkesini enerji dağıtım merkezi haline getirebilecektir.

Bu nedenle Kahire yönetimi, kısa vadeli planlarını gerçekleştirebilmek için hızlı bir şekilde harekete geçmiş ve 2012 yılına kadar enerji ihraç ettiği İsrail'den enerji ithal etmek için görüşmelere başlamıştır. Bu çerçevede İsrail doğalgazını üreten şirketlerden biri olan Delek, yeterli doğalgazın olmaması nedeniyle düşük randımanda çalışan sıvılaştırma tesislerini aktive etmek ve iç pazara yönelik kaynak arzının gerçekleştirilmesini sağlamak için görüşmeleri yoğunlaştırmıştır. Nitekim Mısır için kısa vadede gerçekleşmesi mümkün ve maliyeti en düşük olan yol, İsrail gazının Mısır'a taşınması olduğu bilinmektedir (Johnson, 2014). Bu yöntemle Mısır, sıvılaştırma tesisleri aracılığıyla kullandığı enerjiyi iç piyasaya sunabilecek ve İsrail'den tedarik edeceği kaynağı da uluslararası piyasalara aktarabilecektir. Ne var ki uzun bir dönem enerji ihracatı yapılan Mısır'ın İsrail'den enerji ithal etmesi, kamuoyunun tepkini gündeme getirebilecektir.

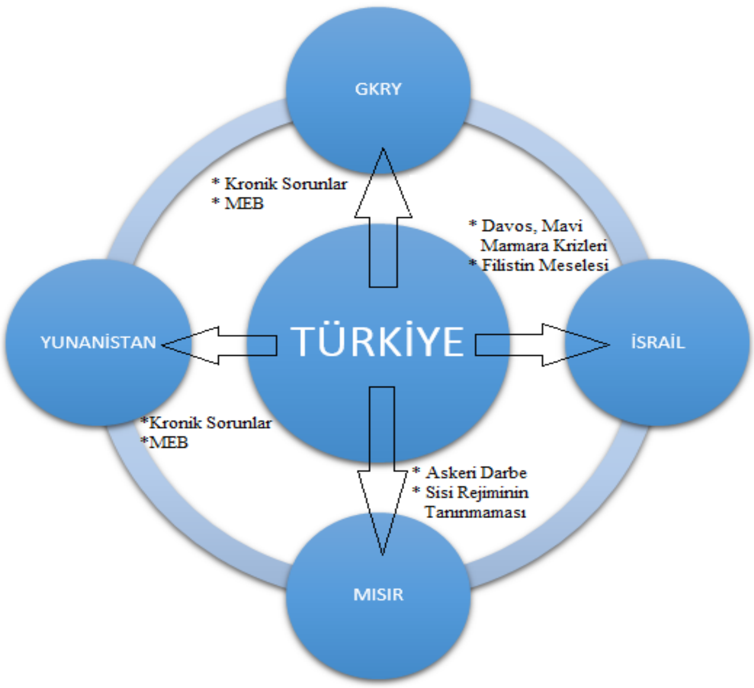
Sîsî'nin izlediği bir diğer politika da GKRY ile olan ilişkilerini geliştirme yoluna gitmesi olmuştur. Bu minvalde Yunanistan'ın da dâhil olduğu bir dizi toplantı gerçekleştirilmiş ve taraflar arasında işbirliği yoğunlaştırılarak artırılmıştır. 29 Ekim 2014 tarihinde GKRY'de yapılan görüşmelerde üç ülke Doğu Akdeniz'de arama çalışmalarının artırılması için işbirliği yapılması konusunda anlaşmaya varmışlardır. Kasım 2014'te Mısır'da yapılan görüşmelerdeyse taraflar, MEB alanlarının belirlenmesi konusunda çalışmaların yeniden başlaması ve Türkiye'nin "*GKRY'nin MEB'indeki*" çalışmalarını durdurmasını istemiştir. Aralık 2014'de Yunan basınının Mısır Dışişleri Bakanı SamehShoukry ile yaptığı röportajda ise bakan, üç devlet arasında Doğu Akdeniz'de başta enerji olmak üzere her alanda işbirliğinin geliştirileceğini belirtmiştir (The Daily News Egypt, 2014). Şubat 2015'teyse taraflar, İsrail'in de yer alacağı bir askerî tatbikatın yapılacağını belirterek, askerî işbirliği yolunda önemli adımlar atacağını da göstermişlerdir (Konstantinidis, 2015). Aynı dönemde GKRY ve Mısırlı yöneticiler, Kahire'de bir araya gelerek "*GKRY'nin MEB'inde*" yer alan 12. parselden/Afrodit'ten çıkarılacak gazın, boru hattı ile Mısır'a taşınması yolunda mutabakat anlaşmasını imzalayarak, teknik konuların müzakere edileceği 6 aylık sürecin akabinde 3 yılda boru hattının inşa edileceğini kararlaştırmışlardır (Kozlov, 2015).

Gerek İsrail'le yapılan, gerekse GKRY ile gerçekleştirilen müzakereler neticesinde Mısır, Doğu Akdeniz kaynaklarının uluslararası piyasalara arzı noktasında önemli bir dağıtım merkezi haline gelme fırsatını yakalamıştır. Tarafların anlaşmaları halinde Kahire'nin, ihtiyaç duyacağı enerjiyi tedarik edebileceği gibi ülkesi üzerinden sıvılaştırılan doğalgazı, uluslararası piyasalara arz ederek, yeniden doğalgaz ihracına başlayabileceği açıktır. Bunun yanı sıra İsrail ve GKRY'nin keşifleri, Kahire'nin Doğu Akdeniz'den daha fazla faydalanma arzusunu artırmıştır. Bu durum, Mısır'ın Doğu Akdeniz'deki yetki alanının belirlenmesi için GKRY, Yunanistan ve İsrail'le MEB anlaşmalarını imzalamasına teşvik edecektir.

Dolayısıyla Sîsî'nin enerji bağlamında izlediği Doğu Akdeniz politikası, bölgede önemli gelişmelere yol açabilecek boyuttadır. Zira bölgede son dönemde siyasî, ekonomik, askerî vb. alanlarda ilişkilerini geliştiren GKRY-Yunanistan-İsrail ekseninin yanı sıra Sîsî'nin izlediği politikalarla aynı zamanda GKRY-Yunanistan-Mısır ekseni de ortaya çıktığı görülmüştür. Olumlu seyreden Mısır-İsrail ilişkileri de göz önüne alındığında bölgede GKRY-Yunanistan-İsrail-Mısır ekseninin de ortaya çıkması kuvvetle muhtemeldir.

Doğu Akdeniz'de GKRY-Yunanistan-İsrail-Mısır eksenin ortaya çıkması, bölgede en fazla kıyı şeridine sahip olan ve bölgenin en önemli aktörlerinden biri konumunda bulunan Türkiye'yi de oldukça yakından etkileyecektir. Ancak Türkiye, gerek bu devletlerle olan ikili ilişkilerinde, gerekse bölgede izlediği politikaların etkisiyle kendi aleyhinde bir eksenin oluşmasını kolaylaştırmış, hatta teşvik etmiştir denebilir. Bu bağlamda Türkiye–Yunanistan ilişkilerindeki çözümlenemeyen tarihî ve GKRY'le olan kronik sorunların yanı sıra son dönemde MEB problemi ve hidrokarbon arama çalışmaları nedeniyle gerilen ilişkiler, 2000'li yılların ikinci yarısından itibaren İsrail'le yaşanan peş peşe krizler,[*] Doğu Akdeniz'de Türkiye karşıtı bir bloğun doğmasına neden olmuştur. Buna karşın Türkiye, AKP ile benzer çizgide olan Muhammed Mursî'nin Mısır'da iktidara gelmesiyle birlikte önemli bir müttefik kazanmış ve Doğu Akdeniz'de kendisine karşı oluşan ekseni dengeleyebilme imkânına kavuşmuştur. Ne var ki Mısır'da Mursî rejiminin askerî darbeyle son bulması ve akabinde Sîsî'nin iktidarı ele geçirmesi, bölgedeki dengeyi Türkiye'nin aleyhine değiştirmiştir.

Şekil 1: Türkiye'nin Doğu Akdeniz Politiği ile Olan İlişkiler Örgüsü



[*] Davos, alçak koltuk, Mavi Marmara, 2008 ve 2014 yıllarında İsrail'in gerçekleştirdiği Filistin operasyonları gibi gelişmeler, Türkiye-İsrail ilişkilerini kopma noktasına getirmiştir.

Çağdaş manada Mısır-Türkiye ilişkileri, kurulduğu 1925 yılından itibaren inişli çıkışlı bir performans sergilemiş ve Muhammed Mursî'nin iktidara gelmesiyle birlikte önemli bir ivme kazanmıştır. Bu çerçevede Mübarek karşıtı halk hareketine ilk destek veren ülkelerden biri olan Türkiye, rejim değişikliği sonrası bu ülkeye gerek başbakan, gerekse cumhurbaşkanı düzeyinde ziyaretler gerçekleştirmiştir. Gerçekleştirilen ziyaretlerde Türk heyeti, genel olarak halk tarafından coşkuyla karşılanmıştır. Mursî de Türkiye'ye ziyaretler gerçekleştirmiş ve hüsnü kabul görmüştür. Bu süre zarfında taraflar, çeşitli ekonomik anlaşmalar imzalamışlar ve Suriye meselesinde benzer politikalar takip etmişlerdir (Akgün ve Gündoğar, 2014: 4). Fakat Mısır'ın halk tarafından seçilmiş ilk cumhurbaşkanının askerî darbeyle iktidardan indirilmesi, Ankara'da yoğun bir tepki ile karşılanmıştır. Bu nedenle Ankara, yeni rejimin meşru olmadığını ve Sîsî'nin tiran olduğunu belirtmiştir (Radikal, 2014). Bu durumun doğal bir sonucu olarak Sîsî, Ankara'nın ülkesinin iç işlerine karışmaması yönünde sert uyarılarda bulunmuş, Kahire'deki Türk Büyükelçisi Hüseyin Avni Botsalı "*personanongrata*" ilan etmiş ve ilişkiler maslahatgüzar seviyesine indirilmiştir. İster istemez bu durum, enerji başta olmak üzere ülkesinin ihtiyaçlarını karşılamaya çalışan Sîsî'nin, Türkiye'yi ortak tehdit olarak gören diğer devletlerle ilişki kurmasını kolaylaştırmıştır.

SONUÇ YERİNE

Son 10 sene içerisinde Doğu Akdeniz'de yaşanan hareketlilik, bölgedeki dengelerin değişmesine ve yeni güç odaklarının/eksenlerinin ortaya çıkmasına neden olmuştur. Bu bağlamda GKRY'nin MEB politikasına Türkiye'nin gösterdiği tepki ve gergin seyreden Ankara – Tel-Aviv ilişkileri, bölgede Türkiye karşıtı GKRY-İsrail-Yunanistan ekseninin doğmasına sebebiyet vermiştir. Bunun yanı sıra gerçekleştirdiği darbeyle iktidara gelen Sîsî'ye, Türkiye'nin gösterdiği yoğun tepki, ülkesinin enerji ihtiyacını karşılamak için realist politikalar izleyen Sîsî'nin Doğu Akdeniz'de önemli bir aktör olmasının yolunu açmıştır. Kaldı ki İsrail'in keşfettiği sahalarda ürettiği ve GKRY'nin yakın dönemde üretmesi muhtemel doğalgazı, ülkesine taşımak isteyen Sîsî'yi, bu ülkelerle yakınlaşmasına ve bölgede İsrail-Yunanistan-Mısır ekseninin doğmasına yol açmıştır. Sîsî'nin izlediği enerji politikaları ve bölgede kurduğu yakınlaşma süreci, beraberinde Türkiye'nin ekonomik, enerji, güvenlik vb. konulardaki ulusal çıkarlarına ciddi tehdit oluşturmuştur.

Her şeyden önce Sîsî'nin enerji politikalarının ilk sonucu, Türkiye'nin enerji siyasasını baltalayabilecek potansiyele sahiptir. Bu bağlamda Mısır'ın, İsrail ve GKRY'yle çıkaracakları doğal gazı, Mısır üzerinden uluslararası piyasalara arz edilmesiyle hususunda anlaşmaya varılması halinde, İskenderiye'nin Doğu Akdeniz'in önemli bir dağıtım merkezi haline geleceği kuşkusuzdur. Aslında bu ihtimal bile Türkiye'nin, Ceyhan'ı enerji dağıtım üssü haline getirmesi ve bölge kaynaklarını kendi üzerinden Avrupa'ya taşıma düşüncesi sekteye uğratacaktır. Bununla ilgili olarak gerek İsrail, gerekse GKRY, Türkiye'yle yapılacak boru hattının daha kısa sürede hayata geçirebileceğinin, proje maliyetinin daha düşük olacağını, Türkiye'nin Mısır'dan daha güvenilir bir pazar olduğunun ve Türkiye'de inşa edilen boru hattıyla Avrupa pazarına açılabileceğinin farkındadır. Fakat taraflar arasındaki gergin ilişkilerin kısa sürede çözüme kavuşamayacağının aşikâr olduğu bir dönemde İsrail'in ve GKRY'nin Mısır alternatifini kullanması normal karşılanmalıdır. Bu durum, enerji tedarikini çeşitlendirmeye çalışan Türkiye'nin Doğu Akdeniz kaynaklarından önemli ölçüde mahrum kalmasına ve Ceyhan'ın enerji dağıtım merkezi haline gelmesine engel olacak niteliktedir.

Aslında Doğu Akdeniz'de enerji potansiyelinin ortaya çıkması, Sîsî'nin Mısır'a düşen MEB alanlarını belirlemesine ve çalışmalarını bu bölgede yoğunlaştırmasına neden olmuştur. Nitekim Mısır ve GKRY'nin bu konuda müzakere halinde olduğu düşünülürse, kısa vadede Sîsî, yeniden GKRY ile MEB anlaşması imzalayabilecektir. Bu durum, Türkiye'nin Mursî'nin iptal ettiği anlaşmayla kazandığı diplomatik zaferi yeniden kâbusa dönüştürebilecek niteliktedir. Özellikle GKRY'nin, Mısır'la, Yunanistan'la ve Suriye'yle anlaşması, Türkiye'yi Doğu Akdeniz'de dar bir su alanına sıkıştıracağı kuşkusuzdur.

Sîsî'nin Doğu Akdeniz kaynaklarını ülkesi üzerinden uluslararası piyasalara arz etmesi, Kıbrıs meselesini ister istemez çözümsüz hale getirecektir. Zira GKRY, içinde bulunduğu ekonomik krizinden doğalgaz ihracatıyla çıkabileceğini ve ekonomik refahını artıracağını düşündüğünden toplum olarak anlaşmaya pek niyeti olmayacağı açıktır. Bunun yanı sıra GKRY, "*bütün Kıbrıs*" adına ilan ettiği ve Türkiye ile tartışmalı olduğu MEB alanlarından doğalgaz ihracı yaparak, Türkiye'ye karşı önemli bir diplomatik zafer kazanacaktır. Ayrıca kaynak ihracı, müzakere masasında GKRY'nin elini kuvvetlendirecek, elde ettiği geliri Kıbrıslı Türklerle paylaşma isteğini azaltacak ve Kıbrıs sorununun çözümü konusunda daha isteksiz davranmasına neden olacaktır.

Mısır'ın yapabileceği bir diğer hamle de Suudî ve Körfez kaynaklarının, ülkesi üzerinden uluslararası piyasalara arzını sağlamak olacaktır. Bu bağlamda Sîsî, Süveyş Kanalı'na paralel şekilde yapmayı planladığı kanalla geçen tanker sayısını ve buna bağlı olarak gelirini en az iki kat artırabilecektir. Buna ilaveten Suudî ve Körfez ülkelerinin enerji kaynakları, borularla Mısır'a aktarılması halinde, ister istemez İskenderiye, uluslararası dağıtım merkezi haline gelecektir. Bu durumun Türkiye'ye yansımasıysa İskenderiye'nin karşısında Ceyhan'ın öneminin azalmasına ve Ankara'nın özellikle Katar'la inşa etmeyi planladığı boru hattının değer kaybetmesine neden olacaktır. Zira Katar'ın, Körfez'in diğer ülkelerinin ve yatırımcıların, ciddi güvenlik problemlerinin yaşandığı Irak veya Suriye üzerinden geçecek boru hattının getireceği riski ve maliyeti yüklenmek istemeyebilecekleri ve bu ülkelere nazaran daha istikrarlı olan Mısır'a yönelebileceklerini düşünmek hiç de zor değildir.

Sîsî'nin GKRY ve İsrail'le gerçekleştirmek istediği hidrokarbon projelerinin Avrupa Birliği tarafından da desteklenmesi ihtimal dâhilindedir. Zira AB Dışişleri ve Güvenlik Politikası Yüksek Temsilcisi Catherine Ashton, Mısır'daki cumhurbaşkanlığı seçimlerini meşru gördüklerini ve cumhurbaşkanı seçilen Sîsî'yi tebrik ettiklerini ve kendisiyle çalışmak istediklerini ifade etmiştir. Bu söylemden hareketle doğalgazda Rusya'ya bağımlı olan AB, Türkiye üzerinden geçen projelerden dolayı, Türkiye'ye de bağlanmak gibi bir riskle karşı karşıyadır. Bunun önüne geçebilmek için AB, GKRY'nin Mısır'la işbirliği oluşturmasını destekleyerek, Rus gazına ve Türkiye güzergâhına alternatif bir kaynak ve mevki oluşturmaktadır.

Sîsî'nin GKRY, Yunanistan ve İsrail'le yakınlaşmasının Türkiye açısından bir diğer sonucu da güvenlikle ilişkilidir. Zira taraflar arasında askerî yakınlaşmanın ilerleyen süreçte askerî ittifaka dönmesi, Ankara'nın, Doğu Akdeniz'den ciddi güvenlik tehdidi algılamasına neden olacaktır. Kısa vadede Esad rejiminin Suriye'de varlığını sürdüreceği veya yerine gelecek kişinin Türkiye karşıtı olması ihtimali de göz önünde alındığında, Doğu Akdeniz'de Türkiye'nin güvenlik zaafı ciddi bir biçimde ortaya çıkacaktır. Ankara'nın bu zaafı giderebilmesi için refahını artırmak yerine güvenliğe ilişkin kaynak kullanımına gideceği aşikârdır. Bu durum, ülkesel refahı doğrudan etkileyeceği gibi güvenlik adına alınacak her önlemin, karşı taraf için yeni bir tehdit alanı oluşturacağı kuşkusuzdur. Bu süreç, ister istemez Doğu Akdeniz'de silahlanmanın artmasına neden olabilecektir.

Yukarıda ifade edilen sıkıntıların önüne geçilebilmesi için Türkiye'nin dış politikasını yeniden gözden geçirmesi gerekmektedir. Bu çerçevede Sîsî'ye karşı tepkinin sona ermesi ve ilişkilerini normalleştirmesi gerekecektir. Zira Türkiye'nin önemli müttefiklerinden biri olan ABD'nin darbe sonrası askerî ve ekonomik yardımlarını durdurduğu Mısır'a yeniden yardıma başlaması, AB'nin Sîsî'yi Mısır'ın meşru lideri olarak tanıması, Suudî Arabistan ve Katar gibi partnerlerin Sîsî'ye ekonomik yardımda bulunması, Filistin sorunu nedeniyle İsrail'le olan ilişkilerinin gergin olmasına karşın Mahmut Abbas'ın Sîsî'yi tanıması vb. örnekler, bu devletlerin ülkesel çıkarlarının korumasının bir gereği olarak görülmelidirler. Bu bağlamda Türkiye'nin bu ilişkileri normalleştirmesi halinde Mısır'ın GKRY'le yaptığı MEB anlaşmasının önüne geçebilecektir. Bunun yanı sıra Mısır'ın, GKRY-İsrail-Yunanistan eksenine kayması da önlenebilecektir. Ayrıca Mısır'ın inşa etmeyi planladığı ve proje değeri yaklaşık 45 milyar dolar olan yeni bir başkent projesinden Türk inşaat firmalarının, normalleşen ilişkiler sayesinde önemli kazançlar elde edeceği muhakkaktır. Fakat ilişkilerin normalleştirilmemesi halinde Mısır'ın ifade edilen politikalarını hayata geçirme imkânı oldukça yüksektir. Buna göre Türkiye'ye karşı birtakım yeni yaptırım kararları da alınabilecektir. Türkiye, Suriye ve Irak'taki kaotik ortamdan dolayı, Körfez'le olan ticaretini 2012 yılında Mısır'la imzaladığı Ro-Ro anlaşmasıyla gerçekleştirmiştir. Lakin mevcut gerilimin devam etmesi nedeniyle Kahire, 2015 yılında biten anlaşmayı yenilemeyerek, Türkiye'ye karşı yeni bir yaptırımda bulunmuştur. Kısa vadede IŞİD tehlikesinin süreceği, Suriye'deki iç çatışmanın devam edeceği ve İran'la olan sıkıntıların yoğunlaşacağı dikkate alınırsa, Mısır'ın aldığı bu karar, Türkiye'nin Körfez ticaretini olumsuz etkileyeceği açıktır. Bunun yanı sıra Türk yatırımcıların yeni başkent projesinin dışında kalmasına ve Mısır'da yatırımları bulunan girişimcilerin sıkıntı yaşamasına neden olabilecektir.

Buna ek olarak Kıbrıs meselesi çözülmeden, Ankara'nın GKRY'yle olan ilişkileri normalleşemez. Bu gerçekten hareketle Ankara'nın, Mısır'ın Doğu Akdeniz enerji kaynaklarını kendi ülkesi üzerinden geçirmesini engellemesi için İsrail'le olan ilişkilerini normalleştirmesi elzemdir. İlişkilerin düzelmesi halinde İsrail'in, daha maliyetli olan Mısır projesinden vazgeçmesi ve Türkiye gibi büyük ve daha güvenli bir pazara kaynaklarını ihraç etmesi mümkün olabilecektir. Ayrıca bu gazın, TANAP hattına entegre edilmesiyle, İsrail'in doğrudan Avrupa pazarına ulaşması da imkân dahilinde olacaktır. Bunun yanı sıra İsrail, kaynaklarını çıkardığı sahaların askerî güvenliğini Türkiye ile ortaklaşa sağlayarak, güvenlik maliyetlerini de azaltabilecektir.

Her ne kadar Sîsî'nin iktidarı, Tel-Aviv için şimdilik bir tehlike arz etmese de ilerleyen dönemde iktidara gelebilecek olan İsrail karşıtı yöneticilerin, yapılan bu anlaşmaları iptal edebilmesi mümkündür. Nitekim İsrail'le iyi ilişkiler içerisinde olan Mübarek'in yerine iktidara gelen Mursî, ülkesinin enerji sıkıntısını da göz önünde bulundurarak kısa süreli iktidarı döneminde İsrail'le olan doğalgaz anlaşmasını iptal etmiştir.

Ankara açısından bakıldığındaysa doğalgaz yönünden Rusya'ya ve İran'a bağımlı olan ülke, Doğu Akdeniz kaynaklarını kullanarak bu ülkelere olan bağımlılığını azaltma imkânına ve İskenderiye'nin Ceyhan'a rakip olmasını engelleme ve enerji koridoru olma tasarısını gerçekleştirebilme fırsatına kavuşacaktır.

İsrail'in Türkiye ile ortak proje yürütmesi, GKRY üzerinde de ciddi bir baskı yapacaktır. Özellikle Mısır–GKRY arasına yapılması tasarlanan boru hattının maliyetinin 5 milyar dolar civarında olacağı[*] ve boru hattıyla taşınan gazın önce sıvılaştırılması, ardından taşınması ve ilgili ülkede tekrar gaz haline getirilmesi maliyeti de hesaba katıldığında toplam maliyetin daha da artacağı muhakkaktır. Buna karşın Türkiye'ye yapılacak olan boru hattı projesinin maliyeti 4 milyar Euro civarındadır.[†] Ayrıca GKRY'nin, İsrail'le

[*] Bu konuyla ilgili tahmini rakam için bkz… Amin, 2014.

[†] Bu konuyla ilgili tahmini rakam için bkz… Olgun, 2014: 64.

Türkiye arasına yapılacak boru hattına eklemlenebilecek olması ve yeni bir hatla kaynaklarını taşıyabilmesi de mümkündür. Türkiye'ye ulaşacak kaynakta herhangi bir sıvılaştırma, taşıma ve yeniden gaz haline getirme işlemleri olmayacağı için GKRY'nin bu işlemler için ayıracağı herhangi bir kaynak olmayacaktır. Bunun yanı sıra çıkartılacak gazın TANAP'a eklemlenmesiyle birlikte doğrudan Avrupa pazarına da ulaşabilecektir. Tüm bu gelişmelerin yansıması ise Kıbrıs meselesine olumlu olması ve sorunun çözülmesi yolunda önemli bir ivme kazandırması beklenmektedir.

Buna karşın mevcut durumun devam etmesi halinde Suriye'den Libya'ya kadar olan sahiller ve deniz alanları –Lübnan dışında– Türkiye aleyhtarı eksenin kontrolü altına girecek ve bölgede yalnızca KKTC, Türkiye'ye güvenlik anlamında "*nefes alma*" imkânı verecektir. Özellikle Türkiye'nin, Mısır'la, İsrail'le veya her ikisiyle birden ilişkilerini normalleştirmesi, aynı zamanda Doğu Akdeniz'deki güvenlik tehdidini de asgari düzeye indirmesine neden olacaktır. Bu durum, Türkiye'nin güvenlik için daha da fazla kaynak ayırmasının da önünü kesecektir.

Netice itibariyle Türkiye'nin, Doğu Akdeniz'de Sîsî'nin tasarılarını engelleyebilmesi ve Doğu Akdeniz'in enerji kaynaklarından faydalanabilmesi için "*değerli yalnızlık*" olarak ifade edilen dış politikasını terk etmesi gerekmektedir. Aslında Türkiye'nin uyguladığı bu politikanın, dış politikasının iflasın eşiğine geldiği gerçeğinden hareketle duygusal dış politikadan ziyade, realist ve pragmatist politikalar izlemesi ve ulusal çıkarlar sistematiğinde hareket etmesi gerektiğini göstermektedir.

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TÜRK ENERJİ POLİTİKASININ BÖLGESEL BOYUTLARI
THE REGIONAL DIMENSION OF TURKISH ENERGY POLICIES

Gökhan TEKIR *

ABSTRACT

Last ten years, Turkish economy has nearly quadrupled in size. This economic boom caused the increase in demand for energy. The energy agreement with Kurdistan Regional Government is a game changing move for Turkey to provide long-term cheap oil and transportation of Kurdish oil to world markets. While developing its relations with KRG, Turkey has to engage complex power play in its volatile region to safeguard its growing economy and protect its territorial integrity by preventing independence aspiration of Kurds living in disintegrating Iraq and Syria

In addition to energy deal with KRG, due to its geopolitical position Turkey is an important player in realization of Southern Gas Corridor with the implementation of TANAP which transports Azerbaijani gas via Turkey. In addition to TANAP, recently proposed 'Turkish stream' pipeline project will strengthen Turkey's position. Turkey must carefully manage this opportunity to fulfill its desire to become a regional energy hub.

Key Words: Turkey, energy routes, regional conflict,

ÖZET

Son on yılda, Türk ekonomisi yaklaşık dört kat büyüdü. Bu ekonomik gelişme Türkiye'nin enerji tüketiminin artmasını da beraberinde getirdi. Kürt Bölgesel Yönetimiyle yapılan anlaşma Türkiye'nin uzun vadeli ucuz petrol ihtiyacının karşılanmasında ve Kürt petrolünün dünya pazarına taşınmasında oyun değiştirici bir hamle niteliğindedir. KBY ile ilişkilerini geliştirirken, Türkiye yüksek derecede kırılgan bölgede, ekonomisininin ihtiyacı olan enerjiyi sağlamak ve ülke bütünlüğünü korumak için çözülmekte olan Irak ve Suriye'de yaşayan Kürtlerin bağımsız bir devlet kurma düşüncelerini engellemek için son derece dikkatli bir politika izlemek zorundadır.

Bunun yanında enerji güzergahlarının merkezinde yer alması, Azerbaycan gazının üzerinden taşınmasını öngören TANAP projesi Türkiye'yi Güney Gaz Koridoru'nda önemli bir oyuncu konumuna getirmiştir. TANAP projesinin yanında son zamanlarda ortaya atılan 'Türk Akımı' projesi Türkiye'nin elini güçlendirici bir mahiyet taşımaktadır. Türkiye bu fırsatlardan mümkün olduğu derecede yararlanma yönünde politikalar geliştirmeli ve bölgesel bir enerji merkezi olma idealini gerçekleştirme yolunda tarihi bir fırsat olan dünyanın içinde bulunduğu konjonktürden yararlanmalıdır.

Anahtar Kelimeler: Türkiye, enerji güzergahları, bölgesel çatışma

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1. INTRODUCTION

The past decade has seen remarkable economic growth in Turkey. Ankara has attempted to secure Turkey's growing energy needs for its growing economy by making oil and natural gas deal with Kurdistan Regional Government. However, recent developments in Northern Syria might spoil Turkey's relations with Kurds in the Middle East. The prospect of the emergence of an independent Kurdish state will threaten Turkey's territorial integrity. Ankara has been playing an astute game in preventing the emergence of the Kurdish state in Syria despite international criticism and small scale of domestic disturbance.

Furthermore, owing to its geopolitical position, Turkey is the center of new pipeline routes. Construction of TANAP project which will bring Azerbaijani natural gas to Europe started on March 17, 2005 in Turkish province Kars. In addition to TANAP project, due to Ukranian crises Russia proposed the Turkish Stream Project which will deliver Russian natural gas pipeline across Black Sea to Turkey and to Europe. This pipeline project will upgrade Turkey's geopolitical position on the condition that the virtual hub is to be established in Turkey instead of Turkey-Greek border. Thus, Turkey must be careful in negotiating with Russia.

2. GROWING ECONOMY OF TURKEY AND ENERGY DEMAND

Turkey's GDP has increased four times in this last decade. According World Bank data, Turkey's GDP was 232,534,560,441.7 in 2002. In 2014, GDP of Turkey was 822,135,183,160 (World DataBank, 2015). Turkey's economic development causes increase in energy demand. "Turkey has been the second country, after China, in terms of natural gas and electricity demand increase" (Turkey's Energy Strategy, 2012). In 2013, Turkey's total liquid fuels consumption averaged 734,800 bbl/d. More than 90% of crude oil consumption and significant quantities of petroleum products came from imports. According to the IEA, Turkey's crude oil imports are expected to double over the next decade (U.S. Energy Information Administration: Turkey, 2014). Natural gas consumption in Turkey reached approx. 46 bcm in 2012 demonstrating an increase of 4.7% compared to the previous year. Natural gas demand is expected to grow by 2.9% annually until 2020 according to the Ministry of Energy and Resources (The Energy Sector: A Quick Tour for the Investor, 2013).

In 2013, Russia had 58% share in Turkey's natural gas imports. Iran, Azerbaijan, and Algeria followed Russia with 19%, 9%, 9% shares, respectively (Ham Petrol ve Doğal Gaz Sektör Raporu, 2014). Turkey buys Russian gas for429$/1000 m^3, Azerbaijani gas for349$/1000 m^3, Irani gasfor507$/1000m^3(Rzeyava, 2014). In same year, Turkey imported oil from Iraq (32%), Iran (28%), and Saudi Arabia(15%). Iran's share decreased from 51% in 2011 and 39% in 2012 to 28% in 2013 and Iraq's share increased 10% to %32 in the same time frame (Ham Petrol ve Doğal Gaz Sektör Raporu, 2014).

When the data concerning Turkey's oil imports are examined, it is observed that Turkey managed replace Iran, which is a main regional rival for Turkey, with Iraq. This aspect highlights the importance of while maintaining the good relations with KRG of Iraq, Turkey must not upset Baghdad. For natural gas, Azerbaijani gas is the most advantageous option for Turkey. However, pipeline capacity prevents Turkey from replacing Russia with Azerbaijan. KRG will be the new option for Turkey to diversify its energy source countries.

3. ANKARA-ERBIL-BAGHDAD AXIS

Ankara's earlier hostile treatment of Kurdish Regional Government turned into a strategic partnership. This transformation of Ankara's Erbil policy has coincided with tension between Baghdad's Shia dominated government and Ankara, concerned for increasing Iran influence over Iraq. There is also a third development in which the relations between Erbil and Baghdad has deteriorated due to Baghdad's obstruction of Erbil's autonomy. This rift between Erbil and Iraq's central government precipitate the alliance between Turkey and KRG. While Turkey exports energy sources of KRG, KRG is seeking to find new energy route through Turkey which offers political and economic autonomy of KRG. However, Iraq still remains to be an important player and Turkey and KRG still have long term interest in Iraq. Therefore, three players engage in complex game in the region.

3. 1. Energy Nexus

Energy constitutes main source of cooperation between Turkey and KRG. KRG has enormous on-shore untapped potential energy resources- 45 million barrels of oil and 3 trillion cubic meters of gas- with relatively low production costs convinced Turkey to reconsider its hostile attitude to this region (İşeri & Dilek, 2013). It is likely that around 30 percent of Iraq's oil reserves lie in Kurdish north of the country. If correct, the KRG alone would be the world's 10th most oil-rich country (Iraq as a whole ranks second), roughly on a par with Nigeria or Libya. Its actual production could very soon match that of Azerbaijan (Park, 2014). Both Turkish state company TPAO and the mid-sized private company Genel Energy International Ltd have expanded their investments. In November 2011, Genel Energy merged with Vallares PLC and transformed into the largest energy company operating in KRG. The Turkish head of the company, Mehmet Sepil stated that his company wants to begin oil exports and start with gas in 2015 (İşeri & Dilek, 2013).

The major contributing factor of acceleration of rapprochement between Ankara and Erbil has been the deteriorating relations of Baghdad and Erbil. The biggest reason of deterioration was Maliki's Shia dominated centralized Iraq vision. He attempted to controlstrategic ministries, the military (i.e. the formation of the Tigris operations command), the electoral commission and the economy. Maliki undermined the arranged constitutional framework for power-sharing in Iraq by excluding Sunni and Kurdish figures from the political and bureaucratic system, thereby incentivizing Kurds to break away from Iraq (İşeri & Dilek, 2013). He also wanted to replace Peshmerga forces with Shiite militias in the Northern Iraq (Park, 2014). Maliki's increasing authoritarianism based on Shia sectarianism alienated Kurds in Iraq. Instead of linking Kurds to Baghdad, Maliki created new problem areas with Kurds and compelled Kurds to search for new allies in the region.

Large spectrum of topics compound conflict areas. "Two of the major problem areas are the status of the "disputed territories" in Kirkuk, Ninewa, Salahaddin and Diyala provinces, and the right of the Kurds to sign independent oil exploration contracts" (Mills,2013: 54). Kirkuk is at the central of considerable oil reserves. The twin pipelines that transport oil from Kirkuk to the Turkish Mediterranean port at Ceyhan are controlled by the federal Iraqi government (Park, 2014). With vast energy resources, Kurds could magnify its autonomy at the expense of central government. In contrast, if the central government continues to exercise jurisdiction over Kirkuk and its resources, the resulting state-controlled mechanisms to manage and allocate hydrocarbon resources will integrate the KRG more thoroughly into the Iraqi state (Hanauer & Miller, 2012).

In June 2014, Islamic State of Iraq and Levant (ISIL) initiated an offensive in Iraq. The Iraqi army collapsed and left the northern part of the country. Musul fell to ISIL forces.

Kirkuk, on the other hand, was occupied by Kurdish Peshmerga forces, which have taken advantage of Iraqi authority’s collapse.Control of Kirkuk city currently rests with the Patriotic Union of Kurdistan (PUK)led by Jalal Talabani, less affiliated with Turkey than Iran but smaller of the two largest Kurdish political parties, but the rival Kurdistan Democratic Party (KDP) is gradually encroaching. In July 2014, the KDP opportunistically expanded their military control of western Kirkuk, including the Northern Oil Company's Bai Hassan and Avana oilfields.Kirkuk Governor Najmaldin Karim, who is close to PUK leader Jalal Talabani, must balance the dual needs to maintain Kurdish unity to defend the city while at the same time restraining the further expansion of KDP influence in Kirkuk (Knights, 2015).

What complicates the already muddled picture is the presence of Turkmen community in Kirkuk. Turkey champions this community and accepting Kurdish claims over Kirkuk would hurt nationalist feelings at domestic level. Furthermore, considering Kirkuk’s energy resources may provide incentive for the establishment of Kurdish independent state, Turkey can’t be comfortable with the possibility of Kirkuk as a Kurdish province. However, current reality compels Turkey to adopt a much more accommodating policy concerning Kirkuk. Central governments’ control over Kirkuk will not benefit Turkey because this increases pressure of Baghdad over Erbil and alienates KDP party led by Barzani. A strengthened PUK will increase the influence of Iran in Kirkuk. If Turkey is guaranteed with exclusive rights over Kirkuk oil field, which might diminish Kurdish independence claims, Kirkuk as a Kurdish province under KDP control would not be a bad scenario for Turkey.

The distribution of oil money causes another point of disagreement between KRG and Iraq’s central authority. The KRG receives 17 percent of Iraq’s budget. This percentage constitutes 94 percent of the KRG’s budget (Park, 2014). Baghdad uses this dependence as a stick to Erbil when Erbil’s autonomy demands are increased to restrain its activities. Baghdad began withholding the money in January leading to delaying in payment of public sector wages. Richard Mallinson, a geopolitical analyst at Energy Aspects states that Baghdad has to be careful about how it uses that power: “Baghdad has an important financial lever, but the more heavily this is used the more incentive the KRG will have to push for greater autonomy” (Otten, 2014). The financial pressure imposed by Baghdad might drive the Kurds to look for new financial partners that would replace Iraq central government and intensify their efforts to sell their energy resources independent of Baghdad. Even after Maliki’s ouster the problems did not cease. In February 2015, Neçirvan Barzani said that Abadi, the Prime Minister of Iraq, had told him in Baghdad that his hands were tied by the Shiite alliance and he borrowed $500 million from Turkey to pay the salaries of public workers (Kurdistan PM says we borrowed $500 million from Turkey to pay salaries, Baghdad holds Kurdish budget, 2015).

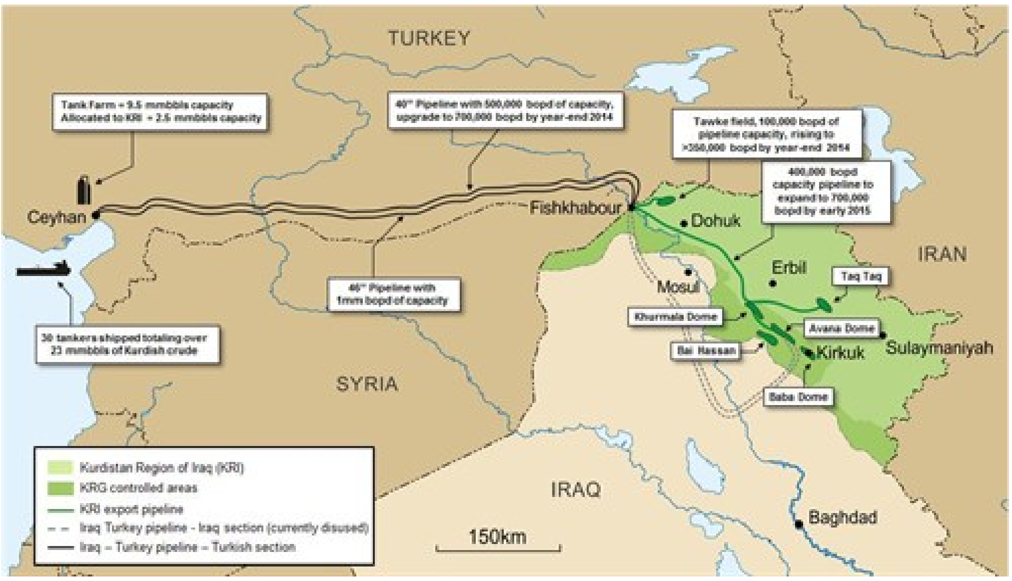
Due to constant threat of budget cuts from Baghdad and the realization of this threat, Erbil sought the ways of exporting its oil independent of Baghdad’s control. Turkey stood as a way to repel Baghdad centralization attempts. KRG Prime Minister Nechirvan Barzani, believed by many to be the KRG’s next leader said that: “Being land locked we have to have a partner, a regional power to be convinced and internationally, a big power to be convinced to support that. That “door of hope,” he said, “is Turkey. And if that door, that hope is closed, it will be impossible for us to surrender to Baghdad” (Park, 2014: 44). The KRG would not only export oil to Turkey but also it would deliver oil to the world market through Turkey. This geographic position offers Turkey leverage over the KRG. Turkey has to hold this leverage over the KRG to keep KRG’s independence desires under control.

In 2013 numbers of energy deals was signed between the KRG and Turkey. In November, 2013, the KRG and Turkey finalized a comprehensive package of deals with Turkey to build multi-billion dollar oil and gas pipelines to ship the autonomous region's rich hydrocarbon reserves to world markets. The deals, which could have important geo-political consequences for the Middle East, could see Kurdistan export some 2 million barrels per day (bpd) of oil to world markets and at least 10 billion cubic meters per year of gas to Turkey.The existing pipeline from Kirkuk to Turkey's Mediterranean port of Ceyhan is currently carrying only a fraction of its 1.6 million barrels per day (bpd) capacity, and could in theory pump up to 700,000 bpd of Kurdistan's oil. The construction of second oil pipeline is considered when Kurdish output increases (Pamuk & Çoşkun, 2013). Istanbul-based Siyahkalem Engineering Construction Industry and Trade was issued a license, valid for 26 years, to import natural gas from northern Iraq. The company will start importing 700 million cubic meters of natural gas in 2014 and will aim to increase the amount to 3.2 billion cubic meters annually by 2033 (Turkey issues first license to import northern Iraq gas, 2013).

Turkey’s energy moves in the KRG bring about new alliances among giant energy companies. Exxon is the leading oil company which pursues contracts in oil and gas fields of the KRG. In November 2011 it signed an oil and gas exploration agreement with Erbil. Baghdad threatened to exclude Exxon from a bidding contest in Iraq’s southern oil fields in retaliation, but for contractual reasons it could do nothing about Exxon’s existing stake in southern Iraq’s West Qurna 1 field. Although in early-2013 it appeared that Exxon might be prepared to sacrifice its agreement with the KRG to exact a better offer from Baghdad for its southern operations,the company has subsequently been reported as having entered into a KRG exploration agreement with a Turkish partner (Park, 2014). A newly established Turkish Energy Company (TEC), a state-backed entity which has struck partnership deals with Exxon and will be Turkey's counterparty in dealings with Kurdistan (Pamuk & Çoşkun, 2013).

Another major player is Anglo-Turkish firm Genel Energy. It is the largest the largest Turkey-based private company which engaged in the KRG’s energy sector. It has interests two of the largest producing fields in the Kurdistan Region of Iraq, Taq Taq and Tawke, with access to local and international markets. These fields have a currently estimated gross proven and probable (2P) reserves of 1.2 billion barrels of oil (429 mmbbls net to Genel Energy) and gross proven, probable and possible reserves of 1.7 billion barrels of oil (614 mmbbls net to Genel Energy). During 2013, the KRG completed the construction of its export pipeline infrastructure which enabled Genel Energy to have independent route to export oil:

Map 1. KRG Pipelines



(Kurdistan Region of Iraq Portfolio, 2014).

At an energy conference in Istanbul on October 31, 2013, Minister for Natural Resources Hawrami stated that Kurdistan has right to export oil. “Oil and gas exports are not the monopoly of anyone in Baghdad. It is our duty to pursue oil and gas routes independently” (Cunningham, 2013). Baghdad was frustrated with this close energy relationship with Erbil and Ankara. Maliki threatened a review of Baghdad’s relationship with Ankara. In November 2012, Baghdad expulsed Turkish Petroleum Corporation (TPAO) from an oil exploration deal in Iraq’s south. Baghdad even refused permission for the private jet carrying Turkish Energy Minister Taner Yildiz to land at Erbil airport. The USA also exerted pressure upon Turkey to temper its energy relationship with the KRG (Park, 2014). However, Turkish side ignored these pressure imposed by Baghdad and Washington. The first batch of Kurdish oil, with an estimated market value of $110 million, was transported through Turkey on May 23.In June, 2014, Turkey and the KRG announced the signing of a 50-year deal to export Kurdish oil to the north. (Jones, 2014a). In the same month, a new serious threat emerged in Iraq, which changed territorial formationof the Middle East.

3. 2. Isıl Offensıve In Iraq

Jamaat al Tawhid, founded by Al Zarkawi which was a part of Al Qaeda franchise broke its alliance with Al Qaeda and with its operations in Syria renamed itself as Islamic State of Iraq and the Levant (ISIL). Although it constantly conducted terrorist attacks, summer offensive of this group in Iraq and Syria demonstrated its strength. ISIL’s takeover of Mosul, Iraq’s second largest and its offensive to the northern Iraq city had important consequences for energy equilibrium.

Threat emanated from ISIL was direct to the KRG. The KRG seems to be bearing much of the immediate burden of the ISIL offensive. The latest figures from the UN show that 135,000 have fled to Erbil and 232,000 to Dohuk in June. Kurdish Peshmerga forces have faced repeated attacks by ISIL-affiliated fighters in the Kirkuk area, which they assumed control of in the face of an Iraqi military retreat (The ISIS offensive: what next for

Iraq, Syria and the Kurds?, 2014). On the other hand, the discontent with Maliki's rule continued to be articulated more soundly due to the failure of Iraqi army and central government to deal with ISIL. Falah Mustafa in an interview published in Al Jazeera stated that: "Instead of providing new opportunities for the people of Iraq, Baghdad's approach has been one of denial of people's rights, monopolization of power, and centralization. The Kurds feel excluded, the Sunnis feel marginalized and even some Shia Muslim groups feel marginalized by the current Shia administration" (Mustafa, 2014). The pressure upon Maliki, who preferred to follow sectarian policy and alienated Sunni community, backed by US administration in Iraq increased. Finally, Maliki stopped his resistance and resigned on August 14. Haider al-Abadi, himself a Shiite, was tasked to form new government. This development gave rise the hopes of a more inclusive government and a possible reconciliation between the KRG and Iraq.

The views that advocate a softened position regarding the sale of Kurdish oil sale started to be articulated in the USA. According to sources with knowledge of US thinking, the State Department prefers a passive policy action which means that potential buyers- if they consult for an opinion- will be advised of the threat of legal action by the Iraqi government. But industry sources say that Iraqi Kurdish and small oil trading firms are likely to test the waters with a shipment or two (LeVine, 2014). Rep. Adam Schiff (D-Calif.) said on Friday that "if the Iraqi government does not resume the financial support owed to the Kurds, we should end our resistance to the direct sale of Kurdish oil" (Grim, 2014). All these developments pressured Iraq and the KRG to reach a resolution. Furthermore, big prospects concerning energy resources of the region compelled them to make an agreement which has been blocked by Maliki's sectarian concerns. Genel Energy CEO, Tony Hayward suggested that "The scale of the opportunity for Kurdistan and for Iraq is so large that there will be a resolution. Over the next year or two, Kurdistan production capacity will grow towards 1 million barrels a day—that's too much oil to be shut in as a consequence of a political dispute. So one way or another, it's going to get resolved" (Mills, 2013: 57).

In December 2014, Baghdad and Erbil reached a formal agreement which will end yearlong oil export and budget disputes between two parties. This agreement endorsed by Iraqi cabinet brought into course at the beginning of 2015. According to the agreement, 250,000 barrels per day (bpd) from the oilfields in northern Kurdish region and 300,000 bpd of Kirkuk oil through Turkey will be imported. The crude oil will be transmitted via pipeline run by KRG, but will be sold by Iraqi state-owned oil company named State Oil Marketing Organization (SOMO). Money will be transferred to an escrow account in New York, instead of Turkish state-owned Halkbank which was assigned previously by the contracts signed by the KRG and Turkey. In turn, Baghdad government agreed to send 17 percent of state budged revenue (approximately 17 billion dollars) to Kurdish Government and paying KRG employees' salaries (Topal, 2014). Although Turkey had to give away the option of the payment of oil resources via Halkbank, it appeased Baghdad by supporting the agreement and demonstrated that it is ready for compromise for fixing its relations with Baghdad. Furthermore, the legality issue of the sale of Kurdish oil was resolved for Turkey.

The deal between the KRG and Baghdad, however, is not working perfectly. Tensions rose due to Baghdad's inability to send KRG's share in federal budget to the Kurds. In February, 2015, Nechirvan Barzani stated that "The Iraqi government is unable to live up to its commitment of paying the Kurdistan Region's share of the national budget because of a sharp shortfall in revenues due to a plunge in oil prices. Obviously we have an agreement with a bankrupt country" (Kamil, 2015). After this statement, Barzani went to Turkey and met with Turkish President and the Prime Minister in Ankara. MP Shaban, who is a member of Barzani's KDP commented that: "The prime minister's visit to Turkey is aimed at talks about independent oil sales so that the Kurdistan Region can overcome the financial crisis. If Baghdad does not commit to the agreement, then KRG will opt for independent oil sales" (Salih, 2015). If the oil deal between Erbil and Baghdad collapses, the KRG is ready to sell its oil independent from SOMO. A source from the KRG said: "After April, the KRG would be technically able to export 825,000 bpd via its own pipeline system. We would be able to fully cover our budget needs with those exports by tightening our spending and providing our fighting forces their salaries on time" (Coles, Gamal, & Zhdannikov, 2015). Baghdad's inability of payment affected oil firms operating in KRG field. The payments to Genel, Norway's DNO, the UK's Key Stone had stopped (Cox, 2015). If Baghdad's incompetence prolonges, Turkey will emerge the only viable financial player for KRG's oil deals.

For natural gas, Genel Energy solidified its position in the KRG.Mehmet Sepil, the CEO of Genel Energy, stated that "In next ten years, Northern Iraq may be providing 30 billion cubic meters of gas per year to Turkey. Given that Turkey's current consumption is 40-45 billion cubic meters, it is easy to understand the significance of the volume of gas from Northern Iraq" (Can, 2012). The region has 11 tcf mean gas resources and 80 million mean liquid resources. The gas is concentrated in two fields Miran (Genel 75 per cent, KRG 25 per cent interest) and Bina Bawi (Genel 44 per cent, OMV, operator, 36 per cent, KRG 20 per cent). Genel is to acquire OMV's 36 per cent interest in Bina Bawi for US$20 million upfront and US$130 million staged after first gas. This will make Genel, the sole contractor for both fields. A contract has already been signed between KRG and Turkey for the export, through low cost infrastructure and at good prices, of 140 bcf a year of gas from 2018 rising to 350 bcf in 2020 and an option of increasing to 700 bcf thereafter (Dalby, 2015). In long-term Turkey can rely on Kurdish gas, but in short-term its dependence on Russia will continue.

3. 3. Isıl Offensıve In Northern Syria

Syrian Civil War, started after 2012 had impact on Turkey's energy supply strategy. After Assad's withdrawal from Northern Syria, PYD (Partiya Yekîtiya Demokrat), comprised of Syrian Kurds and affiliated with terrorist organization PKK, established a canton style administration called as 'Rojava model' by dismissing Turks, Arabs, and other opposing Kurd factions. This self-declared administration might attract other Kurds living in Turkey and Northern Iraq and intensify the independence desires of the Kurds. More importantly, a possible independent Kurdish state in Syria with coastline on the Mediterranean Sea will provide an alternative route for the exports of Kurdish oil and gas ending Turkey's geographic leverage over the KRGbesides threateningTurkey's territorial integrity. The map below shows the Kurds living in the Middle East:

Map 2. Kurds Living in Syria, Iran, Iraq and Turkey

(Syria's Kurdish Threat to Turkish Interests, 2012).

In autumn 2014, ISIL’s offensive to Kobane brought two bad options for Turkey: Turkey does not want a flourishing Kurdish state in Northern Syria. Turkey does not want radical Islamists to gain too much power near its border, either. Ankara, thus, followed a risky and cynical strategy while ISIL was attacking Kobane. Despite the calls for help from international community, Ankara chose not to involve itself in the conflict and it did not allow the opening of help corridor until very last moment. It accepted the refugees to mitigate angry backlash of its policy. However, this action did not prevent international criticism and domestic disturbance in October when the attacks on Kobane intensified.

The Kurds living in Turkey protested Turkey’s indifference to Kobane in October 2014. In Kobane incidents, which continued two days in October, 35 people were killed (Kobani Protestolarında Ölü Sayısı 35'e Çıktı, 2014). In international arena, Turkey was accused of obstructing help to Kobane. In New York Times, a representative of YPG published an article which advocated Western governments to increase pressure upon Turkey to allow help corridor (Abdo, 2014). The Syrian Observatory for Human Rights, a British-based group which monitors the Syrian civil war says Kurdish forces face inevitable defeat in Kobani if Turkey does not open its border to let through arms (Calls for a ‘humanitarian corridor’ between Turkey and besieged Kobani, 2014). Turkey did not open the corridor until ISIL’s activity started to threaten Turkish border (Khatib, 2015). .

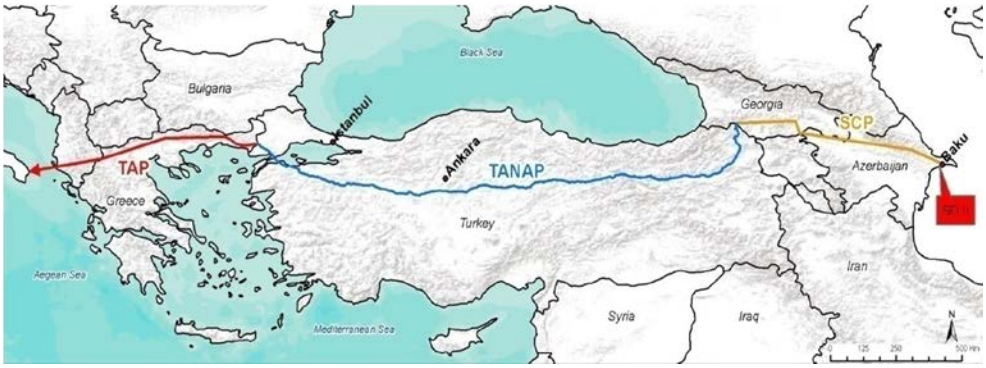
Finally, Turkey allowed the Free Syrian Army and KRG peshmerga forces to arrive in Kobane and help the Kurds to fight with ISIL (Letsch, 2014). After four months fierce fighting, Kobane was liberated on January, 2015. KRG President Massoud Barzani thanked Turkey for liberating the city. He stated that: “I want to thank Turkey on behalf of the Kurdistan Regional Government and myself” (Barzani thanks Turkey for help in 'freeing' Kobani, 2015). The victory, however, came with the price. Kobani city was in ruins due to ISIL attacks. The London-based Syrian Observatory for Human Rights observed that “Large parts of the city have become uninhabitable due to U.S. and Arab , air raids, detonation of booby-trapped vehicles and mutual shelling” (Kirkpatrick, 2015). In addition to Kobane’s destruction, it was understood that YPG was not powerful to be an independent or autonomous. This weakness demonstrated that it needed cooperation of other groups to repel the attack directed to its existence. Turkey successfully placed its allies Free Syrian Army and KRG peshmerga forces in Northern Syria. Despite domestic unrest and international criticism, this war also showed the limitations of international coalition over Turkey.

Turkey engaged in complex power in its southern flank to secure its oil and gas supply. Although Turkey has given up its ‘zero problems policy’ by playing the groups against each other, it secured the flow of cheap KRG oil into its territory. On the other hand, gas supply from the KRG will begin gradually in subsequent years but Turkey needs natural gas now. Therefore, it engages in another Great Game with Russia, the EU and Azerbaijan.

4. TANAP PROJECT

The Trans Anatolian Gas Pipeline (TANAP) is planned to transfer natural gas from Shah Deniz 2 and southern Caspian Sea gas fields. The estimation of gas that will be transferred 1.3 trillion m^3 through South Caucasus Pipeline (SCP), and Trans Adriatic Pipeline, which is currently being built. The map below shows the development of TANAP pipeline system:

Map 3. TANAP System



(Trans Anadolu Doğal Gaz Boru Hattı (TANAP) Projesi ÇED Raporu, 2015).

First gas flow is planned to start in 2018. Gas flow capacity will be 16 billion m^3 in 2020, 23 billion m^3 in 2026 m^3, 31 billion m^3 in 2026 (Erdağ, 2013). 6 bcm will be transported to Thrace region and Eskişehir, where the gas will be connected to the BOTAŞ transmission network for domestic consumption (Rzeyava, 2014).This amount of gas is not panacea for Turkey’s growing energy demand. Until the supply of KRG gas in full capacity, Turkey would remain dependent on Russia.

The real significance of TANAP lies inits geopolitical importance. Azerbaijan would export its gas to Europe by bypassing Russian territory. Azerbaijan takes an important step to follow a relatively independent policy in the South Caucasus. This project also initiates a new energy corridor that counters Russia’s aspiration of establishing a natural gas monopoly over the EU. Possible inclusion of Turkmen gas via Trans-Caspian gas to TANAP will turn Azerbaijan into both a supplier and transit country. In January 2015, when the three countries’ foreign ministers met in Ashgabat, the Azerbaijani and Turkish sides reportedly invited Turkmenistan to join the Trans-Anatolian gas pipeline (TANAP) project. Both Russia and Iran opposedthe Trans-Caspian Pipeline. However, current regional and international developments have influenced Ashgabat's calculations, and emphasized the need for close cooperation with Turkey and Azerbaijan. The Russian financial crisis and decline of oil prices have strengthened Ashkabat's motivations for seeking alternative market for its gas (Shiriyev, 2015). However, legal dispute over the status of the Caspian Sea makes the inclusion of Turkmen gas very difficult. Energy expert Dr. Volkan Özdemir stated that "The Turkmen need to get the consent of Russia for a pipeline under the Caspian Sea to connect with the TANAP pipeline running to Turkey. That will be impossible because Russia does not want competition [for the] European market" (Could Turkey Become The New Ukraine?, 2015).

For Turkey, the geopolitical picture is complex. There is a difference between being an energy corridor and energy hub.Being an energy corridor implies that Turkey fails to prioritize domestic needs, is satisfied with average transit terms and conditions, and cannot re-export a considerable amount of the oil and gas passing through its lands. Turkey as an energy hub stresses Turkey's extensive influence on a web of oil and gas pipelines as well as Liquefied Natural Gas (LNG) trade, not only in terms of its ability to influence transit terms and conditions, but also in re-exporting some of the hydrocarbons passing through this system (Bilgin, 2010). With TANAP project, Turkey becomes an energy corridor instead of an energy hub. Turkish part ofTANAP starts at Turkish-Georgian border and ends in Edirne at Turkish-Greece border. Gas price is not determined in Turkey and Turkey has no right to re-export. TANAP will be connected TAP in Greece (Özdemir, 2015a).

The impact of TANAP will be felt in Turkey's immediate neighborhood. TANAP facilitates close cooperation between Azerbaijan and Turkey. **Turkish state-owned company TPAO acquired French TOTAL's shares (%10) at the Shah Deniz Consortium for USD 1.45 bln. Also, Turkey acquired 10% more shares from SOCAR with BOTAS at the TANAP Project reaching a total share of 30%** (Ertürk & Aybay, 2014)**.Turkey actually becomes the second largest shareholder after BP of Azerbaijani gas field whose gas is transferred via Turkey. "**In order to develop the Shah Deniz 2 in the Caspian Sea and construct the necessary infrastructure to feed the markets, nearly US$50 billion of investment is required. By taking shares in the European majors like French Total and Norwegian Statoil, Turkish companies are now under a huge financial commitment"(Özdemir, 2014). **Azerbaijan is compensating Turkish endeavors to develop Azerbaijani gas fields by investments in Turkey.** SOCAR President Rovnag Abdullayev said that: "SOCAR's investments in Turkey continue with the acquiring of PETKIM by SOCAR and the STAR Refinery which is under construction. Azerbaijan became the largest foreign investor in Turkey" (Ertürk & Aybay, 2014). The effect of this close economic cooperation will be felt in the South Caucasus. In long term, Turkey, which is less dependent on Russia in natural gas supply and Azerbaijan, which is able to transport its gas by traversing Russian territory will be more active in shaping regional developments in the South Caucasus and recovering Azerbaijan's invaded territories in Nagorno-Karabakh region.

Another effect of TANAP will be observed in Western Balkans. **"**Azeri-Turkish energy cooperation will unite Caspian energy with Turkish geography and the two will hold a stake in European markets. In this way, Turkey will become politically more influential especially in the western Balkans in which it has historical ties and interests" (Özdemir, 2014). This ambitious geopolitical design is related with Turkish attempts to tie TAP with Ionian Adriatic Pipeline (IAP) which is planned to transport gas from the Trans Adriatic Pipeline in Albania and Croatia. The IAP project partners plan to build a 290km pipeline from an interconnection point with the TAP at Fieri in Albania, across Montenegro and Bosnia-Herzegovina to Ploce in southern Croatia, with reversed flow capability from north to south (TAP decision gives Ionian-Adriatic Pipeline a boost, 2013). In a feasibility study conducted in January 2014, it is predicted that transit amounts to 5 bcm per year which enable the gasification of Albania and Montenegro, southern Croatia and Bosnia and Herzegovina, providing a diversified and reliable natural gas supply (FS and ESIA for the Ionian – Adriatic Pipeline (IAP) Feasibility Study Report, 2014). Integrating IAP with TAP would give Turkey the opportunity for consolidating its sphere of influence in the Balkans through gas pipelines (Özdemir, 2014).

Russia’s current military assertiveness in Ukraine and attempts to use energy as a blackmail card might accelerate Balkan states to search for alternative natural gas from reliable supply sources. Negative growth of Russian economy and drop in oil prices will inhibit its ability to exert its influence in Balkans. “New demands on exporters, coupled with a weak currency and high interest rates, will hurt Russian investments abroad, including the operations of subsidiaries of large Russian firms. Countries such as Serbia and Bulgaria can expect lower demand for their goods, a decrease in Russian investment and fewer loans from the Russian government” (Russia Is Losing Ground in the Balkans, 2015). Russia already announced the cancellation of the South Stream, which would its consolidation over Balkans, by upsetting Bulgaria and Serbia. This could provide new opportunity for TAP’s extension to Balkans. Russia, on the other hand, proposed new pipeline project, named as ‘Turkish Stream’.

5. TURKISH STREAM

The demonstrations, which started in mid-February led to the ouster of Ukraine’s president Victor Yanukovich and the establishment of a pro-European regime. Russia’s reaction was swift. It annexed Crimea and began to support separatists in Eastern Ukraine. Due to this aggressive policies Russia had to face severe sanctions from the EU and the USA. Plunging oil prices exacerbated Russia’s worsening economy. Oil price fell from its peak earlier in the year of $115 a barrel to below $50. Fifty-two per cent of Russia’s budget revenues are derived from the energy sector (Sakwa, 2015). Declining economy brought some harsh choices in Russian politics and economics.

South Stream is one of the victims of Russia’s economy’s decline. South Stream project which would transport 63 billion cubic meter natural gas a year, equivalent 10 percent of European demand, from Russia via the Black Sea into the EU towards the end of this decade, would cement Russia's role as the region's dominant supplier.Plunging energy prices, stalling European demand and the political standoff between the European Union and Moscow over the crisis in Ukraine made the likelihood of Russia’s $40 billion project being built is close the zero (Gloystein & Zhdannikov, 2014). Instead, Vladimir Putin proposed a new pipeline project that will replace South Stream in transportation of Russian gas to Europe. The new pipeline is to cross the Black Sea seabed, bringing gas from Russia to Europe via a gas distribution hub on the Turkey-Greece border. Its capacity would be 63 billion cubic meter natural gas (Turkish Stream to Replace South Stream Gas Pipeline, 2014). Turkish Stream is financially more reasonable since the construction of a pipeline through the Black Sea to Turkey may come out cheaper, especially if it uses a parallel route to the current Blue Stream (Mordyushenko, 2014).

Turkey will take 15 billion cubic meters from Turkish Stream pipeline. Efgan Nifti, who is an energy expert at the Strategic Studies Institute of the Caspian Sea claimsthat considering Turkey’s enormous gas demand, Turkish Stream will complementary of TANAP instead of being a competitor. Both project are needed for energy security of Turkey (Аналитики: газопроводы TANAP и "Турецкий поток" не будут конкурировать, 2015).Mevlüt Çavuşoğlu, Turkey’s Minister of Foreign Affairs, stated that, The Trans Anatolia Natural Gas Pipeline, TANAP is Turkey's priority rather than Russia's last project proposal (TANAP natural gas project is Turkey's priority: FM, 2014).To gain Turkish favor Putin announced 6 percent reduction in the price of natural gas. PM Ahmet Davutoğlu, however, commented this percentage is not enough. Turkey expects 15 percent reduction in gas prices (Turkey asks Russia for bigger reduction in gas prices, 2014). In February 2015, Taner Yıldız, Turkish Minister of Energy and Natural Resources, announced that Turkey secured 10.25 percent discount on Russian gas supplied to Turkey. He says the agreement has yet to be signed (Moscow and Ankara agree 10.25% gas discount for Turkey, 2015). Turkey aims to buy cheap natural gas while maintaining gas supply until KRG gas becomes operational. Price reduction should not be only target of Turkey in this project. Turkey should make moves to enhance its geopolitical value. Turkey is currently an end consumer for Russian gas. This project will turn Turkey into an intermediate user as Turkish territory will be used to export additional volumes to European gas market (Özdemir, 2015b).Turkey together with TANAP, possible Trans-Caspian pipeline project, the Northern Iraqi gas pipeline project will be the natural gas valve for Europe.

The placement of the hub in Turkish Stream is the most important subject. The hub is planned to be established at Turkish-Greek border. This approach will make Turkey a transit state and enable Greece to become an energy hub. In April 2015 during his visit to Greece, Vladimir Putin said that: "*The new route will provide for European fuel needs, and would allow Greece to become one of the main power distribution centers on the continent, and could help attract significant investment into the Greek economy*" (Turkish Stream will make Greece Europe's energy hub- Putin, 2015). *The project is named after Turkish but Greece will reap the benefits. This is not satisfying for Turkey. Turkey wants* LNG plants to be constructed as a part of Turkish Stream. For this, there would have to be a further pipeline across Turkish Thrace from the Black Sea and ending on the Mediterranean Sea coast for export not only to European and also to world markets (Cutler, 2015). Turkey has the upper hand. *Turkey emerged as the only viable route for the delivery of Russian gas to Europe due to Ukraine crisis. It is Russia which needs Turkey's cooperation to reduce its dependency on Ukraine in delivering its natural gas to Europe. Therefore, Turkey must insist that a physical hub needs to be established within Turkey's borders.*

6. CONCLUSION

Turkey's oil and natural gas demand require Turkey to play an active role in its energy rich neighborhood. Although Turkey had taken a hostile approach towards the emergence of an autonomous Kurdish region in Iraq during Iraq's invasion in 2003, it adopted a more conciliatory approach. The relations with the KRG constitute important element of Turkish foreign policy in recent years. Oil deals made between Turkey and the KRG secure Turkey's energy demand while the KRG will export its energy resources through Turkey reducing its dependence on Iraq's central authority. Turkey, however, is careful in preventing the emergence of an independent Kurdish state which threatens its territorial integrity. The instability in Iraq and Syria compelled Turkey to play a complex game which involved various actors. In recent example, ISIL's offensive in Northern Syria caused Turkey to experience a dilemma. Turkey didn't want self-declared Kurdish region Rojava to flourish in Northern Syria. On the other hand, it contains a significant amount of Kurdish population which forced Turkey to intervene in the conflict and to allow opening of a corridor. Nevertheless, Turkey waited until the last moment, then it allowed opening of the corridor. Despite international criticism and internal havoc, 'Rojava Revolution' has become a diminishing political alternative and Turkey maintained its position.

In long-term, Turkey plans to import natural gas from the KRG in order to reduce its dependency on Russia but Turkey needs natural gas now. Therefore, Turkey engages in realization of gas projects to diversify its supply. TANAP which transports Azerbaijani gas to Europe via Turkey is inadequate for Turkish demand but this project has a potential to bolster Turkey's geopolitical position in its immediate neighborhood. Turkish Stream pipeline project, emerged due to cancellation of the South Stream, is another project, which will increase Turkey's geopolitical position and secure its energy supply in a discounted price. Turkey, however, must use its upper hand vis a vis Russia to establish a virtual hub in its borders. Thus, Turkey will take important step of realizing its dream of becoming an energy hub.

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AVRUPA KOMİSYONUNUN KURUMSAL NORMATİF GÜCÜ: ENERJİ İÇ PAZARININ OLUŞTURULMASI ÖRNEK OLAYI

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ÖZET

Avrupa Birliği'nin (AB) normatif güç olup olmadığı tartışmalarının yapıldığı ve örnek olaylar üzerinde analizlerin yapıldığı sınırsız alana enerji konusu da bu çalışmayla eklenmiştir. Enerji; hem bütün devletlerin etkisine açık olması hem de önemli dengelerin gözetilmesi gerekliliğini içermesi bakımından özel bir alandır. Avrupa Komisyonu'nun enerji iç pazarının oluşturulması yönünde yaptığı çalışmalar ve 1996 yılından bu yana iç pazarın oluşturulması yönünde atılan adımlar, üye devletler ve Komisyon arasındaki politik mücadelenin ana kaynağını oluşturmaktadır. Üye devletler, enerji alanını milli hükümetlerin yetki alanında tutmak isterken; Komisyon, normatif kaygılarla enerji alanının Birlik yetki alanında olması gerektiğini savunmaktadır. Normatif güç tartışmalarının yapıldığı dönemde AB'nin enerji iç pazarına yönelik olumlu olmayan tavrı normatif güç algısının ciddi şekilde eleştirilmesine yol açmıştır. Çalışmada normatif güç kavramı konuyla bağlantılı şekilde incelenip enerji piyasalarının serbestleşmesi alanında üye devletler ve Avrupa Komisyonu'nun pozisyonları değerlendirilecektir. Elde edilecek verilerle AB'nin normatif güç kimliği analiz edilecektir.

Anahtar Kelimeler: AB, Normatif Güç, Avrupa Komisyonu, Enerji İç Pazarı

ABSTRACT

Energy is added to the limitless area which includes the discussions relating if the EU is normative power or not and analysis by case studies. Energy is a special area because both it is open to the all states' influence and it is required to provide balances between powers. The workings made by European Commission in order to establish internal energy market is the main roots of the political struggle between member states and European Commission. Whilst member states aims to keep energy under their own authorization, Commission argue with normative concerns that energy must be kept under Union's competence. At the term normative power concept is under discussion, EU's negative position in relation to internal energy market was seriously criticized. In this study, normative power concept will be studied and positions of European Commission and member states relating to liberalization of energy markets will be examined. EU's normative power will be analyzed with the findings.

Keywords: EU, Normative Power, European Commission, Internal Energy Market

GİRİŞ

AB kurulduğu dönemden itibaren farklı rol tanımlarının içinde bulunmaktadır. Sivil güç, yumuşak güç ve normatif güç bunlara örnek teşkil etmektedir. Özellikle 2000 yılı sonrasında AB'ye normatiflik vurgusu çok fazla yapılmakta ve AB yetkilileri de bu tanımı

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kendi söylemlerine yansıtmaktadır. Bu görüşü savunmayanlar olsa da her karşıt argüman normatiflik vurgusunu daha da arttırmaya neden olmakta ve bu sebeple normatif güç AB özelinde tartışılan önemli bir konu olmaya devam etmektedir.

AB hem ekonomik hem de siyasi tanınmışlık gücünden dolayı normali şekillendirecek kapasiteye sahiptir. Bu sebeple benimsediği normları özellikle aday devletlere ve ilişkide olduğu diğer devletlere yaymayı hedeflemektedir. Fakat AB bu normları yaymadan önce kendisinin de benimsemesi ve bu normları uygulaması beklenmektedir. Fakat enerji iç piyasası oluşturma konusu bu konuda AB'nin eksikliği olarak gösterilebilmektedir.

AB antlaşmalarında çevre, tüketicilerin korunması ve rekabet konuları bulunmaktadır. Çevrenin korunmasına yönelik uluslar arası bir antlaşmaya imzasını atmış olsa da veya aday devletlerden bu konularda adım atmaları beklenmiş olsa da AB'nin kendi içindeki uygulamasında sorun görülmektedir. Çünkü enerji iç piyasasının oluşturulması rekabetin, çevrenin ve tüketicilerin korunması anlamlarına gelmektedir. Fakat AB bu konuda yeterince adım atmış değil onun yerine kurumsal temelde Avrupa Komisyonu'nun aktif olduğu görülmektedir. Bu sebeple AB'nin eksik bıraktığı alanda Komisyon'un önemli bir rol aldığı söylenebilmektedir.

1. NORMATİF AVRUPA?

AB hem yapı hem de dış politika açısından farklı bir uluslararası aktördür. Ticari ve ekonomik meselelerde partner ülkeleri etkileme ve siyasi ve demokratik olarak ideal olanı o ülkelere benimsetme gücüne sahiptir. Bu sebeple diğer uluslar arası örgütlerden farklıdır. AB'nin kendine özgü yapısından ötürü uluslar arası rolü farklı kavramlarla tanımlanmıştır. Louis-François Duchêne AB'yi sivil güç olarak tanımlarken Christopher J. Hill onun yumuşak güç olduğunu söylemiştir. Ian Manners ise AB'yi normatif güç olarak kavramsallaştırmıştır. Yukarıda da bahsedildiği gibi AB'nin farklı biçimlerde tanımlanmasındaki temel etken onun benzersiz bir aktör olmasından kaynaklanmaktadır. AB, savaş sonrası bir dönemde oluşturulmuştur. Yıkıcı ve soykırımların olduğu dönemden sonra AB kurumları kendilerini barış ve özgürlüğü güçlendirme ve korumaya adamıştır. Savaş dönemi yaşamaları, farklı bir örgüt olmaları AB'yi üye devletler ve dünya ile ilişkilerinin merkezine evrensel prensip ve normları yerleştirmeye zorlamıştır.[*]

Normatif güce ilişkin gerekli bilgiler verilmeden önce normal kavramını tanımlamak gerekmektedir. Normal kavramı sübjektif olarak oluşmakta ve bu oluşumdan sonra normal olan benimsenmektedir. Normlar ise uygun davranış standartları olarak anlaşılabilmektedir. Fakat bu uygunluk sübjektiftir.[†] AB'nin normatif güç olarak adlandırılması aslında yeni bir durum değildir. AB'nin normatiflik yönü 1970'lerden beri tartışılan bir konudur. Örneğin, Edward Hallett Carr düşünce üzerindeki güç (power over opinion) kavramını, Duchene fikir gücü kavramını ve Johan Galtung ise ideolojik gücün düşünce gücü olduğunu çalışmalarında dile getirmektedir.[‡]

Normatif güç kavramı farklı disiplinlerde farklı anlamlara gelmektedir. Siyaset felsefesinde, hukuki çalışmalarda ve müzakere çalışmalarında normatif gücün farklı

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[*] Ian Manners, **"Normative Power Europe: A Contradiction in Terms?",** Journal of Common Market Studies, 2002, Cilt:40, Sayı:2, s.240.

[†] Daniel S. Hamilton, ***"The United States: A normative power?",*** *CEPS Working Document, Sayı: 291, Mayıs 2008, s.3*

[‡] Manners, 2002, s.239.

şekillerde tanımları yapılmaktadır.[*] Manners'a göre normatif güç normal kavramını şekillendirme kapasitesidir. Ona göre AB'nin uluslar arası ilişkilerde normali şekillendirecek kapasitesi mevcuttur.[†] AB'nin normatif temeli deklarasyonlar, antlaşmalar, politikalar, kriterler ve şartlar ile geliştirilmiştir.[‡] AB, BM sistemi içinde kabul edilen normları ve prensipleri de desteklemektedir.[§] Normatif güç yaklaşımında bu gücün geniş çaplı olduğuna vurgu yapılmaktadır. Yani bu normlar ve prensipler sadece üye devletlerle ilişkilerde değil aynı zamanda dünyanın geri kalanıyla olan ilişkilerde de merkezi role sahiptir. Yani normatif gücün evrensellik gibi bir özelliği mevcuttur.[**]

Ekonomi temelli kurulan bir topluluk olan AB, 1990'larda siyasi ilişkilere odaklanmıştır. Bu tarihten sonra dış politikasında normatif değerlerin ciddi bir şekilde etkisini görmek mümkün olmuştur. Yukarıda AB'nin deklarasyonlar, antlaşmalar vb belgeler aracılığıyla değerlerini oluşturduğu ifade edilmiştir. Yani bu belgeler aracılığıyla AB, normatif temelin oluşturmuştur. Ayrıca Lizbon Antlaşması (madde 2) ile demokrasi, hukukun üstünlüğü, toplumsal adalet ve insan hakları gibi normlar resmi statü kazanmıştır. [††]

Manners'a göre AB'nin beş temel dört tane de ikincil normu bulunmaktadır. Barış, özgürlük, demokrasi, hukukun üstünlüğü ve insan hakları temel normları oluşturmaktadır. Toplumsal gelişme, ayrımcılıkla mücadele, sürdürülebilir büyüme ve iyi yönetişim ise ikincil norm kapsamına girmektedir. Bu normlar AB antlaşma metinlerinde strateji belgelerinde ve oluşturdukları kriterler içinde mevcuttur.[‡‡]

Çeşitli dökümanlar aracılığıyla benimsenen normlar altı farklı yol ile yayılma etkisi göstermektedirler. Birinci yol normların sirayetiyle gerçekleşmektedir. Bu yol AB fikirlerinin planlanmamış bir şekilde siyasi aktörlere yayılma etkisi göstermesini anlatmaktadır. Enformasyonel bir şekilde de normlar yayılabilmektedir. Stratejik ve açıklayıcı iletişimle bu yol ortaya çıkmaktadır. Üçüncü norm yayma yolu da prosedürel olarak gerçekleşebilmektedir. AB ve hedef aktör arasındaki ilişkinin kurumsallaşması yoluyla normlar yayılabilmektedir. Bunun en bariz örneği ise genişleme politikasıdır. AB ve hedef aktör arasındaki ticaret, finansal veya teknik yardım ilişkisi sonucunda yani faydaların transferiyle de normlar yayılabilmektedir. Bir diğer norm yayma yöntemi aleni olarak gerçekleşmektedir. Yani AB, hedef devlette fiziksel varlığıyla bulunmaktadır. Delegasyonlar, üye devletlerin elçilikleri veya seçim gözlem misyonları bu kapsama girmektedir. Son norm yayma şeklide kültürel yoldan gerçekleşmektedir. Bu yol, hedef devlet veya organizasyonda siyasi öğrenme ve uluslar arası normların etkisi aracılığıyla ortaya çıkmaktadır. [§§]

AB'nin kendi söylemleri, belgeleri ve antlaşmaları normlarının referans noktası olsa da AB dışında da bu normların referans noktaları bulunmaktadır. Örneğin, barışın referans noktası 1945 BM Şartı, 1975 Helsinki Nihai Senedi ve 1990 Paris Şartı'nın

[*] Ian Manners, "Assessing the Decennial, Reassessing the Global: Understanding European Union Normative Power in Global Politics", Cooperation and Conflict, Cilt:48, Sayı:2, 2013, s.311.

[†] Manners, 2002, s.253.

[‡] Manners, 2002, s.242.

[§] Ian Manners, **"The Normative Ethics of the European Union",** International Affairs, Cilt:84, Sayı:1,2008, s.47

[**] Ian Manners, **"The European Union as a Normative Power: A Response to Thomas Diez",** Millennium- Journal of International Studies, Cilt:35, Sayı:1, 2006, s.176

[††]European Commission, Lisbon Treaty, http://eur-lex.europa.eu/legal content/EN/TXT/HTML/?uri=CELEX:12007L/TXT&from=EN, (26.05.2015).

[‡‡] Manners, 2002, s.242-243.

[§§] Manners, 2002, s.244-245.

amaçları olarak gösterilebilmektedir. Özgürlük, demokrasi, insan hakları ve hukuk üstünlüğü normlarının referans noktaları Avrupa Konseyi'nin 1950 Avrupa İnsan Hakları Sözleşmesi ve Avrupa İnsan Hakları Mahkemesi içtihatları olarak gösterilebilmektedir.[*] AB'nin prensipleri ve onun dünya ile ilişkileri BM Şartı, Helsinki Nihai Senedi, Paris Şartı, İnsan Hakları Evrensel Bildirgesi ve BM Sözleşmeleri ve Avrupa İnsan Hakları Sözleşmesi prensipleri temelinde gelişmektedir.[†]

Manners, AB'nin sadece kendi normlarına göre değil aynı zamanda evrensel prensiplere göre de yaşayarak bu prensipleri tesis etmeye çalıştığını vurgulamaktadır. Yani AB'nin dış ve iç politikaları arasında bir uyum mevcuttur.[‡] Üye devletlerin sadece benimsedikleri ve uyguladıkları normları ve prensipleri partnerlere yaymaya çalıştıkları sonucuna varılabilmektedir. Bununla beraber Manners, AB'nin uluslar arası rolünü biçimlendirenin onun ne yaptığı veya ne söylediğiyle değil ne olduğu ile alakalı olduğunu vurgulamaktadır.[§] Yani yine AB'nin normları ve prensipleri uygulayan bir birlik olduğu sonucuna varılmıştır.

AB'nin normatif gücüne en önemli örnek olarak idam cezasının kaldırılması gösterilebilmektedir.[**] Amsterdam Antlaşması'yla ölüm cezasının kaldırılması tüm üye devletler tarafından benimsenmiştir. Bu antlaşma sonrası AB ilişkide olduğu devletlerden de bu cezayı kaldırmalarını talep etmiştir. Bazı ülkelerin bu cezayı terk etmelerindeki sebep AB olarak görülebilmektedir.[††]

Normatif güç diğer güç çeşitleriyle birlikte var olabilmektedir. Yani normatif güç, askeri gücü ve sivil gücü reddetmemektedir. Bu güç çeşitleri normatif gücü destekleyen unsurlar olarak ortaya çıkabilmektedir. Örneğin, normatif güç olarak kabul edilen AB'nin aynı zamanda sivil güce sahip olması hedef devletlerin veya örgütlerin belirli normları benimsemesinde AB'yi daha ikna edici bir pozisyona getirmektedir. Normatif gücün üç temel özelliği bulunmaktadır. Birinci özelliği normatif güç askeri gücü reddetmemektedir. Gerektiği durumlarda askeri gücün kullanılmasının karşısında değildir. Diğer özelliği; normların yayılma biçimi genellikle materyal bir şekilde olmamaktadır. Son olarak hedef devlete, benimsetilmeye çalışılan davranış veya ilke bir ulusal çıkarın çıktısı değil evrensel normun gereği olmaktadır. Yani normatif gücün ulusal çıkarları yerine getiren bir araç olarak görülmemesi gerekmektedir.[‡‡]

Ian Manners normatif gücün devamlılığının normatif güce muhatap olarak kabul edilen aktörün algılamasına dayandığının altını çizmektedir.[§§] Yani normatif güç ilişkide olunan aktörler tarafından öyle algılanmazsa meşruiyet sorunu ortaya çıkması kaçınılmaz olmaktadır. Normatif güçte sadece devletlerin değil aynı zamanda bireylerin de korunması önemli yer teşkil etmektedir. Bireylerin hakları bu güçte vurgulanmaktadır. Ayrıca normatif

[*] Manners, 2006, s.171.

[†] Ian Manners, "The Concept of Normative Power in World Politics", **DIIS Brief**, 2009, http://diggy.ruc.dk/bitstream/1800/8903/1/Ian_Manners_the_concept_of_normative_power_in_world_politics_DIIS_Brief_2009.pdf (26.05.2015), s.2-3,

[‡] Manners, 2008, s.56.

[§] Manners, 2002, s.252.

[**] Ian Manners, **"Normative Power Europe: The International Role of the EU"**, EU Policies and Themes, European Communities Studies Association Panel, Madison, 31 Mayıs 2001, http://aei.pitt.edu/7263/1/002188_1.PDF (26.05.2015), s.17-20,

[††] Manners, 2001, s.19.

[‡‡] Ian Manners ve Thomas Diez, **"Reflecting on Normative Power Europe",** Power in World Politics, (Ed. F. Berenskoetter ve M.J. Williams), New York: Routledge, 2007, s.176-178.

[§§] Manners, 2008, s.46.

değerleri olan aktörün sadece başka aktörleri değil kendini de bu normlara sıkı sıkıya bağlaması gerekmektedir.[*]

Normatif güç üzerine önemli tartışmalar bulunmaktadır. AB'nin diğer ülke ve örgütlere normları benimsetme açısından çifte standart uygulayıp uygulamadığı yönünde sorular mevcuttur. Yani AB her ilişkide olduğu ülkeye benimsediği normları yaymayı amaçlamakta mıdır? AB kurumlarının farklı normları ve çıkarları benimseyip bu yönde hareket edip etmedikleri de sorulan sorular arasındadır.[†]

2.ÇEVRENİN KORUNMASI VE REKABETİN DESTEKLENMESİ NORMLARI

Çevrenin korunması ve rekabetin desteklenmesi AB'nin önemle üzerinde durdukları alanlardandır. Bu alanlar hem antlaşma metinlerinde hem de üyelik için istenen kriterler arasında gösterilmektedir. Bu nedenle bu alanların AB'nin normları olduğunu söylemek yanlış olmayacaktır. Bu sebeple enerji iç pazarı oluşturma çabaları kapsamında özellikle bu iki norm ele alınıp tüketici haklarına vurgu yapılacaktır. Konunun daha iyi anlaşılabilmesi için bu bölümde iki norm hakkında antlaşma temelli kısa bilgiler verilecektir.

AB 1973 yılına kadar çevre konusuyla ilgilenmemiştir. Kurucu antlaşmalarda da bu konuya yer verilmemiştir. 1973 yılında ilk çevre eylem programı oluşturulmuştur. 1987 Tek Avrupa Senedi'ne kadar AB çevre konusuna yoğunlaşmıştır. Bahsedilen dönem içinde 120 yönerge, 27 karar ve 14 tüzük yayımlanmıştır. Avrupa Tek Senedi'nde çevre ve insan sağlığının korunmasına ve doğal kaynakların mantıklı kullanımına özel olarak yer verilmiştir. Ayrıca çevrenin ele alındığı bölümde Komisyon'un çevreyi koruma ve tüketici haklarını koruma alanlarında etkin bir biçimde rol alacağı temellendirilmiştir. Maastricht Antlaşması'nda ise çevre politikalarının sürdürülebilirlik ilkesi gereğince ele alınacağı belirtilmiştir. Ayrıca enerji, ulaşım, ticaret gibi alanlarda Birlik politikalarını belirlerken çevresel kaygıların göz önünde tutulacağı belirtilmiştir. Amsterdam ve Nice Antlaşmaları'nda da çevre konusuna olan önem arttırılmıştır. Lizbon antlaşması ile çevre alanı AB ile üye devletlerin paylaşılan yetki alanları kapsamına girmiştir.[‡]

Konu bağlamında ele alınacak bir diğer konu ise rekabet alanıdır. AB'nin ortak rekabet politikası oluşturduğu bilinmektedir. AB'nin ortak rekabet politikası oluşturmasındaki temel amaç üye devletlerdeki aktörlerin adil bir şekilde rekabet etmelerine izin verecek bir iç pazarı oluşturmaktır. AB bu politikayla bazı önlemler getirmiştir. Bu önlemlerle rekabetin bozulmasının önüne geçilmeye çalışılmıştır. Rekabeti koruma hem tüketicileri hem de üreticileri koruma anlamına gelmektedir. Bu nedenle önemli bir politika alanıdır. Kısacası AB'nin amacı piyasa ekonomisinin işleyişini ve temel aktörlerini korumaktır.[§]

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[*] Helene Sjursen, **"The EU As a "Normative" Power: How Can This Be",** Journal of European Public Policy**,** Cilt:13, Sayı: 2, 2006, s. 169

[†] Diez ve Manners, 2007, s.173

[‡] Bülent Duru, "Avrupa Birliği Çevre Politikası", **Avrupa Birliği Politikaları,** (Ed. Çağrı Erhan, Deniz Senemoğlu), İmaj Yayınevi, Ankara, 2007, s.175-180.

[§] Edward Bannerman, **The Future of Competition Policy**, Centre For European Reform, 2002, s.3-5.

3.AVRUPA BİRLİĞİ ENERJİ İÇ PAZARININ KURULMASI

Avrupa Birliği enerji politikalarının amaçları, topluluğun rekabet edebilirliğine katkı sağlamak, enerji arz güvenliğini temin etmek, sürdürülebilir kalkınmayı sağlamak ve çevrenin korunmasına katkıda bulunmak olarak özetlenebilir. Bu amaçla, çeşitli yönetmeliklerle düzenlemeler yapılmakta ve Komisyon tarafından raporlar, öneriler, strateji belgeleri ile bu alanda oluşturulacak politikalara zemin hazırlanmaktadır.

Kurucu Antlaşmalardan olan Lizbon Antlaşması da, Komisyonun deyimiyle enerjiyi Birliğin eylemlerinin kalbine yerleştirmiştir. Daha önceki antlaşmalardan farklı olarak, enerjiye yasal temellerini vermiştir.[*] Lizbon Antlaşması, kurucu antlaşmalar içinde enerjiye özel bir bölümde yer vererek onun önemini kabul eden oldukça önemli bir antlaşmadır. Bundan önceki antlaşmalarda, Birliğin enerji alanına müdahalesini içeren özel düzenlemeler bulunmuyordu. Lizbon Antlaşmasının 194. maddesi ile üye devletler enerjinin Birlik seviyesinde ele alınmasını kabul etmiş oldular. Bu maddeye göre Birlik,

-enerji iç pazarının işleyişini güvenceye almak

-enerji arz güvenliğini sağlamak

-enerji verimliliğini artırmak

-enerji ağları arasındaki bağlantıları artırmak

konularında yetkilendirilmiştir. [†]

Manners, normatif gücü, normal kavramını şekillendirme kapasitesi olarak tanımlarken, AB'nin normatif temelini deklarasyonlar, antlaşmalar, politikalar, kriterler ve şartlar ile geliştirdiğinden söz etmiş ve AB'nin normları belirlerken bu belgeleri temel aldığından bahsetmiştir. Bu çalışmada da, enerji için temel metinler olan Lizbon Antlaşması ve Komisyon tarafından enerji iç pazarının kurulması ve güçlendirilmesi ile ilgili olarak çıkarılan 3 adet enerji paketi temel dokümanlar olarak kabul edilmiş ve "rekabetin artırılması", "tüketici haklarının korunması" ve "çevrenin korunması" AB'nin üzerinde anlaştığı normlar olarak belirlenmiştir.

İç pazarın kurulması elektrik ve doğal gaz piyasalarında da bir iç pazar kurulmasını zorunlu kılmıştır. Çünkü gerçekleştirilen kamu alımları, oluşturulan çevre yasaları, vergiler ve rekabet politikaları enerji alanında da bir iç pazar kurulmasını gerektirmektedir.[‡] Bu sebeple AB, çeşitli direktifleri içeren 3 adet enerji paketini kabul etmiştir. Paketlerde öncelikle şeffaflığın artırılması ile elektrik ve doğal gaz şebekelerinin ara bağlantılarının artırılmasına odaklanılmıştır. Doğru bir piyasa yapısı oluşturabilmek için öncelikle üye devletler arasındaki ara bağlantılarının artırılması ve bu alanda yatırımlar yapılarak alt yapının güçlendirilmesi gerekmektedir.[§]

Serbestleşme, enerji alanında bir iç pazar kurulması için temel taştır. Ancak

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[*] Europa, European Energy Policy, http://europa.eu/legislation_summaries/energy/european_energy_policy/index_en.htm , (18.05.2015).

[†] Europa, "Energy", http://europa.eu/legislation_summaries/institutional_affairs/treaties/lisbon_treaty/ai0024_en.htm (18.05.2015)

[‡] İzak Atiyas ve Jorge Nunes Ferrer, "İkinci Kuşak Yapısal Reformlar: Altyapı Sektörlerinde De-regülasyon ve Rekabet-Enerji Sektörü Raporu", **Ekonomi ve Dış Politikalar Araştırma Merkezi**, İstanbul, 2007, s.87

[§] Euractiv, "Analysis: Development of the Internal Electricity Market in Europe", 2006, http://www.euractiv.com/energy/analysis-development-internal-electricity-market-europe/article-154609 (12.05.2014)

Komisyonun serbestleşmeyle amaçladığı sadece rekabetçi bir enerji iç pazarı kurulması değildir. Serbestleşme sürecinin sonunda piyasada etkinliğin artması; maliyetlerin düşmesi; müşterilerin daha ucuza daha kaliteli hizmet alabilmesi ve böylece refahın artması; rekabet arttığından aynı zamanda inovasyon ve pazarda dinamizmin artması; elektrik üretim kapasitesine ve iletim ağlarına yapılan yatırımın artması, arz kesintisi olması halinde üye devletler arasında işbirliği sağlanması beklenen çıktılar arasındadır.[*]

Rekabetçi bir piyasa genel olarak, ürün arzındaki kalitenin artmasında ve maliyetlerin düşmesinde oldukça etkili bir mekanizmadır. Rekabetçi bir piyasa oluşturmak için ağ alt yapılarının bağımsız olarak işlemesi ve böylece tüm müşterilere ve üreticilere ağa erişimde eşit fırsatlar sağlanması gerekir. Aynı zamanda müşterilerin, hangi firmadan enerji tedariki hizmeti alacakları konusunda özgürce ve birbirinden farklı tercihleri olması da önemlidir. Komisyon, bugün AB vatandaşlarının tüm dünyanın en pahalı elektriğini kullanmakta olduğunu ve şirketlerin ve hane halkının elektrik enerjisine ödediği nihai fiyatların son on yılda arttığını ifade etmektedir. Komisyon bu durumda, vergilerin artmasının ve ağ masraflarının etkisi olmakla birlikte sınırlı rekabet ve bazen verimsiz sonuçlar doğuran devlet müdahalelerinin de önemli rol oynadığını dile getirmektedir. Bu durum elektrik piyasalarına yapılan devlet müdahalelerinin, enerji iç pazarının sağlayabileceği fırsatların düşünülmeden planlanmasından ve uygulanmasından kaynaklanmaktadır. Komisyon, devlet müdahalelerinin tamamen ortadan kalkmasını savunmamakta ve zaman zaman herkes için piyasa fırsatlarını eşitlemek ve piyasa hatalarını düzenlemek için devlet müdahalelerinin gerekebileceğini dile getirmektedir. Ayrıca, devlet müdahalelerinin haklı görüldüğü bazı alanlarda belirlemiştir. Bunlar, yenilenebilir enerjinin pazar payının artırılması, tüketicilerin enerjiyi daha verimli kullanması yönünde teşviklerin yapılması ve küresel iklim değişikliği ile ilgili tehditlerin azaltılması için daha az karbon salınımı yapan elektrik

üretim yollarının bulunmasıdır.[†] Bu durumların devlet müdahalelerinin meşru görüldüğü alanlar olarak dile getirilmesi, enerjinin temellerinin atıldığı yasal metinlerden çıkarılan “çevrenin korunması”, “tüketici haklarının korunması” ve “rekabetin artırılması” normlarının birbiriyle bağlantılı olduğunu göstermektedir. Rekabetin artırılması için devlet müdahalelerinin olmaması gerektiği dile getirilirken, yenilenebilir enerjiden elektrik üretecek firmalara devlet teşviki verilmesi piyasalara müdahale olarak değerlendirilmemiş ve “çevrenin korunması” normunun bir gereği olarak görülmüştür.

AB’nin rekabetçi bir enerji iç pazarına ulaşabilmesi için “*ayrıştırma*” faaliyetleri yürütmesi gerekmektedir. Ağların ayrıştırılması ayrımcılığa karşı doğal bir çözüm gibi görünmektedir. Ağları tam olarak ayrıştırmak rekabet için tercih edilebilir bir çözüm olsa da, ölçek ekonomisi açısından maliyetleri olabileceği dile getirilmektedir.-[‡] Ancak üye ülkeler bu konu üzerinde tartışıyor olsa da, özellikle Komisyona göre dikey bütünleşmiş şirketlerin yasal ayrıştırması rekabetçi bir piyasa oluşturulması sürecinin en önemli parçalarından biridir. Bu şekilde piyasadaki tekelci ve rekabetçi eylemler birbirinden ayrılır ve piyasadaki tüm aktörler ağlara erişim, bürokratik prosedürlerin kolaylığı ve devlet teşviki gibi konularda eşit fırsatlara sahip olurlar. Serbestleşme sürecinde temelde tartışılan

[*] Peter Turuscott, “Delivering Energy Security at Home: The Creation of an Internal Energy Market”, **Whitehall Papers**,Cilt:73, Sayı: 1, s.54

[†]European Commission, “Communication from the Commission- Delivering the internal electricity market and making the most public intervention”, 2013, http://ec.europa.eu/energy/sites/ener/files/documents/com_2013_public_intervention_en.pdf (23.05.2015), s.4.

[‡] Damien Geradin, “Twenty Years of Liberalisation of Network Industries in the European Union: Where do we go next?”, **Social Scientist Research Network**, 2006, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=946796 (10.04.2014), s.10.

iki farklı ayrıştırma modeli vardır: mülkiyet ayrıştırması ve yasal ayrıştırma.

Mülkiyet ayrıştırması, bir iletim şirketinin aynı zamanda üretim ve dağıtım faaliyetlerinde bulunamayacağı anlamına gelir. Yalnızca üretimde ve dağıtımda kontrol yetkisi bulunmayan bir azınlık hissesi sahibi olabilir; bu da her iki şirkette de veto yetkisi olmayacağından kontrol sahibi olamayacağı anlamına gelmektedir. Başka bir deyişle, faaliyetler ve varlıklar aynı hisse/sermaye sahiplerine ait olamaz. Yasal ayrıştırmada ise faaliyetler ayrılmasına rağmen mülkiyet ortak olabilir. Yani bir şirketin farklı faaliyet alanlarında ayrı tüzel kişilikler olarak yeniden yapılanması gerekir. Ancak bu farklı farklı faaliyetleri yürüten farklı şirketler tek bir sermaye grubuna ait olabilir. Bu sebeple de yasal ayrıştırmanın dikey bütünleşmiş şirketlerin tamamen ayrıştırılması anlamına geldiği söylenemez. Yasal ayrıştırmanın mülkiyet ayrıştırmasından farklılaştığı nokta budur.[*]

AB üye devletleri, enerji piyasalarını serbestleştirmeye 1996 yılında yayınlanan 96/92/EC sayılı Elektrik Direktifi ile başlamıştır. Birleşik Krallık, Almanya ve İskandinav ülkeleri serbestleşme sürecine ilk olarak başlayan ülkelerdir. Fransa, İtalya, Yunanistan, Portekiz ve İrlanda ise çok uzun süre dikey bütünleşmiş şirketleri korumuşlardır. 1996 ve 1998 yılında çıkan elektrik ve doğal gaz piyasalarına yönelik direktifler ise üye ülkeleri aşamalı olarak piyasalar üzerindeki devlet kontrolünü azaltmaya zorlamıştır. Öncelikle serbest rekabet ortamının sağlanması ve yeni girişimcilere fırsat verilmesi için üretim alanında devlet kontrolü azaltılmıştır. Daha sonra 2003 yılında çıkan 2. enerji paketi ve 2009 yılında çıkan 3. enerji paketi ile enerji iç pazarının oluşturulması süreci devam etmiştir.

3.1. Birinci Enerji Paketi

Birinci enerji paketi, 1996 yılında elektrik piyasasına yönelik 1998 yılında da doğalgaz piyasasına yönelik olarak kabul edilen iki adet direktifi içermektedir. Bu iki direktifte çeşitli farklar bulunmakla birlikte temelde içeriği aynıdır. Ancak doğal gaz piyasasında öngörülen ayrıştırma, elektrik piyasasına göre daha yavaş ve daha esnek koşullar içermektedir. Bunun sebebi de AB'li şirketlerin AB dışındaki tedarikçilerle olan rekabetinde ayrıştırma sebebiyle pazarlık güçlerinde bir azalma olmasını engellemektir. İki direktifte de amaçlanan serbest ticaretin önündeki engelleri ortadan kaldırmak suretiyle elektrik ve doğal gaz piyasalarında adil bir rekabet ortamı yaratmaktır.

Elektrik piyasasına yönelik direktif 19 Şubat 1997 tarihinde yürürlüğe girmiş ve ulusal yasalara 2 yıl içinde aktarılması öngörülmüştür. Bu direktifte sadece büyük ve orta ölçekli şirketlerin tedarikçilerini seçebilmelerine imkân verilmiştir. Bunlar için 6 yıllık bir geçiş dönemi öngörülmüştür. İlk elektrik direktifinin uygulanması elektrik piyasasının gelişimi ve piyasaların açılması açısından önemli gelişmeler sağlamıştır. Özellikle büyük tüketiciler için fiyatların düşmesi ve hizmet standartlarının yükselmesi açısından faydalar üretmiştir. Ancak ilk elektrik direktifi yalnızca genel prensipleri düzenlemiştir.[†]

Doğal gaz piyasasına yönelik direktif ise 10 Ağustos 1998 tarihinde yürürlüğe girmiş ve 2 yıl içinde ulusal yasalara aktarılması öngörülmüştür. Bu direktifte de sadece büyük ve orta ölçekli şirketlerin tedarikçilerini seçebilmelerine imkân verilmiştir ve geçiş dönemi 10 yıl olarak belirlenmiştir. Şebeke bağımsızlığı sadece iletim ve üretim

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[*] İzak Atiyas, **Elektrik Sektöründe Serbestleşme ve Düzenleyici Reform**, TESEV Yayınları, 2006, http://www.tesev.org.tr/assets/publications/file/Elektrik%20Sekt%C3%B6r%C3%BCnde%20Serbestle%C5%9Fme%20ve%20D%C3%BCzenleyici%20Reform_02.01.2006.pdf (23.05.2014), s.65.

[†] Mehmet Suat Kayıkçı, "The European Third Energy Package: How Significant for the Liberalisation of Energy Markets in the European Union?", **Social Scientist Research Network**, 2011, http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID2102161_code1844767.pdf?abstractid=2102161&mirid=1 (10.04.2014), s.3

faaliyetlerinde hesap ayrıştırması yoluyla sağlanmaya çalışılmıştır. Ayrıca direktifler şebekelere ayrımcı erişimi de engellemeyi amaç edinmiştir. Şeffaflığın sağlanması konusunda ise net bir kural konmamıştır. İlk doğal gaz direktifinin kabul edilmesi, doğal gaz sektöründe serbest bir iç pazar kurulması açısından önemli bir adımdır.[*]

3.2. İkinci Enerji Paketi

İlk enerji paketi, elektrik ve doğal gaz piyasalarının serbestleşmesini sağlamak konusunda yetersiz kalınca 2003 yılında Komisyon tarafından 2. enerji paketi ilan edilmiştir. Bu paket, birincideki gibi elektrik ve doğal gaz piyasasına yönelik direktifler ve bunlara ek olarak iki adet sınırlar arası ticarete yönelik direktif içermektedir. Bu direktiflerle amaçlanan piyasaların serbestleşmesini hızlandırmak ve 1. enerji paketinde adımları atılan yenilikleri ilerletmektir.

Şebekelere ayrımcı erişimi engellemek ve bu şekilde adil rekabet ortamı oluşturmak için dağıtım ve iletimde yasal ayrıştırma yapılması, bu paketin içerdiği hükümler arasındadır. Komisyon, aslında mülkiyet ayrıştırmasını kuvvetle desteklemesine rağmen piyasaların henüz buna hazır olmaması sebebiyle yasal ayrıştırma yapılmasını uygun bulmuştur. İkinci Enerji Paketinde mülkiyet ayrıştırmasının getirilmesi tartışılmış ancak özellikle Fransa ve Almanya'nın itirazları ile Komisyonca teklif geri çekilmiştir.[†] Bu sebeple de Komisyonun normatif güç olarak, üye devletlerin normal algısını şekillendirirken zamanın koşullarını dikkate aldığı ve adım adım bir ilerleme yolu seçtiği düşünülebilir.

İlk enerji paketinde sadece büyük ve orta ölçekli işletmeler enerji tedarikçisini seçmekte özgürken bu pakete göre piyasalar sanayi kesimindeki müşterilere 1 Temmuz 2004 itibariyle diğer tüm müşterilere ise bundan üç yıl sonra 1 Temmuz 2007 itibariyle tamamen açılacaktır. Komisyonun 2. enerji paketinde temelde hedeflediği; şebekelere ayrımcı erişimi engellemek, dikey yasal ayrıştırmanın gerçekleşmesi, ulusal düzenleyici kurumların kurulması ve elektrik ve doğal gaz tüketicilerinin haklarını belirlemedir. Bundan önce, tüketici haklarının korunmasından ziyade, bu hakların ne olduğu dahi tanımlanmamıştı. Bu direktif ile öncelikle bu hakların tanımlanması ve korunması hedeflenmiştir. Normatif güç olarak tanımlanan Komisyon, bu direktiflerle bireylerin de haklarını korumayı amaçlamaktadır.

2. enerji paketinden sonra Komisyon, elektrik ve doğal gaz piyasalarındaki iç pazarın kurulması ile ilgili 18 aylık bir soruşturma yürüterek 10 Ocak 2007 tarihinde sonuç raporunu[‡] yayınlamıştır. Bu rapora göre enerji iç pazarının kurulması ile ilgili eksiklikler şu şekildedir:

- Ulusal piyasaların çoğunda çok fazla piyasa yoğunlaşması
- Piyasalara yeni girişleri engelleyen ve arz güvenliğini tehdit eden dikey bütünleşmenin varlığı ve ayrıştırma seviyesinin yetersizliği
- Üye devletlerin piyasaları arasında az seviyede bütünleşme, sınırlar arası enerji ticareti kapasitesinin yetersizliği veya yokluğu ve farklı piyasa yapıları
- Piyasa ile ilgili şeffaf ve kolay erişilebilir bilgilerin yokluğu
- Fiyatlandırma mekanizmalarının güvensizlik oluşturması
- Uzun dönemli sözleşmelerle müşterilerin tedarikçilere bağımlı hale

[*] Kayıkçı, 2011, s.4

[†] Euractiv," IEA urges EU to fully liberalise energy markets", 2006, http://www.euractiv.com/energy/iea-urges-eu-fully-liberalise-energy-markets/article-175120 (23.05.2014)

[‡] European Commission, "Communication From The Commission, Inquiry pursuant to Article 17 of Regulation (EC) No 1/2003 into the European gas and electricity sectors(Final Report)",2006. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0851:FIN:EN:PDF (12.02. 2014)

getirilmesi ve perakende piyasalarında rekabetin bu sebeple düşük olması

Bu soruşturmaya dayanarak Komisyon 2007 yılında 3. enerji paketini teklif etmiştir.

3.3. Üçüncü Enerji Paketi

2. Enerji Paketinde belirlenen hükümlerin tam olarak uygulamaya konmaması ve yukarıda belirtilen eksikliklerin varlığı 3. enerji paketinin hazırlanması gerektiği fikrini oluşturmuştur. Yasaların tam, etkin ve şeffaflık ilkesine uyularak belirlenen zaman aralıklarına riayet edilerek tüm üye devletlerce uygulanması oldukça önemlidir. 25 Temmuz 2009'da kabul edilen 3. Enerji paketinin amacı, elektrik ve doğal gaz piyasalarını serbestleştirmek, piyasalar arasındaki entegrasyonu garantilemek ve ulusal enerji piyasaları arasındaki ara bağlantıları artırmaktır.

Ancak hem Parlamento hem de Birleşik Krallık, Hollanda ve İskandinav ülkeleri mülkiyet ayrıştırması konusunda Komisyon'u desteklemiştir. 2007 yılı itibariyle 13 ülke elektrik sektöründe 10 ülkede doğal gaz sektöründe hali hazırda mülkiyet ayrıştırmasını gerçekleştirmiştir. Ancak diğer ülkeler mülkiyet ayrıştırmasının arz güvenliğini tehdit edeceği yönünde görüş bildirmiştir. Çünkü onlara göre milli enerji şampiyonlarını ayrıştırmak, onların arama ve üretim faaliyetlerinde çalışan büyük yabancı şirketlerle müzakerelerde güçlerini zayıflatabilir.[*]

Komisyon'un mülkiyet ayrıştırmasına alternatif olarak sunduğu Bağımsız Sistem İşleticileri modelinde, mülkiyet ayrıştırmasındaki 'aynı zamanda hem iletim hem de üretim alanındaki bir şirkette kontrol yetkisi olan hisse sahibi olamama' kuralının aksine ortak mülkiyete izin verilmiştir. Ancak burada iletim ağı, dikey olarak bütünleşmiş olan şirketten ayrı bir tüzel kişiliği olan BİS tarafından işletilecektir.

Bir başka mesele ise, piyasaların açılmasında karşılıklılık ilkesidir. Avrupa enerji piyasaları 3. ülkelerden üretim faaliyetlerinde bulunanlar da dâhil tüm yatırımcılar için açıkken, tedarikçi ülkelerin piyasaları büyük oranda kapalıdır. Bu maddeye göre, 3. ülke şirketleri eğer bir AB enerji ağı üzerinde kayda değer bir pay sahibi veya kontrol sahibi olmak istiyorsa AB'li firmalar ile aynı ayrıştırma koşullarına uymak zorundadır. Bu madde ile normatif bir güç olarak Komisyonun, belirlediği normları sadece üye devletlerle ilişkilerinde değil, dünyanın geri kalanıyla olan ilişkilerinde de dikkate aldığı ve yayma eğiliminde olduğu görülebilir. AB gibi büyük bir pazarda yer almak isteyen bir üçüncü ülke firması da, Komisyonun normları temel alarak oluşturduğu Direktifteki ayrıştırma kurallarına uymak zorundadır.

Bu maddeye göre ayrıca üye devletler, eğer bu şirketlerin AB enerji ağı üzerinde faaliyette bulunma ruhsatını hem kendisinin hem de Birlik'in arz güvenliğine tehdit olarak görürse, bu ruhsatla işlem yapılmasını reddedebilir. Bu madde üye devletlere, 3. ülkelerin piyasalarına girmesi konusunda takdir yetkisi vermektedir ve üye devletlerin kamunun güvenliği ile ilgili meşru çıkarlarını ulusal yasalarla kontrol edebilme hakkını tanımaktadır.[†]

Son olarak, ulusal enerji düzenleyicilerinin rolünü artırmak da enerji iç pazarının oluşturulması için önemli adımlardan bir tanesidir. Bazı ülkelerde bu ulusal düzenleyici kurumların yetkilerini hükümetle paylaştığı örnekler mevcuttur. Paketle hedeflenen ulusal enerji düzenleyicilerinin bağımsız olması ve yeterli yetkilerle donatılmış olmasını sağlamaktır. Ayrıca; hükümetlerin ayrıştırma ve şeffaflık ile ilgili hükümlere uyumunu izleme, piyasa işlemlerini izleme, diğer rekabet otoriteleri ile işbirliği içinde rekabetin

[*] Per Ove Eikeland, "The Third Internal Energy Market Package: New Power Relations among Member States", **Journal of Common Market**, 2011, Cilt:49, Sayı:2, s.244

[†] Kayıkçı,2011, s. 17

artırılması için adımlar atma ve Avrupa seviyesinde işbirliğini artırma da hedeflenenler arasındadır

Komisyon, 2. ve 3. enerji paketleri ile hazırlanan Direktifleri uygulamanın öneminden bahsetmiş ve iyi işleyen perakende ve toptan piyasalar için akıllıca düzenlemelerin yapılması ve Birlik seviyesinde uygulanması gerektiğini söylemiştir. Ayrıca ulusal enerji düzenleyicilerin de piyasaların etkinliğini artırmak için aktif rol üstlenmesi gerektiğin ve verilen kararların Birlik düzeyinde uygulanıyor olmasının öneminin altını çizmiştir. Komisyon ayrıca, üye devletlerin ihtiyaç duyması halinde enerji iç piyasalarını tamamlamaları için gerekli yardımı yapacaklarını belirtmekle birlikte gerekli olması halinde ihlal prosedürlerini başlatmaktan da çekinmeyeceklerini ifade etmişlerdir. Bu cümleler ile, enerji iç piyasasının kurulması için oluşturulan mevzuata tüm devletlerde eşit seviyede uyum sağlamayı hedeflemektedir. [*]

SONUÇ

Avrupa Komisyonu enerji iç piyasasının oluşturulması yönünde önemli adımlar atmıştır. Bu adımlar kapsamlı bir sonuca yol açmamış olsa da Birliğin bu alanda aktif olduğunu göstermesi bakımından Komisyon'un çabaları önem teşkil etmektedir. Bu sebeple Komisyon'un üç adet enerji paketi temel dokümanlar arasında sayıldığından çalışma içinde önemli bir yere sahip olmuştur.

AB'nin normal kavramını şekillendirecek kapasiteye sahip olduğu Manners tarafından dile getirilmektedir. Yani AB, yeni normları kendi belgeleri veya uluslar arası belgeler aracılığıyla oluşturmaktadır. Küreselleşen dünya yeni normların ortaya çıkmasına neden olmaktadır. Bireylerin memnuniyetlerini veya şikayetlerini daha görünür bir şekilde ifade etmeleri, piyasa ekonomisinin öneminin artması ve çevre konusunda devletlerin ve bireylerin daha yüksek farkındalığa sahip olmaları bu alanlarda normların inşa edilme sürecinde olduğunu göstermektedir.

AB belgelerinde yukarıdaki üç konuyla ilgili vurguların yapılması onların dikkate alındığına işaret etmektedir. Enerji iç piyasasının oluşturulması doğrudan bu alanları korumayı içermektedir. Fakat AB'nin bu konuda önemli adımlar attığı düşünülmemektedir. Her ne kadar kendi belgelerinde tüketicilere, çevreye ve rekabete vurgular yapılmış olsa da enerji iç piyasasında önemli gelişmeler yaşanmaması AB'nin normatif gücünü sorgulamaya yetmektedir. Fakat bu alanda Komisyon'un çabaları AB'nin bütüncül olarak atmadığı adımları gölgelendirmektedir. Yani Komisyon bir bakım normatiflik rolü üstlenmekte ve bu normlar yönünde attığı adımlar ile AB'nin normatiflik yönünü güçlendirmektedir.

[*] European Commission, "Stock Taking Document: Towards a new Energy Strategy for Europe 2011-2020", 2010, http://www.klimabuendnis.org/fileadmin/inhalte/dokumente/2011/Stock-taking-document_energy_strategy_for_Europe.pdf (10.04.2014)

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ENERJİ ARZ GÜVENLİĞİ ÇERÇEVESİNDE AVRUPA BİRLİĞİ VE ORTA ASYA İLİŞKİLERİNDE YENİ GELİŞMELER

NEW DEVELOPMENTS IN THE EUROPEAN UNION - CENTRAL ASIA RELATIONS WITHIN THE ENERGY SUPPLY SECURITY FRAMEWORK

İsa Burak GONCA[*]

ÖZET

Özellikle günümüzde güçlü bir siyaset yapabilmek ve güçlü bir ekonomiye sahip olabilmek için ucuz, elde edilebilir enerji kaynaklarına ulaşım çok önemlidir. Ancak sürekli artan enerji talebi ve bu talebe karşılık veremeyen Avrupa Birliği, enerji kaynaklarının büyük bir bölümünü ithal etmektedir. Rusya Federasyonu ise bu noktada Avrupa Birliği'nin ham petrol ve doğal gaz ana tedarikçisi olarak ortaya çıkmaktadır. Bu ülkenin Ukrayna ve Belarus ile yaşadığı enerji krizleri ise Avrupa Birliği'ni derinden etkilemektedir. Enerjide alternatif rotaların ve kaynakların öneminin Avrupa Birliği için daha da artması sebebiyle Kazakistan, Türkmenistan ve Özbekistan gibi enerji rezervleri bakımından zengin olan Orta Asya ülkelerinin Avrupa Birliği enerji arz güvenliğinde rolünü öne çıkarmaktadır. Bu çalışmanın amacı Orta Asya'nın enerji arz güvenliği perspektifinde tanımlanması ve bölgenin Avrupa Birliği açısından jeo-ekonomik önemini ortaya koymaktır. Çalışmada öncelikle Avrupa Birliği'nin Orta Asya politikalarının çerçevesi çizilmekte, ayrıca Almanya gibi Avrupa Birliği üyesi ülkelerin Birliğin Orta Asya politikalarında yaşanan yeni gelişmelerdeki rolüne değinilmektedir. Akabinde ise Avrupa Birliği'nin Orta Asya politikalarında Rusya faktörü ve son olarak da Orta Asya'da politika eksikliğinin Avrupa Birliği üzerindeki etkileri tartışılmaktadır.

Anahtar Kelimeler: Orta Asya, Enerji, EnerjiArzGüvenliği, AvrupaBirliği.

ABSTRACT

In order to have a strong economy and to make a strong politics, it is crucial to access to cheap, reliable energy resources, especially today. However, despite the ever-increasing demand for energy, the European Union is unable to respond to the demands and imports a large portion of energy resources. At this point, Russian Federation is emerging as the main supplier of crude oil and natural gas for the European Union. The energy crisis with Ukraine and Belarus experienced by this country deeply affects the European Union. Further increase the importance of alternative routes and resources of energy in the European Union, it highlights the role of the energy-rich Central Asian countries, such as Kazakhstan, Turkmenistan and Uzbekistan on the European Union energy supply security. The purpose of this study is to define Central Asia in the energy supply security perspective and is to determine the region's geo-economic importance for the European Union. In the study, firstly the European Union's Central Asia policy framework is drawn, also the role of the European Union members, such as Germany on the new developments in Union's Central Asia policies is mentioned. Then, Russian factor in the policies of the European

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Union in Central Asia is examined, and lastly, the effects on the European Union is discussed in terms of lack of policy towards Central Asia.

Keywords: Central Asia, Energy, Energy Supply Security, European Union

GİRİŞ

Tarih boyunca birbirleri ile sürekli savaşan ve sürekli bir güç mücadelesi içinde bulunan Avrupa ülkeleri, İkinci Dünya Savaşından sonra kalıcı barışı sağlayacak şekilde bütünleşme yolunu tercih etmişler ve bu tercih sonucunda bugünkü 28 üyeli Avrupa Birliği (AB)'ni oluşturmuşlardır. Eşsiz bir ekonomik bütünleşme hikayesi yaratan AB, 2008'de küresel çaptaki finansal krizden derinden etkilenmiştir. Nitekim Euro Alanı ülkelerinde başta Yunanistan olmak üzere İrlanda, Portekiz ve İspanya bu krizden en çok etkilenen ülkeler olmuştur. 2008'den bu yana AB içinde hala bu krizin etkileri görülmekle birlikte, AB'de Yunanistan'ın Euro Alanı'ndan çıkması, Avrupa Merkez Bankası-Yunanistan borç krizi, İngiltere'nin AB'den ayrılması gibi yeni sorunlarda meydana gelmiştir. Bu noktada enerji ithalatının maliyetinin etkileri daha da görünür olmuştur. Kuruluşunda Avrupa Kömür ve Çelik Topluluğu (AKÇT) ve Avrupa Atom Enerjisi Topluluğu (EURATOM) gibi enerji ile ilgili kurumlar olan AB'nde enerji arzında dışa bağımlılık ve enerji ithalatının AB ekonomisine etkileri gibi sorunlar halen aşılabilmiş değildir.

Özellikle Sovyet Sosyalist Cumhuriyetler Birliği (SSCB)'nin yıkılması ile merkezi ve doğu Avrupa'da ortaya çıkan güç boşluğu, başta AB ve NATO gibi organizasyonlarca doldurulmaya çalışılmıştır (Caşın, 2006: 25). 2004, 2007 ve 2013 yıllarında gerçekleştirilen genişlemeler ile AB'ye 13 merkezi ve doğu Avrupa ülkesi üye olmuş ve AB'nin toplam üye sayısı 28'e ulaşmıştır. Ancak son genişleme dalgaları ile birlikte AB'nin enerji talebi daha da artmıştır. Dolayısıyla, Soğuk Savaş dönemindekiAvrupa mı, yoksa bugün finansal krize boğuşan, enerjide büyük oranda dışa bağımlı ve enerji arzı güvenliği sorunlarıyla karşı karşıya olan Avrupa mı güvenli? sorusu akıllara gelmektedir.

Sanayi devriminden bu yana sürekli makineleşen dünyamızda, enerjinin önemi giderek artmaktadır. Bugün neredeyse enerji kaynakları olmadan hareket edemeyecek olan modern dünyamızda, devletler daha ucuz, kolay elde edilebilir enerji kaynakları için birbirleriyle mücadele etmektedir (Pamir, 2005: 68). Enerji güvenliğinde ise 1973 Petrol Krizi önemli bir mihenk noktasıdır (Caşın ve Özgöker, 2008: 75). Bu krizden önce doğalgaz pek fazla dikkate alınmamış ancak, krizle birlikte talebi büyük ölçüde artmıştır. Teknolojik gelişmelere rağmen halen fosil yakıtların kullanımı yaygındır. Son dönemde ise Rusya-Ukrayna arasındaki enerji krizleri dikkat çekmektedir.

Uluslar arası Enerji Ajansı tanımına göre enerji arz güvenliği; enerji kaynaklarının uygun fiyatlardan kesintisiz kullanabilirliğinin teminidir (The International Energy Agency, 2015). Lars H. Röller, Jan Delgado ve Hans W. Friederiszick'e göre ise arz güvenliği, yabancı birincil enerji kaynaklarından bağımsızlık derecesi ve mevcut ve gelecekteki enerji alt yapısının mevcut ve gelecekteki enerji talebini hangi ölçüde karşılacağı ile ilgilidir (Röller vd., 2007:16). Enerji güvenliği, birçok tanımında yer alan ve İngilizce karşılığı 4A olarak ifade edilen, enerji kaynağının mevcudiyeti (Availability), ulaşılabilirliği (Accessibility), ekonomik olması (Affordability) ve sürdürülebilirliği (Acceptability) gibi dört önemli unsuru içinde barındıran ve zaman içinde enerji arz güvenliği ile eş anlamlı kullanılmaya başlanan geniş kapsamlı bir kavramdır (Kruyt vd., 2009: 2165).

Enerji arz güvenliği, değişen ihtiyaçlar ve koşullara göre kısa ve uzun vadeli arz güvenliği olarak zaman boyutuyla da ele alınmaktadır. Arz güvenliğinde mevcut arzın teknik aksaklıklar, hava muhalefeti veya siyasî müdahalelerle riske girmesi kısa vadeli arz güvenliği iken; artan enerji talebini karşılamak için ilave arzın zamanında tedarik edilememesi uzun vadeli bir güvenlik problemidir. Enerjinin üretim ve iletim kapasitesini artırmak için gerekli altyapı yatırımlarının ekonomik, finansal nedenlerle yapılamaması veya siyaseten engellemesi uzun vadede çok önemli bir arz güvenliği sorunudur (Erdal ve Karakaya, 2012:114).

Enerjide arz güvenliğini artırmak için alınacak tedbirler ise; enerji kaynağı ve tedarikçilerin çeşitlendirilmesi, yerel kaynakların değerlendirilmesi, iç piyasanın tam serbestleştirilmesi, sınır ötesi yatırımların artırılması, enerji kaynağı depolama kapasitesinin geliştirilmesi, enerji tüketiminde tasarruf ve enerji verimliliğinin artırılması olarak sayılmaktadır.

Siyaset yapmak ve dünyada söz sahibi olabilmek için güçlü bir ekonomiye, güçlü bir ekonomi için de ucuz, elde edilebilir enerji kaynaklarına ihtiyaç vardır. Maalesef, AB kendine yetecek enerji kaynaklarına sahip değildir ve bu durum AB'nin en büyük açık noktalarından biri haline gelmektedir. AB'nin enerjide dışa bağımlılığı kendisine hem ekonomik hem de siyasi olarak riskler oluşturmaktadır. Özellikle enerjide Rusya Federasyonu (RF)'na bağımlılık AB içinde büyük tartışmalara yol açmaktadır.

İşte bu noktada Avrupa Komisyonu'nun Mayıs 2014'te Enerji 2020: Rekabetçi, Sürdürülebilir ve Güvenli Enerji için Strateji(Energy 2020: A Strategy For Competitive, SustainableandSecureEnergy) konulu yeni enerji güvenliği belgesini ilan etmesi, 2030 İklim ve Enerji Çerçevesi Kapsamında Yeni Hedefleri (2030 Framework For Climate and Energy) oluşturması, Enerji Birliği (Energy Union) gibi planlar üretmesi enerji arz güvenliğinin AB için ne kadar önemli olduğunun göstergesi olmuştur. Buna ek olarak alternatif enerji kaynakları ve enerji rotalarının önemi de ortaya çıkmaktır. AB için alternatif enerji rotalarında en büyük kaynak sağlayıcı bölge olarak Orta Asya'nın ise yıldızı parlamaktadır.

1.ORTA ASYA'NIN AVRUPA BİRLİĞİ AÇISINDAN ÖNEMİ

Orta Asya'da kendi çıkarları doğrultusunda hâkimiyet kurmak isteyen birçok aktör vardır. Bunların başında bölgeyi arka bahçesi olarak nitelendiren Rusya Federasyonu gelmektedir. Yine bölgede aktif olmak isteyen aktörlere Amerika Birleşik Devletleri (ABD), Çin Halk Cumhuriyeti, Türkiye, İran, Hindistan, Japonya, Güney Kore ve Avrupa Birliği de eklenebilir. Bu bölümde Orta Asya'nın AB açısından önemi güvenlik ve ekonomi çerçevesinde incelenecektir.

1.1. Güvenlik Açısından Önemi

İkinci Dünya savaşı sonrasında, Avrupa ciddi tahribat görmüş, yetişmiş insan gücünü kaybetmiş ve dolayısıyla üretim kapasitesi bakımından yıkıma uğramıştır. 6 yıl süren savaş Avrupa ekonomilerini çöküntüye uğratmıştır. Avrupa'da baş gösteren fakirlik ve işsizliğin yarattığı kaos ortamı komünizmin tüm Avrupa'ya yayılması tehlikesini yaratmıştır. Özellikle savaştan hemen sonra SSCB'nin Doğu Avrupa'yı ele geçirmesi Batı Avrupa'da güvenlik endişesi yaratmıştır. Bunun üzerine Batı Avrupalı devletler çözümü bütünleşme sürecinde bulmuşlardır. 80 yılda 3 kez savaşan Almanya ve Fransa'nın arasındaki problem bitmiş ve artık Avrupa halkları bütünleşmeye başlamışlardı. Soğuk Savaş döneminde Avrupa komünizmin ve Sovyetlerin yayılması tehdidi ile yüzleşmiştir. Bu tehdit SSCB'nin dağılması ile ortadan kalkmıştır. Peki, Avrupa'daki güvenlik sorunu da mı ortadan kalkmıştır? ya da Avrupa acaba şuan Soğuk Savaş döneminden daha mı güvendedir?

Özellikle 11 Eylül 2001 sonrası ortaya çıkan terör saldırıları ve Avrupa'da baş gösteren İslamofobi Avrupa'da güvenlik ve güvensizlik kavramlarını yeniden tanımlanmıştır. Ayrıca Afrika ve Orta Doğu'dan Avrupa Birliği'ne kaçak olarak girmeye çalışan insanlardan dolayı göç sorunu ortaya çıkmış ve bu durumda AB'de güvenlik sorunu olarak algılanmıştır. Bu iki durum dışında bir de enerji krizleri eklenebilir. Çünkü Avrupa Birliği 2004, 2007, 2010 yıllarında Rusya - Belarus arasında ve 2006 ve 2009 yıllarında Rusya – Ukrayna arasında yaşanan enerji krizlerinden derin bir şekilde etkilenmiştir.Avrupa'nın gaz ihtiyacının üçte birini Rusya karşılamaktadır. Avrupa'nın en büyük ekonomisi Almanya ham petrolün yüzde 35'ini, doğalgazın yüzde 38'ini ve taşkömürün yüzde 25'ini Rusya'dan almaktadır. Almanya, Avusturya, Macaristan ve Sırbistan Ukrayna üzerinden gelen hat ile Rus doğal gazına bağımlı konumda olması, Bulgaristan, Estonya, Finlandiya, Litvanya, Letonya, Slovakya'nın arasında olduğu altı AB ülkesinin ise doğal gazda tamamen Rusya'ya bağlanmış durumda olması Gazprom bu ülkelerin tek gaz tedarikçisi haline getirmiştir (Esen, 2015). Bu yüzden 2014 yılında başlayan ve halen devam eden Ukrayna ve Rusya arasındaki kriz AB'nin enerji arz güvenliğini olumsuz yönde etkilemektedir.

Ayrıca, 11 Eylül 2001'de yaşanan ve daha sonrasında artan terör olaylarından dolayı Avrupa komşuları ve yakın coğrafyalar ile güvenlik konularına önem vermeye başlamıştır. Özellikle bu konuda 2003 yılındaki Avrupa Güvenlik Stratejisi büyük önem taşır. Buna ek olarak AGİT (Avrupa Güvenlik ve İşbirliği Teşkilatı) yakın coğrafyalar ile güvenlik konusunda işbirliğine gitmiştir. Almanya'nın öncülüğü ile 2010 yılında Kazakistan'ın başkenti Astana'da düzenlenen zirve ile dönem başkanlığını bu ülkeye vermiştir. Bütün bunların yanı sıra, özellikle 1973 Petrol Krizinden sonra giderek önemi artan enerji güvenliği konusu Orta Asya'nın AB gibi enerji ithalatına bağımlı bir aktör için stratejik bir güvenlik unsurudur. Enerji güvenliği doğrudan ulusal güvenliği etkileyen bir faktördür ve AB önemli bir bölgesel aktör olurken ortak bir enerji politikasının yoksunluğu AB için bir zayıflık yaratmaktadır. Bu zayıflık, politika açısından AB'nin Rus doğalgazına artan enerji bağımlılığı tartışmasız jeopolitik endişe yaratmaktadır (Kirchner ve Berk, 2010: 860). Özellikle, AB'nin 2004 ve 2007 genişleme dalgaları sonrası, enerji ithalatı önemli ölçüde arttı ve AB enerji ithalatına daha da bağımlı bir hale geldi (Gonca, 2012: 52). Bu sebepten dolayı Orta Asya enerji rezervleri AB için ayrı bir öneme sahiptir.

Tablo 1: Orta Asya Doğal Gaz Rezervleri

Ülke	**Kanıtlanmış Gaz Rezervi (m3)**	**Dünya Sıralaması**
Türkmenistan	7,504,000,000,000	6
Kazakistan	2,407,000,000,000	15
Özbekistan	1,841,000,000,000	20
Tacikistan	5,663,000,000	91
Kırgızistan	5,663,000,000	93

Kaynak: CIA World Factbook

Tablo 1'de görüldüğü üzere, doğal gaz bakımından Türkmenistan 7,504 trilyon metreküp kanıtlanmış gaz rezervleriyle dünyada altıncı, Orta Asya'da ise birinci sıradadır. Kazakistan ve Özbekistan da Türkmenistan'ın ardından Orta Asya'da en çok gaz rezervine sahip ülkelerdir. Kazakistan 2,407 trilyon metreküp kanıtlanmış gaz rezervleriyle dünyada on beşinci, Özbekistan ise 1,841 trilyon metreküp kanıtlanmış gaz rezervleriyle yirminci sıradadır.

Tablo 2: Orta Asya Ham Petrol Rezervleri

Ülke	Kanıtlanmış Ham Petrol Rezervi (varil)	Dünya Sıralaması
Kazakistan	30,000,000,000	12
Türkmenistan	600,000,000	48
Özbekistan	594,000,000	49
Kırgızistan	40,000,000	81
Tacikistan	12,000,000	89

Kaynak: CIA World Factbook

Tablo 2'de yer alan bulgulara göre Orta Asya'daki beş ülkenin içinde 30 milyar varil kanıtlanmış petrol rezervleriyle Kazakistan en yüksek petrol rezervlerine sahip ülkedir. Ayrıca dünyadaki on ikinci en yüksek petrol rezervlerine sahip ülkedir. Türkmenistan ve Özbekistan da Kazakistan'ın ardından Orta Asya'da en çok petrol rezervine sahip ülkelerdir. Türkmenistan 600 milyon varil kanıtlanmış petrol rezervleriyle dünyada kırk sekizinci, Özbekistan ise 594 milyon varil kanıtlanmış petrol rezervleriyle kırk dokuzuncu sıradadır.

Bölge itibariyle bakıldığında ise Orta Asya doğal gaz açısından yaklaşık olarak 11,800 trilyon metreküp kanıtlanmış gaz rezervleriyle dünyada Rusya, İran ve Katar'ın ardından dördüncü sırayı, petrol açısından ise 31, 246 milyar varil kanıtlanmış petrol rezervleriyle Nijerya'nın ardından onbirinci sırayı almaktadır.

1.2. Ekonomik Açıdan Önemi

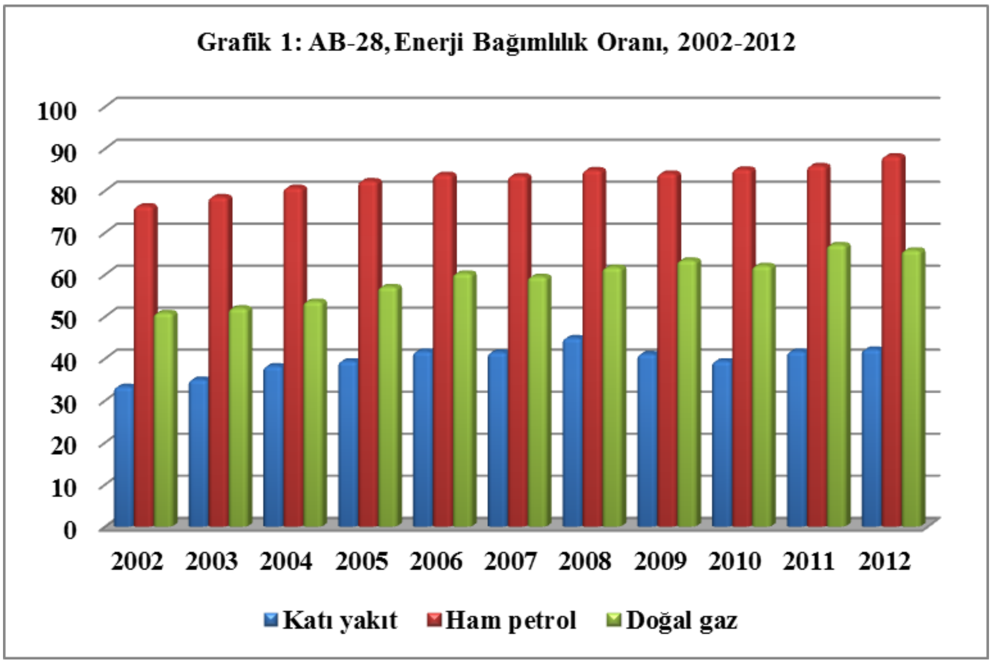
Avrupa Birliği genişledikçe daha doğudaki, Karadeniz, Kafkas ve Orta Asya ülkelerinin önemi artmıştır. Bundan dolayıdır ki AB ve bu ülkeler arasındaki ticaret seviyeleri yükselmiştir. Ayrıca AB ekonomisini güçlü tutabilmek, sanayinin işlerliğini sağlayabilmek için enerji kaynaklarına ihtiyaç duyulmaktadır. Fakat AB kendine yetecek enerji kaynaklarına sahip değildir ve enerjide dışa bağımlıdır. Avrupa Birliği dünyanın en büyük enerji ithalatçısı (petrol ve gaz)'dır. İkinci büyük enerji tüketicisidir (European Neighbourhood Journalism Network, 2009).

Tablo 3'de 2002-2012 yılları arası AB ülkelerinin net birincil enerji ithalatı

Tablo 3: AB'nin Birincil Net Enerji İthalatı, 2002-2012						
(1000 Ton Eşdeğer Petrol)						
	2002	**2004**	**2006**	**2008**	**2010**	**2012**
AB-28	857.127	935.731	1.010.750	1.014.782	954.290	922.756
Euro Bölgesi (AB-18)	813.082	844.164	869.763	850.160	794.647	744.057
Almanya	208.505	211.021	215.396	207.089	201.690	196.772
Avusturya	20.916	23.563	22.527	21.643	18.587	18.131
Belçika	48.789	53.207	52.303	56.061	53.685	46.131
Birleşik Krallık	-28.640	10.576	49.280	58.288	60.764	86.615
Bulgaristan	8.589	9.175	9.352	10.359	7.075	6.597
Çek Cumhuriyeti	11.215	11.631	12.870	12.644	11.384	10.776
Danimarka	-8.724	-9.854	-7.836	-4.468	-3.365	-630
Estonya	1.527	1.664	1.672	1.539	873	1.115
Finlandiya	18.512	20.521	20.401	19.710	17.877	15.547
Fransa	137.440	141.294	141.824	139.126	132.230	125.316
Hırvatistan	4.956	5.055	4.824	5.438	4.461	4.355
Hollanda	30.830	28.955	35.697	33.892	30.548	29.247
İrlanda	13.744	13.783	14.242	14.366	13.157	11.832
İspanya	107.843	115.141	123.898	122.285	106.084	99.409
İsveç	19.582	19.505	18.983	19.016	19.294	14.749
İtalya	152.664	158.770	163.488	156.875	149.804	133.814
Kıbrıs	2.591	2.432	2.991	3.059	2.937	2.622
Letonya	2.537	3.255	3.308	2.880	2.220	2.692
Litvanya	3.662	4.352	5.379	5.407	5.660	5.786
Lüksemburg	3.948	4.591	4.627	4.506	4.498	4.338
Macaristan	14.721	15.949	17.207	16.835	14.988	12.329
Malta	1.559	1.903	1.664	1.879	2.392	2.041
Polonya	9.418	13.244	19.007	29.809	31.555	30.098
Portekiz	22.758	23.024	22.527	21.643	18.587	18.131
Romanya	9.267	11.936	11.920	11.293	7.827	8.024
Slovakya	12.061	12.517	12.047	11.772	11.239	10.023
Slovenya	3.478	3.749	3.831	4.307	3.581	3.641
Yunanistan	23.382	24.775	24.911	25.595	21.712	19.979
Kaynak: Eurostat						

gösterilmektedir. Tabloda ilk olarak dikkat çeken unsurlardan biri birincil enerji ithalatı AB-28'de 2012 yılında yaklaşık 922.800 Ton Eşdeğer Petrol seviyelerine ulaşmış olmasıdır. Bu rakamın 2002 yılında 857.127 Ton Eşdeğer Petrol, 2006 ve 2008 yıllarında ise 1 milyon Ton Eşdeğer Petrolü aştığı görülmektedir. Birincil enerji en büyük net ithalatçı petrol, doğal gaz ve kömür rezervleri olan Birleşik Krallık ve Polonya hariç, genelde en kalabalık AB üye devletleridir. Ancak hem Polonya'da hem de Birleşik Krallık'ta 2002 yılından sonra net enerji ithalatında artış vardır. Polonya'da enerji ithalatı 2002 yılında 9.418 Ton Eşdeğer Petrol değerinde iken 2012 yılında 30 bin Ton Eşdeğer Petrolü geçmiştir. Birleşik Krallıkta ise 2002 yılında -28.640 Ton Eşdeğer Petrol iken 2012 yılında

86 bin Ton Eşdeğer Petrolü geçmiştir. Üye devletler arasında birincil enerji sadece net ihracatçı Danimarka olmuştur.



Grafik 1'de 2002 – 2012 yılları arası AB üye ülkelerinin enerji bağımlılık oranları petrol eşdeğeri tona dayalı brüt iç tüketimin net ithalatı yüzde olarak gösterilmektedir. Buna göre katı yakıtların oranı 2002 yılında yüzde 33,3 iken, 2012 yılında yüzde 42,2'ye yükselmiştir. Ham petrolün oranı ise 2002'de yüzde76,6 iken sürekli artış göstererek bu oran 2012 yılında yüzde 88,2'ye yükselmiştir. Doğal gaz da benzer bir şekilde artış göstermiştir. 2002 yılında yüzde 50,9 iken 2012 yılında yüzde 65,8'e yükselmiştir.

Bütün bu rakamlar ortak bir enerji politikası oluşturulmasının gerekliliğini göstermektedir. Ortak bir enerji politikası oluşturulması adına, ilk kapsamlı girişim olarak 27 Ekim 2005 tarihinde Londra Hampton Court'taki Avrupa Konseyi toplantısı gösterilebilir. Bu toplantıdan sonra, Komisyon, Sürdürülebilir, Rekabetçi ve Güvenli Enerji için Avrupa Stratejisi adı altında 8 Mart 2006 tarihinde Avrupa Birliği Enerji Politikası olası ilkelerini içeren Green Paper (Yeşil Kitap) yayınladı. Yeşil Kitap, yeni enerji gerçekleri ile yüzleşen Avrupa'yı, Avrupa düzeyinde önerilen olası eylemler ve müzakere için hazırlanan soruları göstermektedir. Müzakereyi ileriye taşıyarak, entegre bir şekilde hareket etmek gereklidir. Her üye devlet kendi ulusal tercihlerine göre seçim yapacaktır. Ancak, karşılıklı bağımlı global bir dünyada, enerji politikasının mutlaka bir de Avrupa boyutu vardır (European Commission, 2006). Bu gelişmeyi 10 Ocak 2007 tarihinde Avrupa Komisyonu tarafından yayımlanan, Energy for a Changing World (Değişen Dünya için Enerji) yayını takip etti.

Ancak bütün bu gelişmelere rağmen AB'nin halen net enerji ithalatçısı olmasından ve 2008 yılının ikinci yarısında ABD'nin finans sektöründe ortaya çıkan ve kısa sürede tüm dünyaya yayılarak küresel çapta bir mali ve reel sektör krizine dönüşen ekonomik krizin olumsuz etkilerinden dolayı Euro Alanı 2009 yılında % 4,1 oranında küçülerek tarihindeki en büyük daralmayı yaşamıştır. Yaşanan küresel kriz, AB ülkelerinde kamu açıkları ve borç stoklarının ciddi boyutlarda artmasına nedenolmuştur (Avrupa Birliği Bakanlığı, 2011: 1).

Euro Alanı ülkelerinde Yunanistan'ın iflas noktasına gelmesi, İrlanda, Portekiz ve İspanya'da da görülen yüksek işsizlik oranları dolayısıyla Ekonomik ve Parasal Birliğin ve nihayetinde AB'nin geleceğine dair endişeleri artırmıştır. Öyle ki, 25 Ocak 2015 tarihinde yapılan erken genel seçimlerinde Aleksis Tsipras'ın liderliğini yaptığı radikal sol ittifak Syriza Partisi'nin zaferi sonrası Yunanistan-AB ilişkilerinin geleceği, Almanya-Yunanistan restleşmesi, Yunanistan'ın Euro bölgesinden ve hatta AB'den çıkabileceğine dair konular 2015'in ilk çeyreğinde en sık tartışılan konular haline gelmiştir (Karagöl, 2015: 3).

Petrol, doğal gaz ve kömür için enerji ithalatının 2013 yılında Avrupa Birliği'ne maliyeti 500 milyar dolar civarındadır (Gloystein, 2014). Var olan yüksek enerji ithalatı maliyeti ekonomik göstergelerin AB için daha da kötüleşmesine sebep olmaktadır. Bu yüzden ucuz elde edilebilir enerji kaynaklarına ulaşım çok önemlidir ve Orta Asya'daki enerji rezervleri AB içinRusya dışında önemli kaynak olabilir. Zira sık sık yaşanan Ukrayna-Belarus-Rusya enerji krizleri ile sekteye uğrayan enerji kaynaklarının sevkiyatı AB ekonomisine zarar vermektedir. Kazakistan, Türkmenistan ve Özbekistan AB'ne bu noktada destek olabilecek rezervlere sahiptir.

2.AVRUPA BİRLİĞİ'NİN ORTA ASYA POLİTİKALARININ ÇERÇEVESİ

Sovyetler Birliği'nin dağılmasının ardından bağımsızlıklarını ilan eden Orta Asya ülkeleri ile bölgedeki boşluğu değerlendirmek üzere büyük güçler tıpkı 1800'lü yıllarda yaşanan Büyük Oyun'daki gibi bir güç mücadelesine girmiş ve kendi çıkarları doğrultusunda bir takım politikalar izlemişlerdir.

AB de bölgedeki yerini almış ve bölgeye yönelik politikalar üretmiştir. AB'yi bölgedeki diğer güçlerden ayıran ayrıntı ise komşuları ile izlediği politikalarda gizlidir. AB'yi farklı kılan "Avrupa Değerleri" adı altında uyguladığı soft power (yumuşak güç)'dır. Joseph Nye 1990 yılında Bound to Lead kitabında soft power terimine ilk kez değindiğinde, soft power ya da diğer bir değişle yumuşak güç terimini bir ülkenin, askeri veya mali olarak zorlamak yerine ikna ve etkileme yolu ile olaylara etki etme yeteneği olarak tanımlamıştır (Nye, 1990: 166). 6 Mayıs 2013'te AB'nin Dışişleri ve Güvenlik Politikasından sorumlu Yüksek Temsilcisi ve Komisyon Başkan Yardımcısı Catherine Ashton, UCLA Uluslararası Enstitüsü tarafından düzenlenen bir toplantıda; Avrupa'nın Değeri bizim bir ordumuzun olmamasıdır. Biz güçlü bir ekonomik bloğuz, - yumuşak bir güç – ve biz bu gücü özellikle komşuluklarımızdaki sorunlarla başa çıkmak için kullanabiliriz (UCLA International Institute, 2013)Avrupa Değeri (The value of Europe) ve soft power arasındaki ilişkiyi yorumlamıştır.

Avrupa Birliği Antlaşması'nın 2'inci Maddesinde; "*Birlik, insan onuruna saygı, özgürlük, demokrasi, eşitlik, azınlıklara mensup kişilerin hakları da dahil insan haklarına, hukukun üstünlüğüne saygı değerleri üzerinde kurulmuştur*" (Official Journal of the European Union, 2010: 3). Kısacası AB değerleri dediğimiz bu ilkeler AB'nin Komşuluk ilişkileri kurarken öncelikle sağlamaya çalıştığı ilkelerdir.

Her ne kadar AB değerleri tamamen liberal değerleri kapsasa da Orta Asya ile kurmaya çalıştığı ilişkilerde bu değerleri soft power olarak kullanmaktadır. Zaten bu değerleri AB'nin Orta Asya ülkeleri ile ikili olarak imzaladığı Ortaklık ve İşbirliği Antlaşmaları (Partnership and Cooperation Agreement), 2007-2013 dönemi için Orta Asya'ya Yardım için Avrupa Topluluğu Bölgesel Strateji Belgesinde (European Community Regional Strategy Paper for Assistance to Central Asia for the period 2007-2013) ve AB ve Orta Asya: Yeni Bir Ortaklık Stratejisi (The EU and Central Asia: Strategy for a New Partnership) raporunda da görülmektedir.

Genel olarak, AB'nin Orta Asya'ya yönelik politikaları üç önemli dönem içerisinde gelişmiş ve çerçevelenmiştir. İlk olarak Sovyetler Birliği sonrası dönemde ekonomik ilişkiler çerçevesinde adımlar atılmıştır. İkinci olarak 11 Eylül 2001 sonrasında Afganistan, İran, Pakistan gibi aşırı İslamcı grupları bulunduran ülkeler komşuluğu dolayısı ile bu grupların Orta Asya'ya sıçramasını engellemek amacı ile sürdürülen destekler gündeme gelmiştir. Son olarak da 2004-2010 yılları arasında Rusya'nın Belarus ve Ukrayna ile gaz krizleri yaşaması AB'yi derinden etkilemiş ve enerji alanında Orta Asya ile işbirliği yapılması kararlaştırılmıştır. Kısacası AB'nin Orta Asya'ya yönelik politikaları bölgesel istikrar, ekonomik ilişkiler ve enerji arz güvenliği hedeflerinden oluşmaktadır.

2.1. Almanya'nın AB'nin Orta Asya Politikalarındaki Rolü

AB'nin Orta Asya politikalarında Almanya'nın öncülüğü dikkat çekmektedir. Peki, Almanya'yı bölgeye yönelik AB politikalarında öncü kılan etmenler nelerdir? Almanya 5 Orta Asya ülkesi Kazakistan, Kırgızistan, Özbekistan, Türkmenistan ve Tacikistan'ın bağımsızlıklarını tanıyan ilk Avrupa Birliği ülkesidir. AB'nin Orta Asya'ya yönelik strateji belgesi de yine Almanya'nın dönem başkanlığı sırasında ortaya çıkmıştır. "Süreçte AB Dönem Başkanı ve Almanya Dışişleri Bakanı olarak önemli rol oynayan Frank-Walter Steinmeier, Orta Asya, konumu itibariyle Rusya ve Çin sınırında yer alıyorsa da, bölgenin her iki büyük komşunun tekeline girmesi arzu edilmemektedir (Erdoğan, 2011: 30)diyerek AB'nin ve Almanya'nın bölgeye olan ilgisini açıkça belirtmiştir. Ayrıca, siyasi reformların gerçekleştirilmesine bağlı da olsa, Steinmeier Kazakistan'ın 2009 yılı için AGİT başkanlığında Almanya'nın desteğini (Hamm, 2006)2006 yılında yine bu ülkeye yaptığı ziyarette göstermiştir.

Peki, Almanya neden Orta Asya ile ilişkilerin güçlenmesini istiyor? Öncelikle, Orta Asya'da her ne kadar bugün az da olsa bir Alman nüfus vardır. Almanya'nın Orta Asya'ya ilgisinde enerji kaynaklarının yanı sıra özellikle Kazakistan'da yaşayan, 1990'larda bir milyonun üzerinde oldukları tahmin edilen ancak şimdi sayılarının 200 bine düştüğü Alman nüfusunun payı büyüktür (Erdoğan, 2011: 31). Alman kültürünü bölgede muhafaza etmek ve yaymak için de girişimler mevcuttur. 1994 yılından bu yana, Almatı'da Goethe-Enstitüsü vardır ve bir tanede 1998 yılında Taşkent'te açılmıştır. Okuma odaları ve dil merkezleri de bölgedeki diğer şehirlerde vardır (German Federal Foreign Office, 2010: 5). Nüfus faktörü dışında, Almanya Avrupa sanayisinin işleten lokomotifidir. Dolayısı ile sanayisini ve ekonomisini işletmek için enerji kaynaklarına ihtiyacı vardır. Bu enerji kaynaklarını da genel olarak Rusya ve Orta Asya'dan temin etmektedir. Son olarak Almanya'da Müslüman bir nüfus mevcuttur ve İslam'ın aşırılaşması Almanya için özellikle 11 Eylül 2001 sonrası potansiyel bir sorundur ve Orta Asya'nın aşırı İslami gurupları içeren ülkeler ile tampon olması Almanya ve AB için çok önemlidir (Krumm, 2007: 4).

Almanya kendi ulusal çıkarları doğrultusunda Orta Asya ile yakın ilişkiler kurmaya çalışmaktadır. Bunu bölge ülkeleri ile ikili ilişkiler kurarak ve AB'yi de bölgede politikalar izlemesine öncülük ederek yapmaktadır. Özellikle 2007 yılında ortaya çıkan AB'nin Orta Asya'ya yönelik bölgesel stratejisinde Almanya'nın rolü çok büyüktür. Bunu Kazakistan'ın 2010 yılında AGİT Başkanlığı yapmasına bakarak da görmek mümkündür.

2.2. AB'nin Orta Asya Politikalarında Rusya Faktörü

Orta Asya'da Rusya'dan bağımsız güçlü politikalar yürütmek biraz zordur. Çünkü Orta Asya'daki Kazakistan, Kırgızistan, Özbekistan, Türkmenistan ve Tacikistan 1991 yılına kadar Sovyetler Birliği'nin birer parçası halindeydiler. Dolayısı ile Rusya bölgeyi arka bahçesi olarak görmekte ve bölgenin etki alanından çıkmasını istememektedir. Zaten bölgeyi kaybederse, enerji alanında büyük bir darbe yemiş ve ekonomisi de büyük yara almış olacaktır. FitchRatings göre, federal hükümet gelirlerinin yüzde 50'si ve gayri safi yurtiçi hasıla (GSYİH)'nın yüzde 20'si kadar petrol ve gaza bağımlılığı ile Rusya dünyanın en büyük 10 ekonomisinin arasında en çok petrol-bağımlı ülkedir (Barnato, 2013).

Enerji kaynaklarından gelen gelire bu kadar bağlı bir ülke, Orta Asya'daki hakimiyetinin bitmesine izin vermeyecektir. AB'nin desteği ile Orta Asya ve Hazar havzasındaki enerji kaynaklarını Avrupa'ya taşıyacak NABUCCO projesi ortaya çıkmış fakat 2007 yılında Rusya Kazakistan, Türkmenistan gibi Orta Asya ülkelerine çeşitli baskılar yaparak 2017 yılına kadar bu ülkelerin enerji rezervlerinin büyük bir kısmını Rusya'ya satmalarını taahhüt ettiklerini yansıtan antlaşmalar imzalatmıştır.

Ayrıca bugün Sovyet dönemine göre azalmış da olsa Orta Asya'da 5 ülkede de halen Rus nüfus bulunmaktadır. 2008 yılında iktidara gelen Rusya eski devlet başkanı ve şimdiki Rusya başbakanı Dmitri Medvedev'in de açıkladığı gibi Rusya, Orta Asya'da ve Kafkasya'da bulunan Rus nüfusunun da koruyuculuğunu üstlenmiştir (İyikan, 2011: 602).

Aleksandr Dugin'in, Yeni Avrasyacılık adıyla ortaya attığı görüşlerde; RF'nun eski tecrübeleri dikkate alınarak Avrasya'da jeopolitik bakımdan domine eden bir güç olması gerektiğini aksi takdirde RF diye bir devlet kalmayacağını belirtmiştir ve bunun da ancak Avrasya'nın Av-Rusyalaşması ile gerçekleşebileceğinin altını çizmektedir (Yalçınkaya, 2010: 292).

Avrupa Birliği Sovyetlerin dağılmasından sonra Orta Asya'da doğan güç boşluğundan yararlanmak istemiş ve zaman içerisinde Almanya'nın öncülüğü ile Orta Asya üzerinde varlığını artırmaya çalışmıştır.

Fakat Rusya'nın özellikle AB'ye sattığı enerji kaynaklarından elde edilen gelirlerle ekonomisini düzeltmesi, Orta Asya'daki etkinliğini artırmış ve AB'yi bölgede etkisizleştirmektedir. Tabii ki burada ABD Dışişleri Bakanı Yardımcısı Strobe Talbott'un eski Sovyet coğrafyası politikalarına yönelik kullandığı Önce Rusya (Russia First) özdeyişinin hala geçerli olduğunun unutulmaması gerekir. Dolayısı ile AB'nin enerjide Rusya'ya bağımlı olması Orta Asya'da atacağı her adımda elini kolunu bağlamaktadır.

3.AVRUPA BİRLİĞİ ORTA ASYA POLİTİKALARI VE YENİ GELİŞMELER

AB'nin gerek komşuluk politikası olarak gerekse iş birliği antlaşmaları ile uyguladığı politikalarda yöntemi diğer güçlü aktörlere göre daha farklıdır. Avrupa Değerleri olarak adlandırılan bir takım prensipler AB'nin ilişki kuracağı ülkelere yumuşak bir şekilde dayatılmaktadır ve bu prensipleri uygulamaya çalışan ülkeler ile de ikili ilişkiler ilerlemektedir.

Sovyetler Birliği'nin dağılmasının ardından bağımsızlığını ilan eden Orta Asya ülkeleri ile AB tarafından kurulan ilk ilişkiler mali yardımlar bazında kalmış, 2001'den sonra ise ilişkilerin boyutu değişmiştir.

Bu bölümde ilk olarak bağımsızlıklarının ardından Orta Asya ülkeleri üzerinde yürütülen AB politikaların içerikleri analiz edilecek ve daha sonra da politikaların ne kadar başarılı olduğu tartışılacaktır.

3.1. Dünden Bugüne AB'nin Orta Asya Politikaları

AB'nin Orta Asya ile ilişkileri pek çok kişi tarafından bilinmemektedir. Çünkü bu iki bölge çoğu insan tarafından birbirine uzak görünmektedir. Aslında Orta Asya, AB'nin 2004'den sonraki genişleme dalgası ile Orta Asya ile AB birbirine daha çok yakınlaşmıştır. Çalışmanın önceki bölümlerinde bahsedildiği gibi AB'nin Orta Asya politikalarını üç periyoda ayırmak mantıklı olacaktır. Bu periyotlardan ilki Sovyet dönemi sonrası yani 1991-2001 arasındaki 10 yıllık dönemi kapsar ki bu dönemde AB tarafından bölgeye sadece mali yardımları içeren politikalar güdülmüştür. İkinci periyotda 11 Eylül 2001'den 2007 yılına kadar olan dönemde ise aşırı İslamcı grupların saldırılarında çekinen AB'nin Orta Asya'ya yönelik istikrar amaçlı politikaları ön plana çıkmaktadır. 2007'den günümüze kadar olan dönemde ise AB'nin enerji arz güvenliği konulu politikaları göze çarpmaktadır.

AB'nin Orta Asya'ya yönelik politikalarında TACIS, TRACECA, INOGATE, NABUCCO, Ortaklık ve İşbirliği Antlaşmaları, Avrupa Güvenlik Stratejisi, Yeşil Rapor, 2007-2013 dönemi için Orta Asya'ya Yardım için Avrupa Topluluğu Bölgesel Strateji Belgesi, AB ve Orta Asya: Yeni Bir Ortaklık Stratejisi Belgesi önem taşımaktadır. Sovyetler Birliği'nin dağılmasının ardından bağımsızlıklarını ilan eden Kazakistan, Kırgızistan, Türkmenistan, Özbekistan ve Tacikistan'ı içeren Orta Asya ülkelerine yönelik uygulanan ilk AB politikaları genellikle mali yardımlar ve teknik destekler üzerine kuruludur.

TACIS programı 1991 yılında AT tarafından aralarında Orta Asya ülkelerinin de bulunduğu 12 Sovyet cumhuriyetinin demokrasiye geçiş, hukukun üstünlüğü ve Pazar ekonomisine geçiş konularında teknik yardım sağlamak öngörüsüyle başlamıştır (Gürbüz, 2012: 426). 1992 – 2001 yılları arasında Azerbaycan, Kazakistan, Kırgızistan, Tacikistan, Türkmenistan ve Özbekistan AB'den TACIS programı çerçevesinde toplam 425 milyon Avro yardım almıştır ve bu yardımlardan en çok Kazakistan ve Özbekistan yararlanmıştır (Gürbüz, 2012: 433).

Bir başka AB politikası olan TRACECA (Transport Corridor Europe-Caucasus-Asia)*Avrupa-Kafkasya-Asya Ulaşım Koridoru* ise 1993 yılın Avrupa, Kafkasya ve Orta Asya'yı birbirine yakınlaştırmayı amaçlayan bir ulaşım projesidir. Bu proje ile modern İpek Yolu canlandırılacak ve Rusya devre dışı bırakılarak Avrupa'dan Çin'e kadar bir ulaşım ve ticaret ağı kurulacaktır (Gürbüz, 2012: 428).

INOGATE (InterstateOilandGas Transport to Europe) Avrupa'ya Devletler Arası Petrol ve Doğal Gaz Taşımacılığı Programı kapsamında AB, yukarıda sunulan enerjinin arz güvenliğini sağlanması amaçlamaktadır. Bu sistem sayesinde, özellikle doğal gazın boru hatları ile AB'ye getirilmesi düşünülmektedir (Enerji 2023 Derneği).

2000'li yıllarda ise AB'nin Orta Asya'ya yönelik politikalarında bir takım değişiklikler olmuş ve anlaşmalar mali ve teknik yardım kapsamından güvenlik, enerji ve ekonomik alanda işbirliği kapsamına kaymıştır. Tabi ki bu durumun 11 Eylül 2001 sonrasında yaşanan terör olayları ve 2004 yılından 2010 yılına kadar yaşanan enerji krizlerinden kaynaklandığı bir gerçektir. Bu kapsamda AB Orta Asya ülkeleriyle; genellikle ekonomik alanları içeren Ortaklık ve İşbirliği Antlaşmaları, güvenlik konularını içeren Avrupa Güvenlik Stratejisi çerçevesinde ikili ilişkiler, enerji alanını ilgilendiren Yeşil Rapor çerçevesinde enerji arz ve güvenliğini içeren ilişkiler, 2007-2013 dönemi için Orta Asya'ya Yardım için Avrupa Topluluğu Bölgesel Strateji Belgesi, AB ve Orta Asya: Yeni Bir Ortaklık Stratejisi Belgesi ile politikalar kurulmuştur.

AB-Orta Asya enerji işbirliği, AB-Karadeniz-Hazar Denizi kıyı devletleri ve onların komşuları arasında enerji ve ulaşım işbirliğini geliştirmeyi amaçlayan Kasım 2004'de Bakü'de bakanlar konferansı tarafından başlatılan bir siyasi diyalog olan Bakü Girişimi (BakuInitiative) altında gerçekleşir (BakuInitiative, 2004:1).

Astana'da 2006 Kasım ayında Bakü Girişimi taraflarınca kabul edilen bir bakanlık beyannamesi yayınlandı ve enerji alanında AB ile Bakü ortakları arasında işbirliği için dört öncelik içeren bir yol haritası hazırladı:

Partner Ülkelerin özelliklerini de hesaba katarak AB enerji iç piyasa ilkeleri temelinde enerji piyasalarını bir noktada kesiştirmek.

Enerji ihracat / ithalat, tedarik çeşitlendirme, enerji transit ve enerji talebinin konularını ele alarak enerji güvenliğini arttırmak.

Enerji verimliliği, yenilenebilir enerji kaynakları ve talep tarafı yönetiminin geliştirilmesi dahil olmak üzere, sürdürülebilir enerji gelişiminin desteklenmesi.

Ortak ve bölgesel çıkarlar doğrultusunda enerji projelerine yönelik yatırım çekme (BakuInitiative, 2006:1).

2007-2013 Döneminde Orta Asya'ya Yardım İçin Bölgesel Strateji Belgesi (RegionalStrategyPaperfor Assistance to Central Asiafortheperiod 2007-13) enerjiyi Orta Asya ile işbirliğinde kilit sektörlerden biri olarak tanımlar (EuropeanNeighbourhoodandPartnershipInstrument, 2007: 5). Bu Belge, AB'nin dış enerji kaynaklarına ihtiyacının büyümesinden ve önemli hidrokarbon kaynaklarına sahip olan ve Avrupa'ya coğrafi olarak yakın olan Orta Asya'nın bu talebi karşılamak için iyi bir konuma sahip olmasından bahsetmektedir.

Avrupa Komisyonu'nun Enerji Birliği'nden sorumlu üyesi Maros Sefcovic'in Avrupa Kömür ve Çelik Topluluğu'ndan bu yana Avrupa'daki en iddialı enerji projesi olarak nitelendirdiği Enerji Birliği (EnergyUnion) planı AB'nde ortak enerji pazarında daha fazla entegrasyon sağlamayı, enerjide dışa bağımlılığı azaltmayı ve iklim ve yenilenebilir enerji hedeflerinin yakalanmasına yardımcı olmayı hedefliyor (EurActiv, 2015). Bu planda doğal gaz arzında çeşitlendirme sağlamak adına, Orta Asya ülkelerindekidoğal gazın Avrupa'ya ihracını sağlamak için Güney Gaz Koridoru çalışmalarının yoğunlaşmasının gerekliliği vurgulanmıştır (EuropeanCommission, 2015: 4)

3.2. Çin'in Gölgesinde Türkmen Gazını AB'ne Ulaştırma Çabaları: Aşkabat Deklarasyonu

Çin'in doğal gaz gibi jeo-ekonomik özelliği olan bir enerji kaynağını deniz yolu üzerinden getirmesi Çin için bazı problemlere neden olmaktadır. Doğal gazın arazi üzerinde taşınabilir olması Çin için en önemli noktadır. Çin'in enerji kaynaklarının çoğu Pasifik boyunca deniz yoluyla ithal edilmektedir ve bu rota Pasifik'teki Amerikan askeri varlığı tarafından tehdit edilmektedir. Ayrıca Doğu Çin Denizi ve Güney Çin Denizinde Çin'in Japonya, ve diğer çeşitli ülkelerle arasında sınır anlaşmazlıkları vardır. Bu noktada Çin'e doğal gaz, petrol ve uranyum olmak üzere enerji kaynaklarını sağlayacak olan Orta Asya'nın önemi çok büyüktür. Yani temelde Orta Asya ile enerji bağlarını güçlendirerek, Çin daha tehlikeli deniz rotasını önleyebilir. Son yıllarda Çin bölgedeki etkisini artırmış, bu da Orta Asya ülkeleri için yeni bir çıkış yolu umudu olmuştur. Özellikle 3,666 km uzunluğundaki Orta Asya-Çin doğalgaz boru hattı Orta Asya'daki enerji kaynakları için yeni bir Pazar oluşturmuştur. Ayrıca Kazakistan-Çin petrol boru hattı da Çin'in enerji güvenliği için büyük önem taşımaktadır.

Bölge ülkelerinin Çin ve Rusya gibi büyük güçlerin arasında sıkışmış olması ve Afganistan, Pakistan gibi güneydeki komşuları da siyasal ve ekonomik istikrarsızlıklarla mücadele etmesi dış dünyaya açılmaları adına dezavantajdır. Bu durum Orta Asya ülkelerini uluslararası ticarette ve kaynakların dışa ulaşımında Rusya'ya bağımlı hale getirmektedir. Buna ek olarak, Orta Asya ülkelerinin 1991 yılına kadar Sovyetler Birliği'nin birer parçası halinde olmaları, Rusya'nın bölgeyi arka bahçesi olarak görmesine ve bölgenin etki alanından çıkmasını istememesine sebep olmaktadır. Hem Orta Asya'da daha rahat bir şekilde hareket etme adına hem de enerji arzında çeşitlendirmeye gitmek adına Çin, Rusya ile enerji alanında yakınlaşmaya başlamıştır (Kodaman ve Birsel, 2006: 434). Bu yakınlaşma yakın zamanda Çin ve Rusya arasında imzalanan enerji antlaşmaları ile daha net görülmektedir. Örneğin;,Rusya'nın Gazprom şirketi ile Çin'in devlet gaz şirketi

CNPC şirketi arasında Mayıs 2014'te yapılan anlaşma, 30 yıl süreyle yılda 38 milyar metreküp Rus gazının Çin'e sevkiyatını öngörmektedir (Peng, 2014).

Buna ek olarak, enerji güvenliğini sağlamak isteyen Avrupa Birliği, Rusya'ya alternatif yeni enerji rotaları ve kaynakları sağlamak adına Orta Asya'daki zengin enerji rezervlerinin bir başka taliplisi olmuştur. Bütün bu unsurlar Çin'in enerji güvenliği ve Orta Asya'daki jeo-ekonomik çıkarları için bir mücadele ortamı yaratmaktadır.

Türkmenistan gazın büyük miktarını Çin'e ihraç etmesinden ve Trans-Hazar boru hattınınınşasında henüz herhangi bir ilerleme olmamasından dolayı, bu ülkeden AB'ne gaz ithalatı yakın zamanda beklenmemektedir (Boonstra, 2015: 3). Ancak 1 Mayıs'ta Azerbaycan, Türkiye enerji bakanlarının yanı sıra Avrupa Komisyonu Enerji Birliğinden sorumlu üyesi MarosSefcovic Aşkabat'ta Türkmenistan ile doğalgaz dağıtım seçeneklerini tartıştılar ve onlar bir enerji bildirgesi olan Aşkabat Deklarasyonu'nu imzaladılar. Sefcovic İran üzerinden aktarma ve sualtı Trans-Hazar boru hattı inşası olmak üzere AB'ye yönelik Türkmen gazının transit geçişi için iki seçeneği açıkladı. Trans Anadolu Doğal Gaz Boru Hattı Projesi (TANAP) boru hattı 2019 yılında faaliyete geçtiğinde ve İran'ın on birinci ülkeler arası boru hattı inşa edildikten sonra TANAP akımı Türkmen ve İran gazını farklı rotalardan sağlayabilir (Khatinoglu, 2015).

3.3. Orta Asya'da Politika Eksikliğinin AB Üzerindeki Etkileri

AB'nin yumuşak güç kullanıp bölge üzerindeki etkisini uzun bir zamana yayması, AB'nin şuan için bölgede etkin aktörler arasında yer almamasına sebep olmaktadır. Zira Rusya, ABD ve Çin bölgede AB'den daha etkin konumdadırlar. Özellikle 1800'lü yıllardaki Rusya ve Britanya arasındaki çekişme sanki bugün yerini Rusya ve ABD'ye bırakmış gibi görünmektedir. Sonuç olarak şuan için AB bölgede etkisiz görünen ama etkili olmaya çalışan bir aktördür.

Peki, AB'nin Orta Asya'da şuan için güçlü bir politika eksikliğinin Birlik üzerine etkileri nedir? Bölgeye yönelik güçlü bir ortak politika eksikliğinin AB'ye önemli zarar vermesi olasıdır. Orta politika eksikliğinin var oluşunun temel nedeni ise Birlik içinde birliğin halen sağlanamamış olmasıdır. Yani, Birlik üyelerinin kendi çıkarları doğrultusunda hareket etmeleri Birliğin ortak bir politika yaratamamasına sebep olmaktadır. Bunun en basit örneği ise AB'nin Rusya'ya enerji bağımlılığını azaltacak politikalar güderken, Almanya'nın Rusya ile antlaşmalar imzalayıp Kuzey Akım (NordStream) boru hattının yapımını onaylamasıdır. Böyle bir ortamda ise Orta Asya'ya yönelik bir ortak politika güdülmesi güçleşmektedir.

Güçlü bir ortak politika eksikliği ise AB'nin enerjide giderek Rusya'ya bağımlı hale gelmesine yol açacak ve Rusya'nın enerji kartını AB'ye her an gösterebileceği tehdidini açığa çıkaracaktır. Avrupa Birliği'nin (AB) enerjide dışa bağımlılığı sürekli artmaktadır. AB, ithalat yoluyla enerji ihtiyacının yüzde 50'sini karşılar ve hiçbir şey yapılmaz ise, 2020 ya da 2030 yılında ithalatı yüzde 70 oranında artacak (Europa, 2011). Böyle bir durumda ise AB'nin işleyen ekonomisinin neredeyse tamamen Rusya'ya bağımlı olacağı kaçınılmazdır.

Bunun dışında bölgenin istikrar ortamından uzaklaşması, Afganistan, Pakistan ve İran gibi ülkelerdeki aşırı İslamcı gurupların Orta Asya'ya yayılması olasıdır ve bu durumda son genişleme dalgaları ile doğuya doğru genişleyen AB'nin bu aşırı İslamcı gruplardan ve göç dalgalarından etkilenmesi de kaçınılmaz olacaktır. Yani AB'nin Orta Asya'ya yönelik güçlü bir ortak politika eksikliği AB'de güvenlik tehdidi oluşturacaktır. Son olarak da Orta Asya güçlü Uzak Doğu pazarları ve AB arasında bir köprü niteliği taşımaktadır. AB'nin Orta Asya'da etkin aktörler arasında olmadığı durumda bölge Çin, Rusya, İran veya Hindistan'ın etki alanında kalacaktır ki bu durumda tıpkı 1800'lü yıllarda olduğu gibi Rusya'nın bölgeyi işgal edişiyle birlikte Britanya'nın Asya'daki sömürgeleri ile bağlantısı kesilmiştir. Günümüzün modern Büyük Oyunu'nda da aynı durum geçerli olup AB'nin Uzak Doğu "pazarları ile bağlantısı kesilme riski doğmaktadır.

SONUÇ

Günümüz itibari ile AB'nin 28 üyesi bulunmaktadır. 28 üye devlet içerisinde ise özellikle 2004, 2007 ve 2013 yıllarında gerçekleştirilen genişlemelerde çoğu eski komünist blok ülkelerinden oluşan merkezi ve doğu Avrupa ülkeleri liberal değerleri benimseyen AB'ye üye olmuşlardır. 60 yıl içerisinde olmaz denilenleri gerçekleştiren AB günümüzde nüfusu 500 milyona ulaşmış, Avrupa'da ekonomik bütünleşmeyi gerçekleştirmiş ve dünya ekonomileri arasında önemli bir konuma gelmiştir.

Ancak 2008'de küresel çaptaki finansal krizden derinden etkilenen AB hala krizin etkisinden çıkabilmiş değildir. Yunanistan'ın para birliğinden çıkması, Birleşik Krallık'ta AB üyeliği konusunda yapılacak referandumun tartışıldığı bugünlerde enerji arzı gibi ekonominin sağlıklı işleyişinde çok önemli yeri olan bir konu ise şüphesiz artan üye sayısı, nüfusu ve enerji talebiyle AB için daha da önemli bir hale gelmiştir. Çalışmada da belirtildiği gibi siyaset yapmak ve dünyada söz sahibi olabilmek için güçlü bir ekonomiye, güçlü bir ekonomi için de ucuz, elde edilebilir enerji kaynaklarına ihtiyaç vardır. İngilizce karşılığı 4A olarak ifade edilen, enerji kaynağının mevcudiyeti (Availability), ulaşılabilirliği (Accessibility), ekonomik olması (Affordability) ve sürdürülebilirliği (Acceptability) gibi dört önemli unsuru içinde barındıran enerji arz güvenliğinin makineleşen ve sanayileşen dünyada önemi çok büyüktür. Diğer taraftan ise AB için bu durum büyük bir problemdir. Zira AB'nin kendine yetecek kadar enerji kaynakları yoktur ve bu yüzdendir ki AB enerji kaynaklarının büyük bir bölümünü dışarıdan ithal etmektedir. 2012 yılı baz alınarak Grafik 1'de gösterildiği gibi AB'nin enerji bağımlılık oranı;katı yakıtlarda 2012 yüzde 42,2, ham petrolde yüzde 88,2, doğal gaz da yüzde 65,8'dir. Enerjide bu kadar yüksek dışa bağımlılık AB için güvenlik tehdidi oluşturmaktadır. Öyle ki, AB'nin enerji ithalatının büyük bölümünü gerçekleştirdiği Rusya'nın Ukrayna ve Belarus ile arasında son on yılda çıkan enerji krizleri AB'yi derinden etkilemiştir.

Bu noktada alternatif enerji kaynakları ve enerji rotalarının önemi ortaya çıkmaktadır. Orta Asya'nın önemi AB için alternatif enerji tedarikçisi olmasından dolayı son yıllarda artmıştır. Orta Asya jeopolitik olarak oldukça büyük bir öneme sahiptir. Çağdaş jeopolitik teorilerine baktığımızda da bu apaçık görülecektir. Jeopolitiğin yanı sıra Orta Asya petrol, doğalgaz ve uranyum olmak üzere zengin enerji kaynaklarına sahiptir. Bölge itibariyle bakıldığında ise Orta Asya doğal gaz açısından yaklaşık olarak 11,800 trilyon metreküp kanıtlanmış gaz rezervleriyle dünyada Rusya, İran ve Katar'ın ardından dördüncü sırayı, petrol açısından ise 31, 246 milyar varil kanıtlanmış petrol rezervleriyle Nijerya'nın ardından on birinci sırayı almaktadır.

AB'nin Orta Asya politikalarının çerçevesine bakıldığında ise Orta Asya ile kurmaya çalıştığı ilişkilerde yumuşak güç olarak kullandığı temeller yer almaktadır. Bu değerler AB'nin Orta Asya ülkeleri ile ikili olarak imzaladığı Ortaklık ve İşbirliği Antlaşmaları, 2007-2013 dönemi için Orta Asya'ya Yardım için Avrupa Topluluğu Bölgesel Strateji Belgesinde ve AB ve Orta Asya: Yeni Bir Ortaklık Stratejisi raporunda da görülmektedir. Çalışmada da belirtildiği üzere, AB'nin Orta Asya'ya yönelik politikaları genel olarak üç önemli dönem içerisinde gelişmiş ve çerçevelenmiştir. İlk olarak Sovyetler Birliği sonrası dönemde ekonomik ilişkiler çerçevesinde adımlar atılmıştır. İkinci olarak 11 Eylül 2001'den sonrasında Afganistan, İran, Pakistan gibi aşırı İslamcı grupları bulunduran ülkeler komşuluğu dolayısı ile bu grupların Orta Asya'ya sıçramasını engellemek amacı ile sürdürülen destekler gündeme gelmiştir. Son olarak da 2004-2010 yılları arasında

Rusya'nın Belarus ve Ukrayna ile gaz krizleri yaşaması AB'yi derinden etkilemiş ve enerji alanında Orta Asya ile işbirliği yapılması kararlaştırılmıştır. Kısacası AB'nin Orta Asya'ya yönelik politikaları bölgesel istikrar, ekonomik ilişkiler ve enerji arz güvenliği hedeflerinden oluşmaktadır.

Yalnız AB'nin Orta Asya politikalarında Almanya'nın rolü ön plana çıkmaktadır. Bu durumun da Almanya'nın AB içinde en fazla nüfusa sahip olması, ekonomi ve sanayinin lokomotifi durumunda olması ve dolayısı ile AB içinde en çok enerji kaynaklarına ihtiyaç duyan ülke konumunda olması Almanya'nın Orta Asya'ya ilgi duymasının başlıca sebebidir. Bunun yanı sıra, günümüzde çok fazla olmasa da halen başta Kazakistan olmak üzere Orta Asya ülkelerinde Alman nüfusunun bulunması Almanya'nın bölge ile yakından ilgilenmesine vesile olmuştur.

Orta Asya'ya yönelik güçlü bir ortak politika eksikliğinin AB'ye gelecekte büyük zararlar vermesi olasıdır. Çalışmada AB'nin Orta Asya'ya yönelik politika eksikliğinin varoluşunun temel nedeni ise Birlik içinde birliğin halen sağlanamamış olması olarak belirtilmiştir. Ulusal devlet ve ulusçuluk akımlarının ortaya çıktığı bir kıtada, ulusal çıkarların hemen bir yana bırakılıp tam anlamı ile bir bütünleşmeye gidilmesi beklenemez. Dolayısı ile Birlik üyelerinin kendi çıkarları doğrultusunda hareket etmeleri Birliğin ortak bir politika yaratamamasına sebep olmaktadır. Özellikle AB'nin Rusya'ya enerji bağımlılığını azaltacak politikalar güderken, Almanya'nın Rusya ile antlaşmalar imzalayıp Kuzey Akım (NordStream) boru hattının yapımını onaylaması AB içinde halen ulusal çıkarların ön planda olduğunun en büyük kanıtıdır. Böyle bir ortamda ise Orta Asya'ya yönelik bir ortak politika güdülmesi güçleşmektedir. Bir başka vurguya değer nokta ise AB'nin her üyesinin enerji talebinin ve ithalata bağımlılığının aynı olmaması ve dolayısı ile enerji ithalatı noktasında ve enerji projelerinin geliştirilmesindeki anlayış farklılıklarının ortaya çıkmasıdır. Örneğin, Hollanda ve Almanya'nın enerjide dış kaynaklara ihtiyaçları birbirinden farklıdır. Dolayısı ile enerjide dışa bağımlılık her iki ülke için farklılık göstermektedir.

AB'nin Orta Asya'da istenilen düzeyde etkin olamamasının en büyük nedeni bölgede halen Rusya'nın dominant güç olmasıdır. Rusya'nın Orta Asya'yı arka bahçesi olarak görmesi ve orta Asya'nın enerji pazarında Rusya'ya rakip olabilme potansiyelinden dolayı Rusya bölgede aktif olarak kendini hissettirmektedir. Rus ekonomisinin büyük bir bölümünün de enerji ihracatına dayalı olması Orta Asya ülkelerinde Rus baskısı oluşturmaktadır. Diğer bir yandan da AB'nin enerjide büyük çoğunlukla Rusya'ya bağlı olması, AB'nin Orta Asya'da Rusya'ya karşın adım atmasına engel olmaktadır.

Orta Asya'ya yönelik güçlü bir ortak politika eksikliği ise AB'nin enerjide giderek Rusya'ya bağımlı hale gelmesine yol açarak Rusya'nın enerji kartını AB'ye her an gösterebileceği tehdidini ortaya çıkarmaktadır. Bu durum hem siyasi anlamda, hem ekonomik anlamda hem de güvenlik açısından AB'nin Rusya karşısında güçsüz bir duruma düşmesine sebep olabilir.

Günümüz itibariyle AB için tek sorun Rusya değildir. Çin enerji rezervleri açısından zengin Orta Asya ülkelerinde giderek ağırlığını hissettirmektedir. Son yıllarda Çin bölgedeki etkisini artırmış, bu da Orta Asya ülkeleri için yeni bir çıkış yolu umudu olmuştur. Çin'in öncülük ettiği Yeni İpek Yolu Projesi kapsamında yeni ticaret rotalarının yanı sıra enerji kaynaklarının Çin'e aktarımında önemli unsur olan yeni petrol ve doğal gaz boru hatları göze çarpmaktadır. Özellikle 3,666 km uzunluğundaki Orta Asya-Çin doğal gaz boru hattı Orta Asya'daki enerji kaynakları için yeni bir Pazar oluşturmuştur. Ayrıca Kazakistan-Çin petrol boru hattı da Çin'in enerji güvenliği için büyük önem taşımaktadır.

Ancak yine de AB tarafından son olarak açıklanan Enerji Birliği planında Orta Asya ülkelerinin öneminin enerji arzında çeşitlendirme sağlamak adına vurgulanması ve akabinde Türkmenistan ile Aşkabat Deklarasyonu'nun imzalanması enerji arzı güvenliği çerçevesinde AB - Orta Asya ilişkileri adına umut verici gelişmelerdir.

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DENİZYOLU ENERJİ TAŞIMACILIĞINDA YAŞANAN SİLAHLI SOYGUN VE DENİZ HAYDUTLUĞU SALDIRILARININ ANALİZİ

ANALYSIS OF PIRACY AND ARMED ROBBERY IN MARITIME ENERGY TRANSPORTATION

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ÖZET

Dünyadaki petrol ve gaz talebinin öngörülür şekilde artması ve denizyolu ulaştırmasının enerji hammaddesi taşımacılığında önemli bir paya sahip olması, denizyolu taşımacılığını enerji arz güvenliğinin vazgeçilemez bir unsuru haline getirmiştir. Denizyolu taşımacılığı uluslararası ticaret hareketinde yıllık 9,6 milyar tona ulaşırken bu hareketin % 29,8'lik payını petrol ve gaz taşımacılığı oluşturmuştur. Bununla birlikte, deniz ulaştırmasında özellikle büyük bir çalışma sahasında gerçekleşen saldırı ve yasadışı faaliyetleri engellemek her zaman mümkün olamamaktadır. Bu tür durumlar enerjinin güvenli ve zamanında geçişini aksatmakta, deniz güvenliğini tehlikeye sokmaktadır. Küresel düğüm noktaları ve ana tanker rotaları incelendiğinde deniz ulaştırmasında kullanılmakta olan bu rotalardan bazılarının, otoritelerce "*deniz haydutluğu açısından yüksek riskli bölgeler*" ismiyle tanımlanmış, seyir güvenliğini tehdit eden bölgeler üzerinde olduğu görülmektedir. Bu çalışmada Uluslararası Denizcilik Örgütü (IMO) istatistiklerine göre 2010-2015 yılları arasında gerçekleşmiş deniz haydutluğu ve silahlı soygun saldırıları yıl, ay ve tür olarak incelenerek, petrol ve gaz taşıyan tankerlerin saldırıya uğrama sıklık ve yüzdeleri üzerinde durularak, bu saldırıların denizyolu enerji taşımacılığına ve enerji arz güvenliğine etkisi araştırılmıştır.

Anahtar kelimeler: Enerji arz güvenliği, denizyolu taşımacılığı, deniz haydutluğu.

ABSTRACT

Increasing oil and gas demand throughout the world and the significant role of maritime transportation in global energy supply, has made maritime transportation a key point in energy supply security. Maritime transport has contributed the global trade by 9.6 billiontonnes of which 29.8% of this trade accounted for oil and gas trade. However, taking the large operation area of maritime trade into the consideration, preventing attacks and interruptions are not always possible. These attacks are hampering the reliable and just in time transition of energy carrying vessels and endanger the energy supply security as well as maritime security. When the global choke points and main tanker routes examined, it is clear that some of these routes are in the "*high risk areas in terms of piracy*". In this study, according to International Maritime Organization (IMO) statistics, maritime piracy and armed robbery attacks against ships are analyzed which occurred during the period of 2010-2015 and the effects of these attacks to maritime energy supply security are discussed.

Key Words: Energy supply security, maritime transportation, maritime piracy

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GİRİŞ

Giriş bölümü, "*deniz ulaştırması ve enerji arzı*", "*küresel düğüm noktaları ve deniz haydutluğu açısından riskli bölgeler*" ve "*tankerlere yönelik deniz haydutluğu olay örnekleri*" olmak üzere üç alt başlıkta incelenecektir.

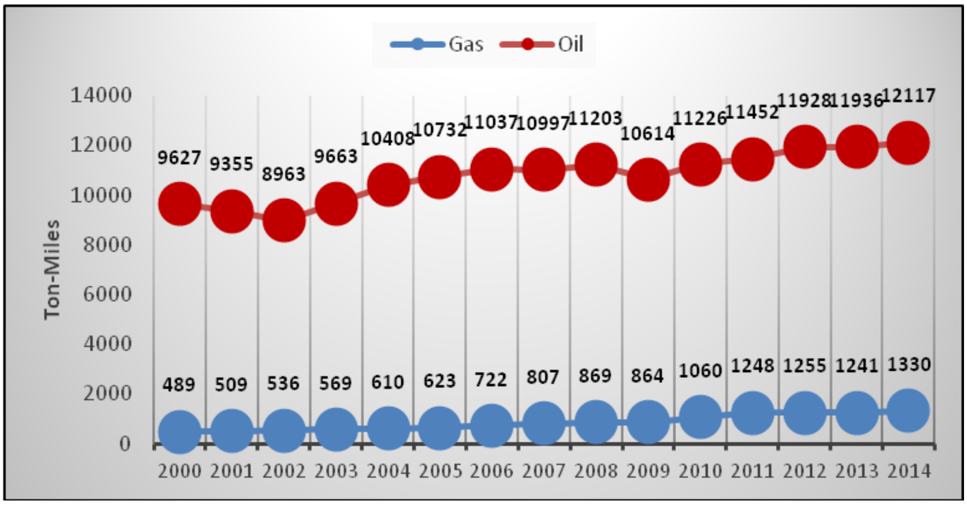
1. DENİZ ULAŞTIRMASI ve ENERLİ ARZI

Enerji bir ülkenin güvenliği, ekonomik istikrarı ve küresel ticareti için çok önemli bir unsurdur ve özellikle deniz ulaştırması esnasında bazı saldırılara ve kesintilere uğramaktadır. Enerji kavramı incelendiğinde, bu kavramın farklı disiplinlerde yer aldığı ve tanımlandığı görülmektedir. Sosyal, siyasi ve ekonomik düzenin bir parçası olan enerjinin, teknolojideki büyük gelişmelerle birlikte hızla büyüyen sanayi ve endüstri alanlarında gittikçe artan ihtiyacı gündeme gelmiştir(Civelekoğlu, 2008:6). Dolayısıyla, özellikle ekonomik açıdan bakıldığında, enerji bir çok sistemin ana girdisi olarak görülmekte ve sosyoekonomik hayatın belirleyici unsuru olmaktadır (Vural, 2006:5; Keskin, 2007:30). Çağdaş dünyada vazgeçilmez bir ihtiyaç haline gelen enerji, üretim, günlük yaşam, ulaştırma gibi önemli alanlarda ana faaliyeti sağlayan bir olgu olarak görülmeye başlanmıştır. Öncellikle ekonomik kalkınmayı büyük ölçüde etkileyen faktörlerden biri olarak değerlendirilirken, zamanla ülkelerin politik amaçları doğrultusunda bir çıkar olarak da kendine yer edinmiştir (Prugh ve diğerleri, 2005:125; Öztürk, 2009:6). Ülkeler sürekli artış gösteren bu ihtiyacı karşılama talebiyle birlikte enerji kaynakları zengin bölgelere yönelmişlerdir. Bu durum ile birlikte enerjinin çeşitlenmesi, yeni enerji kaynaklarını elde etme çabası ve enerji hammaddesi taşınması söz konusu olmuştur. Yıllar içerisinde artan enerji hammaddesi talebiyle birlikte petrolün kullanımı 1900'lü yılların başında % 2'ler seviyesindeyken günümüzde bu oran % 34'ler düzeyine ulaşmıştır(Koçgündüz, 2009:26; Kuleyin,2013:66). Ulaştırma ise genel anlamıyla insan ya da eşyanın bir yerden başka bir yere zaman ve fayda sağlamak amacıyla hareket etmesidir(Lowe, 2002:255; Özer, 2010:1). Limanlar, suyolları ve bunları birbirine bağlayan araçlardan (gemiler/tekneler) oluşan deniz ulaştırması ve taşımacılığı tonaj bakımından büyük ürünleri, ölçek ekonomisinden yararlanarak taşımakta ve uluslararası ticarette büyük önem arz etmektedir(Helmick, 2007:16; Özer, 2010:22). Uluslararası ticaretin artmaya devam ettiği bir dünyada, ticaretin hacim olarak% 80'inin verimli ve etkin maliyetli deniz taşımacılığı ile sürdürülmesi ve sektörün yıllık olarak ortalama %4'lük büyüme oranına sahip olması bu önemi kanıtlar niteliktedir (UNCTAD, 2013:6).

Her ne kadar ticaret ortakları arasındaki enerji hammaddesi alışverişinde, boru hatları ön plana çıkıyor gibi gözükse de; boru hattı altyapısının sınırlı koşullarda olması, dünya çapındaki büyük hacimli petrol ve doğal gaz taşımacılığının denizyoluyla gerçekleştirilmesi gerektiğini göstermektedir. Dünyadaki petrol ve doğal gaz talebinin öngörülür şekilde artması ise denizyolu ulaştırmasının enerji hammaddesi taşımacılığında önemli paya sahip bir hale gelmesine yol açmıştır. Denizyolu taşımacılığı uluslararası ticaret hareketinde yıllık 9,6 milyon tona ulaşırken bu hareketin % 29,8'lik payını tanker taşımacılığı oluşturmaktadır (UNCTAD, 2014:4).Ham petrol ve gaz taşımacılığı tanker piyasasının önde gelen unsurları olarak ele alındığında denizyolu ulaştırmasının enerji arzındaki yeri açıkça ortaya çıkmaktadır. Özellikle dünya ham petrol piyasasında gerçekleşen gelişmelerle birlikte deniz ulaştırmasıyla 2014 yılı itibariyle ortalama 1,8 milyar ton ham petrol ve toplamı 289 milyon tona ulaşan sıvılaştırılmış doğal gaz (LNG-LiquefiedNatural Gas) ve sıvılaştırılmış petrol gazı (LPG-LiquefiedPetroleumGas) taşınmıştır (UNCTAD, 2013:17; UNCTAD, 2014:13).

Şekil 1'de yıllar içerisinde deniz yoluyla taşınan petrol ve gaz miktarları milyar ton-mil cinsinden gösterilmiştir. Ton-mil, bir ton yükün bir mil taşınması ile elde edilen bir birimdir ve deniz ulaştırmasında gemiler için olan gerçek talebin bir ölçüsüdür (TMT, 2009; AmericanHeritage, 2011).

Şekil 1: Ton-Mil Cinsinden Petrol ve Gaz Maddelerinin Deniz Ulaştırmasıyla Taşınma Miktarları (milyar ton-mil)



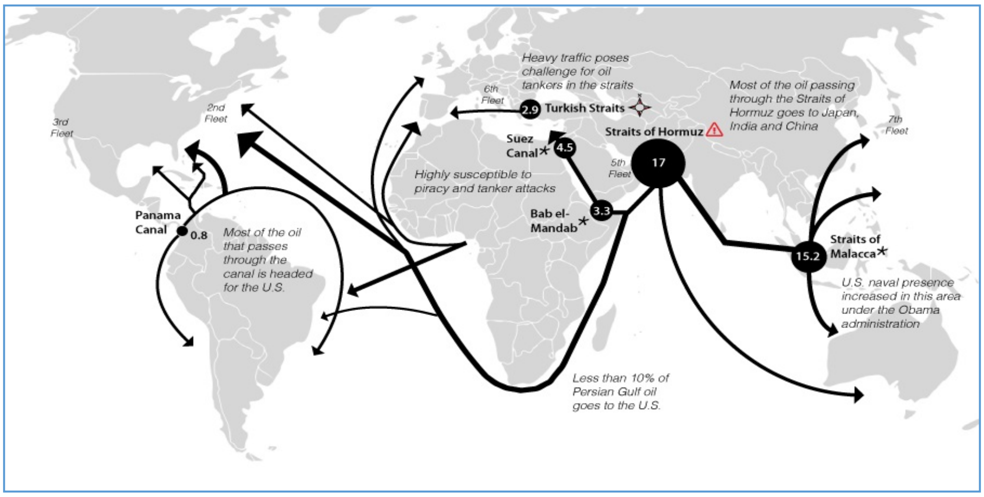
Kaynak: UNCTAD, 2013:17 ve UNCTAD, 2014:13-15 verileri kullanılarak uyarlanmıştır.

Şekil 1'de de görüldüğü üzere; yıllar içerisinde denizyolu ile taşınan enerji hammaddelerinde devamlı bir artış gözlemlenmektedir. 2013 yılında dünya çapında petrol ve diğer sıvı enerji hammaddesi üretimi yaklaşık olarak, günlük 90,1 milyon varile ulaşırken Amerika Birleşik Devletleri (ABD) Enerji Bilgi İdaresi'ne (U.S. Energy Information Administration-EIA) göre bu miktarın % 63'ü (56 milyon varil/gün) denizyoluyla taşınmıştır (EIA, 2013a; EIA, 2013b; UNCTAD, 2013:37; BP, 2014).İhtiyacın ve kullanımın artması ile birlikte ulaştırma ihtiyacı da artış göstermiş ve yıllar içinde deniz ulaştırması sektörü önem kazanmıştır. Dolayısıyla kaynakların ve tedarik noktalarının çeşitlenmesi ve küresel düğüm noktalarının belirginleşmesi ve özellikle bu noktalardaki deniz haydutluğu hareketinin tankerlerin ve dolayısıyla enerji hammaddelerinin güvenli geçişini tehdidi önemli bir sorun olarak ortaya çıkmaktadır.

1.1. Küresel Düğüm Noktaları ve Deniz Haydutluğu Açısından Riskli Bölgeler

Düğüm noktaları ulaştırma sektöründe yaygın olarak kullanılan, dolaşım kapasitesini sınırlayan ve kolaylıkla atlanamayacak coğrafik bölgeleri tanımlayan bir terim olarak tanımlanmaktadır (Rodrigue, 2014:359). Deniz ticaretine hızla artan bağımlılık da Malakka Boğazı ve Hürmüz Boğazı gibi ana petrol rotaları üzerinde bulunan bölgeleri enerji ulaştırmasında birer düğüm noktası haline getirmektedir. Bu durum bahsi geçen bölgelerdeki, herhangi bir tıkanma ya da güvenlik sıkıntısı sonucu tankerlerin alternatif rotalar kullanmasına, gecikmesine ve ekstra maliyetler yüklenmesine neden olmaktadır. Güvenilir ulaştırma rotalarına bağlı olan enerji piyasaları, geçici dahi olsa bu rotalardaki bir tıkanmadan etkilenebilmekte ve dünya enerji fiyatlarında önemli artışlar görülebilmektedir (EIA, 2014:1). Bu nedenlerden dolayı, tarih boyunca bahse konu stratejik noktalar bölge ülkelerinin yada diğer ülkelerin hükümranlık hedefi haline gelmiştir (Ballout, 2013).Günümüzde, Panama Kanalı'ndan Çin'e, Hürmüz Boğazı'ndan Japonya'ya, Batı Afrika'dan Hindistan'a uluslararası deniz ticareti rotaları kullanılmaktadır (bkz. Şekil 2ve Tablo 1). 2012 yılında bu rotalar ile birlikte, Dünya çapında 1,9 milyar tona ulaşan ham petrol akışı tankerlerle gerçekleşmiştir (VSM, 2013).

Şekil 2: Ana Petrol Rotaları ve Deniz Haydutluğu Faaliyetleri



Kaynak: Ballout, 2013. [EIA'dan aktarılmıştır.]

● *Petrol akışı (milyon ton varil/gün)* * *Korsanlık riski (petrol tankerlerine saldırılar)*

Şekil 2'den de anlaşılacağı üzere, 2013 yılı içerisinde Hürmüz Boğazı'ndan 17 milyon varil/gün ve Malakka Boğazı'ndan 15,2 milyon varil/gün petrol belirtilen rotalar üzerinde deniz ulaştırması ile küresel ekonomiye dâhil olmuştur (Ballout, 2013; Kuleyin, 2013). Bu iki küresel düğüm noktasını 4,5milyon varil/gün ile Süveyş Kanalı, 3,3 milyon varil/gün ve 2,9 milyon varil/gün ile Bab-El Mendeb ve Türk Boğazları takip etmektedir. Söz konusu dar suyollarından emniyetli bir seyrin devamlılığı açısından gemiler hızlarını düşürmekte ve saldırılara kolayca maruz kalmaktadır (Ece, 2008).

Tablo 1: Düğüm Noktalarına Göre Enerji Hammaddesi Alıcıları

	Hürmüz Boğazı	Malakka Boğazı	Süveyş Kanalı	Bab-El Mendeb Boğazı
Asya	x	x		
Avustralya ve Okyanusya	x	x		
Avrupa	x		x	x
Kuzey Amerika	x		x	x

Kaynak: Komiss ve Huntzinger, 2011:28'den uyarlanmıştır.

Tablo 1'de bahsedilen ana enerji rotaları ve düğüm noktalarından geçen petrol ve gaz tankerlerinin genel alıcıları gösterilmiştir. Bahse konu düğüm noktalarında sürekli devam etmekte olan deniz haydutluğu ve silahlı soygun tehditleri bulunması ve tankerlerin bu bölgelerde seyir yaparken saldırıya uğraması; olası gecikmelere, rota değişikliklerine ve hatta kaçırılmalarla yükün alıcıya ulaşamaması gibi ağır durumlarla yol açmaktadır. Bu tür olası olayların devamlı tekrarı sonucu alıcı ülkelerin enerji arz güvenliğinde açıklar oluşması kaçınılmazdır.

1.1.1.Hürmüz Boğazı

2009 yılında toplam küresel petrol tedariki 84,9 milyon varil/gün iken Hürmüz Boğazı rotaları ile bu arzın 15,7 milyon varil/günlük kısmı karşılanmıştır. 2013 yılına gelindiğinde ise 90,1 milyon varil/güne ulaşan petrol tedarikinin 17 milyon varil/günlük kısmı Hürmüz Boğazı'ndan gerçekleşmiştir (EIA, 2014:2). Yüzdelik olarak bakıldığında 2009 yılında Hürmüz Boğazı'ndan toplam petrolün % 18,5'i geçerken 2013 yılında bu oran % 18,9'ayükselmiştir. Ayrıca dünya LNG ticaretinin % 20'lere varan bir kısmı Hürmüz Boğazı üzerinden gerçekleşmektedir (Guzansky ve diğerleri, 2011:86).Rakamlardan da anlaşılacağı üzere, Hürmüz Boğazı'nın yıllar içerisinde önemini yitirmediği ve küresel düğüm noktalarından biri olarak kalmaya devam edeceği ortadadır (Rodrigue, 2004:366). EIA'ya (2014) göre;Hürmüz'den geçen petrolün 85%'i Japonya, Hindistan, Güney Kore ve Çin pazarlarına ulaşmaktadır.Hürmüz Boğazı, Süveyş Kanalı ile birlikte;Maritime Security CentreHorn of Africa (MSCHOA) ve United Kingdom Marine Trade Operations (UKMTO) tarafından kabul edilen Best Management PracticesforSomaliaBasedPiracy(BMP4)içerisinde High Risk Area(HRA) yani "*deniz haydutluğu açısından yüksek riskli bölge*" olarak tanımlanan coğrafi alan içerisinde bulunmaktadır (BMP, 2011). Hürmüz Boğazı'ndan çıkan gemiler/tankerler, Hint Okyanusu ve Yemen kıyılarında Somali kaynaklı deniz haydutluğuna maruz kalmaktadır. Bu bölgede gerçekleşen silahlı soygun ya da kaçırılma olayları enerji hammaddesi taşıyan gemileri alıkoyma yada geciktirme şeklinde enerji arz güvenliğini tehlikeye sokmaktadır.

1.1.2.Malakka Boğazı

Malakka Boğazı; Pasifik ve Hint Okyanusu'nu birbirine bağlayan, Asya ile Ortadoğu arasındaki en kısa rota olarak gündeme gelmektedir. Günlük 15 milyon varil ile ikinci en büyük düğüm noktası haline gelen Malakka Boğazı, başta gelişmekte olan Asya pazarı için büyük önem arz etmektedir (Ballout, 2013). Ham petrolün yanı sıra, her yıl dünya LNG ticaretinin 2/3'lük bölümünün Malakka Boğazı'ndan gerçekleştirildiği görülmektedir (Fung-Ng, 2011:1; Forbes, 2008:61).Malakka Boğazı, bölgede yaşanan deniz haydutluğu olayları ve terör tehditleri nedeniyle, dünyanın en tehlikeli düğüm noktalarından biri olarak kabul edilebilir (Pena, 2009:2; UNSC, 2011:2-3). Dar yapısı ve kısıtlı manevra alanına ek olarak ulaştırmada önemli bir düğüm noktası olan Malakka Boğazı bu özellikleriyle deniz haydutluğunun hedefi olarak görülmektedir. Daha çatışmacı güvenlik önlemleri ve deniz haydutluğuna karşı çalışmalara rağmen silahlı soygun ve deniz haydutluğu, Malakka Boğazı'nı tehdit eden bir unsur olarak kalmaya devam etmektedir (Komiss ve Huntzinger 2011).ABD, Çin, Japonya ve Hindistan, sırasıyla birinci, ikinci, üçüncü ve altıncı en büyük enerji tüketicileri olarak, enerji arz güvenliklerini sağlamak açısından Malakka Boğazı'nın stratejik konumunu da göz önünde bulundurarak, bu bölgedeki güvenlik önlemlerini devam ettirmek istemektedirler (Vavro, 2008:13).IMO'nun istatistiklerine göre, 2000 yılında 112 olarak rapor edilen olay sayısı 2008 yılında ciddi oranda gerilemiştir (Fung-Ng, 2011:2; Kuleyin, 2013). Uluslararası Denizcilik Bürosu'nun

(IMB-International MaritimeBureau) 2012 yılı raporuna göre, toplam 439 adet saldırıdan yalnızca bir tanesi Malakka Boğazı'nda gerçekleşmiştir (IMB, 2012:5-6). Yıllar içerisinde alınan güvenlik önlemleri, bahse konu düğüm noktasında deniz haydutluğu olaylarında azalma sağlasa da Malakka Boğazı halen güvenlik açısından önem verilmesi gereken bir bölge olarak görülmektedir.

1.1.3.Bab El-Mendeb Boğazı ve Süveyş Kanalı

Bab El-Mendeb Boğazı, Hint Okyanusu ve Kızıl Deniz arasındaki stratejik bir bağlantı noktası olmakla birlikte Süveyş Kanalı'na girişin kontrol edilebileceği bir bölge olarak görülmektedir. Özellikle İran (Basra) Körfezi'nden Avrupa ve Amerika ülkelerine ham petrol ulaşımının gerçekleştiği önemli bir enerji düğüm noktasıdır (Rodrigue,2004:386; Komiss ve Huntzinger, 2011:36). Boğazın kapanması durumunda, Süveyş Kanalı'na ulaşmak isteyen tankerler Ümit Burnu'nu dolaşmak zorunda kalacağından transit süreleri uzayacak, maliyetler artış gösterecek ve enerji arz güvenliği ciddi oranda etkilenecektir (Fellers, 2004:41; Rodrigue, 2004:386; Kuleyin, 2013). Bu rotada sefer yapan gemiler, bölgenin Kızıl Deniz ve Aden Körfezi'ne yakınlığından dolayı, Somali kaynaklı deniz haydutluğu saldırılarının hedefi haline gelmiştir. Dünyanın en tehlikeli düğüm noktası olarak ifade edilmektedir (Vego, 2009: 170-171; Fung-Ng, 2011: 3). IMO'nun istatistiklerine göre; Somali Bölgesi'nde seyreden gemilere yönelik deniz haydutluğu olayları, 2002 yılında 20'nin altındayken, IMB'nin 2012 yılı raporuna göre, 2011 yılındaki 439 adet gemi saldırısının; 75'i Aden Körfezi ve Kızıl Deniz'de olmak üzere 237 tanesi Somalili deniz haydutları tarafından gerçekleştirilmiştir (Fung-Ng, 2011:3; IMB, 2012:5-6). Somalili deniz haydutları tarafından gerçekleştirilen saldırılar, çoğunlukla gemiye tam-otomatik silahlarla ateş etme, gemiye çıkma, personeli rehin alma ve gemiyi kaçırma şeklinde olmuştur (Ballout, 2013). Toplamda günlük 8 milyon varillik petrol akışının sağlandığı bu iki düğüm noktasının güvenlik açısından daha riskli hale gelmesi sonucu, enerji arzı ancak daha uzun rotalar yada ek boru hatları ile sağlanabilecektir.

1.1.4.Gine Körfezi

Gine Körfezi yıllar içerisinde, Kuzey Amerika, Avrupa ve Asya'ya giden enerji hammaddelerinin ulaştırma rotasında bir merkez haline gelmiştir (Anyimadu, 2013). 2013 yılı itibariyle, bölge günlük 5,4 milyon varillik bir petrol kaynağıdır (House, 2012). Ancak diğer bölgelerde olduğu gibi burada da enerji arz güvenliği tehdit altında bulunmaktadır. 2012 yılı itibariyle Gine Körfezi, deniz haydutluğu ile ünlü Aden Körfezi'ni yaşanan olaylar sayısında geçmiş bulunmaktadır. Üstelik bu bölgede yaşanan deniz haydutluğu ve silahlı soygun olaylarının daha fazla şiddet içerdiği ifade edilmektedir (Osinowo, 2015:1). Batı Afrika'daki deniz haydutluğu doğrudan petrol üretimi ve ulaştırmasıyla ilişkilendirilmektedir (Kennedy ve diğerleri, 2011). Nijerya devletinin zayıf ekonomik ve siyasi durumu, deniz haydutluğu tehditleri ile başa çıkmasını daha güç hale getirmektedir. Deniz haydutları ise bu otorite boşluğundan yararlanmakta ve 2005'ten beri bölgede petrolün ana kaynağı olan, uluslararası petrol platformlarına ve tankerlere saldırılar düzenlemektedirler (Osaretin, 2011:188). IMB'nin raporuna göre; 2007-2011 yılları arası Batı Afrika'da gerçekleşen 252 saldırıdan, 140'ı Nijerya kıyılarında gerçekleşmiştir (IMB, 2011:5-6; Tepp, 2012:187). Diğer bölgelerde yaşanan deniz haydutluğu faaliyetlerine göre Gine Körfezi'nde yaşanan olaylar, rehin alma ya da fidye istemeden daha çok tankerlerdeki petrolün çalınması şeklinde gözlemlenmiştir (UNSC, 2011). Bu durum da özellikle bölgenin enerji arz güvenliği açısından ne kadar vahim durumda olduğunu göstermektedir.

1.2. Ham Petrol Tankerlerine Yönelik Deniz Haydutluğu Olayı Örnekleri

Tankerlere yönelik deniz haydutluğu saldırıları arasında en çok dikkat çeken olaylardan başında M/TSirius Star gemisinin Somalili deniz haydutları tarafından kaçırılması gelmektedir. Sirius Star, 2,2 milyon varil (350.000metre^3) ham petrol kapasiteli, 330 metre boyunda ve 60 metre genişliğinde, Liberya bayraklı(Suudi) VeryLargeCrude Carrier (VLCC)bir tankerdir. 2008 yılında Somalili deniz haydutları tarafından Kenya'nın güneydoğu açıklarında kaçırılmıştır (Telegraph, 2008). Kaçırılma esnasında, 2 milyon varil ham petrol ile Ümit Burnu rotası üzerinden, ABD'ye gitmekte olan gemi 2009 yılında 3milyon dolar fidye bedeliyle serbest bırakılmıştır. M/T SamhoDream, Marshall Adaları bayraklı VLCC, 2010 yılında Irak'tan ABD'ye petrol taşırken Somalili deniz haydutlarınca kaçırılmıştır. 300.000 ton ham petrol kapasitesine sahip, 330 metre uzunluğundaki ve 60 metre genişliğindeki gemi, personeliyle birlikte217 gün rehin olarak tutulduktan sonra 9 milyon dolarlık fidye karşılığı serbest bırakılmıştır (BBC, 2010).M/TMaranCentaurus, kaçırılan üçüncü büyük VLCC olarak gündeme gelmiştir. Daha önce kaçırılan ham petrol tankerlerine benzer olarak ABD'ye petrol taşımakta olan tanker, 2009 yılında Somalili deniz haydutlarınca kaçırılmıştır. 2 milyon varil ham petrol kapasiteli gemi, 5,5-7 milyon dolar arasında bir rakamla fidye karşılığı serbest bırakılmıştır. M/T Irene SL, 2011 yılında Somalili deniz haydutları tarafından kaçırılan bir başka VLCC'dir. Kaçırıldığı sırada Füceyre'den (*Birleşik Arap Emirlikleri'ni oluşturan emirliklerden biri*)ABD'ye, 2 milyon varile yakın ham petrol taşımakta olan tanker, 11-13,5 milyon dolar fidye karşılığı serbest bırakılmıştır (Somali Report, 2011).

2. YÖNTEM

Bu çalışmada IMO tarafından aylık ve yıllık olarak yayınlanan gemilere karşı deniz haydutluğu ve silahlı soygun raporlarından faydalanılmıştır. 2010-2015 yılları arası gemilere karşı gerçekleşen bu saldırılardan, sadece tanker tipinde olan gemiler tespit edilmiş ve ayrılmıştır. Belirtilen yıllara ait incelenen raporlardan (*toplamda 68 rapor olmak üzere*); analizde kullanılmak üzere tankerlerin bayrağı, tipi, saldırıya uğradığı yıl, yer ve yaşanan olayın sonucu (*soygun, yaralama/esir alma, kaçırma, yükün çalınması*) verileri tespit edilmiş ve alınmıştır. 2010 yılında 489, 2011 yılında 544, 2012 yılında 341, 2013 yılında 298, 2014 yılında 240olmak üzere toplamda 1.912 olay incelenmiş, bunlardan 709'unun tankerlere yönelik olduğu tespit edilmiştir. 709 adet olayın, sonuçları, gemi bayrağı, gemi tipi ve saldırı mevkiigibi parametrik olmayan değerler uygulamada kullanılmıştır. Çalışmanın istatistiksel analizlerinde SPSS(*Statistical PackageforSocialSciences*)22 paket programı kullanılmıştır. 2010-2015 dönemi için elde edilen verilerin analizinde parametrik olmayan değişkenler arasında anlamlı bir ilişki olup-olmadığını test etmek için ise ki-kare testlerinden ($\chi 2$) faydalanılmıştır. P değerinin anlamlılık düzeyi0,05 olarak kabul edilmiştir.

3. BULGULAR

Araştırmanın bulguları; "*saldırıların tanker tiplerine göre dağılımı*", "*tanker tipi ve saldırı sonucu arası ki-kare testi*", "*saldırı yılları ile saldırı bölgeleri arası ki-kare testi*", "*saldırı yılları ile tanker tipleri arası ki-kare testi*", "*saldırı yılları ile saldırı sonuçları arası ki-kare testi*" ve "*saldırı bölgeleri ile saldırı sonuçları arası ki-kare testi*" olmak üzere altı (6) başlıkta incelenmektedir.

3.1. Saldırıların Tanker Tiplerine Göre Dağılımı

İncelemesi yapılan 2010-2015 yılları arasında toplamda, 1.912 deniz haydutluğu ve silahlı soygun olayı gerçekleşmiştir. Bu olaylardan 709 (% 37) tanesinin tankerlere yönelik olduğu tespit edilmiştir. Tablo 2'dende görüldüğü gibi, 314 olayla (% 43,8) en çok saldırı petrol tankerlerine gerçekleşmiştir. Diğer saldırılar sırasıyla; 233 olayla (% 32,5) kimyasal tankerlere, 127 olayla (% 17,7) ürün tankerlerine ve en az yaşanan olay ise 35 saldırıyla (% 4,9)LPG tankerlerine gerçeklemiştir.

Tablo 2: Tanker Tiplerine Göre Yapılan Saldırılar

Tanker Tipi	**Sayı**	**Yüzde**	**Kümülatif Yüzde**
Kimyasal Tanker	233	32,5	33,6
LPG Tankeri	35	4,9	38,5
Ürün Tankeri	127	17,7	56,2
Petrol Tankeri	314	43,8	100,0
Toplam	**709**	**100,0**	

3.2. Tanker Tipi ve Saldırı Sonucu Arası Ki-Kare Testi

2010-2015 yılları arasında gerçekleşen saldırılarda tanker tiplerine göre olayların sonuçları analiz edilmiştir. Saldırı sonuçları;"*kaçırma yada gemiye çıkma teşebbüsü*", "*gemideki yükün çalınması*", "*kaçırma*", "*personelin yaralanması yada esir alınması*" ve "*hırsızlık*" olarak sınıflandırılmıştır. Test hipotezi;

H_0: Tanker tiplerinin saldırı sonucu üzerine dağılımı arasında anlamlı bir fark yoktur.
H_1: Tanker tiplerinin saldırı sonucu üzerine dağılımı arasında anlamlı bir fark vardır.

Ki-kare testi sonuçlarına göre; p değerininAsymp. Sig. (2-sided) $\alpha = 0.05$'ten küçük olduğu görülmektedir. Dolayısıyla değerlendirme sonucunda H_1 hipotezi desteklenmiştir. Analiz sonuçları Tablo 3'te gösterilmektedir.

Tablo 3:Gemi Tipi – Saldırı Sonucu Ki-Kare Testi

TANKER TİPİ		**SALDIRI SONUCU**					**OPLAM**
		T eşebbüs	**Kar go çalınması**	**açırma**	**Y aralanma**	**ırsızlık**	
Kim yasal Tanker	Sayı	1 35	2	0	2 0	6	33
	Beklen en sayı	1 29,0	2,6	9,2	1 9,2	0,4	33,0
LPG Tankeri	Sayı	1 8	0		2	4	5
	Beklen en sayı	1 9,4	,4	,4	2, 9	,6	5,0
Ürü n Tankeri	Sayı	5 8	1	7	9	2	27
	Beklen en sayı	7 0,3	1,4	5,9	1 0,5	7,5	27,0
Petr ol Tankeri	Sayı	1 86	5	2	2 8	3	14
	Beklen en sayı	1 73,9	3,5	9,4	2 5,8	7,9	14,0
TOP LAM	**Sayı**	**3 97**	**8**	**0**	**5 9**	**55**	**09**
	Bekle nen sayı	**3 97,0**	**8,0**	**0,0**	**5 9,0**	**55,0**	**09,0**

Chi-SquareTests

	Valu e	**Df**	**Asymp. Sig. (2-sided)**
PearsonChi-Square	7,409 E2[a]	20	,000
LikelihoodRatio	111,1 08	20	,000
N of ValidCases	717		

a.16 cells (53,3%) haveexpectedcountlessthan 5. The minimum expectedcountis ,09.

3.3. Saldırı Yılları ile Saldırı Bölgeleri Arası Ki-Kare Testi

Tankerlere gerçekleşen 709 saldırıdan en fazla olay 207 olayla (% 28,8) 2011 yılında gerçekleşmiştir. Sırasıyla 2010 yılında 159 (% 22,1), 2014 yılında 124 (% 17,2), 2012 yılında 117 (% 16,3) ve en az saldırı 2013 yılında 102 (% 14,2) ile gerçekleşmiştir. Bölge bazında en çok saldırı 195 olay ile Güney Çin Denizi'nde, en az saldırı 2 olay ile Kuzey Atlantik'te gerçekleşmiştir. Test hipotezi;

H_0: Saldırı yıllarının saldırı bölgeleri üzerine dağılımı arasında anlamlı bir fark yoktur. H_1: Saldırı yıllarının saldırı bölgeleri üzerine dağılımı arasında anlamlı bir fark vardır.

Ki-kare testi sonuçlarına göre; p değerininAsymp. Sig. (2-sided) α = 0.05'ten küçük olduğu görülmektedir. Dolayısıyla değerlendirme sonucunda H_1 hipotezi desteklenmiştir. Analiz sonuçları Tablo 4'te gösterilmektedir.

Tablo 4: Saldırı Yılları – SaldırıBölgeleri Ki-kare Testi

SALDIRININ YERİ		**2010**	**2011**	**2012**	**2013**	**2014**	**Toplam**
Arap Denizi	Sayı	9	9	16	2	4	40
	Beklenen sayı	8,9	11,5	6,5	5,7	6,9	40,0
Doğu Afrika	Sayı	58	90	23	5	3	179
	Beklenen sayı	39,7	51,4	29,2	25,5	31,0	1,8E2
Hint Okyanusu	Sayı	26	19	12	13	23	93
	Beklenen sayı	20,6	26,7	15,2	13,2	16,1	93,0
Malakka Boğazı	Sayı	0	6	9	2	29	46
	Beklenen sayı	10,2	13,2	7,5	6,5	8,0	46,0
Akdeniz	Sayı	0	1	0	2	0	3
	Beklenen sayı	,7	,9	,5	,4	,5	3,0
Kuzey Atlantik	Sayı	0	0	1	0	1	2
	Beklenen sayı	,4	,6	,3	,3	,3	2,0
İran Körfezi	Sayı	0	0	1	2	2	5
	Beklenen sayı	1,1	1,4	,8	,7	,9	5,0
Güney Amerika	Sayı	9	5	4	7	2	27
	Beklenen sayı	6,0	7,8	4,4	3,8	4,7	27,0
Güney Çin Denizi	Sayı	44	38	27	46	40	195
	Beklenen sayı	43,2	56,0	31,8	27,7	33,7	2,0E2
Batı Afrika	Sayı	13	38	24	23	20	119
	Beklenen sayı	26,4	34,2	19,4	16,9	20,6	1,2E2
TOPLAM	**Sayı**	**159**	**206**	**117**	**102**	**124**	**709**
	Beklenen sayı	**1,6E2**	**2,1E2**	**1,2E2**	**1,0E2**	**1,2E2**	**7,1E2**

Chi-SquareTests

	Value	**df**	**Asymp. Sig. (2-sided)**
PearsonChi-Square	9,555 E2[a]	60	,000
LikelihoodRatio	330,4 75	60	,000
N of ValidCases	717		

a. 45 cells (58,4%) haveexpectedcountlessthan 5. The minimum expectedcountis ,00.

3.4. Saldırı Yılları ile Tanker Tipleri Arası Ki-Kare Testi

Tanker tipleri ile bu gemilere gerçekleştirilen saldırı yılları arasındaki istatistiksel ilişki olup olmadığı araştırılmıştır.Test hipotezi;

H_0: Saldırı yıllarının tanker tipleri üzerine dağılımı arasında anlamlı bir fark yoktur.
H_1: Saldırı yıllarının tanker tipleri üzerine dağılımı arasında anlamlı bir fark vardır.

Ki-kare testi sonuçlarına göre; p değerininAsymp. Sig. (2-sided) $\alpha = 0.05$'ten küçük olduğu görülmektedir. Dolayısıyla değerlendirme sonucunda H_1 hipotezi desteklenmiştir. Analiz sonuçları Tablo 5'te gösterilmektedir.

Tablo 5: Saldırı Yılları - Tanker Tipleri Ki-Kare Testi

Tanker Tipi		**YILLAR**					**Toplam**
		2010	**2011**	**2012**	**2013**	**2014**	
Kimyasal Tanker	Sayı	69	72	40	36	16	233
	Beklenen sayı	51,5	67,1	37,9	33,1	40,2	233,0
LPG Tankeri	Sayı	0	7	9	8	11	35
	Beklenen sayı	7,7	10,1	5,7	5,0	6,0	35,0
Ürün Tankeri	Sayı	66	94	50	37	67	314
	Beklenen sayı	69,4	90,4	51,1	44,5	54,2	314,0
Petrol Tankeri	Sayı	24	34	18	21	30	127
	Beklenen sayı	28,1	36,6	20,7	18,0	21,9	127,0
TOPLAM	**Sayı**	**159**	**207**	**117**	**102**	**124**	**709**
	Beklenen sayı	**159,0**	**207,0**	**117,0**	**102,0**	**124,0**	**709**

Chi-SquareTests

	Value	**df**	**Asymp. Sig. (2-sided)**
PearsonChi-Square	7,659E2[a]	20	,000
LikelihoodRatio	162,040	20	,000
N of ValidCases	719		

3.5. Saldırı Yılları ile Saldırı Sonuçları Arası Ki-Kare Testi

Yıllara göre saldırı sonuçları incelendiğinde 2010 yılında 31 soygun olayı, 2014 yılında 37 seviyelerinde devam etmiştir. 2011 yılında ise beklenen soygun olayı ile yaşanan soygun olayları arasında büyük bir farklılık vardır. 2011 yılına bakıldığında kaçırma ya da gemiye çıkma teşebbüslerinde ve yaralama, esir alma ile sonuçlanan olaylarda diğer yıllara göre ciddi bir artış olduğu görülmektedir. Kaçırılma olaylarının en düşük olduğu yıl, 2013 (9 olay) olarak gözlemlenirken, 2014 yılında kaçırma ile sonuçlanan olay sayısı 21'e yükselmiştir. Test hipotezi;

H_0: Saldırı yıllarının saldırı sonuçları üzerine dağılımı arasında anlamlı bir fark yoktur.
H_1: Saldırı yıllarının saldırı sonuçları üzerine dağılımı arasında anlamlı bir fark vardır.

Ki-kare testi sonuçlarına göre; p değerininAsymp. Sig. (2-sided) $\alpha = 0.05$'ten küçük olduğu görülmektedir. Dolayısıyla değerlendirme sonucunda H_1 hipotezi desteklenmiştir. Analiz sonuçları Tablo 6'da gösterilmektedir.

Tablo 6: Saldırı Yılları – Saldırı Sonucu Ki-Kare Testi

SALDIRI SONUCU		2010	2011	2012	2013	2014	TOPLAM
Teşebbüs	Sayı	96	139	63	45	54	397
	Beklenen sayı	87,8	114,3	64,6	56,3	68,5	397,0
Kargo Çalınması	Sayı	4	1	1	0	2	8
	Beklenen sayı	1,8	2,3	1,3	1,1	1,4	8,0
Kaçırılma	Sayı	17	29	14	9	21	90
	Beklenen sayı	19,9	25,9	14,6	12,8	15,5	90,0
Yaralanma Esir Alma	Sayı	11	21	9	8	10	59
	Beklenen sayı	13,0	17,0	9,6	8,4	10,2	59,0
Soygun	Sayı	31	17	30	40	37	155
	Beklenen sayı	34,3	44,6	25,2	22,0	26,7	155,0
TOPLAM	**Sayı**	**159**	**207**	**117**	**102**	**124**	**709**
	Beklenen sayı	**159,0**	**207,0**	**117,0**	**102,0**	**124,0**	**709,0**

Chi-SquareTests

	Value	df	Asymp. Sig. (2-sided)
PearsonChi-Square	7,776E2[a]	25	,000
LikelihoodRatio	166,405	25	,000
N of ValidCases	719		

3.6. Saldırı Bölgeleri ile Saldırı Sonuçları Arası Ki-Kare Testi

Saldırıların yaşandığı bölgelere göre yaşanan olayların sonuçları incelenmiştir. Basra Körfezi'nde kaçırma ve gemiye çıkma teşebbüsü dışında bir olay görülmemiştir. Kaçırma olayları özellikle Doğu ve Batı Afrika'da ön plana çıkarken, Güney Çin Denizi ve Hint Okyanusu'nda soygun ile sonuçlanan saldırılar görülmüştür. Test hipotezi;

H_0: Saldırı bölgelerinin saldırı sonuçları üzerine dağılımı arasında anlamlı bir fark yoktur.
H_1: Saldırı bölgelerinin saldırı sonuçları üzerine dağılımı arasında anlamlı bir fark vardır.

Ki-kare testi sonuçlarına göre; p değerinin Asymp. Sig. (2-sided) $\alpha = 0.05$'ten küçük olduğu görülmektedir. Dolayısıyla değerlendirme sonucunda H_1 hipotezi desteklenmiştir. Analiz sonuçları Tablo 7'de gösterilmektedir.

Tablo 7: Saldırı Bölgeleri – Saldırı Sonuçları Ki-Kare Testi

SALDIRI BÖLGELERİ		Teşebbüs	Yük çalınması	Kaçırılma	Yaralanma	Soygun	TOPLAM
Akdeniz	Sayı	0	0	1	0	2	3
	Beklenen sayı	1,7	,0	,4	,2	,6	3,0
İran Körfezi	Sayı	5	0	0	0	0	5
	Beklenen sayı	2,8	,1	,6	,4	1,1	5,0
Batı Afrika	Sayı	60	3	28	18	10	119
	Beklenen sayı	65,7	1,3	14,9	9,8	25,7	119,0
Doğu Afrika	Sayı	152	1	20	2	4	179
	Beklenen sayı	98,8	2,0	22,4	14,7	38,6	179,0
Güney Amerika	Sayı	9	1	0	2	15	27
	Beklenen sayı	14,9	,3	3,4	2,2	5,8	27,0
Güney Çin Denizi	Sayı	69	3	28	26	69	195
	Beklenen sayı	107,7	2,2	24,4	16,0	42,0	195,0
Hint Okyanusu	Sayı	52	0	6	2	33	93
	Beklenen sayı	51,4	1,0	11,6	7,6	20,0	93,0
Kuzey Atlantik	Sayı	0	0	0	0	2	2
	Beklenen sayı	1,1	,0	,3	,2	,4	2,0
MalakkaBoğazı	Sayı	17	0	2	9	18	46
	Beklenen sayı	25,4	,5	5,8	3,8	9,9	46,0
Umman Denizi	Sayı	33	0	5	0	2	40
	Beklenen sayı	22,1	,4	5,0	3,3	8,6	40,0
TOPLAM	**Sayı**	**397**	**8**	**90**	**59**	**155**	**709**
	Beklenen sayı	**397,0**	**8,0**	**90,0**	**59,0**	**155,0**	**709**

Chi-SquareTests

	Value	Df	Asymp. Sig. (2-sided)
PearsonChi-Square	9,481E2[a]	50	,000
LikelihoodRatio	359,312	50	,000
N of ValidCases	719		

a. 41 cells (62,1%) haveexpectedcountlessthan 5. The minimum expectedcountis ,02.

SONUÇLAR

Deniz güvenliği, enerji arz güvenliğinde hayati bir bileşendir. Tankerlere düzenlenen saldırılar sadece denizcilik sektörünü değil, dünya ticaretini ve enerji arz güvenliğini de tehdit etmektedir. Güvenlik zaaflarından kaynaklı olası bir kaza sonucu çevreye verilecek hasarlar ve bu tür bir olayın, özellikle önemli düğüm noktalarında gerçekleşmesi ekonomik olarak yıkıcı olabilir. Son yıllarda önemli ölçüde yükselişe geçmiş ve birçok ülke tarafından ciddi önlemler alınmasına neden olmuş deniz haydutluğu ve silahlı soygun olayları, deniz ulaştırmasında ve dolaylı olarak enerji arz güvenliğinde önemli bir tehdit haline gelmiştir. Deniz haydutluğu ve silahlı soygunların yaşandığı bölgelere bakıldığında doğu bölgelerinden batıya doğru daha ciddi sonuçlara neden olan saldırılarla karşılaşıldığı ortadadır. Nijerya açıkları ve Gine Körfezi'nde yaşanan deniz haydutluğu olaylarının kasıtlı olarak petrole yönelik haydutluk olayları olduğu görülmüştür.

2010-2015 yılları arasında tankerlere yönelik gerçekleşen 709 saldırıdan, büyük çoğunluğunun kaçırma, gemiye çıkma teşebbüsü (397-%55,4) ve gemi ekipmanının çalınması (155-%21,6) olduğu gözlemlenmiştir. Bu olayların azımsanmayacak kadarı kaçırılma (90-%12,6) ve yaralanma, personelin esir alınması (59-%8,2) ile sonuçlanmıştır. Toplamda tankerlere yönelik saldırılar 2011 yılında 207 olay ile tavan yapmış ve 2014 yılında 124'e kadar düşmüştür. Bu durum yaşanan tanker olaylarında bir azalma gibi gözükse de 2011 yılında gerçekleşen toplam 544 saldırının % 38'ine denk gelirken, 2014 yılında yaşanan 240 olayın % 51,7'sine tekabül etmektedir. 195 saldırı ile tankerlere yönelik en çok olay Güney Çin Denizi'nde yaşanmıştır. Bu olayların çoğunluğunu soygun (69) ve teşebbüs (69) oluşturmuştur. 179 olay ile ikinci sırada gelen deniz haydutluğu bölgesi Doğu Afrika olarak görülmüştür. Doğu Afrika bölgesinde yaşanan saldırıların çoğunluğunu ise teşebbüs (152) ve kaçırılma (20) oluşturmuştur. Tanker tiplerine göre en düşük saldırı yüzdesi 39 olay ve % 4,2 ile LPG tankerlerine karşı gerçekleşmiştir. Kaçırma olayı, 32 saldırı ile en çok petrol tankerlerinde gözlemlenirken, en az kaçırma durumu bir olay ile LPG tankerlerde gerçekleşmiştir. LPG tankerlerinde yüke yönelik bir soygun eylemi gözlemlenmezken, petrol tankerlerinde gerçekleşen 5 olayda yük çalınmasına yönelik saldırılar meydana gelmiştir. LPG tankerlerine 2010 yılında hiçbir saldırı gerçekleşmezken, bu sayı 2014 yılında 11'e kadar çıkmıştır. 2010 yılında 69 olay ile en çok saldırı düzenlenen tanker tipi kimyasal tankerlerken, 2014 yılında kimyasal tankerlere karşı gerçekleştirilen saldırılar 16'ya kadar düşmüştür.

Yapılan istatistiksel analizler sonucunda;*"tanker tipi ve saldırı sonucu"*, "*saldırı yılı ve bölgesi*", "*saldırı yılı ve sonucu"*, "*saldırı yılı ve tankeri tipi*", "*saldırı bölgesi ve sonucu"*arasında anlamlı bir ilişki olduğu anlaşılmaktadır. LPG'lere karşı "*kaçırma ve yük çalma*" olayları sık yaşamakta olmasa da, yıllar içerisinde bu tip tankerlere karşı düzenlenen saldırılarda artan bir eğilim görülmektedir. Alınan ulusal/uluslararası önlemlerle birlikte; değişmekte/gelişmekte olan deniz haydutlarının izleyeceği yol, enerji hammaddesi taşıyan tankerlere yönelik tehdit artışı ve özellikle Gine Körfezi bölgesinde yaşanan petrole yönelik saldırı olayları yakından takip edilmelidir. Başta uluslararası kuruluşlar olmak üzere, deniz haydutluğu tehdidini kalıcı olarak engellemek ve enerji arz güvenliğinin deniz ayağını tehditlerden uzak tutmak amacıyla çok boyutlu yeni stratejiler geliştirilmelidir.

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İNSAN VE DOĞA - ENERJİ UYUMU VE KULLANIMI
HUMAN AND NATURE - USE OF ENERGY AND COMPLIANCE

Mustafa Şakir BAŞARAN*
Mustafa Özgür TÖNGEL†

ÖZET

Bireysel olarak yaşayan insanlar daha fazla düşünmeye, yerine göre fiziksel olarak daha güçlü bir birey olma eğilimindedir. Tropik veya sub-tropik bölgelerden daha kuzeyde veya güney yarım kürede yaşayan insanlarda sürekli yiyecek için kaygılanma söz konusudur. Sürekli rekabet vardır ve güçlü kalmak için sürekli düşünmek ve rakiplerini bertaraf etmek zorundadırlar. Bazı durumlarda ise rekabet beyinde biter. Zeki olmak veya güçlü olmak çoğu zaman yeterli olmayabilir. Dolayısıyla güçlü ve zeki olmanın yanında kurnaz da olmak gerekebilir. Zamanla bu bölgelere adapte olmuş bu toplulukların artık sıcak bölgelerde yaşamaları imkânsızdır. Bu nedenle ekvatordan uzak bölgelerde yaşayan topluluklar ekvator çevresindeki alanlara kurnazlıkları ve güçleri yettiği oranda inmişlerdir. Burada bütün dengeleri değiştiren unsur fotosentezin (ışık bileşim) esas kaynağı olan Güneş'tir.

Anahtar Kelimeler: Canlılar, Enerji, Güneş

ABSTRACT

Individual people need to think much more than the others and ultimately they are physically more powerful. For the people living far northern or southern places, there is always a worry and competition about finding food. They have to think about food to be strong and they have to eliminate their opponents. In some conditions, competition ends in their brains. Most of the time, being intelligent or strong may not enough. Therefore, besides being intelligent or strong, they have to be cunning as well. It would not be possible to re-adapt to hot places for the populations who previously adapted to these harsh conditions. The people living far from equator have visited the places around equator with their powers and cunning attitudes. Here the element that alters the whole balances is the Sun which is the main source of photosynthesis also known as light reactions.

Key words: Creatures, Energy, Sun

1. GİRİŞ

Dünyanın ısı kaynağı güneştir. Dünyanın atmosferdeki konumuna göre değişmekle birlikte, Güneş, ışınları yerkürenin farklı noktalarına farklı zaman dilimlerinde farklı miktarda iletir. Bu durum yerkürenin farklı bölgelerinin farklı zaman dilimlerinde farklı derecede ısınmasına ve soğumasına neden olur.

Dünya üzerindeki canlılar, yerkürenin farklı bölgelerine dağılmışlardır. Kutuplardan ekvatora, en yüksek noktalarından en derin okyanuslara kadar canlı türlerine rastlama mümkündür. Dünya canlılarının kütle olarak büyük çoğunluğunu oluşturan bitkiler de dünyanın değişik bölgelerine yayılmışlar ve adapte olmuşlardır.

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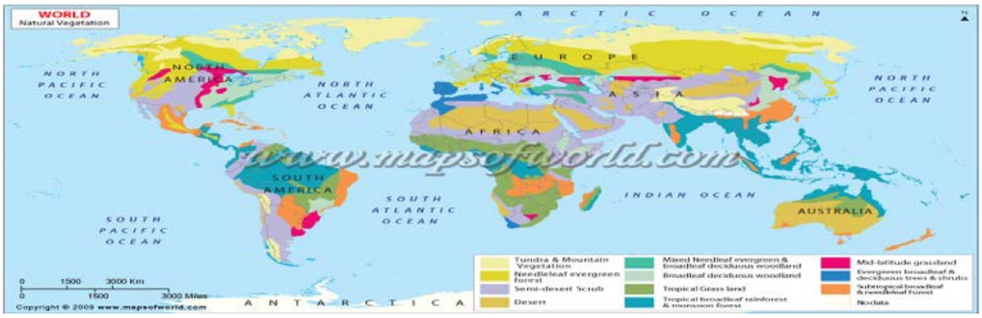
Şekil 1.1. Farklı Bitki Gruplarının Dünya Üzerindeki Dağılımı



(Mapworld, 2013)

Yukarıdaki haritaya göre Tundra ve Dağ Vejetasyonu Arktik okyanusunun olduğu bölgelerde Kuzey Buz Denizine yakın olan kuzey kutbu etrafında yoğunlaşmıştır. İğne yapraklı sürekli yeşil kalan bitkiler genellikle hemen tundra vejetasyonunun güney kısımlarında yer alır. Yarı çöl özelliği gösteren bölgelerde çalımsı bitkilerin yoğunlaştığı görülür. Dünyadaki çöl bölgelerinde ise çöl bitkileri Kuzey Afrika'nın orta bölümleri ve SubSahara Bölgeleri, Avustralya'nın orta bölümü, Arabistan Yarımadasının orta Bölümü ve Asya'nın iç bölgelerinde bazı alanlar yer almaktadır. Kuzey Avrupa, Türkiye, Kanada'nın bazı bölgelerinde iğne yapraklı sürekli yeşil kalan bitkiler ile geniş yapraklı ve yapraklarını döken bitkiler vuku bulmuştur. Orta ve Batı Avrupa, Doğu Asya Kıyıları, Kuzey Amerika'nın Batısı, Güney Amerika'nın Doğu Bölümü'nde bazı bölgeler, Orta Afrika'nın doğu kısmında bazı bölgeler, Hazar Denizi'nin doğusundan yine doğuya uzanan hatta geniş yapraklı, yapraklarını döken ormanlık alanlar yer alır. Güney Amerika'nın Orta Doğu bölümü, Orta ve Güney Afrika'nın bazı bölümleri, Avustralya'nın İç Kuzey Bölgeleri, Madagaskar Adasının bazı Bölümlerinde tropik yeşil alanlara rastlanır. Güney Amerika'nın Kuzeyi, Orta Afrika'nın Güney Bölümü, Hindistan'dan Kuzey Avustralya'ya kadar uzanan bölgede tropik geniş yapraklı yağmur ve muson ormanları bulunur. İber Yarımadası, Kuzeydoğu Afrika Kıyıları, İtalya ve Batı Türkiye ve Türkiye'nin Akdeniz Kıyılarında sürekli yeşil kalan bitkiler, yapraklarını döken ağaçlar ve maki tarzı bitki toplulukları bulunur.

Ekosistemde, bitki, hayvan ve insan topluluklarının sayılarını belirleyen faktörler vardır. Kısıtlayıcı faktörler biotik ve abiotik faktörler olarak ikiye ayrılır.

1.1.Biotik Faktörler: Biotik faktörler, bütün yaşayan canlıların veya onların materyallerinin dolaylı ve direk olarak bir organizmaya bulunduğu çevre şartlarındaki müdahalesidir.

- Asalak yaşam
- Hastalıklar
- Canlıların birbirlerini yemesi şeklinde sınıflandırılır.

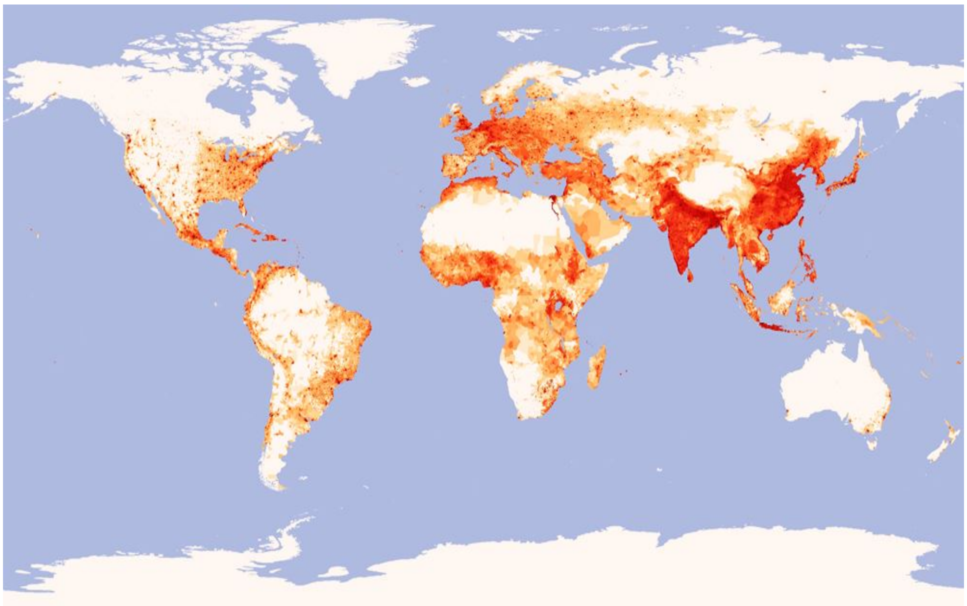
1.2.Abiotik Faktörler:

- Işık yoğunluğu
- Sıcaklık ve ısı değişim oranı ve sıklığı
- Toprak veya kaya tipi
- pH(asitlilik veyaalkalilik)
- Suyun mevcudiyeti & kullanılabilirliği
- Çözünmüş gazlar
- Kirlilik derecesi

Birçok kısıtlayıcı faktör canlıların doğada nüfuslarının artışlarını durdurur. Örneğin kutup bölgelerinde ağaçların büyümesi sınırlıdır.

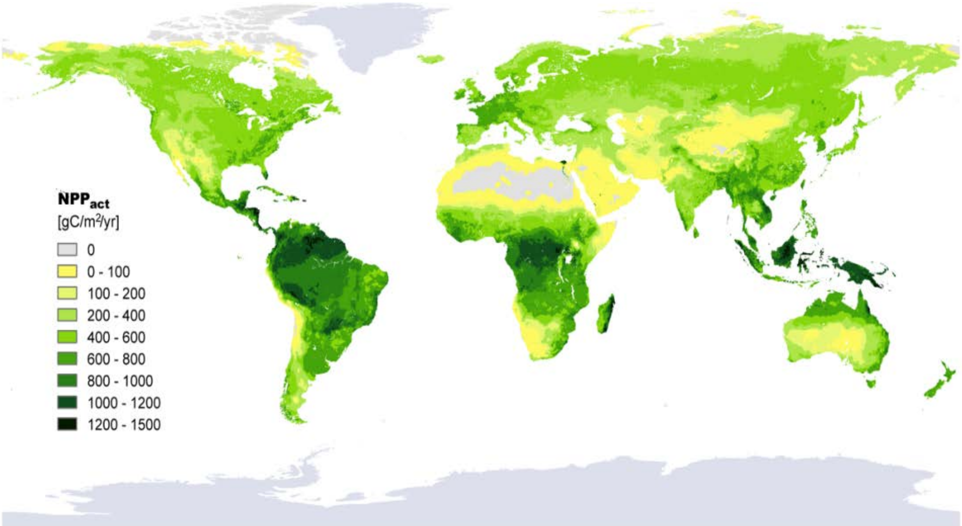
Tıpkı diğer canlılar gibi insanlar da biotik ve abiotik faktörlerden etkilenmekteler ve dünya üzerinde farklı bölgelerde yaşamaktadırlar.

Şekil 1.2. İnsanların Dünya Üzerindeki Yoğunlukları



(Mapworld, 2013)

Şekil 1.3. Bitkilerin Dünya Üzerindeki Yoğunlukları



(Crop Yield Map,2013)

Yukarıdaki üç haritada insanların ve bitkilerin dünya üzerindeki dağılımlarını ve de tarımsal ürün yetiştirilen yerlerin yoğunluğu görülmektedir. İlginçtir ki, bitki popülâsyonlarının yoğun olduğu yerlerde insan nüfusunun da yoğun olduğu görülmektedir. Bu durum insanın olduğu yerde tarım yapılmasından kaynaklanan bir durum değil, daha fazla ürün elde edilebilen yerlerin insanlar tarafından yoğun kullanım alanlarını tercih etmelerinden kaynaklanan bir durumdur.

Kısacası insanlar bitki dolayısıyla da besin kaynağı olarak kullandıkları hayvanların yoğun olduğu yerlerde daha yoğun yaşamaktadırlar. Bitkilerin yoğun olduğu bölgelere bakıldığı zaman, bitkilerin büyümesini birincil derecede etkileyen sıcaklık ve suyun kısıtlayıcı olmayan yerler olarak görülür. Özetle bitkiler, kendileri için en uygun sıcaklık değerleri arasında olan yerleri ve suyun kısıtlayıcı durumda olmayan bölgeleri seçerler veya bu bölgelerde yoğun olarak bulunurlar. Genetik farklılaşma temelinde, yukarıda bahsedilen abiyotik ve biyotik faktörlerden dolayı bu bölgeler dışına çıkmak durumunda kaldıkları da gözlemlenmiştir. Fakat bu bölgelerde yoğun değillerdir ve bu bölgeye adaptasyonları da kolay olmaz. Adapte olduklarında diğer bölgelerde yaşayan bitkilerden zamanla farklılaşır ve genetik varyasyon oluşmaya başlar. Tıpkı bitkiler gibi, hayvanlar ve insanlarda da bu durum gözlemlenir.

İnsanlar bitkilerin ve besin kaynağı olarak kullandıkları hayvanların yoğun yaşadıkları yerlerden uzaklaştıkları durumlarda, nüfusları azaldığı gibi doğal olarak birbirlerinden daha seyrek bir yaşam, başka bir deyişle daha bireysel bir yaşam sergilerler. Bu durumda besin kaynaklarına ulaşmak daha da zorlaşmaktadır. Yoğun bitki ve hayvan popülasyonunun olduğu yerlere göre bu bölgedeki insanlar, besinlere ulaşmak için daha fazla çaba göstermek zorundadırlar. Bu durum bireysel olarak yaşayan insanları daha fazla düşünmeye, yerine göre de daha güçlü fiziki bir duruma sevk eder. Yine daha bireysel bir yaşam tercih etmiş insanlarda çocuk sayıları da, daha toplu yaşayan insan gruplarına göre azdır. Fakat daha güçlü yavrular elde edilir. Zamanla kazanılmış değişimler yavrulara da geçer veya bireylerin birim besin maddelerinden faydalanmaları daha yüksektir. Yine besin kaynaklarına zor ulaşan bireyler, toplu halde yaşayanlara nazaran Azot (N) içeriği daha yüksek proteinler ile beslenirler. Toplu halde yaşayan bireyler ise nispeten daha sıcak yerlerde yaşadıklarından Karbon(C)elementinin yoğun bulunduğu bölgelerde yaşarlar. Kısaca, daha soğuk yerlerde yaşayan insanlar protein ağırlıklı beslenirken sıcak bölgelerde yaşayan insanlar karbonhidrat ağırlıklı beslenirler. Güneş ışığı yardımıyla Karbon elementini karbonhidratlara dönüştüren bitkiler sayesinde (özellikle C4 bitkileri sayesinde bu süreç daha hızlıdır) insan gıdası birim zamanda çok fazla düzeye ulaşır. Bu durumda çok miktarda hızlı tüketime açık şekere ulaşan insanlar, daha fazla üreme eğilimindedir fakat protein yönüyle eksik beslenen çocukların gelişimi kuzeydeki daha az sayıdaki çocuklara göre zayıftır. Bu bölgede yaşayan insanları yiyecek bulmak için sürekli kaygılanması gerekmez çünkü daha önceden yiyecek vardı, halen hazırda yiyecek var ve gelecekte de var olacaktır. Dolayısıyla bu insanların düşünmelerine ve çaba sarf etmelerine gerek yoktur. Diğer bireylerle rekabet etme durumları da söz konusu değildir.

Tropik veya sub-tropik bölgelerden daha kuzeyde veya güney yarım küre için daha güneyde yaşayan insanlarda sürekli yiyecek için kaygılanma söz konusudur. Sürekli rekabet vardır ve güçlü kalmak için sürekli düşünmek ve rakiplerini bertaraf etmek zorundadırlar. Çoğu zaman bu durum çok şiddetli olabilir. Bazı durumlarda ise rekabet beyinde biter. Zeki olmak veya güçlü olmak çoğu zaman yeterli olmazken, daha iyi adapte olabilenler nesillerini daha iyi sürdürenlerdir. Dolayısıyla güçlü ve zeki olmanın yanında kurnaz da olmak gerekebilir. Zamanla bütün bu özelliklere sahip olan kuzeyde yaşayan insanlar neden yiyecek kaynağının bol olduğu yerlerde yaşamıyorlar? Zamanla bu bölgelere adapte olmuş bu toplulukların artık sıcak bölgelerde yaşamaları imkânsızdır. Fakat sıcak bölgelerdeki hazır yiyecekler ve diğer zenginlikler de (enerji kaynakları) son derece cezp edicidir. Bu durumda bu bölgelerin zenginliklerini kendi ihtiyaçları doğrultusunda kullanmaları için kendileri gibi güçlü ve zeki olmayan (!) veya daha önce hiç kurnaz olmak zorunda kalmamış insan toplulukları ile rekabet etmeleri hiç de zor olmayacaktır.

	Dünya	7,124,200,000
1	China	1,361,060,000
2	India	1,236,420,000
3	United States	317,061,000
4	Indonesia	237,641,326
5	Brazil	201,032,714
6	Pakistan	184,790,000
7	Nigeria	173,615,000
8	Bangladesh	152,518,015
9	Russia	143,500,000
10	Japan	127,300,000
11	Mexico	118,395,054
12	Philippines	98,649,000
13	Vietnam	90,388,000
14	Ethiopia	86,613,986
15	Egypt	83,661,000
16	Germany	80,523,700
17	Iran	77,053,000
18	Turkey	75,627,384
19	DemocraticRepublic of theCongo	67,514,000

20	Thailand	65,926,261
21	France[9]	65,806,000
22	United Kingdom	63,705,000
23	Italy	59,829,079
24	Burma	53,259,000
25	South Africa	52,981,991
26	South Korea	50,219,669
27	Colombia	47,321,000
28	Spain	46,704,314
29	Ukraine	45,461,627
30	Tanzania	44,928,923

Buradan şöyle bir yorum yapılaması yanlış olabilir. Kalabalık ülkelerin gelişmekte olan ülkeler olduğu anlamı çıkmamalıdır. Ancak genel olarak ülkelerin nüfus oranları ile refah düzeylerine bakıldığında nüfusu nispeten daha az olan ülkelerin daha gelişmiş olduğunu söylemek yanlış olmayacaktır.

Dünyada en kalabalık 30 ülkenin nüfusları incelendiğinde Çin ve Hindistan'ın nüfus toplamı 2.597.480.000 kişi olduğu gerçeği ortaya çıkar. Her iki ülkenin toplam nüfusu toplam dünya nüfusunun %36'sıdır. Bu iki ülkenin coğrafik koşulları incelendiğinde bitki ve hayvan varlığı bakımından zengin bölgelerin olduğu, suyun ve optimum sıcaklığın kısıtlayıcı olmadığı yerler anlaşılır. Birim alandan elde edilen zengin karbonhidrat içerikli bitki besin maddeleri sayesinde insan nüfusunda artış görülmüştür.

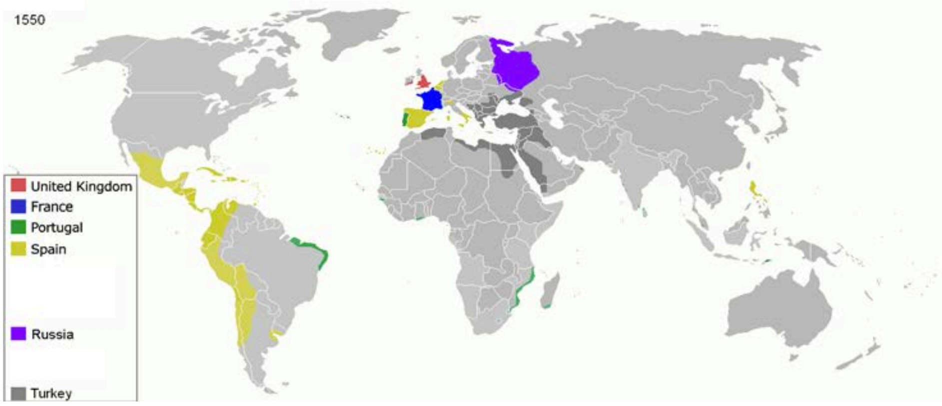
Bir ülkedeki insanlar çoğu zaman birçok nedenle göç etmek zorunda kalmaları yanında sömürülme tehlikesine de maruz kalmışlardır. Tam ve kısa manasıyla sömürgecilik, bir türün ırkın veya grubun normal olarak var olduğu alan dışında herhangi bir zamanda var olmasıdır. Birleşmiş Milletlerin raporuna göre aşağıdaki harita hangi bölgelerin hangi ülkelerin yönetiminde olduğunu 29.05.2012 tarihi itibarıyla belirlemiştir. Bu haritaya göre hala bazı bölgeler Fransa, Yeni Zelanda, İngiltere ve A.B.D.'nin yönetimi altındadır.

Şekil 1.4. Bazı Ülkelerin Yönetimi Altında Olduğu Bölgeler

(Nacu, 2013)

Ancak daha geçmişe gidersek 1550 tarihi itibarıyla İngiltere, Fransa, Portekiz, İspanya, Rusya ve Türkiye dünya toprakları üzerinde güçlü olduğunu görebiliriz. Ancak şu unutulmamalıdır ki, Osmanlı İmparatorluğu 1500'lü yıllarda sömürgecilikten uzak bir yönetim izlemiş, yönetim idaresini yine bölgede yaşayan halka bırakmıştır.

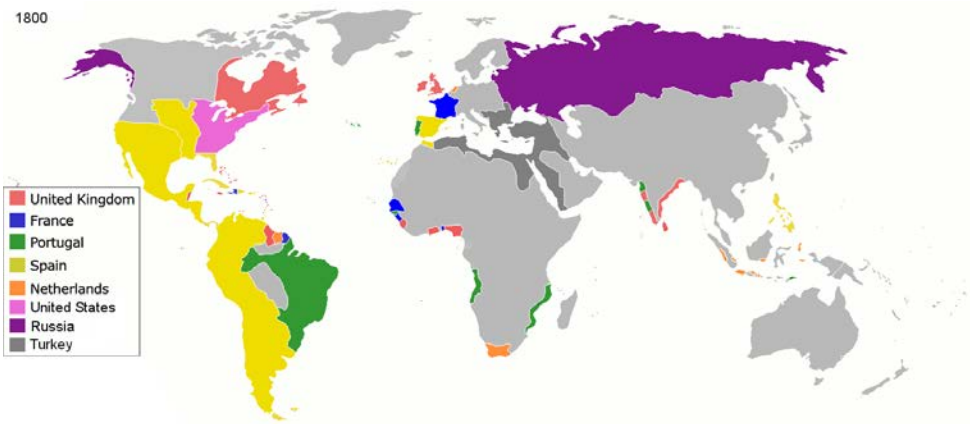
Şekil 1.5. 1500'lü Yıllar Ülke Yönetimi Altındaki Bölgeler



(Nacu, 2013)

1800'lü yıllarda sömürgecilik anlayışı yayılmış, bu ülkelere Hollanda da dahil olmuştur. Okyanus ötesi hakimiyet gerçek sömürgeciliği acımasızca hissettiren Büyük Britanya, Fransa, Portekiz, İspanya, Hollanda, A.B.D. olmuştur. Alaska dahil edilmezse Rusya ve Türkiye sadece karasal olarak toprak genişliğine sahip olmakla beraber okyanus ötesi zenginlikleri kendi ülkelerine taşıma gayreti içinde olmamışlardır.

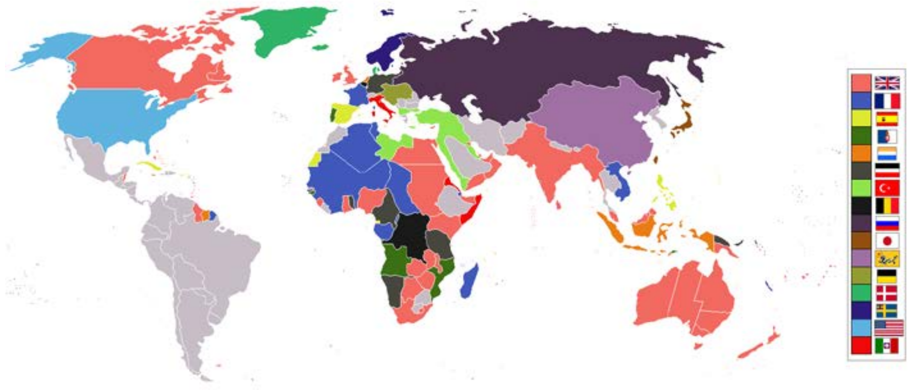
Şekil 1.6. 1800'lü Yıllar Ülke Yönetimi Altındaki Bölgeler



(Nacu, 2013)

Birinci Dünya Savaşı'nda hemen sonra, 1920'li yıllarda hemen bütün ülkeler ya sömürgeci ya da sömürülen olmuştur.

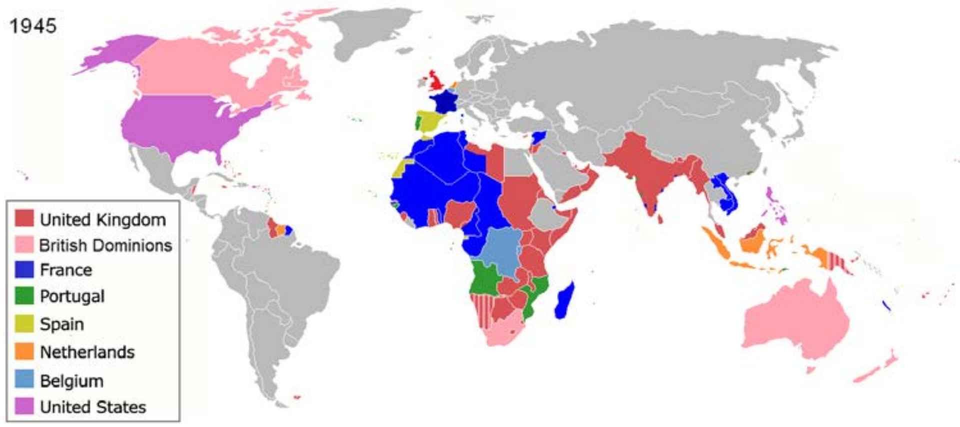
Şekil 1.7. 1920'li Yıllar Ülke Yönetimi Altındaki Bölgeler



(Nacu, 2013)

1945 yılında İkinci Dünya Savaşı'nın hemen ardından Savaştan galip gelen ülkelerin sömürge ülkelerini koruduğu görülmektedir.

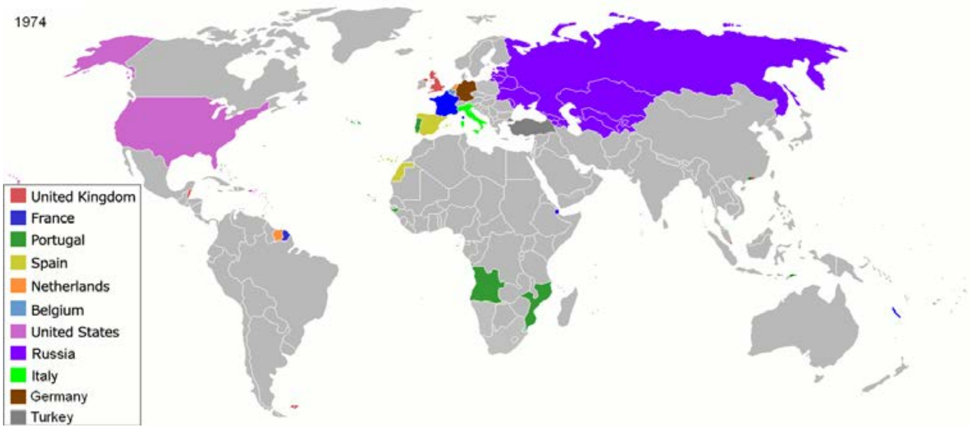
Şekil 1.8. 1945 Yılı Ülke Yönetimi Altındaki Bölgeler



(Nacu, 2013)

1974 Yılı Birleşmiş Milletler haritasında göre yine Sömürgeci ülkeler Avrupa Ülkeleri, A.B.D. ve Rusya'da oluşmaktadır. Türkiye bu tarihte sadece Kıbrıs'ta yaşayan Türk toplumuna barış getirmek amacıyla yapılan bir çıkarma söz konusudur. Tüm adanın işgali veya sömürge anlayışı kesinlikle yoktur.

Şekil 1.9. 1974 Yılı Ülke Yönetimi Altındaki Bölgeler



(Nacu, 2013)

Bütün bu sömürgecilik anlayışı adı altında, tıpkı diğer canlılar gibi insanlar kendi soylarının diğer soylara göre üstün olduklarını ve diğer soyların kaynaklarını kendi soyları için kullanmaları isteğinden kaynaklanmaktadır.

Fransız Devrimi (1789-1799), Fransa'daki Monarşik yapının devrilip, yerine cumhuriyetin kurulması vekilise'nin ciddi reformlara gitmeye zorlanmasıdır. Avrupa ve Batı dünyası tarihinde bir dönüm noktasıdır.

Bu yılarda İngiltere yöneticileri, Fransız Devrimininülkeyi baştanbaşa saran coşkusuyla büyük bir korkuyakapılmışlardı. Devrim, kendileri için tehlikeli fikirler içeriyordu. Fransız devrimi sadece ülkelerin genel yapısını değil ülkeler içerisinde en ince detayların dahi daha eskisi gibi olamayacağı izlenimi verdiği için korkutucu olmuştur.

Malthus, nüfus ilkesi, insanların büyük çoğunluğununyetkinleşebileceği düşüncesini kesin bir biçimde çürütmekte olduğunu vurgulamıştır. Kendisinin bu konudaki görüşü oldukça nettir:

"*Nüfusun gücü, yeryüzünün, insanın geçimini sağlama gücüne kıyasla, sınırsız ölçüde büyüktür.Nüfus, kısıtlanmadığında, geometrik oranla çoğalır. Geçimaraçları ise, ancak aritmetik oranla artar. Sayılarla ufak bir tanışıklık,birincinin ikinciye kıyasla ne denli güçlü olduğunu gösterecektir.*"

"İnsan yaşamı için gerekli olan besini doğa yasası gereği, eşitolmayan bu iki gücün etkileri eşitlenmelidir."Geçim nesnelerinin sağlanmasındaki güçlük, nüfus üzerindegüçlü ve sürekli bir kısıtlamayı gerektirir. Bu güçlüğün etkisinibir yerde ortaya koyması ve insanlığın geniş bir bölümünekendisini zorunlu olarak, şiddetli bir biçimde duyurması gerekir. "Nüfusun ve yeryüzündeki üretimin bu iki güç arasındakidoğal eşitsizlik ve onların etkilerini sürekli olarak eşitlemesi gerekenbüyük doğa yasası, toplumun yetkinleşmesini olanaksızlaştıranbüyükbir engeldir." şeklinde görüşünü belirtmiştir.

Malthus,bu durumda yapılabilecek tek şeyin, "Yoksullar Yasası"nın kaldırılması yönünü savunuyordu.

Ancak bu görüşte Malthus bilimin, bir önceki kuşağın aktardığı bilgi kitlesine oranla arttığı, yani en sıradan koşullar altında bile bilimin geometrik diziyle arttığı olgusunu görmezden gelmiştir. Aslında yoksulların nüfuslarındaki artışın yoksulları koruyan yasalardan ileri gelen bir durum olmadığı, dolayısıyla da yoksul kişilerin daha fazla çocuğa sahip olmalarının yoksullukla bir ilişkisi olmadığı, nüfus artışının aslında zenginlikten kaynaklanan bir durum olduğu ortaya çıkmıştır.

Bu makalenin en başında bahsedilen konu Malthus Teorisi ile karıştırılmamalıdır. Gelişmekte olan ülkelerin gelişmeleri için nüfuslarının kontrolüne gidilmesinin zorunluluğu genel doğal dengeler düşünüldüğünde bir çözüm hiçbir zaman olmamıştır ve olması da beklenemez. Üreme içgüdüsel bir davranış olup soyların devamı için ne kadar nüfusun artacağı insanlar tarafından oluşturulabilecek kurgusal bir olaydan ötedir. Ölüm oranları, soyların devamını tehdit eden unsurların bütünü düşünüldüğünde, nüfus artışı bütün bu etmenlerin etkisi altında otomatik olarak kendiliğinden dengelenir. Kontrolün dışındaki nüfusun artışı saten diğer unsurlarca dengelenmektedir. Sömürgeci ülkeler, kendilerini güçlü kılan bireysel yeteneklerin kolektif hareket edebilme özellikleri ile birleştirebildikleri ve bu sayede aslında güçlü kalabildikleri gerçeğinin farkına varamamışlardır. Durum oldukça net ve basittir. Aslında zengin kaynaklardan uzak oldukları için güçlüdürler. Sömürgeci ülkeler, zengin kaynakları kendi ülkelerine taşıdıklarında uzun vadede bireysel yeteneklerinin bir sonraki nesillere aktarılmasında sorunlar yaşayacak daha tembel bir toplum olup tıpkı gelişmekte olan ülkelerin durumuna düşmeleri gözlemlenebilir.

Biz ise zengin kaynaklarımızı kullanamamaktayız. Özellikler yenilenebilir enerji alanında alt yapı sıkıntılarımız devam etmektedir. Bu nedenle de gelişmekte olan ülkeler gibi enerji ithali ile üretimimiz gerçekleşmektedir. Enerji ithalatı Türkiye'nin dış dengesizliklerine önemli ölçüde katkıda bulunmaktadır. Ocak 2012'den bu yana 12 aylık birikimli enerji açığı GSYH'nin yüzde 6 ile 6,8'i arasında seyretmektedir. Ortalama yıllık enerji ithalatı, mal ithalatının yaklaşık yüzde 23'ünü oluştururken, yıllık dış enerji açığı toplam ticaret açığının yüzde 58'ini oluşturmaktadır.

Enerji fiyatlarının düşmesi Türkiye'nin yüksek düzeydeki cari açığını, dolayısıyla da finansman ihtiyaçlarını azaltmasına yardımcı olacaktır. Enerji fiyatlarının dış dengeler üzerindeki etkisinin tahmin edilmesinde takip edilen iki yaklaşım mevcuttur Bunlardan ilki nispi fiyatları kullanarak etkiyi tahmin ederken, ikincisi dolar bazında enerji fiyatlarını kullanarak regresyonda reel döviz kuru değişikliklerini ayrı olarak kontrol etmektedir. İkinci yaklaşım dolar bazlı enerji fiyatlarının cari denge üzerindeki doğrudan etkisinin ölçülmesine olanak tanıdığından dolayı daha fazla tercih edilmektedir. Regresyon sonucu enerji fiyatlarındaki yüzde 10'luk bir düşüşün, cari dengenin GSYH'ya olan oranında yüzde 0,39 puanlık bir iyileşme sağladığını göstermektedir.

2.ENERJİ KAYNAKLARININ KULLANIMI

Enerji kaynakları yenilenemeyen ve yenilenebilir enerji kaynakları olmak üzere iki başlık altında incelenmektedir. Petrol, kömür, doğalgaz ve nükleer enerji başlıca yenilenemeyen enerji kaynakları arasında yer alırken, rüzgâr enerjisi, güneş enerjisi, hidrojen enerjisi, biyoenerji, jeotermal enerji ve hidroelektrik enerjisi yenilenebilir enerji kaynakları olarak değerlendirilmektedir. Yenilenemeyen enerji kaynakları kullanıldığında tekrar yerine konulamayan nitelikleri ile sınırlı bir potansiyele sahiptirler. Yenilenebilir enerji kaynakları ise yoğun kullanıldıkları halde azalmayan nitelikleri vardır.

Enerji ekonomik ve sosyal yapı üzerinde doğrudan ve türev etkileri ile önemli bir çalışma alanı olarak sürekli gündemde kalan bir konu olmuştur. Üretim sürecinde son derece önemli bir girdi olan enerji, maliyet fonksiyonları içerisinde hemen her zaman öncelikli olarak üzerinde durulan bir değişkendir. Enerji özellikle gelişmekte olan ülkeler bakımından ortaya çıkardığı maliyet ve bunun cari denge üzerindeki etkileri bakımından da önemli bir yere sahiptir. Yenilenemeyen enerji kaynaklarına olan bağımlılık, bunlara ulaşmanın ve kullanmanın yüksek maliyetleri, söz konusu maliyetlerin bütçe açıkları ve cari açıklar üzerindeki etkileri ve yenilenemeyen enerji kaynaklarının çevreye olan zararları, dikkatleri bu kaynaklara yönlendirmiştir.

2.1.Yenilenemeyen Enerji Kaynakları: Yenilenemeyen enerji kaynaklarının başında petrol, kömür, doğalgaz ve nükleer enerji gelmektedir. Dünya enerji kullanımında petrolün payı %40'a yakındır. Endüstriyel kullanımda önemli bir ağırlığa sahip olan petrol, özellikle türev ürünleriyle birçok sanayi dalı için vazgeçilmez bir niteliğe sahiptir. Petrol ve türev ürünleri çok kapsamlı kullanım alanına sahip oluşunun yanı sıra mevcut enerji kaynakları içerisinde çevreye en zararlı atıkları bırakan enerji kaynaklarından biri olarak değerlendirilmektedir.

Doğalgaz, petrol gibi sanayi ve konut başta olmak üzere geniş kullanım alanına sahip bir enerji kaynağıdır. Yüksek enerji kullanım verimliliği, alternatiflerine göre daha ucuz olması, çevreye zarar vermemesi, depolama maliyetinin olmayışı, taşıma sorunun olmayışı, işletme ve bakım maliyetlerinin düşük olması doğalgaz talebini artıran önemli hususlardır.

Kömür, elektrik üretiminde, demir, çelik ve çimento imalatında, endüstriyel proseslerde buhar üretmek ve ısınma amacı ile kullanılmaktadır. Dünya'da elektrik üretiminin yaklaşık olarak %40'ı kömürden sağlanmaktadır (TKİ, 2011).

Diğer enerji kaynaklarına göre daha yeni kullanılmaya başlanılan bir enerji kaynağı nükleer enerjidir. Nükleer enerji elektrik üretiminde tercih edilen bir enerji kaynağı olmasının yanında savunma sanayi ve sağlık sektörü başta olmak üzere kimi endüstrilerde de kullanımı söz konusudur. Nükleer enerjinin önemli niteliklerinden biri alternatif enerji kaynaklarına göre çok daha yüksek miktarda enerji sağlamasıdır. Buna rağmen bugün dünyada elektrik üretiminde nükleer enerjinin payı %13,5 düzeyindedir (ETKB, 2011).

2.2.Yenilenebilir Enerji Kaynakları: Yenilenebilir enerji kaynakları, enerji kullanımında ithalatı ve dolayısıyla dışa bağımlılığı azaltmasının yanı sıra çevrenin korunmasına büyük katkı sağlamaktadır. Yenilenebilir enerji kaynakları konusunda en büyük kısıt yenilenebilir enerji kaynaklarının işletme maliyetlerinin düşük olmasına karşın ilk yatırım maliyetlerinin yenilenemez enerji kaynaklarına göre oldukça yüksek olmasıdır. Rüzgâr enerjisi en yoğun yatırımın yapıldığı yenilenebilir enerji kaynağı olarak bilinmektedir. Rüzgâr enerjisinin önemli bir yenilenebilir enerji kaynağı olarak gelişmesine neden sürekli, temiz ve maliyeti düşük bir enerji kaynağı olması, kolay kurulumu ve işletimidir.

Hidrojen bilinen tüm yakıtlar içerisinde en yüksek enerji içeriğine sahiptir. Yerel olarak üretimi mümkün olan hidrojen, kolayca ve güvenli olarak her yere taşınabilen, temiz, taşınması sırasında az enerji kaybı olan, ulaşım araçlarında, ısınmada ve sanayide yararlanılabilecek bir enerji sistemidir (EİE, 2015a).

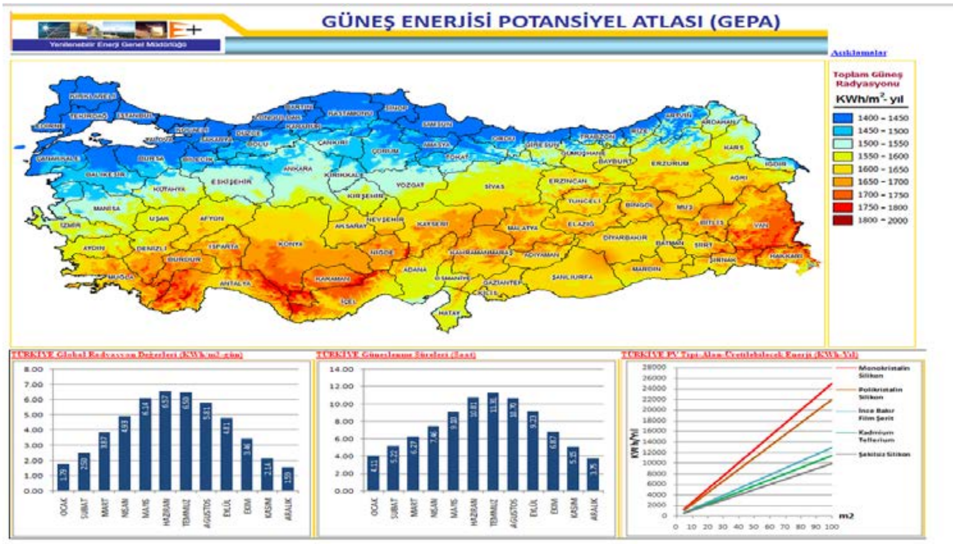
Jeotermal enerji yeryüzüne doğal olarak veya sondajlarla sıcak su veya buhar olarak ulaşmaktadır (EİE, 2015a). Bu yenilenebilir enerji kaynağından rüzgâr veya güneşte olduğu gibi iklim koşullarına göre değil, sürekli yararlanabilme imkânı vardır. Elektrik üretiminde, sağlık turizminde, konutlarda ve sanayide kullanılabilen jeotermal enerjinin maliyeti diğer yenilenebilen enerji kaynaklarına göre daha düşüktür ve çevre dostu bir enerji kaynağı olduğu söylenebilir.

Hidroelektrik çevreye uyumlu, temiz, yenilenebilir, yüksek verimli, yakıt gideri olmayan, enerji fiyatlarında sigorta rolü üstlenen, uzun ömürlü, işletme gideri çok düşük dışa bağımlı olmayan yerli bir kaynaktır (EİE, 2015a).

Güneş enerjisinin iktisadi boyutunun daha çok ön plana çıktığı alan elektrik enerjisi üretimindeki kullanımıdır. Güneş enerjisinin kullanım alanlarından biri çok da iktisadi boyutu olmayan gündelik yaşamda kullanılan suyun ısıtılmasıdır. Öte yandan güneş enerjisinin sonsuz olması ve temiz bir enerji kaynağı olması daha düşük maliyetle ve daha yüksek verimlilikle üretimin yapıldığı bir sektör haline getirilmesini zorunlu kılmaktadır. Büyük miktarlarda üretilen elektrik enerjisinin depolanmasında yaşanan sorunlar, alternatif enerji kaynaklarına göre daha yüksek teknoloji ve maliyetle üretiliyor olması güneş enerjisinin yaygın olarak kullanımını engellemektedir.

2.3.Ülkemizde Güneş Enerjisi: Ülkemizde yenilenebilir enerji kaynakları Enerji ve Tabi Kaynaklar Bakanlığına göre önemsenmiş ve bunun için yenilenebilir Enerji Genel Müdürlüğü kurulmuştur. Bu genel müdürlük de dünyadaki gelişmeleri takip ederek düzenlemeler yapmakta yenilenebilir enerji kullanımının geliştirmeye çalışmaktadır.

Bakanlıkça güneş enerjisi haritası çıkarılmıştır. Bu haritaya göre bu enerji nerdeyse yurdumuzun tamamında kullanılabilmekte ve alternatif bir enerji kaynağı olarak görünmektedir.



(EİE, 2015b)

Enerji kontrolünü Güneş Kollektörleri Isıl Performans Deney Testi ile Ülkemizde üretilen düzlemsel güneş kolektörlerinin Türk Standartları Enstitüsü tarafından verilen ürün belgesi ile ürün veya marka yenileme belgesi alabilmesi ve üretilen yeni bir ürünün ısıl performansının test edilmesi amacı ile yapılmaktadır.

Isıl performans deneyi akışkanın çeşitli sıcaklıklarda, belirli debide, sabit basınçta ve diğer çevre şartları dikkate alınarak yapılır. Deney testinde akışkan olarak su kullanılmaktadır. Test sonuçlarında belirtilen sıfır kayıplı verim ifadesi ideal şartlar altında yapılan deneyin sonucudur.

Önceki yıllarda yapılan deneylerin test sonuçları kolektör özelliklerine göre genel olarak %60 ile %80 arasında değerler almaktadır. Tek bir kolektör için geçerli olan bu değerler, kolektörlerin seri veya paralel bağlanması, kolektör sayısı, iklim şartları ve diğer bazı faktörlerden dolayı düşük çıkması normaldir.

Düzlemsel güneş kolektörlü bir sistem ile sıcak su üretilmesi amacı ile sistem hesaplaması yapılırken yukarıda belirtilen şartlar dikkate alınması gerekmektedir. Ülkemizde son yıllarda kullanımı giderek artan diğer bir kolektör çeşidi ise vakum tüplü güneş kolektörleridir. Bu kolektörlerin ısıl performans deney test standartları Türk Standartları Enstitüsü tarafından henüz belirlenmediği için testi yapılmamaktadır.

Dünyada ısıl performans deney testi ABD, Almanya, İsviçre, İspanya, Kanada gibi gelişmiş ülkelerde yapılmaktadır. Türkiye, Avrupa Birliği ülkelerinin direktif olarak kabul ettiği EN 12975-1 ve EN 12975-2 numaralı standart metotlarını Mart 2008 Ayından itibaren geçerli olmak üzere kabul etmiştir. Bu standart halen yürürlükte bulunmaktadır (EİE, 2015a).

1.6 kWp gücünde tek kristalli fotovoltaik sistem işletilerek yapısal özelliklerini incelemek verimi ve enerji üretimini etkileyen başlıca parametreler araştırılmış ve bir bilgi birikimi sağlanmıştır.

Yenilebilir Enerji Genel Müdürlüğü (EİE); ülkemizin güneş enerjisi potansiyelini belirlemek için öncelikle, Devlet Meteoroloji İşleri Genel Müdürlüğü'nün (DMİ) 1968-1982 yılları güneşlenme verilerini değerlendirmiştir. Bu değerlendirmenin sonucu 2 ayrı raporu halinde yayınlanmış olup, bu değerlendirmede ülkemizin yıllık ortalama güneş ışınımı 3,6 kWh/m2.gün ve güneşlenme süresi 2640 saat olduğu belirlenmiştir. Bu çalışmanın sonucunda elde edilen değerlerin güneş enerjisi değerlendirme çalışmaları açısından yeterli olmadığı görülerek, güneş enerjisi potansiyelini belirlemek amacıyla yeni bir proje, DMİ ile işbirliği içinde başlatılmıştır. Bu proje kapsamında, 5 adet güneş gözlem istasyonu, 5 yıl süreyle çeşitli illere tesis edilmektedir. Toplanan veriler; yatay düzlemde toplam ve difüz güneş ışınımı, güneşlenme süresi ve çevre sıcaklığıdır. Bu proje kapsamında şu ana kadar 13 istasyon yerleştirilmiştir, bunlardan 7'sinde ölçümler sona ermiştir (EİE, 2015a).

Bu istasyonlardan alınan ölçümlerden yararlanarak ve DMİ'nin verileri de kullanılarak bir model geliştirilmiş, 58 il için güneş ışınımı ve güneşlenme süreleri hesaplanmıştır. “Türkiye'nin Güneş Işınımı ve Güneşlenme Süreleri” adlı bu rapor 2001 yılında yayınlanmış ve ilgilenenler için satışa sunulmuştur.

3.SONUÇ

Enerji, sosyal ve ekonomik kalkınmanın esaslı belirleyicilerinden bir tanesidir. Yenilebilir enerji kaynakları süreklilik arz eden ve çevre kirliliğine yol açmayan niteliğiyle ilgili beklentilerin karşılanmasında son derece önemlidir Ancak ilgili talebin düşük maliyetlerle karşılanması, zamanında, sürekli ve bütünüyle karşılanabilmesi de bir o kadar önem arz etmektedir. Ekonomik ve sosyal gelişmelerle birlikte üretim düzeylerinin artması, dış ticaret hacimlerinin genişlemesi, hızlı kentleşme enerji tüketimini hem sanayide hem de hane halklarında hızla artırmıştır. Bu dönüşüm özellikle enerjide dışa bağımlı olan Türkiye gibi gelişmekte olan ülkeler bakımından çok daha sorunlu olmaktadır. Büyüme ve kalkınma konusunda önemli hedefleri olan Türkiye'nin enerji ihtiyacının %75'ini dışarıdan karşılıyor olması Türkiye için büyümenin ne denli sorunlu olduğunu göstermektedir. Böylesi bir yapı ekonomik büyüme cari açık sarmalına işlerlik kazandırırken, enerjide dışa bağımlılığı azaltacak alternatif arayışları da bir zorunluluk olarak ortaya çıkmaktadır. Bu noktada yenilenebilir enerji kaynakları enerji kullanımında bir çeşitlilik oluşturarak dışa bağımlılığı azaltabilecek önemli bir alternatif olarak değerlendirilmektedir. Yenilenebilir enerji kaynaklarında ise yenilenebilir enerji kaynaklarının yatırım ve işletme maliyetlerinin karşılanabilmesi ve ilgili iklim ve coğrafyaya uygun rasyonel bir tercih sıralamasının yapılması söz konusu kaynakların kısa sürede devreye alınabilmesi için yeterli olacaktır.

Hızlı büyüme gereksinimi içinde olan ülkelerde hızlı büyümeyle birlikte enerji ihtiyacı da hızla arttığı söylenmektedir. Türkiye'de 2004 yılı itibariyle enerji tüketiminin sektörlere göre dağılımında %45'lik payla sanayi sektörü ilk sırada yer alırken, konut ve hizmetler %30, ulaştırma %20, tarım ise %5'lik bir paya sahiptir. 1990'lı yılların başında ilgili oranlar sanayi sektöründe %35, konut ve hizmetlerde %37, ulaştırmada %21, tarım sektöründe de %5 düzeyindedir (DPT, 2006).

Enerji tüketiminde ön sıralarda yer alan ülkeler içinde Türkiye enerji kullanımında dışa bağımlı yapısı ve enerji temelli yüksek cari açığı ile dikkat çeken bir ülke durumundadır. Özellikle son dönemlerde Türkiye'nin cari açığı enerji açığı olarak ele alınmaktadır. Türkiye bu niteliğinin yanı sıra zengin yenilenebilir enerji kaynaklarının yaklaşık %15 gibi çok az bir kısmından yararlanması ile de dikkat çeken bir ülke durumundadır. Türkiye gibi zengin yenilenebilir enerji kaynaklarına sahip olduğu için yenilenebilir enerji kaynaklarına çok daha yoğun yatırım yapılmasıyla açığın azalacağı düşünülmektedir. Yatırım imkânları da organize sanayi bölgelerinden başlayarak coğrafi ve ekonomik koşullarına göre yenilenebilir enerji üretimine geçilmelidir. Kaynak olarak da üniversitelerin bilimsel araştırma fonları ile kalkınma ajansları ve KOSGEP birleştirilmesiyle oluşturulabildiği gibi tarımsal kalkınma ajansları ile gübreden enerji üretimi destelenebilecekti.

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ENERJİ FİYATLARI VE VERGİ İLİŞKİSİ: TÜRKİYE ÖRNEĞİ

Şennur SEZGIN *

ÖZET

Dışa açık küçük bir ekonomi olarak, Türkiye enerji ihtiyacının çok büyük bölümünü ithal etmektedir. Türkiye'de enerji ithalatının önemli iki kalemi petrol ve doğalgazdır. Petrol ve doğalgaz üzerinde yüksek oranlarda çeşitli vergi yükümlülükleri söz konusudur. Enerji üzerinden alınan vergilerin ülkedeki akaryakıt fiyatlarına ve vergi gelirlerine etkisi ne şekilde gerçekleşmektedir. Enerji fiyatlarındaki değişiklik ile vergi arasında nasıl bir ilişki vardır? Türkiye uzun yıllardır OECD üyesi ülkeler arasında, nihai tüketicinin kullandığı petrol fiyatının en yüksek olduğu ülkeler arasındadır. Bu çalışmada Türkiye'de akaryakıt fiyatları ile vergi arasındaki ilişki analiz edilmektedir. Enerji fiyatlarındaki artış ekonomi üzerine yük getirirken vergi yoluyla talep daraltıcı bir etkiye sahip olmaktadır.

ABSTRACT

As a small open economy, Turkey is depending on both oil and natural gas which is importing a large proportion of its primary energy demands. On oil and gas, are subject to various tax liabilities at higher rates. Of taxes on energy in what way effects gasoline price and tax revenue. Is there a systematic relationship between changes in energy prices and tax? For many years Turkey is the highest rates of oil prices by the final consumer used among the OECD countries. This study analyzed the relationship between the change in energy prices and tax. The increase in energy prices bringing pressure on the economy, through increase tax revenue is having an effect of contractionary demand.

GİRİŞ

Türkiye 800 milyar dolar GSYİH ve 76 milyon nüfusu ile dünyanın 16. büyük ekonomisi konumundadır. Bu büyüklükteki GSYİH'yı yaratabilmek için 2013 yılı sonu itibariyle kullandığı toplam enerji miktar 80482 ktoe'dir. Enerji tüketiminde 42240 ktoe ile doğal gaz ilk sırada yer almaktadır. Doğal gazdan sonra 20557 ktoe ile elektrik ve 11618 ktoe ile motorin tüketimleri gelmektedir. Oransal olarak bakıldığında; tüketimin %52'si doğal gaz, %26'sı elektrik ve %16'akaryakıt (%14 motorin, %2 benzin)'tan oluşmaktadır (www.enerji.gov.tr). Türkiye'nin enerji kaynakları, özellikle doğal gaz ve petrolü sınırlıdır. Dolayısıyla temel enerji ihtiyacının büyük bölümünü, yaklaşık olarak %78,7 ithalatla karşılamaktadır. Dünya Bankası Odak Notu (2014) raporuna göre bu ithalat, dış ticaret açığının % 58'ini oluşturmaktadır. Enerji konusunda bu yüksek dışa bağımlılık ödemeler bilançosu açığı ve petrol fiyatlarını Türkiye'nin en önemli sorunu yapmaktadır. Dolaysıyla da son zamanlardaki petrol fiyatlarındaki değişmeler ekonomiyi yakından etkilemektedir. Bu çalışmada petrol ürünleri üzerinden alınan vergilerin akaryakıt fiyatına etkileri nasıldır? Bu vergiler akaryakıt fiyatlarını ve ülke ekonomisini nasıl etkilemektedir? Bu sorulara cevap verebilmek için bir sonraki bölümde akaryakıt ile vergi arasındaki ilişki ele alınarak, takip eden bölümde toplam vergi gelirleri içindeki payı analiz edilecektir. Dördüncü bölümde ise, Türkiye'deki akaryakıt litre fiyatı içindeki dolaylı vergiler analiz edilerek, OECD ülkeleri ile karşılaştırılacaktır.

1. AKARYAKIT – VERGİ İLİŞKİSİ

Günümüzde petrol ulaştırma, sanayi, enerji ve konut gibi birçok alanda önemli oranda kullanılan bir enerji kaynağıdır. BP(2014) istatistiklerine göre 2013 yılı bilinen petrol rezervleri 1687,9 milyar varildir. Bu rezervlerin %71'i OPEC ülkelerinde, %20,3'ü ise OPEC üyesi olmayan ülkelerde, % 7,8 ise eski Sovyetler Birliği ülkelerinde yer almaktadır. Dünya üzerindeki petrol rezervlerinin % 47,9'u Orta Doğu ülkelerinde bulunmaktadır. 2013 yılında, Türkiye'de günlük yaklaşık 48.000 varil/gün'lük ham petrol üretimi yapılmış; buna karşılık günlük 500.000 varil ham petrol tüketilmiştir. Bu nedenle 2013 yılında yerli ham petrol üretiminin tüketime oranı % 9,6 olarak gerçekleşmiştir (Türkiye Petrolleri, 2014). Yani Türkiye'nin petrolde dışa

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bağımlılığı % 90,4 oranındadır.

Türkiye uzun yıllardır OECD üyesi ülkeler arasında, nihai tüketicinin kullandığı petrol fiyatının en yüksek olduğu ülkeler arasındadır. Petrol fiyatlarının yüksekliği bir yandan ekonomi üzerine yük getirirken, diğer yandan vergi hasılatı yoluyla talep daraltıcı bir etkiye sahip olmaktadır. Petrol, üretimde kullanılan önemli bir girdi olması nedeniyle fiyatlardaki bir artış üretim maliyetlerini arttırarak arzın azalmasına yol açar. Yine artan vergi nedeniyle fiyat artışları da talebin kısılmasına yol açar. Birçok ülkede akaryakıt üzerinden alınan vergiler devlet için önemli bir gelir kaynağıdır.

1.1 Akaryakıt üzerinden neden vergi alınır?

- Vergi toplama kolaylığı açısından vergilendirme
- Çevreye verdiği zararı azaltmak için vergilendirme
- Etkinlik ve istikrarı sağlamak için vergilendirme
- Talebin kısılması için vergilendirme
- Otoyolların yapım ve bakımı için vergilendirme

Petrol ürünleri üzerinden alınan vergiler dolaylı vergilerdir. Türkiye'de petrol ürünlerinden alınan iki tane vergi vardır: KDV(Katma Değer Vergisi) ve ÖTV(Özel Tüketim Vergisi). Dolaylı vergilerde, vergi malın fiyatı içinde yer aldığından mali yükümlülük kişi fark edilmeden yerine getirildiği için mali anesteziye (mali uyuşma) yol açmaktadır. Bu da vergilerin daha kolay ve fazla tepki vermeden toplanmasına yol açar (Sagbaş; 2010). Ayrıca petrol ürünlerinin yakın ikamesi olmadığı için bu ürünlerin fiyatlarında meydana gelen bir artış karşısında tüketici talebini aynı oranda kısamamaktadır. Dolayısı ile talep esnekliğinin birden küçük olan petrol ürünlerinin, fiyat ya da vergi değişiklikleri karşısında tüketimi fazla değiştirilememekte ve petrol ürünleri düzenli vergi gelir kaynakları arasında sayılmaktadır. Bu konuda Türkiye ile ilgili yapılan çalışmalarda çok net bir şekilde akaryakıt talebinin fiyat esnekliğinin inelastik olduğu bulunmuştur. Erdoğdu (2014) yapmış olduğu çalışmada hem vergi öncesi hem de vergi sonrası fiyat artışlarına tüketimin aynı oranda kısılarak cevap vermediğini tespit etmiştir.

Akaryakıt üzerinden vergi alınmasının ikinci nedeni, bu ürünlerin çevreye verdiği zararları azaltmak içindir. Bu tür vergilere düzeltici vergi sınıfındadır. Düzeltici vergiler negatif dışsallıkların çevreye vermiş olduğu zararları içselleştirmek amacıyla kullanılan vergilerdir. Bu vergilere Pigou'cu vergi veya yeşil vergi (Çevre Vergileri) adını da veriyoruz (Sağbaş; 2011). Taşıtlarda kullanılan akaryakıtlar havayı kirlettiğinden dolayı negatif dışsallığa yol açmaktadır. Eğer bu mallar üzerinde herhangi bir müdahale olmazsa toplum açısında optimalın üzerinde bir tüketim oluşacaktır. Eğer yaratılan bu negatif dışsallık içselleştirilirse bu malların tüketimi optimal düzeyde gerçekleşecektir. İşte akaryakıt üzerinden alınan vergiler bu işlevi gerçekleştirmektedir.

Petrol ürünleri üzerinden vergi alınmasının üçüncü nedeni ise, etkinlik ve istikrarı sağlamak içindir. Devletler bu ürünlerin israf edilmemesi, fiyatlardaki beklenmedik yükselişler karşısında enerjinin etkin kullanılması ve ekonomide istikrarı sağlamak için vergi almaktadır.

Aşağıdaki Tablo 1'de devletin petrol üzerinden aldığı vergileri nasıl istikrar sağlama amaçlı kullandığı görülmektedir.

Tablo 1: Otomotiv Yağları Vergi/Fiyat Bilgileri (2012-2013)

Türkiye Pompa Fiyatları (TL/lt)	2012	2013	Fark (%)
Vergili Benzin (95 Oktan)	4,19	4,50	7,4
Vergili Motorin (Standart 10ppm)	3,64	3,93	8,0
Vergili Otogaz (LPG)	2.32	2,51	8,2
Vergisiz Benzin (95 Oktan)	1,66	1,85	11,4
Vergisiz Motorin (Standart 10ppm)	1,78	1,95	9,6
Vergisiz Otogaz (LPG)	1,25	1,37	9,6

Kaynak: PETDER, 2013,s. 11.

Tablo1'de akaryakıt ürünlerinin vergili ve vergisiz fiyatları görülmektedir. İki yıl fiyatları karşılaştırıldığında vergisiz fiyatlardaki artışın daha yüksek olduğu görülmektedir. Bu da petrol fiyatlarındaki artışın tamamının yansıtılmadığını vergilerdeki düşme ile fiyatlarda istikrar sağlanmasının amaçlandığını göstermektedir. Ham petrol fiyatları çok arttığı yıllarda devlet aldığı vergileri düşük tutarak, ham petrol fiyatlarının düştüğü yıllarda ise tam tersine vergileri arttırarak ekonomide nihai petrol fiyatlarının aşırı dalgalanmasını önlemeyi amaçlamıştır. Örneğin: 2015 Mayıs ayında 95 Oktan benzin litre satış fiyatı 4.70 TL ve ham petrolün varili 60-70 $ civarındadır. Bir yıl önce 2014 Haziran ayında ham petrolün varili 120 $ civarındayken 95 oktan benzinin nihai litre fiyatı iki katı olmadığı gibi (5.20 kuruş civarındaydı), 2009 yılında ham petrolün varili 140-150$ iken benzinin nihai tüketici fiyatı da bugünün 2,5 katı değildi. Yani, devlet ham petrol fiyatları aşırı yükseldiğinde vergiyi azaltarak veya ham petrol fiyatları düştüğünde vergiyi artırarak, ekonomide istikrarı amaçlamaktadır.

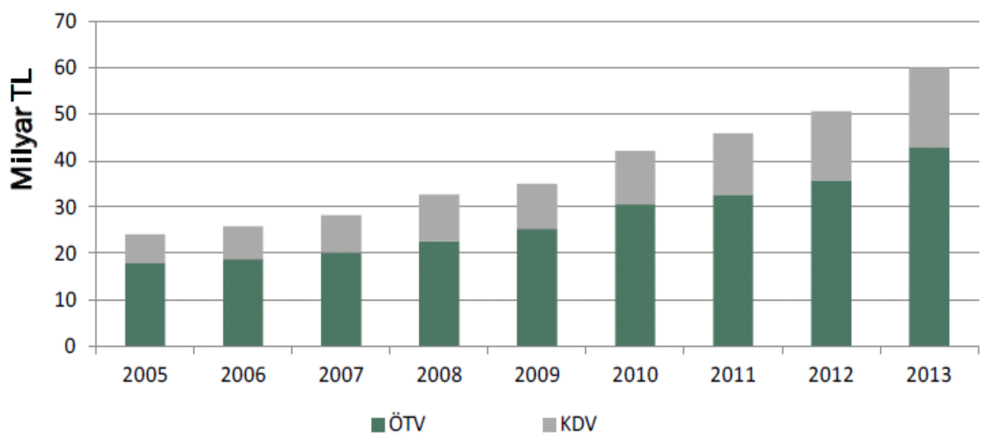
Petrol ürünlerinden vergi alınmasının dördüncü nedeni ise, talebin kısılması içindir. Eğer benzin üzerindeki vergi yükü düşürülürse zaten otomotiv de yüksek olan talep vergi düşürüldüğünde daha da yükselecektir. Otomotiv talebinin yükselmesi istenmemektedir. Talebin yüksek olması nedeniyle ÖTV yüksek tutulmaktadır. Ayrıca akaryakıt üzerindeki vergi yükü düşürülürse devlet vergi kaybına uğrayacaktır. Çünkü Akaryakıt üzerinden alınan vergilerin bütçe gelirleri içinde önemli bir payı vardır. Bu vergide indirim olması durumunda KDV ile telafi edilmesi gerekecektir. Bu durumda vergi yükü tüm topluma yansıtılır. Akaryakıta uygulanan vergiler açısından birçok dünya ülkesinin üzerinde olan Türkiye, 15 Temmuz 2009 tarihinde yapılan ÖTV düzenlemesi sonucunda benzinde dünyanın en çok vergi alan ülkelerinden biridir. Bununla birlikte genel KDV oranı daha düşük belirlenmiştir.

2.TÜRKİYE'DE AKARYAKITTAN SAĞLANAN TOPLAM DOLAYLI VERGİLER

Türkiye'de yıllar itibariyle Akaryakıt üzerinden alınan ÖTV ve KDV gelirleri düzenli olarak artmıştır. Bu artışta otomotiv talebinin artması etkili olmuştur. Vergi oranlarında önemli değişiklik olmamıştır. Otomotiv talebindeki artış bu gelirlerin yükselmesini sağlamıştır.

Grafik 1 de 2005- 2013 yılları arasında petrol ürünlerinden elde edilen dolaylı vergilerin seyrini göstermektedir. Buna göre Türkiye'de akaryakıt ve LPG sektörlerinden sağlanan dolaylı vergilerin toplamı her yıl artış göstermiştir. Tüketim verileri üzerinden yapılan hesaplamalara göre, petrol sektöründen sağlanan dolaylı vergiler 2012 yılında bir önceki yıla göre %11,5 artarak 50,5 milyar TL düzeyine ulaşmıştır. 2013 yılında ise bu rakamın 60,1 milyar TL olduğu görülmektedir. Yine PETDER(2014;35) yapmış olduğu hesaplamaya göre, 2007-2013 döneminde petrol sektöründen sağlanan toplam dolaylı vergi gelirinin 294 milyar TL'ye ulaştığını belirlenmiştir.

Grafik 1: Akaryakıt Ve LPG'den Sağlanan Toplam Dolaylı Vergilerin Yıllara Göre Değişimi



Kaynak: PETDER, 2014, sf 35

Petrolden alınan vergilerin yıllar içinde toplam değeri artsa da bütçe içindeki payı son yıllarda azalma göstermiştir. Tablo 2' de görüldüğü gibi, 2007 yılında petrol üzerinden alınan KDV+ÖTV 26,3 milyar TL'den, 2013 yılında 49,6 TL'ye ulaşmıştır. Toplam değer olarak artan bu vergilerin toplam vergi gelirleri içindeki payları ise düşmüştür. 2007 yılında petrol ürünleri üzerinden alınan vergilerin toplam vergi gelirleri içindeki payı % 15.56 iken, 2013 yılında bu oran %13.50'ye düşmüştür. Bu durum bütçe giderlerini karşılanmasında diğer vergilerin payının arttığını ve devletin Bütçe finansmanında akaryakıt vergilerini daha az kullanma niyetini göstermektedir.

Tablo 2: Petrolden Alınan Vergilerin Seyri Ve Payı (Milyar TL)

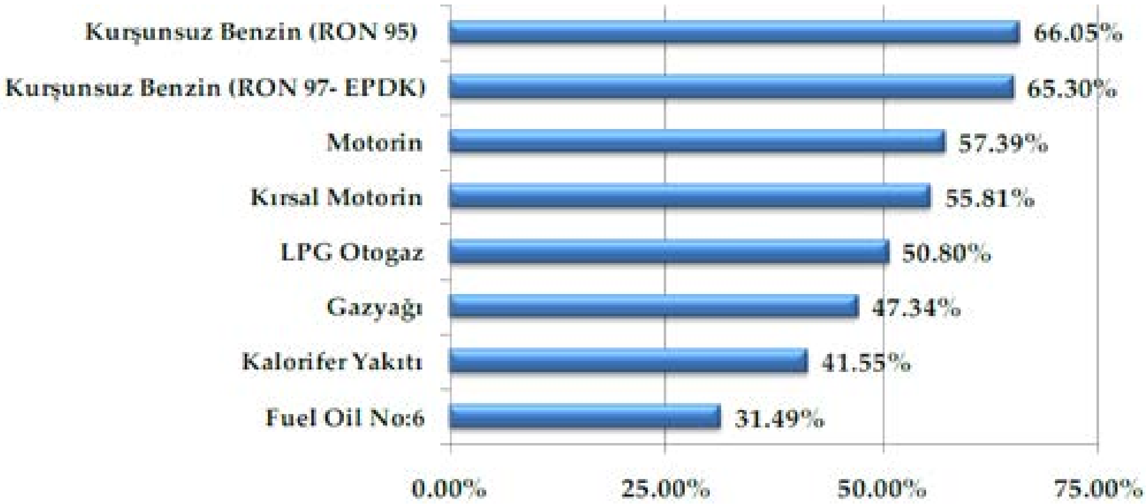
Kaynak: EPDK, 2014, sf 182, Maliye Bakanlığı BÜMKO

Tablo 2'den görüldüğü gibi petrol üzerinden alınan vergilerin kamu bütçesi içinde önemli bir yeri vardır. Bu vergileri GSYİH içindeki payı 2008 yılında %2.98 iken 2013 yılında bu oran %3.20'ye yükselmiştir (Maliye Bakanlığı).

3. TÜRKİYE'DE AKARYAKIT ÜZERİNDEKİ VERGİ ORANLARI

95 oktan kurşunsuz benzinin fiyatındaki vergi oran Türkiye de 1996 yılında %65,8 olan bu oran 2005 yılında %70'ler seviyesine gelmiştir. 2014 yılında ise bu oran % 60 olmuştur.

Grafik 2: Akaryakıt Üzerindeki Vergi Oranı



Grafik 2 'ye bakıldığında dolaylı vergiler açısından en yüksek payın kurşunsuz benzin üzerinde olduğu görülmektedir. Tarımı destek amacıyla kırsal motorindeki oran daha düşük tutulmuştur.

Yıllar	Petrolden alınan vergilerin vergi gelirleri içindeki payı (%)	Vergi gelirleri	Petrol ürünlerinden alınan KDV+ÖTV
2007	15.56	169,50	26,37
2008	14.90	190,00	28,32
2009	14.65	200,60	29,40
2010	14.33	248,30	35,57
2011	13.00	301,70	39,20
2012	13.24	328,50	43,49
2013	13.50	367,50	49,60

Aşağıdaki Tablo 3'de ise kurşunsuz benzin, motorin ve LPG'nin 2011 yılı litre fiyatını oluşturan maliyetler görülmektedir. Kurşunsuz benzinin fiyatındaki en büyük maliyet unsuru ÖTV olurken, motorin ve otogazdaki en büyük pay ürün bedeline aittir.

Tablo: 3 Akaryakıtta Ortalama Maliyet Unsurları

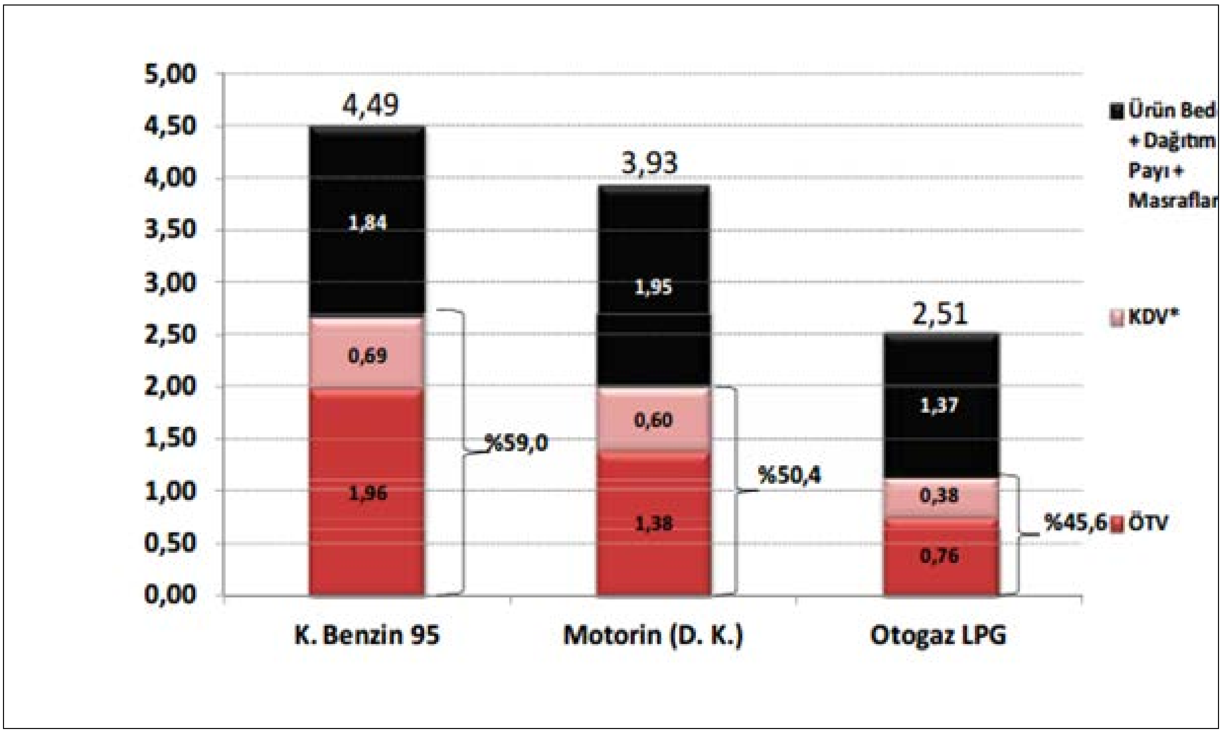
	Kurşunsuz Benzin 95	Motorin (DK)	Otogaz LPG
ÖTV	1.89	1.30	0.72
KDV	0.64	0.55	0.35
Ürün Bedeli	1.28	1.38	0.88
Dağıtım	0.38	0.39	0.37
Toplam	4.19	3.62	2.32

Kaynak: www.petder.org.tr, 2011 yıllık rapor, s.15

Şekil 2'de ise 2012 yılı akaryakıt pompa fiyatları içindeki vergi ve diğer maliyetleri göstermektedir. Yine 95 oktan kurşunsuz benzindeki dolaylı vergiler (KDV+ÖTV) litre fiyatının % 59'unu oluştururken, Motorinde bu oran % 50 ve LPG' de ise % 45 olmuştur.

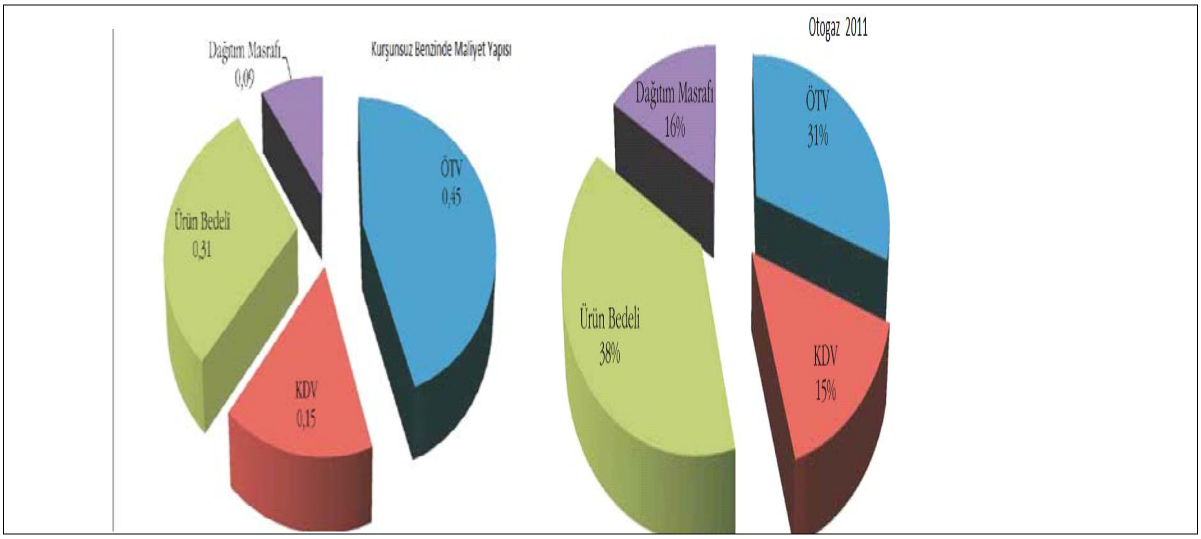
Aralık 2013 tarihi itibariyle kurşunsuz benzinin litre fiyatı 4.70 kuruş civarındadır. Bunun 1.59 TL rafineri çıkış fiyatıdır. ÖTV 2.17 TL ve 2 kuruş EPDK'nun payı eklendiğinde 3.79 TL olmaktadır. Bu değere % 18 olan KDV (69 kuruş) ve % 8 bayi karları eklendiğinde nihai fiyata ulaşılır (EPKD, 2013).

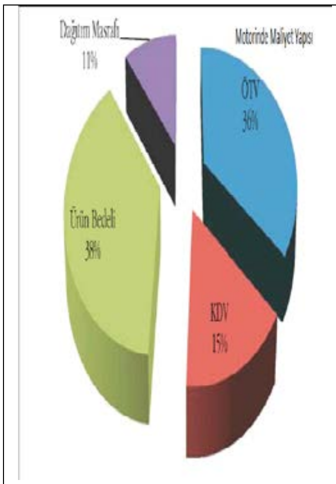
Grafik 3 Akaryakıt Fiyatı İçindeki Vergiler Ve Diğer Maliyetler



Kaynak: EPKD raporları (2012 yılı ortalaması)

Grafik 4 Benzin, motorin ve LPG'nin fiyatı içindeki vergiler ve diğer maliyetlerin oranlarını göstermektedir. Kurşunsuz benzinin litre fiyatındaki ürünün maliyeti % 31 iken ÖTV % 45' dır. Otogaz ve motorinde ise ürünün maliyeti % 38, ÖTV ise her ikisinde de kurşunsuz benzinden daha düşüktür. Motorinde tarımı destekleme amaçlı, LPG deki ise çevresel nedenlerle ÖTV payı düşük tutulmaktadır. Yüksek vergi nedeniyle en ucuza mal olan kurşunsuz benzini tüketici en yüksek fiyattan satın almaktadır. Dolayısıyla dünya ham petrol fiyatlarının çok düşmesi benzinin fiyatını aynı oranda düşürmemektedir Çünkü benzin pompa fiyatı sadece ham petrol maliyetlerinden oluşmamaktadır. Fiyatı etkileyen en önemli unsur dolaylı vergiler (payı %60 civarında) olmaktadır.





Grafik 4 Akaryakıt Fiyatı İçindeki Vergiler Ve Diğer Maliyetlerin Oranları

Kaynak: EPKD raporları, 2013.

Tablo 4'de OECD ülkelerinin benzin fiyatlarındaki vergi miktarı verilmektedir. Litre başına ödenen benzin fiyatının yüzde kaçı vergidir diye oranladığımızda Hollanda, Norveç ve Finlandiya % 57 ile ilk üç sırayı almaktadır. Türkiye ise litre başına ödenen vergi sıralamasında % 48.87 ile 20. sırada yer almaktadır. Dolayısıyla, Türkiye Akaryakıt üzerinden yüksek vergi alarak OECD ülkelerinden ayrışıyor algısı doğru değildir.

Tablo 4: 2012 Yılı OECD Ülkerinde Benzin Fiyatları

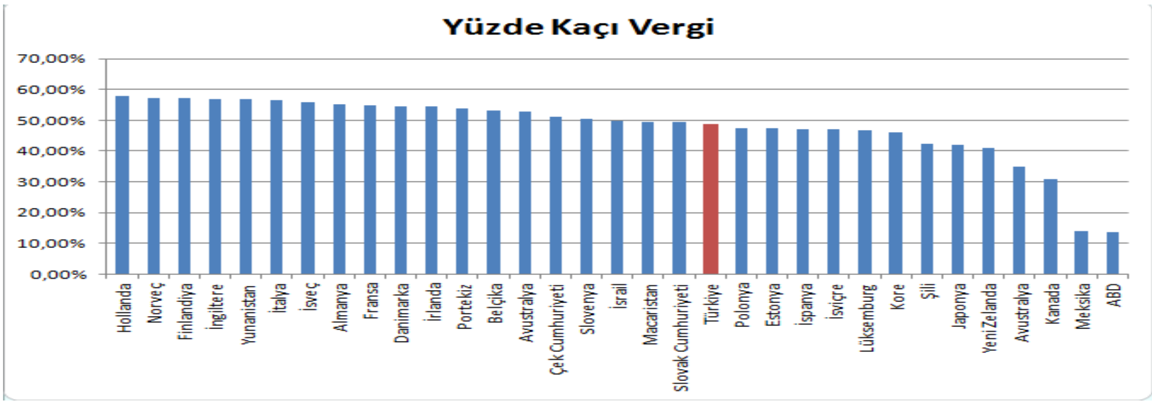
	Yüzde Kaçı Vergi
Hollanda	57,80%
Norveç	57,27%
Finlandiya	57,17%
İngiltere	56,99%
Yunanistan	56,83%
İtalya	56,63%
İsveç	55,84%
Almanya	55,35%
Fransa	54,95%
Danimarka	54,50%
İrlanda	54,38%
Portekiz	53,82%
Belçika	53,04%
Avustralya	52,73%
Çek Cumhuriyeti	51,22%
Slovenya	50,61%
İsrail	49,93%
Macaristan	49,45%
Slovak Cumhuriyeti	49,33%
Türkiye	48,87%
Polonya	47,27%
Estonya	47,27%

İspanya	47,24%
İsviçre	47,21%
Lüksemburg	46,81%
Kore	46,01%
Şili	42,47%
Japonya	41,88%
Yeni Zelanda	41,07%
Avustralya	34,99%
Kanada	30,81%
Meksika	13,84%
ABD	13,72%

Kaynak: Energy Prices & Taxes, 1st Quarter 2013 International Energy Agency

Grafik 5 Benzin fiyatlarındaki vergi oranlarını bize vermektedir. Burada Tablo 4'deki veriler kullanılarak sütun grafik üzerinde Türkiye'nin konumu gösterilmiştir. Grafik 5'de görüldüğü gibi Türkiye diğer OECD ülkelerinin önünde değil, aksine en yüksek vergi sıralamasında ortanın sonlarına doğru yer almaktadır.

Grafik 5 Benzin Fiyatlarındaki Vergi Oranı



Türkiye birçok OECD ülkesinden daha düşük vergi almasına rağmen neden diğer ülkeler arasında nihai tüketicinin kullandığı benzin fiyatında üst sıralarda yer almaktadır sorusuna cevap verebilmek için benzin fiyatlarını vergi öncesi ve sonrası olarak ayırma gereği duyduk. Bunun için Tablo 5 yapılmıştır. Tablo 5 OECD ülkelerinin vergi öncesi benzin fiyatları gösterilmektedir. Türkiye yüzde olarak daha düşük vergi almakla beraber akaryakıt giriş fiyatının yüksekliği nedeniyle daha üst sıralarda yer almıştır. Hatta vergi öncesi benzin fiyatının yüksekliğinde ilk sırada yer almaktadır. Vergi sonrasında ise, Norveç'den sonra ikinci konumdadır. İngiltere Fransa daha yüksek oranda vergi almasına rağmen petrol giriş fiyatının düşüklüğü nedeniyle daha alt sıralardadır.

Tablo 5: 2012 Yılında OECD Üyesi Ülkelerde Benzin Fiyatları (ABD Doları)

	Vergi Öncesi Fiyat	**Vergi**	**Toplam Fiyat**	**Yüzde Kaçı Vergi**
Norveç	1,085	1,454	2,539	57,27%
Türkiye	1,268	1,212	2,48	48,87%
İtalya	1,004	1,311	2,315	56,63%
Hollanda	0,952	1,304	2,256	57,80%
Yunanistan	0,973	1,281	2,254	56,83%
Belçika	1,036	1,17	2,206	53,04%
Finlandiya	0,929	1,24	2,169	57,17%
Danimarka	0,985	1,18	2,165	54,50%
İsveç	0,952	1,204	2,156	55,84%
Portekiz	0,985	1,148	2,133	53,82%
Almanya	0,952	1,18	2,132	55,35%
İrlanda	0,964	1,149	2,113	54,38%
İngiltere	0,889	1,178	2,067	56,99%
Fransa	0,919	1,121	2,04	54,95%
İsrail	1,019	1,016	2,035	49,93%
Slovak Cumhuriyeti	1,024	0,997	2,021	49,33%
İsviçre	1,041	0,931	1,972	47,21%
Macaristan	0,965	0,944	1,909	49,45%
Çek Cumhuriyeti	0,921	0,967	1,888	51,22%
Slovenya	0,929	0,952	1,881	50,61%
Japonya	1,092	0,787	1,879	41,88%
Avustralya	0,884	0,986	1,87	52,73%
İspanya	0,964	0,863	1,827	47,24%
Lüksemburg	0,934	0,822	1,756	46,81%
Polonya	0,926	0,83	1,756	47,27%
Estonya	0,926	0,83	1,756	47,27%
Kore	0,947	0,807	1,754	46,01%
Yeni Zelanda	0,983	0,685	1,668	41,07%
Şili	0,936	0,691	1,627	42,47%
Avustralya	1,009	0,543	1,552	34,99%
Kanada	0,885	0,394	1,279	30,81%
ABD	0,849	0,135	0,984	13,72%
Meksika	0,641	0,103	0,744	13,84%

Kaynak: Energy Prices & Taxes, 1st Quarter 2013 International Energy Agency

En düşük vergi oranı ise, ABD ve Meksika'dadır. Bu ülkelerdeki verginin payı % 10 lar seviyesindedir.

Tablo 6 litre başına vergi öncesi ve vergi sonrası benzin fiyatına göre ülkelerin sıralaması gösterilmiştir. Bu tablo Türkiye'nin enerjiyi pahalıya aldığını göstermektedir. Sorun vergiden çok petrol tedarikin daha uygun fiyata alınmasında yatmaktadır. Vergi öncesi fiyatta Türkiye ilk sırada yer alırken vergi tutarları bakımından altıncı sıraya gerilemektedir.

Tablo 6: Vergi Öncesi Ve Vergi Sonrası Benzin Fiyatına Gore Ülkelerin Sıralaması

VERGİ ÖNCESİ FİYATA GORE SIRALAMA					VERGI TUTARINA GORE SIRALAMA				
		Vergi Öncesi Fiyat	**Vergi**	**Toplam Fiyat**			**Vergi Öncesi Fiyat**	**Vergi**	**Topla m Fiyat**
1	Türkiye	1,268	1,212	2,48	1	Norveç	1,085	1,454	2,539
2	Japonya	1,092	0,787	1,879	2	İtalya	1,004	1,311	2,315
3	Norveç	1,085	1,454	2,539	3	Hollanda	0,952	1,304	2,256
4	İsviçre	1,041	0,931	1,972	4	Yunanistan	0,973	1,281	2,254
5	Belçika	1,036	1,17	2,206	5	Finlandiya	0,929	1,24	2,169
6	Slovak Cumh.	1,024	0,997	2,021	6	Türkiye	1,268	1,212	2,48
7	İsrail	1,019	1,016	2,035	7	İsveç	0,952	1,204	2,156
8	Avustralya	1,009	0,543	1,552	8	Danimarka	0,985	1,18	2,165
9	İtalya	1,004	1,311	2,315	9	Almanya	0,952	1,18	2,132
10	Portekiz	0,985	1,148	2,133	10	İngiltere	0,889	1,178	2,067
11	Danimarka	0,985	1,18	2,165	11	Belçika	1,036	1,17	2,206
12	Yeni Zelanda	0,983	0,685	1,668	12	İrlanda	0,964	1,149	2,113
13	Yunanistan	0,973	1,281	2,254	13	Portekiz	0,985	1,148	2,133
14	Macaristan	0,965	0,944	1,909	14	Fransa	0,919	1,121	2,04
15	İspanya	0,964	0,863	1,827	15	İsrail	1,019	1,016	2,035
16	İrlanda	0,964	1,149	2,113	16	Slovak Cumh.	1,024	0,997	2,021
17	İsveç	0,952	1,204	2,156	17	Avustralya	0,884	0,986	1,87
18	Hollanda	0,952	1,304	2,256	18	Çek Cumh.	0,921	0,967	1,888
19	Almanya	0,952	1,18	2,132	19	Slovenya	0,929	0,952	1,881
20	Kore	0,947	0,807	1,754	20	Macaristan	0,965	0,944	1,909

Kaynak: Energy Prices & Taxes, 1st Quarter 2013 International Energy Agency

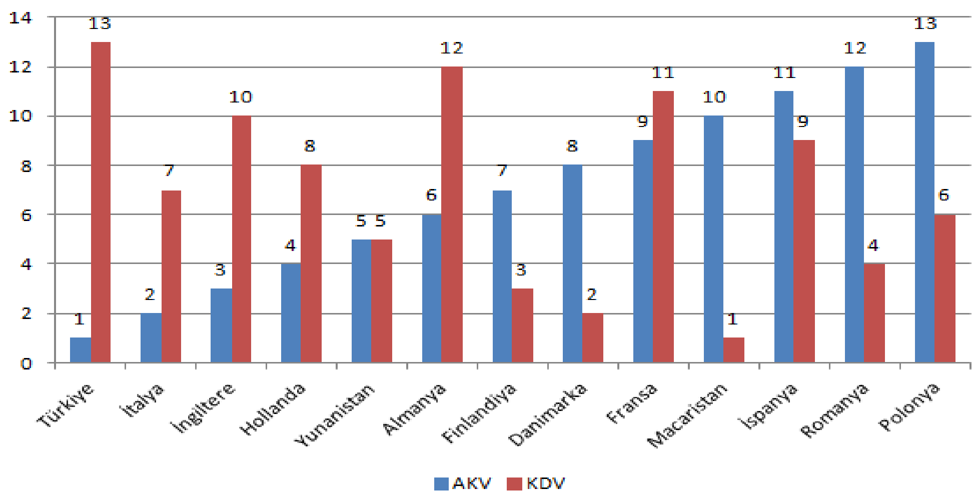
Tablo 7 galon başına ödenen KDV ve ÖTV miktarlarını vermektedir. KDV oranı olarak Türkiye % 18 ile OECD ülkeleri arasında en düşük orana sahiptir. En yüksek oran ise % 27 ile Macaristan'dır. KDV'de en düşük orana sahip olan Türkiye'nin Akaryakıt Tüketim Vergisinde (ÖTV)'de ise en yüksek vergiyi aldığını görüyoruz. KDV ile kaybedilen vergilerin ÖTV ile telafi edilmeye çalışılmıştır.

Tablo 7: KDV ve Akaryakıt Tüketim Vergisi (ÖTV) Vergisi ve Sıralaması

		KDV %	KDV Sıra	AKV Sıra			AKV €	AKV Sıra	KDV Sıra
1	Macaristan	27%	1	10	1	Türkiye	2,70	1	13
2	Danimarka	25%	2	8	2	İtalya	2,40	2	7
3	Finlandiya	24%	3	7	3	İngiltere	2,30	3	10
4	Romanya	24%	4	12	4	Hollanda	2,20	4	8
5	Yunanistan	23%	5	5	5	Yunanistan	2,10	5	5
6	Polonya	23%	6	13	6	Almanya	2,10	6	12
7	İtalya	22%	7	2	7	Finlandiya	2,00	7	3
8	Hollanda	21%	8	4	8	Danimarka	1,90	8	2
9	İspanya	21%	9	11	9	Fransa	1,90	9	11
10	İngiltere	20%	10	3	10	Macaristan	1,50	10	1
11	Fransa	20%	11	9	11	İspanya	1,50	11	9
12	Almanya	19%	12	6	12	Romanya	1,30	12	4
13	Türkiye	18%	13	1	13	Polonya	1,30	13	6

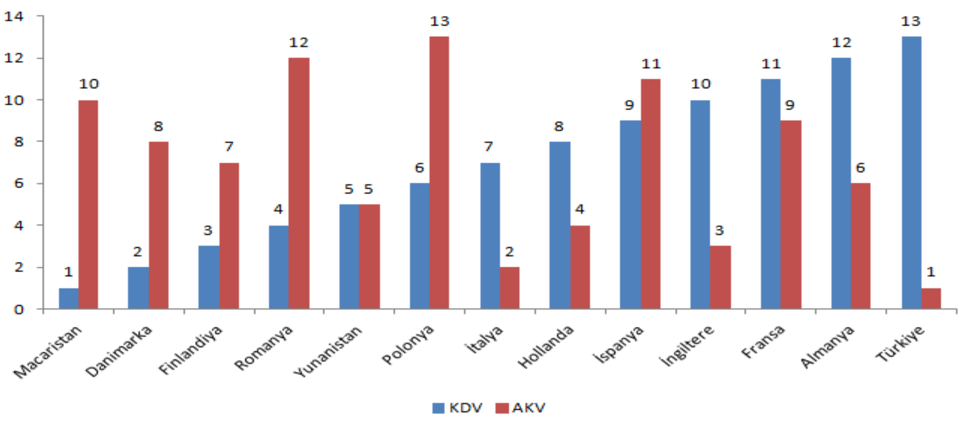
Grafik 6 ve Grafik 7, Tablo 7'de gösterilen veriler kullanılarak çizilmiştir. Grafik 6'da akaryakıt tüketim vergisinde yükseklik sırası gösterilmektedir. Türkiye En yüksek AKV uygularken KDV de sonuncu sırada yer almaktadır. Bu durum KDV oranındaki düşüklüğün AKV deki yüksek oranla telafi edildiğini göstermektedir. Macaristan en düşük KDV uygularken AKV de son sıralarda yer almaktadır.

Grafik 6 OECD Ülkelerinin Akaryakıt Tüketim Vergisine Göre Sıralaması



Grafik 7'de ise ülkeler KDV oranlarına göre sıralanmıştır. Grafik'de en yüksek KDV oranını uygulayan 1 değerini alarak sıralanmıştır. Türkiye KDV oranı yüksekliği bakımından en son sırada yer almaktadır. Fakat buna karşılık AKV de birinci konumdadır.

Grafik 7 OECD Ülkelerinin Katma Değer Vergisine Göre Sıralaması



SONUÇ

Günümüzde ülkeler başta gelir elde etmek amacıyla petrol ürünlerini vergilendirmektedir. Özellikle otoyolların yapım ve bakımı için bu vergiler önemli bir gelir kaynağıdır. Akaryakıt üzerinden vergi alınmasının diğer ekonomik nedeni, etkinlik ve istikrarı sağlamak ve otomobil talebinin kısılmak istenmesidir. Bunun dışında, taşıtlarda kullanılan akaryakıt çevreye zarar verdiği için negatif dışsallığı içselleştirme amaçlı çevreci bir vergi olarak alınmaktadır.

Bütün bu nedenlerden dolayı alınan vergiler nihai akaryakıt fiyatlarının önemli bir kısmını (neredeyse yarısını) oluşturmaktadır. Türkiye'de de akaryakıt üzerindeki vergi yükümlülükleri oldukça yüksektir. Fakat bu vergiler diğer OECD ülkelerinden çokta farklı değildir. Akaryakıt üzerindeki toplam dolaylı vergiler açısından Türkiye orta düzeyde bir ülke konumundadır. Dolayısıyla, verginin yüksekliği yanında vergi öncesi fiyatın yüksekliği de üzerinde durulması gereken diğer bir önemli konudur.

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AKILLI SAYAÇLARIN ŞEBEKE ENTEGRASYONU VE TÜRKİYE UYGULAMASI

SMART METER NETWORK INTEGRATION AND ITS APPLICATION IN TURKEY

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Serdal ATİÇ[†]
Şakir PARLAKYILDIZ
Olcay PALTA
Emin EL

ÖZET

Akıllı sayaçlar geleneksel enerji sayaçlarına göre sistem yöneticilerine ve tüketicilere çok daha fazla bilgi sağlayan, müdahale imkanı sunan gelişmiş elektrik enerji ölçüm cihazlarıdır. Bir akıllı sayaç tasarımı elektrik dağıtım şirketi ve müşteri gereksinimlerine bağlıdır. Bu çalışmada akıllı sayaçlar ile entegre olabilecek çeşitli özellikler ve teknolojiler anlatılmaktadır. Akıllı sayaçlara dair tasarım dahil karşılaşılabilecek çeşitli sorunlar, zorluklar, dağıtım süreci, kullanım ve akıllı sayaç altyapısı hakkında özet bilgilere yer verilmiştir. Buna ek olarak, ülkemiz için gelecekte akıllı sayaçlara dair karşılaşılabilecek çeşitli uygulamalar ve avantajlara değinilmiştir. Dünya'da birçok ülkede akıllı sayaçlara yapılan yatırımlar ve teşvikler hakkında bilgi verilmiştir. Ayrıca, ülkemiz gibi gelişmekte olan ülkelerde akıllı sayaçların tanıtılması açısından da akademik ve elektrik piyasası sektörüne katkı sağlaması hedeflenmiştir.

Anahtar Kelimeler: Akıllı sayaç, Akıllı şebeke, Dağıtım şebekesi

ABSTRACT

Smart meters are developed measurement devices that provide much more information to the consumers and that provide the intervention opportunity compared to the conventional energy meters. A smart meter design is dependent on the requirements of the electricity distribution company and the customers. In this study, various features and technologies that can be integrated with the smart meters are explained. Summary information on various problems that can be encountered including design of smart meters, difficulties, distribution process, use and infrastructure of smart meters was given. In addition, various applications and advantages about smart meters that can be encountered in the future in our country were mentioned. Information about promotions and investments made in smart meters in many countries in the world was given. Furthermore, the study aims to contribute to the academic and electricity market sector in term of the introduction of smart meters in developing countries such as our country.

Keywords: Smart meter, Smart grid, Distribution network

1. Giriş

Dünya nüfusu hızla artmakta ve şehirlerde yoğunlaşmaktadır. 2025'te dünya nüfusunun 8 milyara erişmesi öngörülüyor. 2035 yılında, enerji tüketiminin tüm dünyada %40 artmış olacağı hesaplanıyor. 2050 yılındaysa dünya nüfusunun %70'inin şehirlerde yaşaması bekleniyor. Günümüz dünyasında tüketim açısından daha çok insanın yoğun olarak şehirlerde yaşadığı dolayısıyla daha çok enerjiye ihtiyaç duyulduğu bir sürece girilmektedir. Tüm dünyada olduğu gibi ülkemizde de enerji ihtiyacı ve enerjinin verimli kullanımı en önemli gündem konusudur. Türkiye'de enerji verimliliği konusunda önemli handikaplar bulunmaktadır. Bugün Türkiye dünyanın en çok elektrik enerjisi tüketen 22'nci ülkesi konumundadır. Yılda 119,5 milyon ton petrole eşdeğer enerji tüketmekte ve Avrupa'nın 6'ncı büyük enerji piyasası konumundadır. Ülkemizde elektrik talep artışının 2014-2024 yılları arasında yıllık yaklaşık %6,5-7,5 civarında olacağı hesaplanmaktadır. Bu oranla Türkiye, elektrik tüketim talep artışında dünyada Çin'den sonra ikinci sıradadır. Bu oran Avrupa'da sadece %1,6'dır. Türkiyedeki elektrik şebekelerinde kayıp kaçak oranı ortalama %15 cıvarındadır. Sadece kayıp kaçak elektrik nedeniyle Türkiye'de hane başına ortalama yılda 120 TL'lik fazladan ödeme yapılmaktadır. 2023 yılında elektrik enerjisi ihtiyacımızın, bugüne kıyasla iki kat artarak yaklaşık 500 milyar kWh olacağı tahmin edilmektedir

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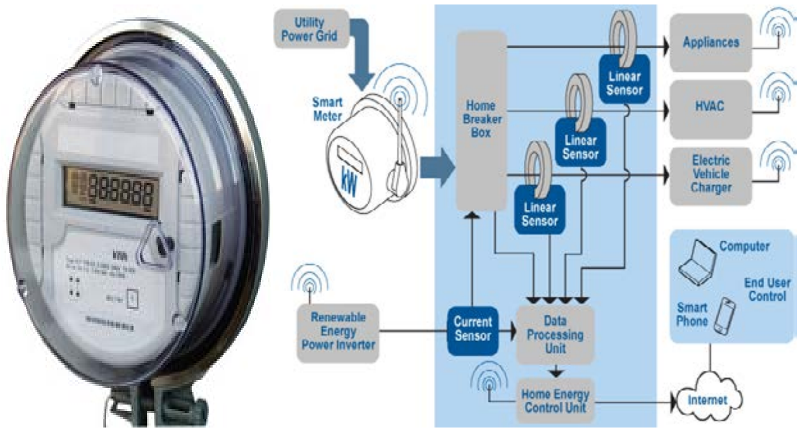
(Enerji ve Tabii Kaynaklar Bakanlığı, 2015:07.04.2015). Bu talebi karşılayabilmek için bugün ülkemizde mevcut kurulu güç en az iki katına çıkarılmalıdır. Yenilenebilir enerji kaynaklarının payı artırılmalı ve enerji verimliliğinde gelişmiş ülkelerin standartlarına erişilmelidir (Cengiz, 2014:149; Cengiz ve Rüstemli, 2014:76). Bu doğrultuda dağıtım şirketlerinin özelleştirilmeleri, yasal ayrışma gereksinimi, artan rekabet ve teknolojik gereksinimler neticesinde dağıtım sektöründe akıllı sayaç ihtiyacı ön plana çıkmıştır. Akıllı sayaç tüketicinin enerji tüketimini ölçen ve diğer sayaçlara kıyasla elektrik şirketine bilgi veren bir enerji ölçüm cihazıdır. Akıllı sayaçlarda çift yönlü iletişim söz konusu olmakla birlikte gerilim değerleri, faz açısı, faz frekansı ve güvenli veri iletişimi de dâhil olmak üzere gerçek zamanlı enerji tüketim bilgileri okunabilir. Bu sayede sistem hakkında bilgi toplanabilir.

Bir akıllı sayaç sisteminde; sayaç, iletişim altyapısı ve kontrol cihazları bulunur. Böylelikle dağıtım şebekesinden tüketici bilgileri alınabilir, diğer sayaçlarla iletişim kurulabilir ve şebekeden elektrik tüketimi ölçülebilir. Müşteriye ait dağıtık üretim kaynakları veya akü sistemlerinden çekilen enerji yoksa akıllı sayaçlarla sadece tüketilen güç faturalandırılır. Akıllı sayaçlar maksimum enerji tüketim miktarıyla sınırlandırılabilinir ve istenildiği zaman iptal edilebilir veya tekrar bağlanabilir. Bir akıllı sayaç, sistem verilerini çeşitli kontrol cihazları ve birçok sensör ile algılar. Gelecekteki elektrik dağıtım şebekelerinde, akıllı sayaçların performansı ve yük enerji kulanım özelliklerinin izlenmesi önemli rol oynayacaktır. Akıllı sayaç sistemi ile düzenli olarak tüm müşterilerin enerji tüketim verilerinin toplanması ve hizmet şirketlerinin tüketimleri göz önünde bulundurularak hizmet şirketinin müşterilerine maliyet açısından tavsiyelerde bulunulması sağlanacaktır. Akıllı sayaçlar ev aletleri ve diğer cihazları kontrol etmek için programlanabilir. Buna ek olarak akıllı sayaç entegrasyonu, dağıtım verimliliği ve güç kalitesinin iyileştirilmesi açısından izinsiz tüketime ve elektrik hırsızlığı tespiti için hizmet şirketlerine yardımcı olur (Cengiz, 2013:206). Şekil 1'de akıllı sayaç ve çalışma mantığı görülmektedir.



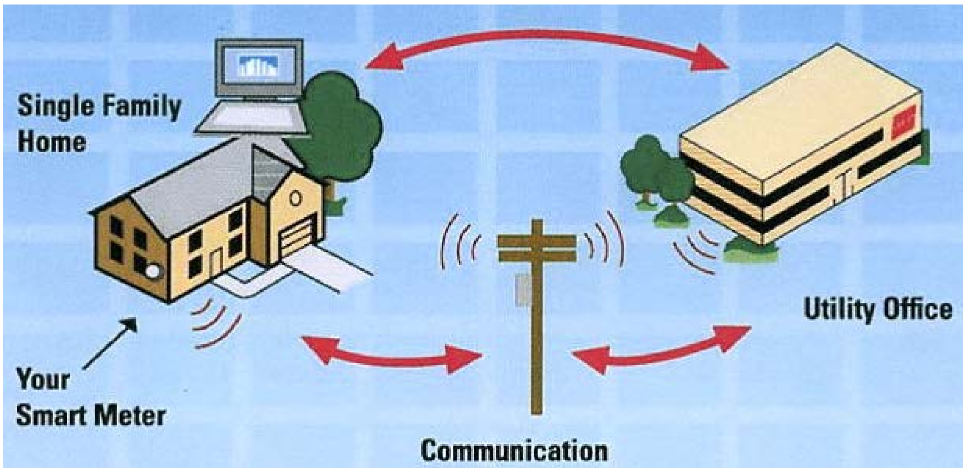
Şekil 1. Akıllı sayaç ve çalışma mantığı

2. AKILLI SAYAÇLARDA HABERLEŞME

Akıllı sayaçlarda haberleşme işlemi için iletişim cihazları ve iletişim ağı karmaşık gereksinimleri karşılayacak şekilde olmalıdır. Akıllı sayaç sistemi, akıllı sayaç ve diğer şebeke elemanları arasında veri transferini yönetir. Bu veriler gizli olup, özel hayatı ilgilendiren bilgiler olduğundan bilgilere erişim mümkün olan en az personelle sınırlı olmalıdır.

İletişim standartları ve kuralları ağ içindeki veri aktarımının güvenli olması için formüle edilmiş olmalıdır. Bu veriler enerji tüketimi hakkında ayrıntılı bilgi verdiği için manipülasyonlar ve yanlış hesaplamalar açısından önemlidir. Bu sayede müşterinin kullandığı enerjinin ve diğer enerji sistem bileşenleri ile cihaz arasındaki enerji akış yönüne dair bilgiler görülebilmektedir. Bu bilgiler bir akıllı sayaç ya da bir müşteriye atanmış bir cihaza verilen kriptonik kimlikler tarafından teminat altına alınmıştır. Seçilen haberleşme ağı akıllı sayaç üzerinden enerji kesintisini algılamalı ve destek dağıtım otomasyonuna bilgiyi ulaştırmalıdır (Amin ve Wollenberg, 2005:34).

Kontrol sinyallerinin haberleşmesi ve enerji tüketim verilerine ulaşmak için bluetooth olası bir seçenek olabilir. Power Line Carier (PLC) ve Boardbord Power Line (BPL) haberleşmesi, TCP/IP gibi veri aktarımı diğer olası seçeneklerdir. Kablosuz modem, mevcut internet bağlantısı, güç hatları üzerinden haberleşme, RS-232/485, Wi-Fi, Wimax ve Eternet veri yükleme işlemleri için kullanılabilir (Garrity, 2008:38). Şekil 2'de akıllı sayaçlı bir dağıtım şebekesinde haberleşme durumu gösterilmiştir.



Şekil 2. Akıllı sayaçlı bir dağıtım şebekesinde haberleşme durumu

3. AKILLI SAYAÇ ENTEGRASYONUNU ETKİLEYEN OLUMSUZ FAKTÖRLER

Akıllı sayaç entegrasyonu yeni nesil şebekelerin oluşmasıyla gelecekte en önemli sorun haline gelecektir. Şebekenin yeniden tesis edilmesi yöntemi yerine, mevcut şebekeyi yenileştirme alternatif bir çözüm olabilir. Şebekenin çalışma kapasitesi, teknik avantajları ve ar-ge açısından akıllı şebeke entegrasyonu mevcut şebekenin yönetilmesinde en önemli çözüm olarak değerlendirilebilir. Ancak mevcut şebekenin tasarım ve bakımı birçok sorun ve zorluğu barındıracaktır. Mevcut sistemle yeni teknolojiyi birleştirebilmek için uygun altyapı eksikliğinin giderilmesi ve akıllı sayaçların şebekeye yerleştirilmesi gereklidir. Müşteri ağının artması sistemi karmaşık hale getirir. Enerji tüketimi ve veri toplama otomatik olarak yapılan sürekli bir süreçtir (Mcdaniel ve Mclaughlin, 2009:75). Bu bağlamda bazı gizlilik ve güvenlik riskleri oluşabilir. Ayrıca adres bilgileri, kullanılan aletler, insanlarla ilgili bilgiler vb. bilgilere ulaşılabilir. Temelde iletilecek parametrelerin seçimi ile ilgili sorun ve bu bilgilere erişmek için yönetici kimliğine sahip olmak gerekir.

4. AKILLI SAYAÇLARIN SISTEME KAZANDIRDIKLARI

Akıllı sayaç sistemiyle iş gücü akışı, iş gücü yönetimi ve faturalandırmanın sistematik bir biçimde yönetimi sağlanır, Akıllı sayaçlar sayesinde SCADA sistemleri arttırılabilir, güç sisteminin kontrolü gibi çeşitli faydalarının yanında kesinti ve kayıpları en alt düzeye indirmek için gerektiği zaman operasyonel kararlar alınabilir. Özellikle mikro şebekeler sayesinde akıllı sayaçların enerji maliyetlerinin düşürülmesi, hata analizi, talep kontrolü ve güç analizi yapılabilir. Akıllı sayaçlar doğru faturalandırma yapmak, arıza önleyici bakımı planlamak, arıza kaynağını tespit etmek ve arızanın giderilmesine yardımcı olmakta kullanılabilir. Buna ek olarak akıllı sayaçlar ile sistemden kaynaklanan istenmeyen harmonik bileşenlerin varlığı tespit edilebilir (Cengiz vd., 2013:155).

Manuel okuma süreklilik ve daha fazla maliyet gerektiren bir iştir. Geleneksel ölçüm sisteminde sayaç manuel olarak okunur. Bütün bu süreç bir akıllı sayaç ve uygun bir iletişim mekanizması yardımıyla basitleştirilebilmektedir. Akıllı sayaç kurulumuyla enerji güvenilirliği ile birlikte enerji tasarrufu ve devamlılığı da sağlanır. Akıllı sayaç, tüketicilere enerji tüketim miktarı ve maliyeti açısından bilgi vererek tasarruf yapma hususunda yönlendirme yapabilmektedir.

Uzak mesafede bulunan trafolar enerji dağıtım esnasında gerilim dalgalanmalarına ve yük dengesizliğine sebep olur. Akıllı sayaç ile alçak gerilim şebekelerindeki dalgalanmalar analiz ve kontrol edilebilmektedir. Ayrıca kullanıcıya gerekli yük ve maksimum yük talebinin kontrolü ile ilgili bilgi sağlayabilmektedir. Akıllı sayaç puant (pik) yük esnasında kullanıcıların maksimum yük taleplerini kontrol ederek herhangi bir müşterinin sınırı aşması durumunda enerjiyi keserek sistemi koruyabilmektedir.

Mevcut şebeke sistemleri tek yönlü güç akışı için tasarlanmıştır. Akıllı sayaç sistemine ek cihazlar entegre edilerek akıllı ölçümleme teknolojisinin yetenekleri arttırılabilir. Coğrafi Bilgi Sistemi (CBS) potansiyel bir arızanın coğrafi konumu hakkında detaylı bilgi elde edebilmek için akıllı sayaç sistemine entegre edilebilir. Bu sayede elektrik şirketleri arızaların hızlıca tespit edilmesi ve arızanın giderilmesinde daha kısa sürede çözüme ulaşabilir. Yani akıllı sayaçlar sayesinde elektrik kesintilerine ve arızalara daha hızlı cevap verilerek, enerji kesinti süreleri ortalama 4-6 dakikaya kadar düşürülebilir.

Bir akıllı sayaç sisteminde elektrik şirketi bir merkezi kontrol noktası oluşturarak belirlenen plan çerçevesinde müşteri için ev aletlerini kontrol etmek ve bu aletleri çalıştırmak için akıllı sayacı yönlendirir. Akıllı sayaç uygulaması hizmet şirketlerinin tarife planlarını değiştirip yeni tarifelerini tanıtmasını sağlar (Mcgranaghan vd., 2008:1). Böylelikle müşteriye fayda sağlayan önemli argümanlar ve yeni dinamik tarife planlarının tanıtılmasına olanak tanır.

Kullanım tarifesi ve gerçek zamanlı fiyatlandırma şemalarına ek olarak ön ödemeli akıllı kart sistemi tanıtımı ile hizmet şirketleri tüketicilerin yararı için tüketicilere makul bir tarife sunabilecektir.

Sonuç olarak tüm bu bilgiler ışığında akıllı sayaçlar (Rüstemli vd., 2011:108; Rüstemli vd., 2013:30);

- Operasyonel Maliyetlerin Azaltılması: Dağıtım şirketlerinin sayaç bilgilerini toplama ve işgücüne dayalı olan sayaç okuma giderlerini azaltma faydasını sağlar. Bununla birlikte dağıtım şirketlerinin, abone kesintilerini uzaktan görüntüleyerek, abone telefonları veya arıza bildirimlerine karşı oluşan ulaşım maliyetlerini de azaltır.

- Gelirlerin Korunması: Gerçek zamanlı ve daha kesin fatura bilgileri sağlayarak aylık fatura tahmin ihtiyacını ortadan kaldırır. Bu model, gelir koruma adına hem ön ödeme sistemleri hem de faturasını ödemeyen abonelerin elektriklerini uzaktan kesme sistemlerini desteklemektedir. Son olarak ta dağıtım şirketlerinin kayıplarını azaltmak için ‘’Enerji Hırsızlığı Tespiti” uygulamasını destekler.

- Talep Yönetimi: Abonelerin elektriği gün içerisinde kullandığı zamana göre fiyatlandırma ve/veya kritik pik oranlarına göre fiyatlandırma gibi elektrik dağıtım firmalarının ileri düzeyde fiyatlandırma politikaları için şebekeden ve abonelerden tek tek veri toplar. Bununla birlikte dağıtım şirketleri abonelerinin, kendi tüketim miktarlarını görmeleri ve yük oranlarını değiştirilebilmeleri imkanı sağlar.

5. GELİŞEN ÜLKELER İÇİN AKILLI SAYAÇLARIN KATKILARI

Gelişmekte olan birçok ülkede müşteriler tarafından tüketilen enerji faturalandırılması için geleneksel enerji sayaçları kullanılmaktadır. Akıllı sayaçların ev aletleri kullanım kolaylığı sağlama, teknik olmayan kayıpları kontrol etme, geliştirilmiş yük paylaşımı sağlama, güç kalitesinde iyileştirme ve şebeke izleme gibi olanakları gelişen ülkelere tanıtılmalıdır. Çünkü hizmet şirketlerinin teknik olmayan kayıpları dünya çapında her yıl yaklaşık 20 milyar dolardır. Buna ek olarak artan teknik olmayan kayıpların çoğalması ile hırsızlık ve faturalandırmada usulsüzlük, gerçek ve şeffaf ölçüm yapmayı zorlaştırır. Ancak akıllı şebeke ve akıllı sayaç sisteminin kurulması için devasa bütçeler gereklidir. Kamu hizmetleri şirketleri sayesinde veya kamu teşvikleriyle bu altyapıya milyarlarca dolar yatırım yaparak ulaşılabilir.

Gelişmiş haberleşme yeteneği ve gelişmiş yazılım araçları ile akıllı sayaçlar dağıtım verimliliğini arttırır. Akıllı sayaçların entegrasyonu üretim aygıtlarının dağıtılmış gücünün depolanmasını kolaylaştırmıştır. Yakın gelecekte toplam enerji talebinin mevcut talebin iki katına çıkması beklenmektedir (Rüstemli ve Cengiz, 2015). Bu durum göz önünde bulundurulduğunda pek çok gelişmekte olan ülke ek kaynaklar konusunda yeterli kapasiteye sahip değildir. Bu boşluğun doldurulması için, mevcut üretim kapasitesi yönetilebilir, müşteri talepleri doğrultusunda mevcut yük kontrol edilebilir ve artan kaçak elektriğin önüne geçilebilir.

6. AKILLI SAYAÇ VE KÜRESEL BAZDA KULLANIMI

Avantajları ve uygulamaları göz önünde bulundurulduğunda akıllı sayaç sistemleri dünya çapında büyük ölçekli dağıtım şirketleri tarafından kullanılıyor. Örneğin Austin Energy, yaklaşık 400.000 müşteri ile ABD’nin en büyük elektrik hizmet şirketlerinden biridir. 2008 yılında yaklaşık 260.000 müşteri konutuna akıllı sayaç dağıtmaya başlamıştır. Houstan merkezli bir elektrik hizmet şirketi olan Centerpoint Energy, Houston-Metro ve Galveston yerlerinde 2012 yılına kadar 2 milyon müşteriye akıllı sayaç dağıtmıştır. ABD’de akıllı sayaçların hedeflenen uygulaması 50 milyarlık bir yatırım gerektirir. İtalya’da Enel, Avrupa’da Thirdlargest enerji sağlayıcıları 27 milyon müşteri ile akıllı sayaç dağıtımına başlayarak dünyanın en büyük akıllı sayaç dağıtım projesini oluşturmuştur. Kanada, Ontario hükümeti 2007 yılı sonrasında konut ve küçük işletmeler dahil olmak üzere yaklaşık 800.000 tüketiciye akıllı sayaç dağıtmayı planlamıştır. Kore’de Kore Electric Power Corporation (KEPCO) 2000 yılında sanayi müşterileri için AMR tabanlı enerji ölçüm sistemi uygulamasına başlanmıştır. Şu anda bu sayaç yaklaşık 130.000 yüksek gerilim tüketicisinin enerji tüketim bilgilerini iletir. KEPCO bu akıllı sayaç sistemlerini kullanarak düşük voltajlı müşterilerinin yaklaşık 55.000’i için katma değerli hizmetler sağlar. Avustralya’da Temel Hizmetler Komisyonu Victoria yaklaşık 2,6 milyon elektrik tüketicisi için sayaç kurulumunu zorunlu hale getirmiştir.

İnsan işgücü unsurunun olduğu her türlü yapı dış etkilere açıktır. Tüm dünyada bunu iyi bilen şehir ve şirket yöneticileri akıllı şebekelere yönelmektedirler. Özellikle elektrik, su, doğalgaz gibi kaynakların verimli kullanımı için tüm süreçler artık akıllı şebekelerle yönetilmektedir. Enerji kaynaklarının kullanımında verimliliğin artırılması, maliyetlerin azaltılması ve tasarrufun artırılmasında akıllı sistemler önemli bir katma değer sağlamaktadır. Akıllı şebeke sistemleri bugün birçok gelişmiş pazarda önemli enerji projelerinin altyapısını oluşturmaktadır. 2012'de dünya çapında 186 milyon aktif akıllı sayaç vardı. 2022'de 1,7 milyar akıllı sayacın kullanılacağı öngörülmektedir (Ipakchi ve Albuyeh, 2009:52). Örneğin, Amsterdam, Barcelona gibi şehirlerin altyapı çalışmaları veya Fransa'da ERDF'in 35 milyon sayaç için başlattığı SOGRID projesi, İtalya'da 32 milyon sayaçlık Enel projesi, İspanya'da 13 milyon adetlik Enel Endesa sayaç projesi, Amerika'da Southern California Edison projesi ve İngiltere'deki 53 milyon adetlik elektrik ve gaz sayacı projeleri dünyanın akıllı şebekelere verdiği önemi göstermektedir.

7.SONUÇ

Bu çalışmada akıllı sayaç birkaç önemli yönden incelenmiştir. Çalışmada şirketin akıllı sayaç kullanımında enerji sisteminde oluşacak avantajlar yanı sıra müşteri bakış açısı da ele alınmıştır. Akıllı sayaç iletişimi için çeşitli potansiyel iletişim ağları sunulmuştur. Buna ek olarak tasarım, geliştirme ve kurulumda ki birçok zorluk, gereksinim ve sorunlar tartışılmıştır. Gelişmekte olan ve akıllı sayaç kurulum statüsünde olan ülkeler için bu ülkelerin akıllı sayaçlara olan ihtiyaçları anlatılmıştır. Son olarak dağıtım şirketlerinin özelleştirilmeleri, yasal ayrışma gereksinimi, artan rekabet ve teknolojik gereksinimler neticesinde Türkiye'nin dağıtım sektöründe akıllı sayaç ihtiyacı ön plana çıktığı görülmüş olup bu doğrultuda dağıtım şirketleri ve diğer paydaşların bu değişim ve dönüşüme hazır olmaları gerektiği belirtilmiştir.

İnsan işgücü unsurunun olduğu her türlü yapı dış etkilere açıktır. Tüm dünyada bunu iyi bilen şehir ve şirket yöneticileri akıllı şebekelere yönelmektedirler. Özellikle elektrik, su, doğalgaz gibi kaynakların verimli kullanımı için tüm süreçler artık akıllı şebekelerle yönetilmektedir. Enerji kaynaklarının kullanımında verimliliğin artırılması, maliyetlerin azaltılması ve tasarrufun artırılmasında akıllı sistemler önemli bir katma değer sağlamaktadır.

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ARDA'LI ATLETİCO MADRİD FORMASINDAKİ SÜRMANŞET 'AZERBAYCAN-ATEŞ ÜLKESİ' REKLAMININ AZERBAYCAN ENERJİ GELİR-GİDER DENGESİNE PROMOSYON KATKISI!

THE SUBHEADED AD 'LAND OF FIRE AZERBAIJAN' ON ARDA'S ATLÉTICO DE MADRID SQUAD'S JERSEY AND ITS PROMOTION IMPACT FOR THE BALANCE OF AZERBAIJAN ENERGY'S INCOME AND EXPENSES !

Kutlay ARTUÇ*

ÖZET

Enerji ekonomisi için multi-disipliner bir vakıa analizi. Türkiye'de Passolig, şike vs.'den ilgi, geçici azalsa da fanatikçe sevilen futbol artık ticari bir sektör, hedef pazar ve yoğun reklamlarla paydaşlar için yerel-global pazarlama mecrasıdır da. Spor lig ve kulüp adları sponsorları ile anılmaktadır. FB Ülker, Medicana Sivasspor vs. Futbol kulüp formalarına "duvar" değil diye reklam izni vermeyen bürokrattan, Barcelona'nın forma kutsaldır reklam alınmaz fikrinden bugün sol kolundaki BEKO reklamına, şortların popo kısmına, tarafsız hakem formasına, Spor Toto Süper Lig adına her yer reklamdır. Burada, "Tek millet, iki devlet" Azerbaycan'ın, Arda'lı İspanyol Atletico Madrid futbol takımı formasını uluslararası pazarlama mecrası olarak kullandığı, "Azerbaycan-Ateş Ülkesi" sürmanşet forma reklamının Azerbaycan enerji gelir-gider dengesine ± promosyon katkısı için nitel spekülasyon yapılmıştır. 2011'de 821,000 bbl/gün ham petrol ihracatı ile dünya 17.ü Azerbaycan'ın 2013'de $23.74 milyar cari dış fazlası vardır. 21.02.1015'de Manat'ın %33 devalüasyonun Azerbaycan petrol ihracatına olumlu katkısı beklenirse de bu forma hizmet ithalat gideri göreceli yüksebilecektir. Bu reklamın amacı "reklamın kötüsü olmaz" ile paydaşların farklı beklentileri olabilir. Nitekim Azerbaycan 2015 ve 2017'deki iki farklı uluslararası spor organizasyonunun da ev sahibidir. Aslında eğer enerji piyasası tam rekabet özellikleri taşıyorsa ekonomi teorisine göre reklama gerek yoktur. Veri paydaşlar Türkiye, Azerbaycan, İspanya, futbol, Atletico Madrid, Arda, bu bildiri yazarı, bu sempozyum ve enerji sektörü vs. için sonuç "kazan-kazan" görünümündedir.Zaten bazı büyük enerji aktörleri futbolla gayet ilgilidirler. Rus Gazprom şirketinin UEFA Şampiyonlar Ligi Organizasyonu, Alman FC Schalke 04 ve Rus Zenit St Petersburg futbol takımı için aynı anda 3 ayrı futbol resmi sponsorluğu vardır. Rus-İngiliz çifte vatandaşı petrol oligarkı Roman Abramoviç İngiliz futbol takımı Chelsea'nin sahibidir. Görünen o "futbol asla sadece futbol değildir". Ancak ülke milli takımlarının futbol başarısı ile petrol üretimi arasındaki ters korelasyonu dengelemek için olmalı, dünya petrol üretimde 18., doğal gaz üretimde 6. olarak kişi başı milli geliri $102.000 ile dünya 1.i Katar 2022 FİFA Dünya Futbol Şampiyonasının ev sahibidir. Fransız Paris Saint German futbol takımının sahibi de Katar'lıdır. Futbol ve enerji ile igili yavru vatan KKTC'den spor-siyaset-ticaret üçgenine güncel radikal örnek olarak Kıbrıs adası civarı denizde petrol arama gerginliğini pingpong diplomasisi gibi detente edecek KKTC Futbol Federasyonunun G.Kıbrıs Futbol Federasyonu ile birleşme kararı da vardır!

Anahtar Kelimeler: Arda, Atletico Madrid Forması, Azerbaycan Ateş Ülkesi, Enerji, Petrol, Reklam, Sponsorluk

ABSTRACT

A multi-disciplinary case study for energy economy.Even though there is a temporary decreasing interest for soccer in Turkey because of Passolig Card and/or match-fixing, popular soccer is being liked fanatically, in general. And soccer is now a commercial sector, the target market. With a heavy sponsorships or ads, soccer is a the local and global market opportunity for any stakeholders. The names of sports leagues and clubs are referred to by the sponsors. FB Ülker, Medicana Sivasspor etc. Once the Turkish bureaucrat said that the sport clubs' jerseys were not the wall and he did'nt permit any ads on it. Barcelona's shirt was also thought as sacred one and not taken any ads. Whereas today, ads are everywhere, even BEKO ads on Barca's holy jersey. All kind of ads can even be seen on the butts part of shorts, impartial referees jerseys. Turkish soccer league was named as a Spor Toto Super League. There is a the proclamation "one nation, but two countries" for Turkey and Azerbaijan. Azerbaijan uses Spanish Atlético De Madrid's Jersey with Turkish player Arda Turan for international marketing channels with "Azerbaijan-Land Of Fire" subheaded slogan. The speculation is produced here for this ads' promotion impact for the balance of Azerbaijan energy's income and expenses. In 2011, with 821,000 bbl/day of crude oil exports Azerbaijan is listed No:17 in the world. This makes the amount of its current external surplus with $23.74 billion in 2013. In 21.Feb.2015, 33% devaluation of Azerbaijani Manat will

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be expecting to contribute positively oil exports amount. However this devaluation most probably increase the mentioned ads costs which is a kind of service import. The expectations and purposes of all stakeholders for this sponsorship-ad might be various but "any ad would not be bad" idea is common. Indeed, Azerbaijan will be the host the two different international sports organization in 2015 and 2017. In fact, if energy market is fully competitive features, according to economic theory there should not be any ads. Stakeholders can be counted such as Turkey, Azerbaijan, Spain, Soccer, Atlético De Madrid ,Arda, myself, this symposium and energy sector. And the result of the ad for all of them looks like “win-win situation”.Already, some major energy actors are involved in football immensely. Gazprom has the three offical sponsorships at the same time for UEFA Champions League Organization, German FC Schalke 04 and Russian Zenit St Petersburg football team. The oil oligarch Roman Abramovich, Russian-British, is the owner of British soccer team Chelsea FC. It seems that "soccer is never just soccer"!There is a reverse correlation between any country's national soccer team succession and its oil production amount. It looks like for balancing this inverse correlation Qatar with listed World rank no:18 for oil production, listed No: 6 for natural gas and No:1 for its $ 102,000 per capita income will be home for 2022 FIFA World Soccer Cup.The owner of French soccer team PSG is from Qatar. A current and radical example based on soccer and energy for sports-politics-commerce triangle from Turkish Republic of Northern Cyprus; Oil exploration tension in the sea around Cyprus may be detented like pingpong diplomacy with the merger demand of TRNC Soccer Association with Southern Cyprus Soccer Association !

Key Words: Ad, Arda, Atlético De Madrid's Jersey, Azerbaijan-Land of Fire, Energy, Oil, Sponsorship

Foto 1: “Azerbaycan-Ateş Ülkesi” Forma Reklamı ile La-Liga Şampiyonu Oldukları 2013-2014 Sezonunda Attığı Bir Gol Sonrası A.Madrid'li Arda'nın Gol Sevinci (A.Madrid, 2014)

GİRİŞ

"Futbol Asla Sadece Futbol Değildir"

Yukarıdaki söz (Kuper, 2003) "Football against The Enemy (Futbol Düşmanına Karşı)" adlı kitabının vurucu Türkçe adıdır ve artık slogandır.İspanyol diktatör Franco ve maliye profesörü Portekiz'li diktatör Salazar'ın uzun iktidarlarının temelinde 3F (futbol, fado, fieasta) vardır. Franco'nun "insanları stadyum adlı beşikte uyuttum" dediği rivayet edilir. Ancak optimistik olaraksa İspanya ve Portekiz'in futbolda bugün ki başarı temelleri de bu diktatörlerce atılmış olmalı! Çünkü Mart 2014 FIFA Dünya sıralamasında İspanya 1510 puan ile 1. idi (Hürriyet, 2014).Nisan 2015 FİFA sıralamasına göre İspanya 10.'dur. Türkiye 52., S. Arabistan 95., Katar 99. ve Azerbaycan 115.dir (FIFA, 2015). İşte bu nitel çalışmada literatür taraması yanında gözlem, tecrübe, bilgi ibriğinden damlayanlar da vardır.

Futbolda FİFA milli takımlar dünya sıralaması ile ülke dünya ham petrol üretimi sıralaması arasında korelasyon var mıdır? Yukarıda bahsedilen ülkelerin (CIA, 2014) verilerine göre ham petrol üretimi sıralamasına göre ilgili korelasyon zıttır, (Türkiye hariç). Mutfağı kirli olan lokantanın yemeklerinin lezzetli olduğu ileri sürülür. Çünkü konsantrasyon temizliğe değil lezzete verilmiş olmalı! Teşbihte hata olmaz misali görünen o, petrolü çok olan ülkelerde çalışma enerjilerini futbol oynamaya değil petrol işine harcamaktadırlar. Ancak futbol başarılarındaki eksikliklerine dünya kupası düzenleyerek veya dünyaca ünlü futbol takımları satın alarak veya forma reklamı sponsorluğu ile bypass etmektedirler.

Hidroelektrik santralde elektrik üretimi olmayan ***S. Arabistan*** ham petrol üretiminde 2012'de tahmini 11.73 milyon bbl/gün ile ve ihracında 2011'de 6.88 milyon bbl/gün dünya 1.dir. Ocak 2013 ispatlanmış ham petrol rezervleri 267.9 milyar bbl ile dünya 2.idir. Doğal gaz üretiminde 2012'de 103.2 milyar cu m ile dünya 9.dur. 2013'de ispatlanmış doğal gaz rezervlerinde 8.15 trilyon cu m ile dünya 6.dır. Ancak S.Arabistan FIFA'da 95.'dir.

2013'de GSYİH içinde satın alma gücüne göre kişi başı $102,100 gelir ile dünya 1.i ***Katar*** Emirliği 2012'de ham petrol üretiminde 1.579 milyon bbl/gün ile dünya 18'dir. 2011'de 1.389 milyon bbl/gün ile petrol ihracında dünya 14.dür. 2011'de tahmini 133.2 milyar cu m doğal gaz üretimi ile dünya 6.ı, 113.7 cu m milyar doğal gaz ihracı ile dünya 2.sidir.

Çok zengin bir ülke olmasına rağmen uluslararası sorunu olmaması ilginç bir nadirliktir. Buna rağmen Mayıs 2015'de Katar, Fransa'dan Rafale tipi 24 adet savaş uçağı satın alacaktır (TRThaber, 2015). 2014'de 27.35 göçmen/1000 kişi oranı ile net göçmen alımında dünya 2.i olması zenginliğin albenisinden olmalı!2013'deki % 0.3 işsizlik oranı ile dünya 2.sidir. İşte petrol zengini ***Katar*** Emirliği diğer bir paradoks ile FIFA dünya sıralamasında 99.dur. Ancak Fransa'nın ünlü futbol takımı İbrahimoviçli Paris Saint German'in 2012'den beri sahibi de petrolle ilgisi olan Katarlı yatırım şirketi Qatar Investment Authority'dir.

FIFA demokrasi ile değilde emirlik ile yönetilen Katar'a 2022 Dünya Futbol Kupası evsahipliğini vermiştir.2022 Dünya Futbol Kupasının geleneksel zamanı yazın sıcağında değilde kışın yapılması tartışılmaktadır.Bu organizasyonun olası kaynağı petrol geliri vs. açısından Katar ekonomisi ile ilgili (CIA, 2014) şu bilgileri vardır:

Katar, 1800'lerden beri Al Thani ailesince yönetilir. İngiltere'nin fakir halli kontrolünden, çok önemli petrol ve doğal gaz gelirleriyle inci gibi parlayan bağımsız bir ülkeye dönüşmüştür. Geç 1980'ler ve 1990'lar başlarında 1972'den beri ülkeyi yöneten Amir'in petrol gelirlerini sürekli kendine harcaması ile Katar ekonomisi tökezlemiştir. Ama 2007'de petrol ve doğal gaz gelirleri Katar'ı kişi başı milli gelirde dünya 1. yaptı.Yoğun zenginliğinden olmalı ki Yakın Doğu ve Kuzey Afrika ülkelerinde 2010-2011'deki iç isyanları Katar yaşamadı. 2013'de Körfez Arap Ülkeleri tarihinde nadir bir barışçıl feragat ile HAMAD iktidarını 33 yaşındaki oğlu TAMIM bin Hamad'a bıraktı. TAMIM, gelişmiş sağlık ve eğitim sistemleri oluşturmak ve Doha'da 2022'de düzenlenecek Dünya Kupası için ülke altyapısını geliştirme vs. dahil Katar'ın yurtiçi refahının gelişmesine öncelik verdi.

Katar ekonomisi son yıllardaki yüksek gerçek GSYİH büyümesi ile oldukça zenginleşti. GSYİH daha çok petrol fiyatlarındaki değişim ve enerji sektörüne yatırımla arttı. Ekonomi politikası; eşsiz doğal gaz rezervlerini geliştirmek ve enerji dışı sektörlerde artan özel ve yabancı yatırımlarına yoğunlaşsa da, petrol ve gaz halen GSYİH'in % 50'ını, ihracatının %85'ini ve de hükümet gelirlerinin %50'ni oluşturur. Petrol ve gaz Katar'ı kişi başı milli gelirde dünya 1.si ve en düşük işsizlik oranına sahip ülke yapmıştır. 25 milyar varil ispatlanmış petrol rezervleri ile mevcut üretim çıktı seviyelerini 57 yıl daha sürdürebilir. 2022 Katar Dünya Kupası organizasyonu metro sistemi, hafif raylı sistemi, yeni liman yapımı, yollar, statlar ve spor altyapısı gibi büyük ölçekli altyapı projelerini hızlandırmıştır. Bunlar futbolun olumlu dışsallıklarıdır. Ancak 2014 Brezilya Dünya Kupası öncesinde Brezilyalılar yoksulluğa çözüm için değil spor altyapısına yatırım yapılıyor diye protesto yapmışlardı. Al- Jazeera uydu TV kanalı da, Katar hükümetinin sahibi olduğu ve finanse ettiği ama özerk şirket statüsünde bağımsız yayın yapan bir kanaldır.

Ana temamız ***Azerbaycan***'la ilgili bazı veriler ise (CIA, 2014); 2013'de % 90'ı petrol ve gaz olan $34.46 milyar ihracatı ile dünya 63.'dür. 2013'de satın alma gücüne göre GSYİH $102.7 milyar ile dünyada 75. ve kişi başı milli gelir $10.800 ile 114.dür. İhracat partnerleri arasında Türkiye ve İspanya yoktur.2013'de ithalat miktarı $10.72 milyar ile dünya 97.'dir. Yani $23.74 milyar cari dış fazlası vardır. İthalatında petrol ürünleri vardır ve İspanya gene ithalat listesinde yokken Türkiye, Rusya'nın %14.1'lik payından sonra %13.7 ile 2.dir. Ne kadarı A.Madrid forma reklamı etkisiyle geldi bilinmez ama 31 Aralık 2013'de ülkeye gelen direkt yabancı yatırım sermaye stoğu $14.35 milyarla dünyada 83.dür. Yurtdışındaki direkt yabancı yatırım miktarı $8.616 milyarla dünya 56.dır. A.Madrid forma reklamı yurtdışındaki direkt yabancı yatırım stoğunda sayılabilir!

Azerbaycan 2012'de 931,900 bbl/gün ham petrol üretimi ile dünya 24.dür. 2011'de 821,000 bbl/gün ham petrol ihracatı ile dünya 17.dür. 2013'de ispatlanmış 7 milyar bbl ham petrol rezervi ile dünya 20.dir. 2011'de 17.86 milyar cu m doğal gaz üretimi ile dünyada 34., 5.55 milyar cu m ihracatı ile dünyada 33.dür. 2011'de 250 milyon cu m doğal gaz ithalatı ile dünya 70.dir. 2013'de sıvılaştırılmış olarak 89 km, gaz için 3,890 km ve petrol için 2,446 km boru hattı vardır. 90 tane tankerinden 47'i petrol tankeridir.

Petrol ve doğal gaz zengini sayılabilecek Azerbaycan FIFA dünya sıralamasında 115.dür.

Azerbaycan; ülkedeki ve Hazar Denizi'ndeki özellikle ham petrolden olan kirliliği (CIA, 2014) unutturmak için spora reklam vermiş olabilir. GSYİH'dan eğitim payı %2.4 ile dünyada 158.dir. A.Madrid forması reklamına harcanan para eğitime mi aktarılsaydı? GSYİH'in %5.2'ni askeri harcamalara ayırma oranı ile dünyada 5.dir. A.Madrid forma reklamı da askeri harcamalarının zimmi bir türevi sayılabilirse Ermenistan'a karşı kamuoyu üstünlüğü için yapılmış sayılabilir!

Azerbaycan ile ilgili diğer bilgiler(CIA, 2014):Ülke ulusal sembolü "ateş alevi"dir. Ülkede rüşvet yaygındır ve hükümet 2009'da başkanlık süresi limitini referandumla kaldırdığından beri otoriterlikle suçlanmaktadır. Yoksulluk oranı azalsa ve petrol ve gaz üretimi sayesinde altyapı yatırımları son yıllarda oldukça artsa da reformlar özellikle eğitim ve sağlık sektöründeki çoğu hükümet dairelerindeki zayıflıklara yönelmemiştir. OSCE gözlemcileri 9 Ekim 2013'teki İlham Aliyev'in %84.5 oy ile yeniden başkan seçildiği seçimi uluslararası standartlara uygun bulmamışlardır. Bakü, Hazar Denizi vs. ciddi hava, toprak ve su kirliliğinden dünyanın ekolojik olarak en harap yeridir. Toprak kirliliği petrol sızıntısı ana nedendir. Petrolün olumsuz dışsallığı!

Azerbaycan'ın yüksek ekonomik büyümesi geniş ve büyüyen petrol ve gaz ihracatına bağlı olsa da inşaat, bankacılık ve gayrimenkul gibi bazı ihracat dışı sektörlerde çift haneli büyümüştür. Bakü-Tiflis-Ceyhan, Bakü-Novorossiysk ve Bakü-Supsa petrol boru hattından petrol ihracatları ana ekonomik etkendir. Gaz üretimini artıracak çabalar sürmektedir. Azerbaycan ile Avrupa arasındaki Güney Gaz Koridoru'nun tamamlanması gaz ihracatlarında gelen diğer küçük gelir kaynağı olsa da asıl olan jeopolitik önemdir. Pazar temelli ekonomik reformları oluşturmada sınırlı gelişme sağlamıştır. Yaygın kamu ve özel sektör yolsuzlukları ve yapısal ekonomik eksiklikler özellikle enerji dışı sektörlerde uzun dönemli büyümeyi aksatmaktadır. Enerji dışı yabancı yatırımlarını hızlandırma ihtiyacı (A.Madrid reklamı bunu tetiklemek için belki de) ve Ermenistan ile Dağlık Karabağ sorunu vs. engellerde ekonomik gelişmese engeldir. Türkiye ve diğer Avrupa ülkeleri ile ticaret arttıkça Rusya ve eski Rus Cumhuriyetleri ile ticaretin önemi azaltmaktadır. Uzun vade planları dünya petrol fiyatlarına, büyüyen gaz üretimi için ihracat rotaları için pazarlık kabiliyetine ve enerji zenginliğini büyümeyi tutundurma kabiliyetine aktarmasına (A.Madrid formasındaki reklam bunun cabası olmalı!) ve ekonominin enerji dışı sektörlerinde iş imkanlarını canlandırabilmesine bağlıdır.

Uluslararası sorunları; Azerbaycan etrafındaki Ermeni askeri varlığı bölge kırılganlığı için ana konudur. Türkmenistan ile Hazar Denizi ortasındaki çekişmeli petrol alanları ve deniz dibini bölme konusundaki ikili görüşmeler devam etmektedir.

A. Madrid'in ülkesi, parlamentolu demokrasi ile yönetilen ***İspanya*** Krallığı'nın (CIA, 2014); Ulusal sembolü "Herkül'ün Sütunu"dur. Doğal kaynakları arasında petrol yoktur (Ancak CIA'ın aşağıdaki bilgilerine göre vardır!). 2013'de satın alma gücü paritesine göre kişi başı milli gelir $30,100 ile dünya 47.sidir. 2013'de GSYİH'in %93.7 oranında kamu borcu ile dünya 17.dir. 15-24 yaşındakilerde işsizlik oranı olan %53.2 ile dünya 5.dir. Bu gelişme doyduğu için artık çalışana ihtiyaç yok anlamında mı? Ayrıca 2013'de işsizlik oranı %26.3 ile dünya 175.dir. 2009'de hizmet sektörünün iş gücündeki %71.7'lik payının içinde futbol hizmeti de olmalı.

2013'de $458 milyar ihracatı ile dünya 13.dür. İhraç ürünleri arasındaki diğer tüketim mallarına A.Madrid forma reklamı da girer kanımca.İhracat partnerleri arasında Azerbaycan yoktur! Ancak bu reklam 2013 sonrası verilmiştir. 2013'de ithalatı ise $431 milyar ile dünya 14.dür. İthalat ürünlerinde yakıt vardır ama ithalat partnerleri arasında da Azerbaycan yoktur. Ülke içi direkt yabancı yatırım stoğu 2013'de $779.5 milyarla dünya 10.dur. Bu meblağ içinde Azerbaycan'ın A.Madrid reklamı sayılabilir mi? İspanya'nın 2013'de yurtdışındaki direkt yabancı yatırım stoğu ise $714.4 milyar ile dünya 12.dir. 2012'de ham petrol üretiminde 29,290 bbl/gün ile dünya 68.dir. 2010'de sıfır petrol ihracatı ile dünya 184.dür. 2010'de 1.061 milyon bbl/gün petrol ithalatı ile dünya 11.dir. Azerbaycan ile futbol ürünü-petrol offset anlaşması veya barter yapıyor olabilir.2013'de ispatlanmış ham petrol rezervi 150 milyon bbl ile dünya 65.dir. 2010'de rafine petrol ürünleri üretimi 1.189 milyar bbl/gün ile dünya 18.ü, bu ürünlerin 249,500 bbl/gün ihracı ile dünya 25.dür.

Türkiye'nin en büyük sanayi kuruluşu TÜPRAŞ'ın Nisan 2015'de tamamladığı $2.7 milyar ile Türkiye'nin en büyük sanayi yatırımı olan fuel dönüşüm tesisini 17 Aralık 2009'da İspanyol UTE TR RUP-Treunidas RUP konsorsiyumu ile yapım anlaşmasıyla başlatmıştı (TÜPRAŞ, 2015). Rafine petrol ürünleri ithalatında 566,200 bbl/gün ile dünya 12.dür. 2012'de doğal gaz üretimi 61 milyon cu m ile dünya 85, doğal gaz ihracatında 36. iken doğal gaz ithalatında 36.75 cu m ile dünya 16.dır. Cari çevre sorunları arasında ham lağım suyu ve açık denizdeki petrol ve gaz üretiminde sızıntılar Akdeniz'i kirletmesi de vardır.

İşte ham petrol üretiminde dünya 68., doğal gaz üretiminde dünya 85.i olan İspanya FIFA Mart 2014 sıralamasına göre dünya 1.dir. Ters korelasyon!

İspanya ile ilgili diğer bilgiler (CIA, 2014);Hükümet cari olarak, 2008 ortasında başlayan ciddi ekonomik durgunluğu tersine çevirecek tedbirler üzerinde yoğunlaşmıştır. Büyük bütçe açığını azaltmak için ve yabancı yatırımcıların şüphelerini gidermek için alınan sert önlemler Avrupa'daki en yüksek işsizlik oranlarından birine neden olmuştur. Kanımca, Azerbaycan, A. Madrid'e verdiği forma reklamı ile yabancı yatırımcı statüsündedir.

İspanya, global finansal kriz sonrası uzun durgunluk yaşadı.Ancak hemen toparlanan ihracat, iç harcamaların düşmesini dengeleyerek 1986'dan beri ilk kez 2013'de cari dış fazla vermesine yardım etti.İşsizlik oranı 2007'deki %8'ten 2013'deki %26'a yükselerek vergi gelirleri düşerken artan sosyal ödemeler kamu maliyesini zorlamıştır. Bütçe açığı 2009'da GSYİH'ın %11.4'iyle zirve yaptı. Kamu borcu da 2010'daki GSYİH'in %60.1'den 2013'deki % 93.4'e yükseldi. Yükselen işçi verimliliği (futbol başarısı ve Messi ve Ronaldo örneği gibi mi?), ılımlı işçi maliyetleri, ve düşük enflasyon yabancı yatırımcıların ekonomiye ilgisini arttırdı ve hükümet borçlanma maliyetlerini azalttı. Azerbaycan'dan gelen reklam parası ve İspanya'da futboldaki harcanan fahiş meblağlarda yabancı yatırımcıyı (yabancı futbolcu transferi ithalat olsa da kaliteli futbolcunun gelmesi) cezbetmeye örnek olabilir.

Ve Kerkük, Musul, İran, Azerbaycan gibi yanıbaşında petrol fışkırırken neden yeterince petrolü olmadığı tartışılan ***Türkiye*** (CIA, 2014);Petrol zengini olmasa da Boğazlar'daki petrol gemilerinin artan trafiğinden denize petrol akıntısı çevre sorundur. Kaçak akaryakıtta ayrı bir sorundur. Azerbaycan ile 17 km, Ermenistan ile 268 km. sınırı vardır. 2013'de satın alma gücüne göre kişi başı milli gelir $15,300 ile dünya 90.dır.Petrol endüstrisi vardır. 2013'de bütçe geliri $190.4 milyar, harcamaları $ 207.9 milyardır. İthalat ürünlerinde en çok yeri yakıt tutar. İthalat partnerlerinde Rusya % 11.3 ile 1. iken Azerbaycan yoktur. 2012'de 56,650 bbl/gün ham petrol üretimi ile dünya 59.dur. 2010'da sıfır ham petrol ihracatı ile dünya 193.dür. 2010'da 338,900 bbl/gün petrol ithalatı ile dünya 25.dir. 2012'de 632 milyon cu m doğal gaz üretimi ile dünya 69.dur. Aynı yıl 600 milyon cu m doğal gaz ihracatı ile dünya 45.dir. Doğal gaz ithalatında ise 45.92 milyar cu m ile dünya 11.dir. 2013'de 12,603 km gaz, 3,038 km petrol boru hattı vardır. 2012'de GSYİH'ın %2.31'ı oranı ile askeri harcamalarda dünya 35.dir.

Türkiye ham petrol üretiminde dünya 59.'u, doğal gaz üretiminde 69.dur. FIFA 2015 Futbol Milli Takımlar Dünya sıralamasındaki yeri ise 52.dir. Yani Türkiye bu yaklaşık sıralama yerleriyle petrol/gaz üretimi miktarı ile futbol başarısı arasındaki ters korelasyona istisnadır.

1974 Kıbrıs Barış Harekatında Libya'nın Türk tank, uçak ve gemilerine petrol verdiği rivayet edilir. .Futbol ve enerji ile igili yavru vatan KKTC'den spor-siyaset-ticaret üçgenine güncel radikal örnek olarak Kıbrıs adası civarı denizde petrol arama gerginliğini pingpong diplomasisi gibi detente edecek KKTC Futbol Federasyonunun G.Kıbrıs Futbol Federasyonu ile birleşme kararı vardır.

Türkiye için diğer bilgiler (CIA, 2014); Mayıs 2006'ta petrol akmaya başlayan Bakü-Tiflis-Ceyhan boru hattı Hazar Deniz'inden günlük 1 milyon fıçıya kadar petrol taşıyan önemli bir yatırımdır. Birkaç tane gaz boru hattı projesi de Orta Asya gazının Türkiye üzerinden Avrupa'ya taşınmasına yardım edecektir. Bu da uzun vadede Türkiye'nin enerji ihtiyacının %97'i kadar ithal petrol ve gaz ihtiyacını karşılayacaktır.

Türkiye'nin uluslararası sorunları; 2009'da İsviçreli arabuculular Türkiye ve Ermenistan arasında diplomatik ilişki için bir antlaşma düzenlediler ama her iki ülke de antlaşmayı onaylamadı ve uzlaşma çabalarını tökezledi.

Görüleceği üzere ülke milli takımlarının futbol başarısı ile petrol üretimi arasında ters korelasyon vardır. İspanya az petrolü varken futbolda çok başarılı, S. Arabistan, Katar ve Azerbaycan vs. ise çok petrolü varken futbolda az başarılıdır.Bu durumda petrol zengini ama futbol başarısızı ülkeler bu açığı spora dahası futbola olan reklam, sponsorluk ile kapatmaya çalışır gözükmektedir. Nitekim Azerbaycan A.Madrid'e forma reklamı vermiş, Katar 2022 FIFA Dünya Futbol Kupası ev sahibi olmuştur.

1. FUTBOL FANATİZMİ, SPOR-SİYASET-TİCARET ÜÇGENİ

İnsanların futbol sadakatları, takım bağımlılıkları için esneklik neredeyse sıfırdır. Yani insanların çoğu işini, eşini, şehrini, okulunu, evini, arabasını vs. değiştirir ama takımını ölse değiştirmez."Sana canım feda", "seni sevmeyen ölsün", "pazara kadar değil mezara kadar" vs. sloganlar. İnsanların takımlarından bıkmaması akılcı mı? Çünkü insan yenilgileri, başarısızlıkları veya işinden alıkoyacak, aşırı harcamalar nedeniyle mutsuzluk yaratacak bir takıma neden bağımlı kalır ki? vs. retorik sorular! İnsan, kendini mutsuz eden takımı bırakıp kendisini daha mutlu edecek bir takımı tutmaz ki? Bu paradoks, mutsuzluk ısrarı psikolojide "akıldışı tutku" alanında çözülmeyi beklemektedir.

Ülkeler, markalar kendilerine sadakat için kıskançlıkla gıpta ettikleri, takım sadakatindeki sarsılmaz sürdürülebilirliği bir benchmark olarak alabilirler .Ülkeler, markalar bu sadakati (nedendir bilinmez Türk milli takımına az, kulüp takımlarına aşırı yoğun sadakatin benzerini) aynen sağlayamalarsa da bu takım sadakatini ticari, pazarlama aracı olarak kullanarak hedef müşterilerine, vatandaşlarına ulaşmaya çalışmaktadırlar.

Takım sadakatini ticari olarak paraya havale, bir niş idi. Bugün ki şifreli TV yayın gelirlerinden, orijinal ve tescili forma satışlarından, reklamlardan vs. gelen astronomik gelirlere bakılınca bu niş yıllarca bomboştu. Statükonun "istemezük" düşüncesi asla anakronik değildir. Aslında şu anda özellikle futbolda pek çok niş keşifini bekliyor olmalı!

Futbol-Enerji şirketleri İlişkisi: Bazı büyük enerji aktörleri futbolla gayet ilgilidirler. Rus Gazprom şirketi UEFA Şampiyonlar Ligi Organizasyonu, Alman FC Schalke 04 ve Rus Zenit St. Petersburg futbol takımı olmak üzere aynı anda 3 ayrı futbol resmi sponsorudur. Ancak Nisan 2015'de basına yansıyan haberlere göre Gazprom, AB'in gazının %25' inin tedarikçidir ama aynı AB ile de davalıktır da.

Rus-İngiliz çifte vatandaşı petrol oligarkı Roman Abramoviç İngiliz futbol takımı Chelsea'nin sahibidir. Manchester City futbol takımının sahibi de petrol yatırımlarıda olan Birleşik Arap Emirlikleri'nden Sheikh Mansour bin Zayed bin Sultan Al Nahyan'dır.

Türkiye'de de enerji şirketlerinin futbol takımlarını sponsorluğu yeni de değildir. Çukurova Elektrik (ÇEAŞ) Adanaspor A.Ş.'e sahipti. O zamanlar ÇEAŞ'ın sahibi Uzan Grubu İstanbulspor A.Ş'e de sahipti. Türkiye'nin en çok vergi veren ili Kocaeli'nin şu an eski şaşalı günlerini arayan Kocaelispor'unun bir zamanlar formasında aynı ilde Genel Merkezi olan TÜPRAŞ'ın reklamı vardı..Spora sponsorluk sosyal sorumluluk mu tartışılır ama TÜPRAŞ'ın “meslek lisesi, memleket meselesi” uygulaması dolaysız sosyal sorumluluk projesidir. TÜPRAŞ, keza, 2008'de Kurtuluş Savaşı anısına Polatlı'da 32 m. yüksekliği ile Türkiye'nin en büyük anıtı “Kartaltepe Mehmetçik Anıt”ını yaptırmıştır. TÜPRAŞ'ın 2014'deki reklam filminin sloganı ise “Lüksümüz Yok” idi.

"Spora siyaset karışmamalı" ise ütopyadır. FB stadında rakip GS'lı bir siyasi parti liderine atıfla “sandıkta görüşürüz” pankartı asılmıştı. İşte futbol oldukça siyasi, hiçte laik değildir. Müslümanlık açısından belki laiktir .Yani kutsal, dini Kurban ve Ramazan Bayramları zamanında, oruç zamanı vs. Türkiye ligleri devam eder. Ancak yabancı oyuncular oynadığı için Türkiye ligi dahil genelde tüm Avrupa'da ligler Noel'de tatile girer.

Atatürk ve İnönü adlı stadyumlar vardır. FB stadına adını veren Şükrü Saraçoğlu 1934-1950'de FB Başkanlığı yanında aynı anda Başbakan idi. FB Saraçoğlu stadının güneyindeki cadde adı "Recep Peker" de eski başbakan olduğu gibi BJK başkanıydı. Siyasi parti liderlerinin ziyaret ettikleri illerin takım kaşkollarını takması spor-siyaset birlikteliğidir.

Azerbaycan Hazar Denizi'nin en batısındaki Petrol çıkardığı Demir Ada'sında çalışanlar için halı saha vardır. 1960'larda ABD'in Küba'da Rus askerleri var iddiasını Küba kabul etmez. Ancak uydu görüntülerinde futbol değil beyzbolsever Küba sınırları içinde askeri bölgelerde futbol sahası olması Rusların varlığının kanıtı kabul edilmiştir.

Atatürk'ün Söylev'ine göre Büyük Zafer (30 Ağustos 1922 Başkomutanlık Meydan Savaşı) öncesi askeri planlar, hazırlıklar Batı Cephesi Karargahı Akşehir'deki bir futbol maçı ile kamufle edilmiştir. Yani Kurtuluş Savaşı başarısında futbolunda yeri vardır. “Büyük Zafer, siyasal devrim, Lozan Barışı- Saldırıya Hazırlık Emri:..27 Temmuz 1922'de yeniden Akşehir'e dönen Atatürk, aynı gece, Fevzi Paşa ve İsmet Paşa ile, saldırı planını inceledi. Plan gereğince, 15 Ağustos'a kadar bütün hazırlıkların tamamlanması kararlaştırıldı. 28 Temmuz 1922 Cuma öğleden sonra, ordu birlikleri arasındaki bir futbol maçı nedeniyle, ordu komutanlarıyla bazı kolordu komutanları Akşehir'e çağrıldılar. Atatürk, o gece, komutanlarla yapılacak saldırı konusunda konuştu...” (Atatürk, 1981: 218)

Azerbaycan'a petrol ve doğal gaz zengini olmasından olmalı "Ateş Ülkesi" denir. Azerbaycan'ın A.Madrid'e forma reklamı verme nedeni Ermenistan'a karşı propaganda üstünlüğüyse spora siyaset karışmıştır. Belkide reklamın kötüsü olmaz diye verilmiştir bu reklam.Eğer enerji piyasası tam rekabet özellikleri taşıyorsa (ki bunun tespiti başka çalışmaların konusudur) ekonomi teorisine göre reklama gerek yoktur. “..iktisat teorisinin tam rekabet kavramı terimin günlük dildeki yorumuna hiç uymaz. Günlük dilde tam rekabet, genellikle, birbirleri ile, piyasa payı için, kıyasıya boğuşan firmaların durumunu akla getirir. Reklâmı akla getirir. Oysa iktisat teorisinin tam rekabetinde firmalar arasında boğuşma yoktur, reklama yer yoktur, ihtiyaç yoktur.” (Türkay,1989:154).

İşte tam rekabet teorisinde yok ama pratiğinde reklam vardır .Örneğin bir zamanlar ABD'nin halka açık 7. şirketi olan ama 2000'lerde batan enerji şirketi Enron'da reklamı kullanmıştır. “Yatık E”- (Enron) Şirket merkezi dışına yerleştirilen ünlü Enron logosu (McLean ve Elkind, 2005:288-289) kanımca reklamın bir parçasıdır.

A.Madrid resmi internet sitesinde Azerbaycan promosyonu için 1dk’lık videonun başlığı "Hayran Olunası Azerbaycan"dır (A.Madrid, 2014):"Azerbaycan'ı keşif ettiğinizde fazlasını bulacaksınız, yeni turist ve iş destinasyonları sizi beklemektedir. Atletico'nun resmi sponsoru olarak "Azerbaycan-Ateş Ülkesi" sponsorluktan fazladır. Azerbaycan-A. Madrid ilişkisi, farklı yapılardaki eylemlerle önemli amaçları sağlamak için olağanüstü bir araçtır."

A.Madrid resmi internet sitesinde "Azerbaycan: Atletico'nun Resmi Sponsoru" ve "Sponsorluktan daha fazlası ile" şu bilgiler vardır (A.Madrid, 2014):

"A.Madrid ve Azerbaycan, lüks ile geleneği birleştiren ve stratejik iş merkezi Azerbaycan'ın dünyaki promosyon stratejisi için beraber çalışır. A.Madrid'te dünyadaki farklı pazarlarda markasını sunmak, kulübe yeni büyüme fırsatları ve iş alanı yakalamak, uluslararası pozisyonunu pekiştirmek için stratejik bir uluslararası genişleme planı için çalışır.

Bir spor kurumu olarak futbolun sosyal önemi ile uluslararası çapta medya gücüne inanıyoruz. Futbolun bu değeri kültürleri bir araya getirmede, insanların ve şehirlerin birbirleri ile bağlantısını güçlendirme de stratejik bir araçtır.

Spor; global iletişim, mesajların transferi, eylemler ve global iş stratejileri projesi için mükemmel bir platformdur. Bu çerçevede A.Madrid, Azerbaycan'ın imajının promosyonu ve bu ülkenin faydası için kaynaklarını tüm dünyaya ilan için başlattığı özel bir proje ile Atletico oyuncuları formalarında "Ateş Ülkesi-Azerbaycan" logosu giydiler.

Futbol takımlarının ana tanıtım elementi olan formalarının pazardaki global etkisinin olağanüstü büyüklüğüne yaklaşacak çok az araç veya yöntem vardır. Minnettar olunan bu sponsorluk ile Azerbaycan ismi A.Madrid vasıtasıyla tüm dünyaya ulaşacaktır.

Azerbaycan ekonomisi en hızlı büyüyen ülkelerden biri olarak önemli ekonomik potansiyele sahiptir. Örneğin ülke coğrafyasının 2/3'ün (tümü 86.600 km²) zengin petrol ve doğal gazla kaplı olması ülkede enerji sektörünün büyüklüğünü gösterir. Önemli uluslararası yol güzergahlarının kavşaklarında bulunması da stratejik lokasyonunu gösterir. Ama Azerbaycan asıl, turizm destinasyonu olmak için yatırımlarla gelişmek ve büyümek yanında bilim ve teknoloji de modernleşme ve inovasyon ile ekonomisinin gelişmesine yardım etmek istemektedir.

Azerbaycan ve A.Madrid arasındaki bağlantı, forma sponsorluğu ile doğan geleneksel ticari sponsorluktan çok daha fazlasıdır. Çünkü bu bağ; farklı yapılar, sporlar, ticaret, iletişim, pazarlama ve şirket sosyal sorumluluğu vasıtasıyla tüm partilerin önemli amaçlar elde etmesi için muazzam değerde bir araçtır. Bunun gerçekleşmesiyle iki tarafta, imajları markanın ana destekleyicisi olan teknik direktör ve Atletico'lu futbolcuların işbirliğine sahip olacak ve böylece genişleme ve kalkınmaya yardım için projeler doğacaktır.

Bu faaliyetlerin vurguladığı üzere kulüp, spor tutkusunu gösteren Azerbaycan'ın futbol seviyesini geliştirme de görev almak ister. Örneğin A.Madrid, Bakü ve Madrid'te genç oyuncular için eğitim programları planlamıştır.

Her iki tarafın girişimci vizyonlarına minnettarlıkla A. Madrid ve Azerbaycan arasında oluşturulan bu bağlantı ile doğan ümit, gelecekte İspanya ve Azerbaycan arasında tüm alan ve sektörlerin ilgisini içine alacak şekilde ikili ilişkiler doğurabilecektir.".

Nitekim Arda bazı futbolcular Azerbaycan'ı ziyaret etmiştir. Bu sponsorluk için Azerbaycan'ın A. Madrid'e ne kadar ödeme yaptığı bilgisi yoktur. 2013'de cari dış fazlası olsa da düşen petrol fiyatlarından azalan ihracat gelirini artırmak için olmalı 21.02.1015'de Manat'ın % 33 devalüasyonun Azerbaycan petrol ihracatına olumlu katkısı beklenirse de bu A. Madrid forma hizmet ithalatı gideri göreceli yüksebilecektir ve dolayısıyla Azerbaycan bu forma reklamı hizmet ithalatında vazgeçebilecektir. Neden mi? Teorik bilgiler öyle dediği için; “Devalüasyon, sabit kur sistemi uygulayan ülkelerde zaman zaman ödemeler dengesinde meydana gelen aleyhteki açıkları kapatmak için başvurulan bir enstrümandır. Devalüasyonun ihracatı artırıcı ve ithalatı azaltıcı bir etkisi vardır..Böylece, ödemeler dengesinde meydana gelen açık küçülür veya denge sağlanır. Bu ise Kambiyo Denetleme Sistemi sayılabilir.” (Cantekin, 2013:33-34 ve 42).

OPEC'in petrol arzını azaltarak tetiklediği 1973-74 Dünya Petrol Krizi'nin hemen öncesi ABD'de enflasyon yükseldiği halde piyasa canlanacağı yerde enflasyon-durgunluk/hatta gerileme ve yüksek işsizlik aynı anda olmuştur (Gordon,1993:G8). Bu, klasik ekonomistlerin çoğu varsayımlarını ihlalle, stagflasyon adlı terimi literatüre kazandırmıştır. Zaten çoğu kez söylemek, yapmaktan kolaydır ki! Başkan Carter yönetiminde faiz fırladı, fiyatlar oldukça yükseldi, derin durgunluk oldu .Durgunluk içinde enflasyon demek olan stagflasyonun ana nedeni petrol dahası OPEC'in 1973'te petrol arzını kısmak suretiyle petrol fiyatlarının aşırı yükselmesiydi (Webster’s, 1992: 1049).

Teoride Manat'ın devalüasyonu Azerbaycan petrol ihracını artırıp, bu reklam dahil hizmet ithalatını azaltması gerekirken, forma reklamı ithalatı harcamalarının bir finansal kaldıraç gibi petrol ihracını artırmasının beklendiği görülür. Bu paradoks teoriye istisnadır.

Kısaca; A.Madrid formasında ki "Azerbaycan-Ateş Ülkesi" logosu Azerbaycan'ın ve enerjisinin küresel pazarlama ve stratejisine girer. Bu forma reklamı Azerbaycan'ın ülke propagandası için nesil mentalitesi değişimidir de.Zira, cari Azerbaycan Cumhurbaşkanı İlham Alivey babası ve selefi Cumhurbaşkanı merhum Haydar Aliyev'in proganda aracı forma reklamı değil" Dünya Siyasetinde Azerbaycan Petrolü” (Aliyev, 1998) kitabı idi .

A.Madrid formasına reklam Azerbaycan için uluslararası bir ilişkidir .Uluslararası ilişkiler eğitimi alan ve Moskova'da akademisyenlikte yapan tarih doktoru Cumhurbaşkanı İlham Aliyev'in (Wikipedia, 2015) CV' deki petrol (Azerbaycan Cumhuriyeti Devlet Petrol Şirketi SOCAR'daki) yöneticiliği ve spor, olimpiyat geçmişi uygulamalarındaki 3F izinin kökeni olabilir. Zaten Fado versiyonu olarak Bakü 2012'te Eurovision'a ev sahipliği yapmıştı.

Azerbaycan 12-28 Haziran 2015'deki “Bakü 2015, 1.Avrupa (Olimpiyat) Oyunları”nın evsahibidir (Yeni Şafak, 2014). Azerbaycan'ın A. Madrid forma reklam harcamasından somut ne kadar ne kadar fayda sağladığı tam belli değilse de Azerbaycan Gençlik ve Spor Bakanı Azad Rehimov, 2015 Avrupa Olimpiyat Oyunları'ndan 120 milyon Euro gelir elde edeceklerini söylemiştir. (haber7, 2012). Spor sadece spor değildir! Azerbaycan 23 Haziran -2 Temmuz 2017'de de İslam Dayanışma Oyunlarının 4.sünün de ev sahibidir (Bugün, 2015). Bu iki oyunlarda Bakü'ye promosyon, propaganda katkısı yanında pek çok tesiste kazandıracaktır. Azerbaycan halkının bu harcamalardan memmuniyeti ayrı bir araştırmadır.

17.03.2015'de Şampiyonlar Ligi 2. tur maçında A. Madrid- Bayern Leverkusen maçında A. Madrid'in forma reklamı bu sefer "Baku 2015 European Games" Spor oyunları idi. Digitürk 89 nolu kanal NTVspor veya TRTspor benzeri "İdman Azerbaycan" spor kanalıdır.

2. FUTBOLUN TİCARİLEŞMESİ

İngilizce'de "commercial" hem reklam anlamındadır hemde ticari. Öyleyse her reklam bir ticarettir. Futbol ise son yıllarda her iki açıdan had safhada ticaridir. Binlerce kişi spor turizmi kapsamındadır. Çocukların "ya topçu ya popçu" olmasını istenir.

Futbol artık dernek statüsünde yönetilmiyor, amatör değil profesyoneldir. Oligopol sayılabilecek dört büyükler FB, GS, BJK ve TS şirkettir ve de 10 yıldır BİST'de işlem görmektedirler. Aslında FB, GS, BJK, TS artık sadece spor kulübü değil pek çok şirketleri ile, CEO'larıyla "holding" adı da sayılabilir. Yani bu kulüpler artık vergi istisna/ muafiyetine tabii dernek statüsünde sadece teberrulu biletlere bağımlı olmayıp vergi mükellefidir.

Futbolcu transferi, şifreli TV yayın, stad maç ve forma gelirlerinde vs.deki parasal rakamlar fahiştir. Uğruna ölünen forma renkleri artık Fenerium, GS Store, Kartal Yuvası'da daha çok forma satmak için renkten renge girmektedir.Arda'nın eski takımı GS'ın farklı forma renk ve dizayn lansmanı öncesi mor renkli GS forması için "b... gibi" ifadesi vardır. Paradoks vardır. Aslında bir ülkenin milli bayrağı kolay kolay değişmiyorsa da, takımın forma rengi de değişmemelidir. Görünen o, "Futbolda ticaret icat oldu, forma rengi kutsallığı bozuldu!"

Para başarı, saadet getirir mi yoksa esas olan amatör ruh, gönüllük mü? Derwall para-futbol ilişkisi için pesimistiktir (Derwall,2004:165-6,201, 221);"…Helmut Schön kitabının sonuna doğru yazdıklarını hatırlamak çok hoşuma gider.Derwall'in yerimi dolduracağından eminim…En büyük üzüntüm, futbolun her geçen gün daha çok spor dışı eğilimlerin etkisinde kalmasıdır..Milli takımda nasibini alacak.Ticarileşme büyük boyutlara ulaştı. Sporla ilgisiz atraksiyonlar futbola daha çok karışıyor ve düşündürücü bir hal alıyor."..Schön bunları 1978'de yazdı.Etkisi hala (2002'de) süren sözler...Ama kim işinde her şeyi kendi seçer ve kararlaştırabilir ki!.Bugün bir oyuncunun yetenekten "üstün yeteneğe", oradan "futbol dahisi" düzeyine yükseltilmesini büyük futbol ülkelerinin ünlü kulüpleri ve teknik adamları değil, para belirliyor.Çok yazık!..Para her zaman en önemli rolü önlemez. En önemli şey kazanmak, puan cetvelinde üstte olmaktır.Amaca ulaşmak ve yılmadan görevini getirmektir."

3.TÜRKİYE'DE SPOR KULÜPLERİNİN FORMALARINA REKLAM ALMALARININ TARİHİ

"Formalar duvar değildir, reklam koymak yasaktır" BTGM

TRT3spor'daki nostaljik futbol maçlarında stadlarda saha kenarında ancak tek tük (bazıları kalmayan şirketlerin) reklam panosu görülür. Bugün ise her yer reklamdır.TRT3'deki bu görüntülerden bugüne nasıl gelindi? Türkiye'de ilk sponsorluk nasıl yapıldı?

"Fenerbahçe Cumhuriyeti" kitabında Türkiye'de futbol takımlarının formalarına reklam alma tarihçesi (Doğan, 1989:188-192); "..Yabancı takım formalarında firma reklamı Türk yöneticilerin gözüne takılıyordu. Firmalar için önemli reklam aracına dönüşmüştü futbol takımlarının formaları. Hem kulüpler gelir sağlıyor, firmadan formalarına yazdıracakları mal,ürün karşılığında para alıyorlar, firmalar da bir anda insanlara 90 dakika ulaşabiliyordu.

Beden Terbiyesi Genel Müdürlüğü (BTGM) Baş Hukuk Danışmanı Bülent Savcı'nın hazırladığı, Spor Bakanı Ünol Şakar'ın imzaladığı,...1977 Eylül, sonra 1980 Mart'taki yönetmeliğe göre, profesyonel futbol takımları maçlarda formalarının önüne 30 X 15 cm ölçülerinde ya da eşofman arkasına "diledikleri firmayla imzalayacakları anlaşmayla" reklam alabileceklerdi .Alkollü içki, sigara vb. ürün reklamları yapılamayacaktı.Reklam gelirinin %5'i kulüplerin bağlı bulundukları Bölge Müdürlüklerine yatırılacak, bölge amatör spor dallarının kalkınması amacıyla harcanacaktı. Ancak, bu amaç pek de kolay olmadı. Fikir babası FB yönetim kurulu üyesi Şenes Erzik'ti."Kulübün gelir açısından parlak olmadığı" tartışılırken, Erzik yurtdışı takımlardan örnek göstermişti. FB öneriyi yerinde görünce, BJK ve GS ile temasa geçildi .BTGM Yönetmeliğine göre, "forma üzerinde herhangi yazı yasaktı". Bu madde, bir başka yönetmelikle değişmeliydi. FB'liler AP-MSP-MHP koalisyonundaki FB'li İsmet Sezgin'i devreye soktu. Sezgin, Başbakan Demirel'i ikna için söz verdi. Ancak, BTGM; "Formalar duvar değil, reklam koymak yasaktır" diye karşı çıkıyordu. Başbakan nezninde işi yokuşa sürme baskısına rağmen yönetmelik değişti. Kulüpler önce bankalara gitti reklam için. Çünkü, şirketler başta bu işi pek sevmedi.Nedeni de, zaten bazılarının kendi basketbol ve voleybol takımları vardı.Firmalar bu takımlara kendi isimlerini vermiş, takımlar firma ismiyle kapalı salonlara çıkmış, bol reklam olanağı sağlamıştı. Bir de futbol takımlarına reklam vermek, ek bir harcama anlamına geleceğinden buna gerek duymamışlardı.

FB formasına ilk yazılan reklam Şekerbank oldu. Çeşitli firma ve bankalarla görüşmeler sonucunda, bir yıllık ve 180 milyon TL karşılığında, bir sezon FB formasının önünde, eşofmanlarının arkasında "Şekerbank" yazıldı. Şekerbank, FB'e verdiği 180 milyon liralık reklam giderini, kendi vergisinden düştü. Şekerbank reklamının etkisi görülünce, diğer bankalar, sonra firmalar özellikle büyük kulüplerin ağzını aramaya başladı. Çünkü, maç TV'den naklen verilirken, görüntüler yayınlanırken, formalardaki reklamın değeri anlaşıldı. Kulüpler reklam gelirlerini arttırmak için genellikle bir yıllık anlaşma imzalamak isterken, firmalar işi baştan sıkı tutmak ve üçer dörder yıllık anlaşmalardan yana eğilim gösterdiler.

Kendi voleybol ve basketbol takımları olanlar ise, başta futbol takımlarının reklam almasına dönük yönetmelik değişikliğini köstekledi. TOFAŞ SAS, Boronkay, Eczacıbaşı, Vinylex.. Basket ve voleybol takımlarına doğrudan kendi isimlerini vermişlerdi. Amaç belliydi. 1977'de Ankara'da "Özel Sektörün Spora Katkısı", seminerinde Şakir Eczacıbaşı: "Spor kulübü kurmanın, spor faaliyetinin amacı tanıtım ya da halkla ilişkiler dediğimiz faaliyettir. Bir şirket bir sporda başarılı olduğunda, ürününü daha fazla satamaz

.Ancak, o şirkete toplumda olumlu duygular duyulur. Yani, spor yoluyla halkla yakınlaşır, organizasyonlarda başarılı olduğu zaman, başarısı konusunda iyi fikirler verir ve adının daha geniş tanınmasını sağlar. Dolayısıyla spor, bir müessenin tanıtılmasında başarılı olabilecek bir faaliyettir. Halkla ilişkilerde uzun dönemli bir yatırımdır."

..Aynı mantıkla sonra Türkiye'nin değişik illerinde güreş, el topu, eskrim, kürek, halter vs. farklı spor dallarında özel firmalar isimlerini duyurmakta gecikmeyecekti.Özellikle salon karşılaşmalarını içeren spor dalları özel firmalarca desteklenerek, çoğu firma salon sporunda, kendi isimleriyle anılan takımları sahalara sürecekti.

..firmalar neden futbol takımı kurmuyor da diğer spor dallarına el atıyordu?.Basit. Sadece ekonomik nedenden..Basketbol takımı birkaç yüz milyon lirayla, voleybol takımı onun yarısına kurulabiliyor. Bir futbol takımı kurmak, milyarlarla ifade ediliyor. Bir kaç yüz milyon lirayla kurulan bir özel firmanın, diyelim ki basketbol takımına, o firma reklam veriyor. Yani, kendi adının dışında, bir de kendi kurduğu takıma reklam vermek hakkından yararlanıyor. Bu reklam gideri, firmanın genel giderlerine yazılıyor ve ödeyeceği vergiden düşülüyor. Yani, firma hem takım kurup adını hergün gazete ve TV'lerde duyuruyor, hem de kendi takımına verdiği reklam giderini düşerek verdiği reklamın yarısını devlete ödetmiş oluyor.Örneğin, son bir yıl içinde basketbol sahalarına çıkan Gaziantep'in Beslenspor Okan Holding'in bir takımı.Beslenspor formasında Okan Holding reklamını yazdırıyor ve bu reklam giderini vergiden düşüyor. Firma yolsuzluk yapmıyor .Sadece yasalardan yararlanarak, bir yandan kendine sempati topluyor, bir yandan "ticaret" yapmış sayılıyor. Futbol takımı kurmak ise, çok pahalı olduğu için, firmalar bu işi ya Anadolu kentlerine ya da kurulmuş büyük kulüplere bırakıyor."

Merhum (Fişek, 1980:272) "Spor Yönetimi" kitabında 1960'larda pek çok ilde mantar biter gibi futbol takımı kurulmasını irdeler; "..bir de bugün, 1967 sonrasında çıkan "kent kulüpçülüğü" var..." Diğer yandan ülkemizdeki mevcut lig maçlarının illerarası takımlarla değil de başka bir organizasyon yapısıyla nasıl olabileceği de düşünülebilir.

Türkiye'de futbol taraftarları arasında totem de yaygındır .Benzer bir totem forma reklamı içinde olmuştur. Bir zamanlar Süper Lig'de olan Sarıyer, Doğuş Holding'ten başta hiç para almadan kendileri formalarına "Doğuş" reklamını yazar ve ve bu reklamlı formalar ile GS'ı kupada 3-2, Ankaragücü'nü deplasmanda 3-4 ve sonrada lider BJK'ı 1-0 yenince "Doğuş" reklamlı formalar oyuncu ve taraftarlarca uğurlu kabul edilir ve bu uğrundan dolayı bu reklam formalarında bir süre ücretsiz taşınır (Betil, 2002:158-160).

Türkiye'de futbola ilgi had safhadır. Nitekim, vali otobiyografilerinde, nerede ise her valinin ilin futbol takımıyla anısı vardır. Maça gitmek valilerin görevleri arasında

4. SPORUN PROMOSYON ETKİSİNE ÖRNEK İÇİN TÜRKİYE'DE İLK SPONSORLUK VE GÜNCEL BAZI SPONSORLUKLAR

Sponsorluk iki tarafın ortaklığıdır (Sponsorluk, 2014).16.06.2004 tarih, 25494 sayılı RG'de GSGM Sponsorluk yönetmeliği vardır. IEG Sponsorship Report'a göre 2002'de dünyada $22 milyarlık sponsorluk harcaması yapılırken 2003'te $25 Milyar, 2004'te $28 milyardır. Bu sitede sponsorluk istatistikleri de bulunmaktadır (Sponsorluk, 2014a).

Türkiye'de sponsorluk başlangıcı Atatürk zamanına gider (GSGM,2014);"Spor yönetiminin istek ve beklentileri, sponsor firmalarca uygulamaya geçiriliyor. ABD 1994 Dünya Kupası' nın birçok maçının, naklen yayınlayan TV şirketi isteğiyle öğle saatlerine alınması vs. Bunun nedeni ise, naklen yayın ya da sponsor firmaların mali gücünün yüksek olmasıdır.

Sponsorluk, sanılanın aksine, Türkiye'ye geç gelmedi.Ciddi ilk sponsorluk 1931'de uçma rekoruna destek amaçlıydı....1930'lar ABD'si.. J.Polanda ve R. Bortman, üstü açık spor bir pır pır uçakla okyanusu geçerken havada kalma, en uzun noktaya uçuş rekoru hedefliyorlar. Ancak çok pahalı projeyi finanse edecek sponsora ihtiyaçları var. Destek bulmakta zorlanan gençlerden Türkiye'nin haberi oluyor, Atatürk'e bildiriliyor. Savaş sonrası güçlüklerini yaşayan ve mali durumu parlak olmayan Türkiye'nin, dünyada tanınmaya ihtiyacı var... Atatürk olaya el atıyor. Finansman anlaşmaları yapılıyor..28 Temmuz 1931 Salı, gençler NY'dan hareket ediyorlar. Aralıksız 49 saat 5 dakika havada kalan Polanda ve Bortman, hedeflerine ulaşır. İstanbul semaları da bir dünya rekoruna evsahibidir. İstanbullular, dünya basınına Türkiye için çok olumlu demeçler veren Amerikalılar'ı bağrına basıyor...Atatürk, onları kabul ettiği Yalova'da kutluyor..İki serüvenci beklenilenin de üzerinde, dünya gündemine oturuyor, olay ve Türkiye günlerce dünya basınının konusu haline geliyor."

Spor kulüplerinin dahası futbol takımlarının, UEFA'nın internet sitelerine bakınca pek çok sponsor logoları, linkleri vardır. THY Avrupa'nın en önemli basketbol organizasyonlarına adı vererek sponsor olmuştur. "Turkish Airlines Euroleauge" vs. A.Madrid formasındaki "Azerbaycan-Ateş Ülkesi" reklamı Azerbaycan'a gelen turist sayısını artırıyor mu gibi, THY'ın bu sponsorluğunun yolcu sayısını artırıp artırmadığı incelemeye değerdir.

Takımların kutsal forma renklerinin artık renganerenk olması gibi GS, kurucusu adını alan Ali Sami Yen stadını bırakıp devletin yaptığı Türk Telekom (TT) Arena'ya geçmiştir. TT Arena yanında, Ali Sami Yen adı yeni statta ancak ikincil ve vurgusuz, "bazen" kullanılır. BJK'ın yeni stadı "BJK Vodafone Arena"dır. Türkiye'de statların mülkiyeti devletindir. Kayseri Kadir Has Stadı belediyenindir. Kulüpler "üst kullanım (intifa) hakkına" sahiptir.

Liglerin adı bile sponsorlarla anılmaktadır. Futbolda Spor Toto Süper Lig, PTT 1.Lig, Ziraat Türkiye Kupası, Beko Basketbol Ligi, Acıbadem Erkek/Bayan Voleybol Ligi vs. Basketbol da FB Ülker, BJK İntegral Forex, GS Liv Hospital, voleybolda FB Grundig vs. Beko Basketbol ligindeki takımların neredeyse tamamı firma isimleri içerir. Futbolda; Spor Toto Süper Lig'de, Akhisar Bld.Spor, KDÇ Karabükspor, MedicalPark Antalyaspor, Torku Konyaspor, Çaykur Rizespor, Vestel Manisaspor vs. sponsor isimli destekli takımlardır.

2001-2002 İsrail Dışişleri Bakanı, Başbakan Vekili-1994 Nobel barış ödüllü (Peres, 2005: 27); "Dünya çapında karar vermeye yetkili biri varsa o da ticarettir. Büyük sanayi birlikleri kararları ile dünyada olup bitenlerin çerçevesini belirler. BM bile yarışamaz" der. Nitekim 1998 Fransa Dünya Kupası öncesi sakat Brezilya'lı Ronaldo'nun şahsi sponsoru Nike verdiği paranın heba olmaması için Ronaldo'nun sakat olsa dahi iğneyle oynamasını sağlamıştır. Sponsorların, sporun amatör ruhunu öldürmesine acı bir örnek!

İngiltere Premier Ligi maçlarında stadlarda saha kenarı panolarda "visit Malaysia" vs ilan vardır. Nitekim futbola "cihan-ı şumul" ilgiden M.United vs. Çin vs. uzakdoğu pazarlarına hitap için "sarı ırk" futbolcular almakta, Uzak Doğu'ya hazırlık maçlarına gitmektedir.

"Ç" İngilizce'de olmadığı için Arçelik İngiltere'ye "BEKO" markası ile ihraç edilir. İngiltere'de beyaz eşya sektöründe %5 pazar payı olan BEKO'da İngiliz stadlarında saha kenarı panolarında reklam vermektedir .Belkide A.Madrid'in Azerbaycan forma reklamından esinlenerek 2015'den itibaren Barcelona'nın sol kol reklamı ile en önemli ana sponsorlarından biridir (Barcelona, 2015).BEKO, BJK futbol takımınında ana sponsorudur. Kanımca BEKO şirketi BEKO, BJK, Barcelona'nın her üçününde B ile başlamasından dolayı reklam sloganlarında B'yi kafiyeli bir şekilde vurgulamalıdır.

"Join Our Team BEKO& BARCELONA" (BEKO& BARCELONA Takımımıza Katıl") reklamında olduğu internet sitesinde BEKO neden Barcelona'ya sponsor ortağı olduğunu açıklar (BEKO, 2015):"BEKO VE FC BARCELONA ŞİMDİ TAKIM ARKADAŞI!"

FC Barcelona'nın ortağı olmaktan gururlu Beko; insanlardan esinlenmiştir. Bu esin global şirket olarak büyümüze, vizyonumuzu şekillendirmeyi, yolumuzu belirlemeyi ve amacıma ulaşmamıza yardım etmiştir. BEKO'nun spor için büyük aşkı sporun canlandırıcı güç olduğuna inancından gelir ve bu da yaşamı iyileştirecek, eğlence ve zevk artışı sağlayacaktır. Ya da sosyal spor programları toplumu şekillendirecek, inşa edecektir. Bu yüzden başta basketbol ve futbol olmak üzere farklı spor branşlarını aktif desteklemekteyiz.

Bu ruh, dünyanın en hızlı büyüyen global markalarından biri ile dünyanın en çok sevilen ve desteklenen futbol kulüplerinden birini biraraya getirdi. Bu durum ve alenilik, sporun gücününe inanarak fark yaratmak isteyen iki büyük marka Beko ve Barcelona'yı birleştirdi.

Daha iyisi için değişim; FC Barcelona ile ortaklık ile yeni logomuzu ilk kez açıklamaktan çok heyecanlıyız ve bu logonun gelecek sezon Barcelona'nın formasında (sol kolda) gözükmesi ayrıcalığını taşımaktayız.

Başarı hikayelerimiz nerede başlarsa başlasın herbirimiz daha iyisine doğru değişim için ilhamımız sürecektir. Bu da insanlar için daima en iyisini denemek için nedenimizdir.

İnsanların eylemleri, gayretleri, aslında ruhları bize bugün, dün ve 60 yıldan beri esin kaynağıdır. Beko bu ruhla "daha iyisi için değişim" yapmak için daima motive olmaktadır. Bu yeni logo, "daha iyisi için değişim" felsefemize dayanan yeni marka kampanyamızın başlangıcının işaretidir. Daha çok bu vizyon bizi, futbol içi ve dışı değerleri ve vizyonu bizimkinin aynası olan Barcelona ile biraraya getirdi.

Barcelona'nın sloganı "Bir Kulüpten Fazlası" taraftarlarına ve tüm topluma olan vaadini gösterir. Onlar gibi BEKO'da icatın daimi takipçisi ve daha çok araştırmak, yapmak ve başarmak ile insanların yaşamlarında fark yaratmak için uğraşını sürdürmektedir."

SONUÇ VE ÖNERİLER

Buradaki fikirler makro bazda Türkiye'nin tanıtımı için mikro bazda bu sempozyumun yapıldığı İzmir'de gerileyen futbol başarısı için esin sponsoru olabilir. Katar, Azerbaycan gibi petrol zenginlerinin milli takımlarının FIFA sıralaması çokta başarılı olmasa da bunu denge için futbola olan sponsor ilgilerini görünce bir spekülasyon; "İzmir'de futbola ilginin azalması dolayısıyla futbol kulüplerinin başarısızlığının ana nedeni Aliağa'da TÜPRAŞ rafinesi olsada petrol kaynaklarının olmamasıdır (veya tersi)". Demirel'in "petrol vaadı da biz mi içtik" sözü gibi İzmir'de petrol vardı da futbol takımlarına sponsor mu olunmadı? Yani İzmir'de petrol üretimi olsa futbol takımlarına olan sponsorlukta artabilirdi! Aslında İzmir'de futbola destek yokta değildir. Tarihi İzmir Altınordu kulübü temelinde Altınordu Futbol Yatırımları A.Ş'i ise 2012'de Özkan Demir Çelik Sanayi A.Ş kurdu. Ayrıca Göztepe A.Ş'i 2007'de TMSF'den 1,305 milyon TL'ye alan Altınbaş Holding, hisselerini Genel Energy'e devretti (Sabah, 2014).

Takımlarının futbolcu alma yöntemleri "Say Kanuna" uygundur, yani her futbolcu arzı kendi talebini yaratır. Ancak bu arz yönlülük yerine talep yönlü yani taraftarlar hangi futbolcuyu istiyor anketiyle daha demokratikçe futbolcu transferi taraftarları daha mutlu mu eder? Ederse, daha mutlu taraftar maça daha sık gelerek kulübe hem 12. adam olarak manevi hem de bilet parası ile maddi destekle kulüp başarısını artırabilir.

A.Madrid formasında "Azerbaycan-Ateş Ülkesi" reklamının veri paydaşlara promosyon katkının detayları yukarıda çalışma içinde ele alınsa da burada sonuç olarak şu spekülasyonlar, çıkarımlar yapılabilir;

Türkiye için;A.Madrid'in, Arda'ya ve eski takımı GS'a verdiği transfer, bonservis parası (milyon dolarlar) Türkiye'nin cari açığını azaltıcı bir "futbolcu ihracatı" geliridir. GS'ın aldığı bu parayı transfer ettiği yapancı futbolculara kaptırmayarak cari açığı artıcı "futbolcu ithalatı" yapmadığını düşünmek ceteris paribus'dur!

Recep Tayyip Erdoğan 12. Cumhurbaşkanı seçilince ilk ziyaret ettiği yerler Yavru Vatan KKTC ve "Bir millet iki devlet" olan Azerbaycan idi. Bir keresinde Bakü'deki bir Azerbaycan-Türkiye futbol milli maçı çok sert geçse de Türkiye ile Azerbaycan arasında futbol açısından bir diğer ilişki de vardır. Teknik Direktör Mustafa Denizli 2013-2014'de kısa bir süre de olsa Azerbaycan'ın "Hazar Lenkeran" futbol takımını çalıştırmıştır.

Azerbaycan için; Bu sponsorluk ve reklamın Azerbaycan halkının ülke sadakatlerini artırıp artırmadığı, memmuniyeti diğer araştırmalara bırakılmıştır .Bu araştırmalarda ülke parasının çarçur edilip edilmediği sorusuna yanıt oranının "0" çıkması düşüktür!

Bahsi geçen reklam, beklenen amaçlar için birbirine zıt bazı sonuçlara da neden olabilir;

1) Kaz gelecek yerden (forma reklamı sonucu olumlu propaganda ile artacak enerji geliri), tavuk (sponsorluk gideri) esirgenmez .Böylece gelir gider dengesi, gelir lehine artabilir. Sponsorluk giderleri bir nevi finansal kaldıraç sağlayabilecektir.

2) Çarçur ile "Haydan (petrol) gelen gelir, huya (A.Madrid'e) gider" veya "reklamdan maraz doğabilir." Nitekim, "Paranın saklanılması kazanılmasından zahmetlidir" (Montaigne, 1997: 160). Öyleyse petrolden gelir etmekten ziyade bu geliri harcaması daha zordur. Annemin dediği gibi işten değil dişten artar.

Bugün dağıtılan Nobel Bilim ödüllerinin kurucusu İsveç'li Alfred Nobel'in zenginliğinin kökenlerinden biri dinamiti bulması diğeri ise Bakü'de çıkardığı petroldür.İşte bu nedenle kanımca Azerbaycan, Nobel ödülleri üzerinden reklam yapabilir, Nobel ödüllerine sponsor olabilir . Bu sponsorluk, forma reklamından daha çok ses getirebilir.

Bu reklamı görüp, İspanya ve diğer ülkelerden Azerbaycan'a gelen turist sayısı artışı oldu mu da, çalışma kapsamını aşar. Turist sayısı artmadıysa bu reklam, 3F mantığı ile Azerbaycan'a ülke içi ve dışında olumlu propaganda artışı sağlamış olabilir.

İspanya için; Özellikle Azerbaycan ve Türkiye'den İspanya'ya maç seyretmeye geleceklerden turizm geliri vs.. 2010'de 1.061 milyon bbl/gün petrol ithalatı ile dünya 11.si olması dolayısıyla yoğun petrol ithalatinde indirim, barter, offset imkanları..

A. Madrid için; Sponsor geliri, maçlarının Türkiye ve Azerbaycan'da izlenmesi talep artışı ile İspanyol TV'lerinin yayın geliri artışının dolaylı olarak takıma yansıması ile gelir artışı. A.Madrid'li oyuncu Diego'nun dediği "takımımız İspanya'nın Robin Hood"u ifadesinin arkasında bu sponsorluk gelirinin etkisi olmalı. Nitekim A. Madrid bu forma reklamını taşıdığı 2013-2014 sezonunda İspanyol Ligi- La Liga'da uzun yıllar sonra şampiyon olmuş ve UEFA Şampiyonlar Ligi finalinde de R. Madrid'e yenilerek ikinci olmuştur.

Arda için; İspanya'da kaybolacak yorumları yapılan Arda formunun zirvesinde. Kendisine ödenen milyon dolarlı transfer ücreti kaynaklarından biri "Azerbaycan-Ateş Ülkesi" reklamı olmalı."Tabak sevdiği deriyi taştan taşa çalar" misali Türkiye'de çok kırıcı olarak kendi taraftarlarınca dahi eleştirilse de, sadece GS taraftarların sevgisinden şu an tüm Türkiye'nin gururu noktasına gelmesi. Kısacası "Arda Turan" marka olmuştur. Dolayısıyla reklam yıldızı olarakta, Defacto, Simit Sarayı, Türkiye Finans reklamlarında oynamıştır.

Bir Türkün düşünemediği yaparak, İspanyol J.E. Rodriguez Farrido, ArdaTuranizmo felsefesi temelinde Arda'nın hayat hikayesini yazmıştır. Kitabın adı "Arda Turan-Bayrampaşa'nın Dahisi"dir (Kralspor, 2014).

Arda'dan önce de birkaç Türk futbolcu da İspanya'da top koşturmuştu. Kaleci Rüştü 2002 Dünya Kupası 3.sü Türkiye'nin başarısındaki katkısı sonrası Barcelona'ya transfer olmuşsa da başarılı olamayıp 1 yıl dolmadan Türkiye'ye geri dönmüştür. Halen İspanya'da futbol adamlığı yapan Nihat Kahveci'de İspanya'da oynadığı ilk takım Real Sociedad'de başarılı olmuş ve şampiyonluğu kılpayı kaçırmışlardı.Oktay Derelioğlu Las Palmas'ta, İbrahim Kaş Getafe'de, Arif Erdem Real Sociedad'de fazla maç oynayamamış, başarılı olamamışlardır.

NBA'de yabancı kökenli basketbolcu sayısı önce çok azsa da (Michael Jordan'lı Chicago Bulls'ta Hırvat Toni Kukoç vs.) NBA yönetimi strateji değiştirerek yabancı basketbolcu sayısını artırmıştır .Bu NBA'ın dünya spor pazarında ticari payını artırma amacı ile olmalı. Nitekim Mehmet Okur Detroit Pistons ile NBA şampiyonluğuna ulaşmıştır. Hido (Hidayet Türkoğlu'da) NBA'daki kariyerinin ilk yıllarında oldukça başarılı idi.

Şahsım için; Bir futbolsever olarak, sponsorlar ve reklamların mali desteği ile daha kaliteli futbolcuların arzı endamı sonucu göze daha hoş gelen futbol seyretme zevki. Bu bildiriyi yazarak akademik tatmin.

Bu Sempozyum için; Bu bildirinin doğmasına neden ile literatüre katkı.

Görünen o; tüm paydaşlar için durum, genelde, "kazan-kazan"dır. Kulüplerin finansman ihtiyacını sağlayan sponsorluk ve reklam gelirleri, UEFA'nın mali kriter zorunluluklarını sağlamada da fayda sağlayıcıdır. Ancak 2013-2014 sezonunda A.Madrid başarılı olduğu için "sıfır toplam" ile yani "kazan-kaybet" ile A.Madrid'in tüm rakipleri kaybedenlerdir.

Başarı, madalya, para ve ün için yan etki ölüme dahi katlanabilen herkes için en iyi dopingte yarışın bir parçası ve serbest olsun düşüncesi "amaca ulaşmak için her mübah"tır düşüncesinin şahikasıdır. Sponsor ve reklam paraları maddi dopingtir. Formaya reklam yasağından bugüne gelindiyse gelecekte de bugün yasak ilaçsal dopingler serbestleşebilir.

Yine de sporda şiddet, fanatiklik, fair-play'a aykırılık, bahis skandalları, şike, doping vs artışı engellenmedir. Ancak spora ilginin bunlardan beslendiği, adrenali bunların arttırdığı acı gerçektir. Firma ve ülkelerde futbol ilgisini, sadakatini kurumsal promosyonlarına tahvil etme fırsatını kaçırmamaktadırlar ve kaçırmayacaklardır da!

Son söz; Hemen sınır ötesi Bakü, Kerkük, Musul ve İran'da petrol varken aynen James Dean'in "Devlerin Aşkı (Giants)" filminde tarlasından petrol çıkması gibi, Türkiye'de neden petrol çıkmaz? "Petrol fırtınası" kitabında bunu sorgulayan (Karadağ, 2010) otel odasında öldürüldü iddiasına rağmen cahil cesareti ile bir kıvılcım.Romanlarındaki araç-gereçlerin çoğunun gelecekte çıkması ile Jules Verne bir futurist, bilim falcısı bilinir. H.Schliemann'ın Homeros'un İlyada kitabını pusula, harita gibi kullanarak Truva'da hazineyi bulması gibi Verne'in, oryantalist yazdığı "İnatçı Keraban'" kitabından proaktif, reaktif kalıntılar, perspektif çıkabilir mi? Spekülasyon bilimde de yapılırsa, evet. Verne'in dediği gibi Çayeli'nde petrol var mıdır? (Artuç, 2013:42) ele aldığı gibi Karadeniz'de petrol olmalı! "..temiz sularına, civardaki **petrol kaynağından** akan yağlı bir sıvının karıştığı akarsu ağzında kurulu Çayeli kasabasında mola" (Verne,2009:108) .

Schliemann tarzına benzer Kanadalı mühendis W.Knot D'Arcy'de anayurdu İran olan *ateş melikesi*-Hürmüz'ün kuvvet ve kudretini petrolden aldığını bilerek yani Hürmüz'den yola çıkarak (Karadağ, 2010:36) yine Schliemann gibi arkeolojik araştırma kisvesiyle İran'da petrol aramıştır. Verne'in Çayeli'nde petrol ifadesiyle, ipucuyla yola çıkarak Karadeniz'de petrol bulunursa, artık enerji için ihtiyaç kalınmayacak güzelim Fırtına Vadisi HES baraj inşasından kurtulabilecektir!

Arda'nın bu bildiriden haberi olması dileğiyle .Böylece teşekkür için yazarı, tercihen Barcelona veya R. Madrid olmak üzere bir A.Madrid maçını statta seyretmeye davet etmesi ümidiyle! Yine ayrıca zülfüyare dokunulmadığını umarak Azerbaycan'da 2015 Haziran ve 2017'deki spor organizasyonlarına davet edilmekte diğer bir ümittir!

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